Measuring Globalisation

OECD Economic Globalisation Indicators



2010

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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Foreword

Appropriate indicators that can measure the magnitude and intensity of the globalisation process are increasingly important to underpin evidence-based policy. This publication is the second edition of the OECD's Economic Globalisation Indicators, *which responds to the demand of policy makers.*

It includes a range of indicators that are largely based on the OECD Handbook on Economic Globalisation Indicators, *which provides a conceptual and methodological framework for gathering quantitative information and constructing indicators. The* Handbook *also provides national data compilers with the methodological and statistical guidelines needed to construct the chosen indicators and make them compatible with international standards.*

This second edition of OECD Economic Globalisation Indicators *presents measures of globalisation related to capital movements and foreign direct investments, international trade, the economic activity of multinational firms and the internationalisation of technology. However, it goes beyond what is proposed in the* Handbook *as it also includes some indicators linked to the financial crisis, portfolio investments, environmental aspects and the emergence of global value chains.*

This volume results from the co-operation of four OECD directorates: the Directorate for Science, Technology and Industry (DSTI), the Directorate for Financial and Enterprise Affairs (DAF), the Statistics Directorate (STD) and the Environment Directorate (ENV).

This second edition was prepared under the direction of Thomas Hatzichronoglou of DSTI with the help of Isabelle Desnoyers-James and Laurent Moussiegt who provided statistical assistance and managed all technical aspects of the report. Koen De Backer was responsible for the final revision.

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Executive Summary

The past decades have witnessed a rapid globalisation of economic activity which has significantly changed the outlook of the world economy. An increasing number of firms, countries and other economic actors take part in today's global economy and all of them have become increasingly connected across borders. Globalisation results in a more efficient allocation of resources across countries and generates important welfare effects, including higher productivity and efficiency, increased average incomes and wages, greater competition, lower prices and increased product variety and quality. At the same time, the process of globalisation also raises concerns in many countries, and needs to be well managed to ensure its benefits are widely distributed.

Globalisation and the crisis

The recent economic crisis has underscored the power of globalisation but has also shown the vulnerability of the global economic system. Global linkages have increased the economic interdependence between countries and this facilitated the spread of the crisis. What started as a financial crisis in the United States turned rapidly into a global economic crisis, leading to a dramatic collapse of international trade and foreign direct investment.

The financial crisis started with payment difficulties in the subprime mortgage segment of the US property market which resulted from high mortgage debts and falling housing prices. Securitisation, which was intended to distribute risk across a larger number of players, made financial institutions increasingly interconnected as the globalisation of the financial sector had already multiplied their relationships across countries (see Section A). As a result, the financial crisis spread rapidly around the globe and also reached the real economy, resulting in dramatic drops in stock markets and a deterioration of business and consumer confidence affecting all economic operators (see Figures A.3.1, A.3.2 and A.4.1). Financial institutions were unwilling to lend to each other, while households cut back their consumption and started to save more; access to credit became more difficult and more costly, undermining corporate investment especially in small businesses.

Falling demand caused international trade and inward investment (including mergers and acquisitions) to contract, causing the crisis to spread over the entire global economy; trade in the OECD area fell on average by 25% between October 2008 and June 2009 (Figure A.5.1). While this fall in trade at the start of the crisis might have been similar to past downturns for individual countries, the synchronisation of the fall in trade was unprecedented as almost all OECD countries simultaneously reported drastic declines in trade (Figures A.6.1 and A.6.2). Foreign direct investment and mergers and acquisitions also dropped drastically (Figures A.7.1 and A.7.2).

The spread of global value chains

Global value chains, in particular, are believed to have played an important role in the spread of the crisis. Production processes have become increasingly fragmented as goods are produced sequentially in stages in different countries in so-called global value chains. Firms seek to optimise the production process by locating the various production stages across different sites according to the rule of comparative advantage, which contributes to the restructuring of activities across countries. As a consequence, outsourcing and offshoring of activities have been on the rise, especially in manufacturing industries characterised by modular production processes, but recently also in services (see Section L).

Global value chains have increased the economic interdependence between countries as intermediate inputs like parts and components are produced in one country and then exported to others for further production/and or assembly in final products. Such "vertical" trade involves arm's length relationships with independent suppliers as well as intra-firm trade between headquarters and affiliates within multinational networks. The past decades have witnessed a steady growth in trade of intermediate inputs and in 2006, intermediate inputs represented 56% of trade in goods and 73% of services trade (Figure L.3.1). Correspondingly, the import content of exports has increased in almost all OECD countries, demonstrating the rising import dependency of countries in producing their exports, in particular from neighbouring countries and within geographical zones (Figures L.9.1, L.10.1 and L.10.2).

Global value chains can give rise to a domino effect in times of adverse shocks as lower exports of final goods directly lead to relatively smaller imports of intermediate inputs. Empirical evidence suggests that the industries that have been most affected by the crisis are also those characterised by global production networks (Figures A.10.1 and A.10.2). But global value chains do not fully account for the dramatic drop in trade recorded during the crisis and other factors have also contributed to the global depth of the trade crisis. This includes the collapse in international demand; the fiscal stimulus plans of national governments that were mainly targeted at supporting the non-tradable sector; the spread of "murky" protectionism; and the credit crunch, which directly aggravated problems in trade finance.

Trade flows within supply chains might be more resilient to adverse shocks since the development of global production networks entails large and often sunk costs. Furthermore, firms cannot easily drop or switch suppliers that produce very knowledge-intensive parts and components based on specific production technologies. Companies therefore consider alternatives very carefully before taking irrevocable steps to reduce their global value chain. Recent empirical evidence shows that firms are mainly reducing volumes instead of reducing their numbers of suppliers (Figure A.10.3).

The changing character of globalisation

International trade and foreign direct investment are still the two key channels for economic integration across borders (see Sections B, C and D). But while these economic linkages between countries are not new, their scale and complexity has substantially increased over the past decades due to, amongst others, the emergence of international

production networks. Global value chains have increased foreign direct investment flows and intra-firm trade, and have made them increasingly interdependent.

Within international trade, services trade has grown strongly in recent years although it still accounts for only a fraction of trade in goods (Figures B.1.1 and B.1.2). While the number of regional integration agreements has grown, the share of intra-regional trade in total trade has remained fairly constant over the past decade (Figure C.12.2). International investments, both direct and portfolio, have grown more strongly than international trade but are highly volatile at the same time (Figure B.1.1). International mergers and acquisitions that are largely undertaken to restructure firms' activities have contributed in particular to the strong surge in international investment flows (Figures D.10.1 and D.10.2).

The internationalisation of technology is also an important characteristic of today's globalisation process (see Sections F, G and H). Technology flows between countries have grown and cross-border relationships between countries have grown in many ways. International co-operation in science, technology and innovation is on the rise as illustrated by several indicators along different dimensions, including patents (Figures F.5.1 and F.5.2), co-authorship of scientific publications (Figure F.6.1) and formal co-operation arrangements (Figure F.5.3). Flows of human capital also contribute to the internationalisation of technology through increased international mobility and rising numbers of foreign students and researchers in countries (Figures G.1.1 to G.4.3). Environmental technologies and knowledge are increasingly exchanged across borders as countries collaborate to tackle global environmental challenges (Figures H.1.1 and H.2.2).

The current globalisation process is spreading more widely and includes a growing number of countries. China, in particular, has become a major trading partner for most OECD countries and its market share in OECD export markets has risen significantly (Figures C.4.1 and C.5.1). China and the other BRIICS countries (Brazil, Russia, India, Indonesia and South Africa) have become important players in international investments both as hosts and investors (Figures B.5.3 and B.5.4) and also participate actively in global technology networks. Global value chains increasingly include emerging countries as locations of R&D and innovation activities, reflecting the increased capacity of these countries in research and innovation (Figure F.1.1). The economic crisis has hit some emerging countries hard although the economic dynamism of some of them, notably China and India, has contributed to the current recovery in the OECD area (Figure A.4.2).

The key role of multinationals

Multinational enterprises (MNEs) are the most important driver of globalisation, as they embody simultaneously the international transfer of capital, highly skilled labour, technology, and final and intermediate products (see Sections I, J and K). Due to their global reach, MNEs are able to shift activities within their multinational networks according to changing demand and cost conditions in order to co-ordinate production and distribution across many countries. Their affiliates abroad serve not only local markets in the host country but often also serve other neighbouring markets and, additionally, produce inputs for other affiliates in the multinational network. This intra-firm trade, *i.e.* cross-border trade between MNEs and their affiliates, accounts for an increasing share of international trade (Figures J.6.1 and J.6.2).

MNEs play a crucial role in the internationalisation of technology, since they develop and transfer proprietary knowledge which gives them a competitive edge. In addition, MNE headquarters largely fund R&D investments of their affiliates abroad (Figure F.2.3), resulting in an increasing share of R&D investments by these foreign affiliates in host countries. In some smaller countries, MNEs account for the majority of R&D investment (Figure K.2.1). MNEs play an important role in R&D investments across the world: the largest R&D spending MNEs are positioned among the top 10 countries investing in R&D in 2008, and the aggregate spending of the world's eight largest MNEs in 2008 was larger than the R&D investments of all individual countries, except for the United States and Japan (Figure F.3.1).

Firm-specific knowledge and the corresponding production technologies that provide the core strength and rationale for MNEs differentiate them from firms under national control: foreign affiliates are observed to be significantly larger (Figures J.1.1 and J.1.2), more capital-intensive (Figures J.2.1 and J.2.2), and hence more labour-productive than national firms (Figures J.3.1 and J.3.2). Due to these distinctive characteristics, MNEs are responsible for a large share of employment, turnover and value added created in host countries (Figures I.1.1 and I.1.2), especially in high-technology industries in manufacturing (Figure I.4.3). However, the benefits of MNEs do not accrue only to host countries but increasingly also to the home countries because of the positive effects of outward foreign direct investment on economies, notably in enabling MNEs to tap into foreign technology and knowledge (Figure K.7.1).

A need for policy change?

The changing characteristics of current globalisation and the emerging spread of global value chains call for a rethinking of government policies. Traditional policies related to globalisation aim at enhancing competitiveness in the international economy, so as to safeguard employment and added value. These policies are often still focused on specific industries (manufacturing, services, high technology, etc.).

However, following the international fragmentation of production, this industry dimension seems less and less valid. Given that stages and activities of the production process are located across different countries, competitiveness and comparative advantage might increasingly have to be interpreted in terms of activities instead of industries. How can policies in different areas (industry, innovation, attractiveness) better reflect this change and provide governments with effective policy tools?

MNEs are forceful actors in the current globalisation process, and often limit the effectiveness and success of government policies. Countries need to take this changing reality into account and explore how policies can be designed that benefit both the country and the multinational. Facilitating the location of hubs and decision centres is particularly important, as these centres direct the technology and investment flows within MNEs networks.

The internationalisation of technology particularly to emerging countries like China and India also raises questions about the long-term future of high-technology activities in more developed countries. How can countries safeguard their home-based R&D investments while at the same time being connected to global research centres?

Questions also remain about the interdependence of the economic crisis and global value chains. Until now adjustments in the global value chains have mainly been in trade volumes rather than in number of suppliers. However, it remains to be seen what the long-term impacts of the crisis on global value chains will be and how these will bounce back following the crisis. These and other questions will be explored in OECD work on economic globalisation over the coming years.


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PRICE OF SECURITY
MOVING AVERAGE

PART I

Globalisation and the Crisis

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A. GLOBALISATION AND THE FINANCIAL CRISIS

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A.1. The world economy prior to the crisis

■ In 2007, macroeconomic imbalances between countries and regions were growing but most of the world enjoyed strong economic growth. Emerging countries, and China and India in particular, recorded high growth.

■ Prior to the crisis, large current account imbalances had built up globally. The United States reported a large and growing deficit. The European Union's deficit was much smaller. Japan, China and Middle East countries displayed a surplus, with China's current account surplus rising particularly rapidly.

■ The US trade balance deteriorated substantially between 2000 and 2008 especially in trade in goods, since trade in services continued to generate a surplus. The current account balance of the United States improved slightly between 2006 and 2008, entirely owing to a rising surplus from services and investment income, especially inward investment. However, the trade balance in goods continued to deteriorate.

■ The growing discrepancy between excess savings in emerging countries and insufficient savings in the United States in particular caused goods and capital to flow from emerging countries, especially China, to the United States. US consumption greatly outstripped production, partly explaining the deteriorating US trade and current deficit. US household consumption was spurred by strong increases in debt, including to the poorest households.

■ Oil prices rose 37% between 2007 and 2008 but have plunged since autumn 2008. They started to climb back from April 2009 despite falling global consumption.

■ Consumer prices started to increase from mid-2007. However, since the end of 2008 they have fallen sharply, especially in the United States and Japan.

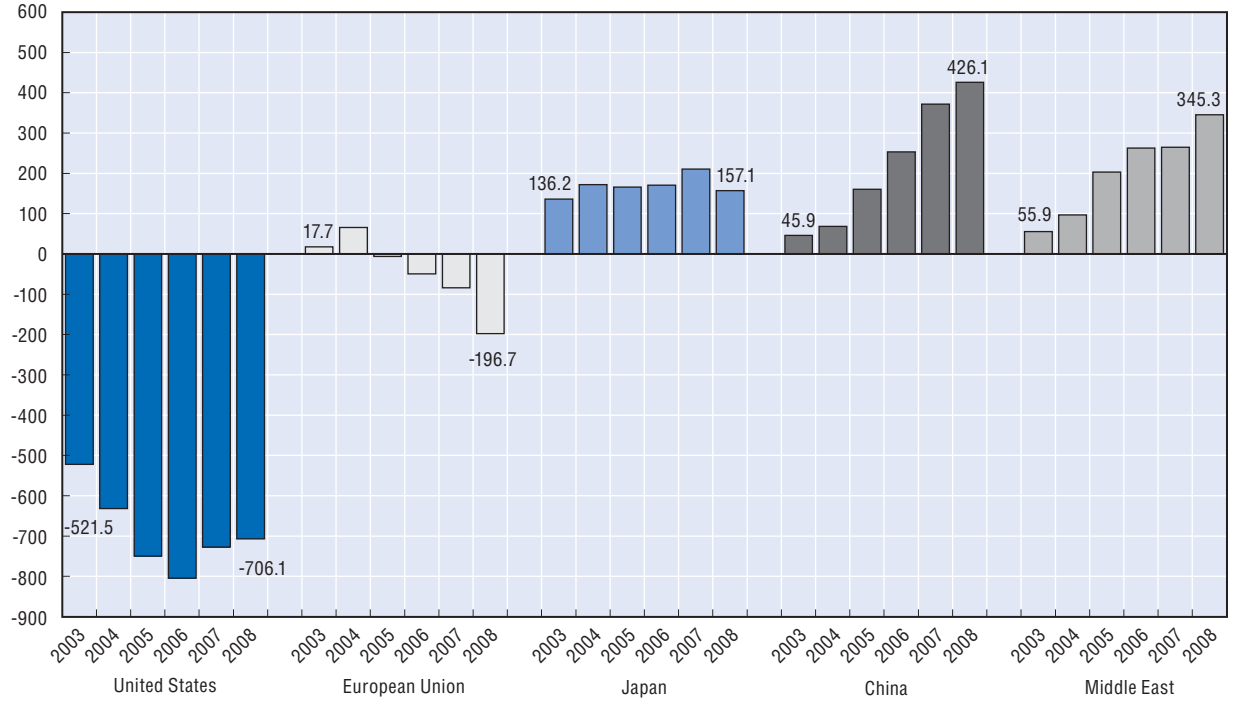
Sources

- International Monetary Fund, *World Economic Outlook Database*, October 2009.
- OECD, *OECD Economic Outlook No. 86*, December 2009.

A.1. The world economy prior to the crisis

Figure A.1.1. **Current account balance**

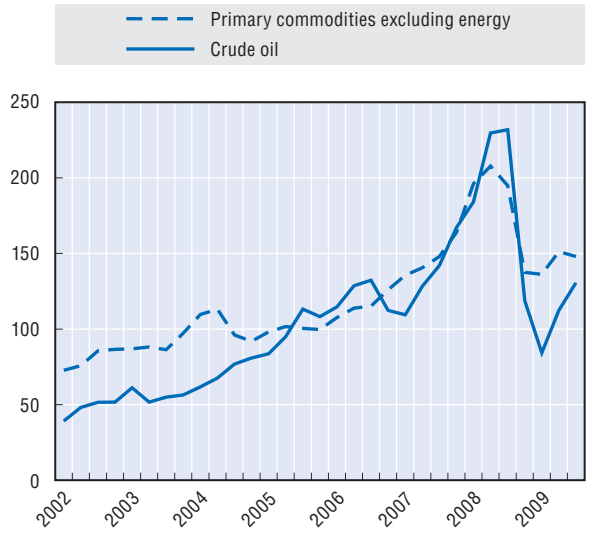
USD billion



StatLink http://dx.doi.org/10.1787/837503847624

Figure A.1.2. **World oil and raw materials prices**

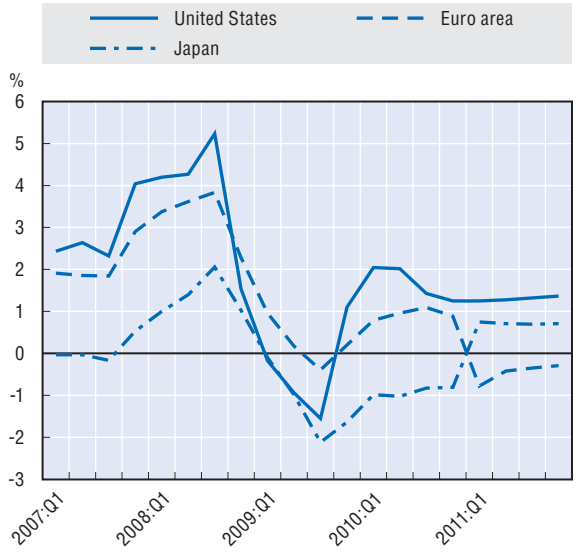
2005 = 100



StatLink http://dx.doi.org/10.1787/837516366147

Figure A.1.3. **Inflation[1] in the main OECD areas, 2007-2011[2]**

Year-on-year growth rate in percentage



1. Consumer price indexes (harmonised for the euro area).
2. Forecasts from 2009 to 2011.

StatLink http://dx.doi.org/10.1787/837526483454

A.2. The financial crisis in the United States

The US household savings rate, which was already among the lowest in the OECD area, turned negative in 2005, owing to the build-up of large debts for housing. Rising housing prices created a "wealth effect" which encouraged households to contract excessive amounts of debt. In the United States between 2003 and 2008, mortgage debt increased strongly, with outstanding home mortgages nearly doubling.

Property prices in the United States rose by over 35% between 2000 and 2006, levelled off in 2006 but started to fall in 2007. House prices started to fall in several countries in 2008 but the adverse effects of the decline on consumption are likely to be greater in countries where mortgage lending was abundant such as the United States. Mortgage debt combined with falling house prices triggered the subprime crisis. Subprime mortgages allowed poorer people and riskier borrowers to obtain mortgage loans on the assumption that their ability to finance their homes was ensured by the capital gains inherent in rising property prices.

Extensive securitisation, especially in the United States, enabled banks to pool and transfer risk. Securitisation expanded the supply of credit but caused risk to be under-assessed. This was then compounded by the use of intermediate lenders that were neither regulated nor supervised. Credit risk was thus transferred out of the banking system to unregulated and non-transparent lenders. This eventually undermined the stability of the financial system.

Securitisation was a key factor because it created high-risk, illiquid assets in the form of complex financial securities. Securitisation was employed extensively in the United States in 2007 but fell sharply in 2008. In Europe, however, securitisation was relatively modest in 2007 but started to rise in 2008, especially in the last quarter, when it outstripped the level in the United States.

Sources

- US Bureau of Economic Analysis, January 2010.
- OECD, *OECD Economic Outlook No. 86*, December 2009.
- Board of Governors of the Federal Reserve System, January 2010.
- Association for Financial Markets in Europe/European Securitisation Forum, January 2010.
- Blanchard, O. (2009), *The Crisis: Basic Mechanisms and Appropriate Policies*, IMF Working Paper.
- *OECD Journal: Financial Market Trends*, various issues 2007-2009.

Securitisation

Asset-backed securities (ABSs) are created from a portfolio of assets (corporate bonds, consumer credit, mortgage loans, export credits, etc.). They are based on real and apprehendable risk. Being negotiable, they transform illiquid or privately traded loans into securities that may generate frequent and regular listing and a secondary market. ABSs are generally specialised. An ABS corresponding to a mortgage loan will group together a portfolio of property loans. These loans are classified by order of priority into three tranches: the most risky, representing a small percentage of the total, those representing an intermediate risk, and tranches that suffer losses only if the entire portfolio fails.

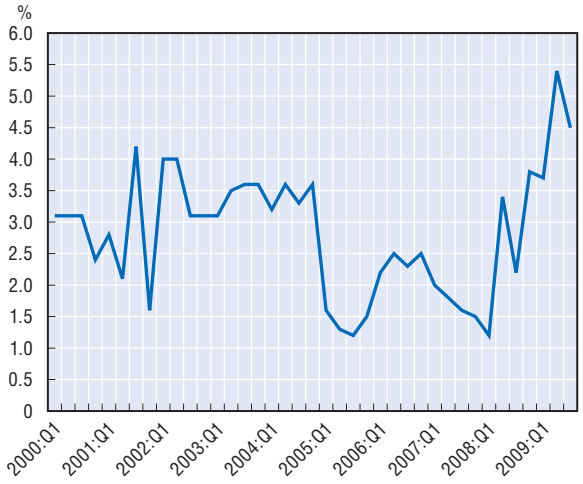
Collateralised debt obligations (CDOs) are securities created in the same way as ABSs but from corporate bonds. ABS CDOs were formed after the intermediate risk tranche was found to be harder to sell to investors than the tranches on either side. This gave rise to the idea of mixing the intermediate tranches of several ABSs and slicing them up again into three tranches of rising risk: low, medium and high. This division in tranches has been one of the most toxic aspects of the subprime securitisation crisis.

A *credit default swap* (CDS) is a contract whereby a lender insures against the risk of a company defaulting or going bankrupt. By paying a premium, the lender obtains the right to sell a bond issued by the company to the insurer at its face value. If the company goes bankrupt, the contract provides for either transfer of the bond or a cash payment. The CDS price indicates the confidence placed in the debt issuer and serves as a basis for setting the value of the debt product. CDOs have dried up since the crisis but CDSs are still listed and traded, though they are regarded as risky.

Mortgage-backed securities (MBSs) are securities backed by a pool of subprime, Alt-A or prime mortgage loans. Holders of MBSs receive the repayments of capital and the interest on the underlying loans. Securitisation involves transforming loans into financial securities by means of a three-stage operation.

A.2. The financial crisis in the United States

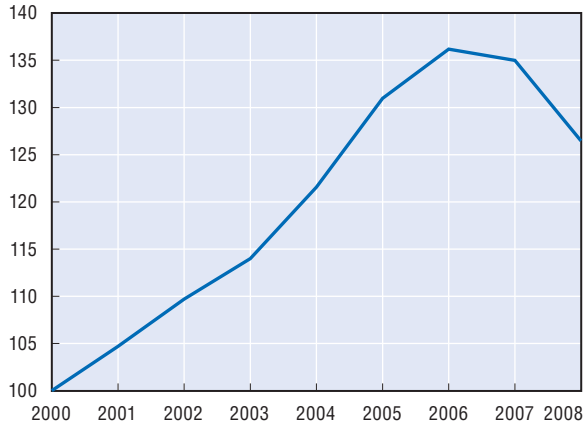
Figure A.2.1. **Individual savings as a percentage of individual available income in the United States**



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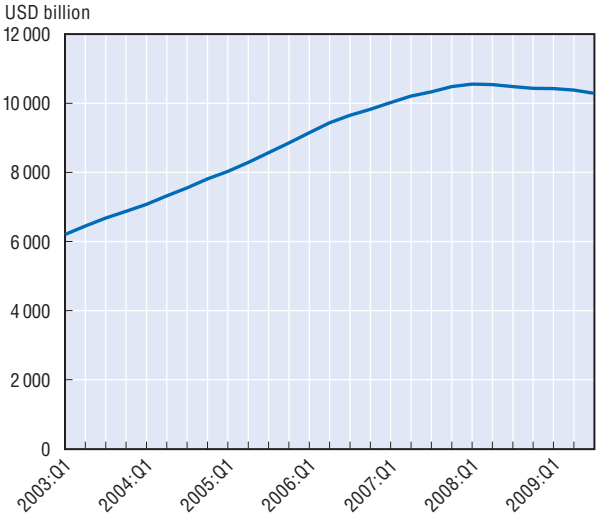
Figure A.2.2. **Real housing prices in the United States**

2000 = 100



StatLink http://dx.doi.org/10.1787/837535071317

Figure A.2.3. **Home mortgage[1] debt outstanding in the United States**

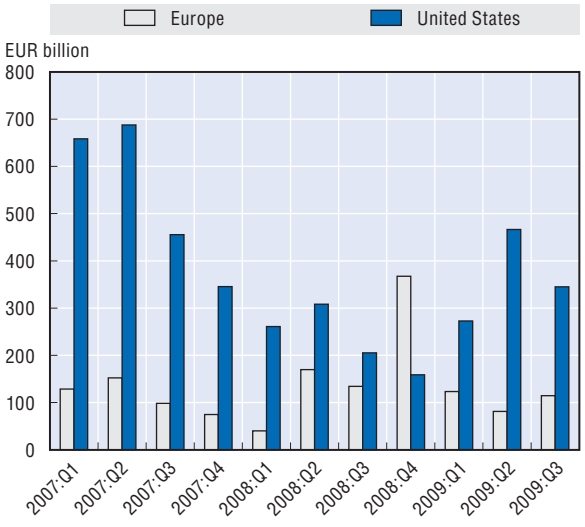


1. Mortgages on one- to four-family residences including mortgages on farm houses.

StatLink http://dx.doi.org/10.1787/837604821851

Figure A.2.4. **Debt securitisation in the United States and Europe**

Quaterly issuance of ABS, MBS and CDOs



StatLink http://dx.doi.org/10.1787/837681003172

A.3. Global economic crisis: stock market trends

■ An expanded supply of credit and an under-assessment of risk combined with the use of intermediate (often unregulated and non-transparent) lenders to gradually undermine the stability of the financial system. Owing to the extent of the contagion across assets, institutions and countries, the financial crisis rapidly acquired a global character (Blanchard, 2009).

■ The drying-up of interbank lending due to the collapse of confidence between financial institutions, the need to make huge provisions for toxic debt, and asset sales by banks in order to shore up their capital base caused stock prices to fall dramatically.

■ The financial crisis spread rapidly around the globe and affected the real economy, resulting in dramatic drops in stock markets and decreases in business and consumer confidence. The financial meltdown set off a crisis of confidence that affected all economic operators. Banks were unwilling to lend to each other, and households cut back their consumption and started saving more. Access to credit became more difficult and more expensive. Tighter credit and the crisis of confidence undermined corporate investment, especially among small businesses.

■ Stock market indexes plunged on all markets between June 2007 and February 2009, by amounts ranging from 43% in the United Kingdom to 59% in Hong Kong, China. Stock markets started to pick up again from March 2009 as investors regained some confidence.

■ The market capitalisation of the New York stock exchange, equivalent in 2007 to that of all the European exchanges plus Tokyo, had halved in value by the end of 2008.

Sources

- *Yahoo Finance*, January 2010.
- Thomson Reuters Datastream.
- World Federation of Exchanges, January 2010.
- Blanchard, O. (2009), *The Crisis: Basic Mechanisms and Appropriate Policies*, IMF Working Paper.

Stock markets

Principal causes of the decline in stock market prices

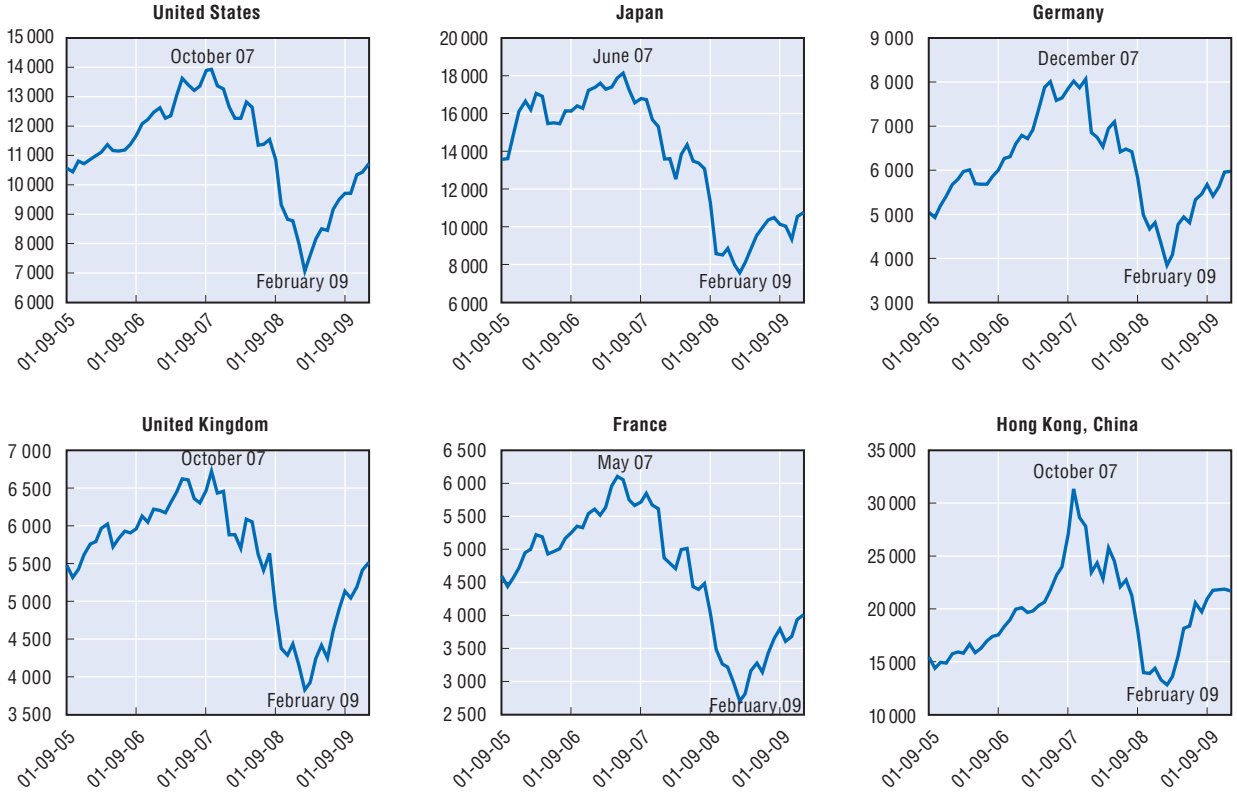
From the beginning of June 2007 until March 2009, stock market prices plunged. The depreciation of assets was sparked off by the decline in the property market. Those with real-estate assets, to the extent that these were becoming a risk, and especially banks took the first losses. Since banks had to make provision for these losses, a share of their capital base simply melted away. Because banks are obliged to have a minimum amount of capital in order to make loans or buy other assets, they found themselves obliged to sell off large chunks of their assets in order to reconstitute their capital. At the same time, the difficulties experienced by businesses for financing their projects and the shortage of liquidity propelled investors into hastily liquidating their positions. A lack of confidence and aversion to risk also brought mergers and acquisitions to a halt and further undermined stock market prices, which in turn aggravated losses.

Principal causes of the recovery

Despite the deterioration of the employment market and public debt, from March 2009, many economic indicators, including business performance indicators began to look better than expected. This somewhat restored investors' confidence and they began to anticipate an end to the recession and a return to growth. Financial assets were the first to reap the benefits of returning investor confidence, as were cyclical stocks (commodities, oil, etc.). A halt to the slide in the property market and recovery in the automobile sector, supported by various government stimulus packages, coupled with more reassuring macroeconomic indicators, all contributed to a remarkable turnaround. Less risk aversion and lower interest rates encouraged investors to seek higher returns and put their capital back into shares. A point to note is that certain securities offered high returns because of the discounts applied. At the same time, the restructuring that accompanied the emergence from the crisis encouraged the resumption of mergers and acquisitions, boosting the upward trend.

A.3. Global economic crisis: stock market trends

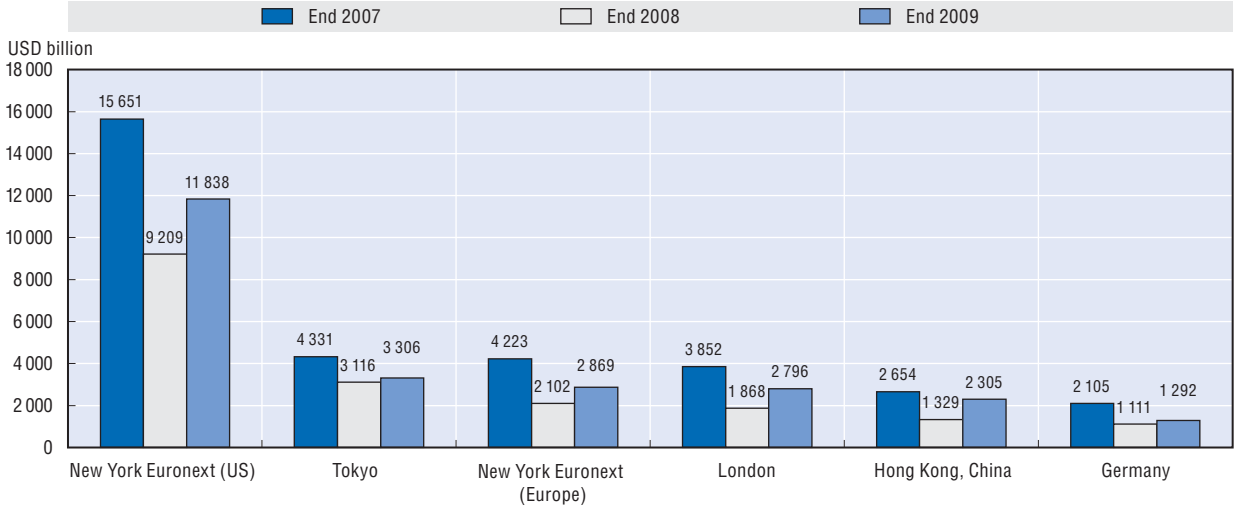
Figure A.3.1. **Main stock market indexes[1] since 1 September 2005**



1. United States: Dow Jones Industrial Average; Japan: Nikkei 225; Germany: DAX; United Kingdom: FTSE 100; France: CAC 40; Hong Kong, China: Hang Seng.

StatLink http://dx.doi.org/10.1787/837733674302

Figure A.3.2. **Market capitalisation of the world's leading stock exchanges**



StatLink http://dx.doi.org/10.1787/837741011742

A.4. Global economic crisis: GDP growth

■ Most OECD countries recorded positive economic growth in 2007. While growth of gross domestic product (GDP) was relatively strong in the OECD area, it was much stronger in the emerging BRICS (Brazil, the Russian Federation, India, China and South Africa). As in previous years, China recorded double-digit growth.

■ In 2008, overall economic growth was still positive in most OECD countries but growth rates fell back sharply in the last quarter. Economic growth turned negative in several countries and in fact resulted in negative annual growth rates in Ireland, Denmark, New Zealand, Italy, Japan and Sweden.

■ Emerging countries continued to record strong economic growth in 2008. Nevertheless, they were also affected by the crisis, and growth was significantly lower than in 2007. In China and India GDP grew slightly more than 8% and 6%, respectively.

■ The global character and the consequences of the financial crisis are particularly evident in the figures for GDP growth in 2009. Almost all OECD countries except Australia and Poland recorded (strong) negative growth rates for 2009. Mexico, Ireland, Iceland and Finland were particularly affected.

■ From the second half of 2009, some countries started to report positive economic growth. In the last quarter of 2009, the number of OECD countries recording positive GDP growth increased significantly, although the recovery remained rather limited.

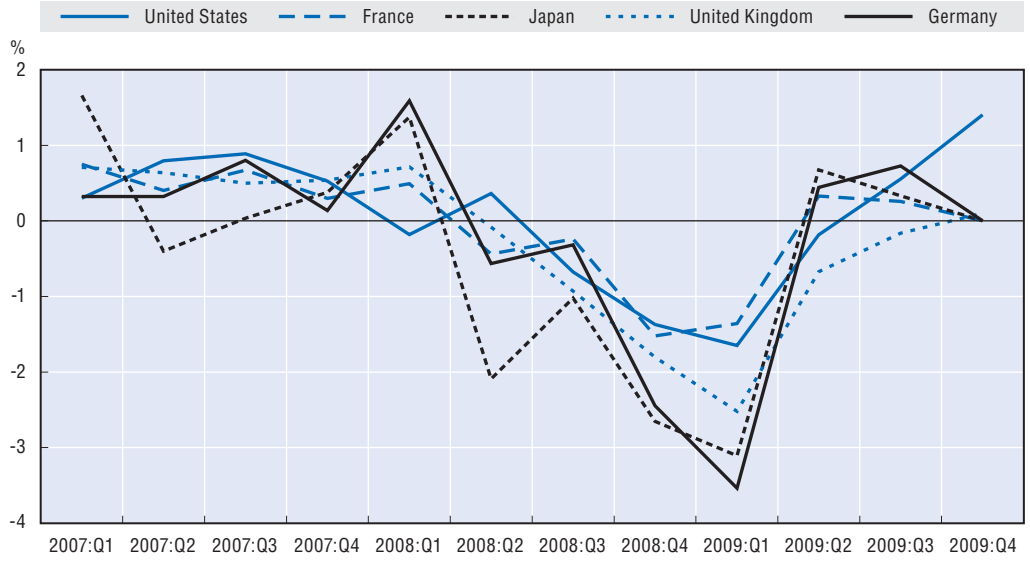
■ While the financial/economic crisis hit the Russian Federation, South Africa and to a lesser extent Brazil as well, China and India were still able to realise significant GDP growth in 2009.

Sources

- OECD, *Main Economic Indicators Database*, January 2010.
- OECD, *OECD Economic Outlook No. 86*, December 2009.

Figure A.4.1. **Quarterly growth rate of GDP, 2007 to 2009**

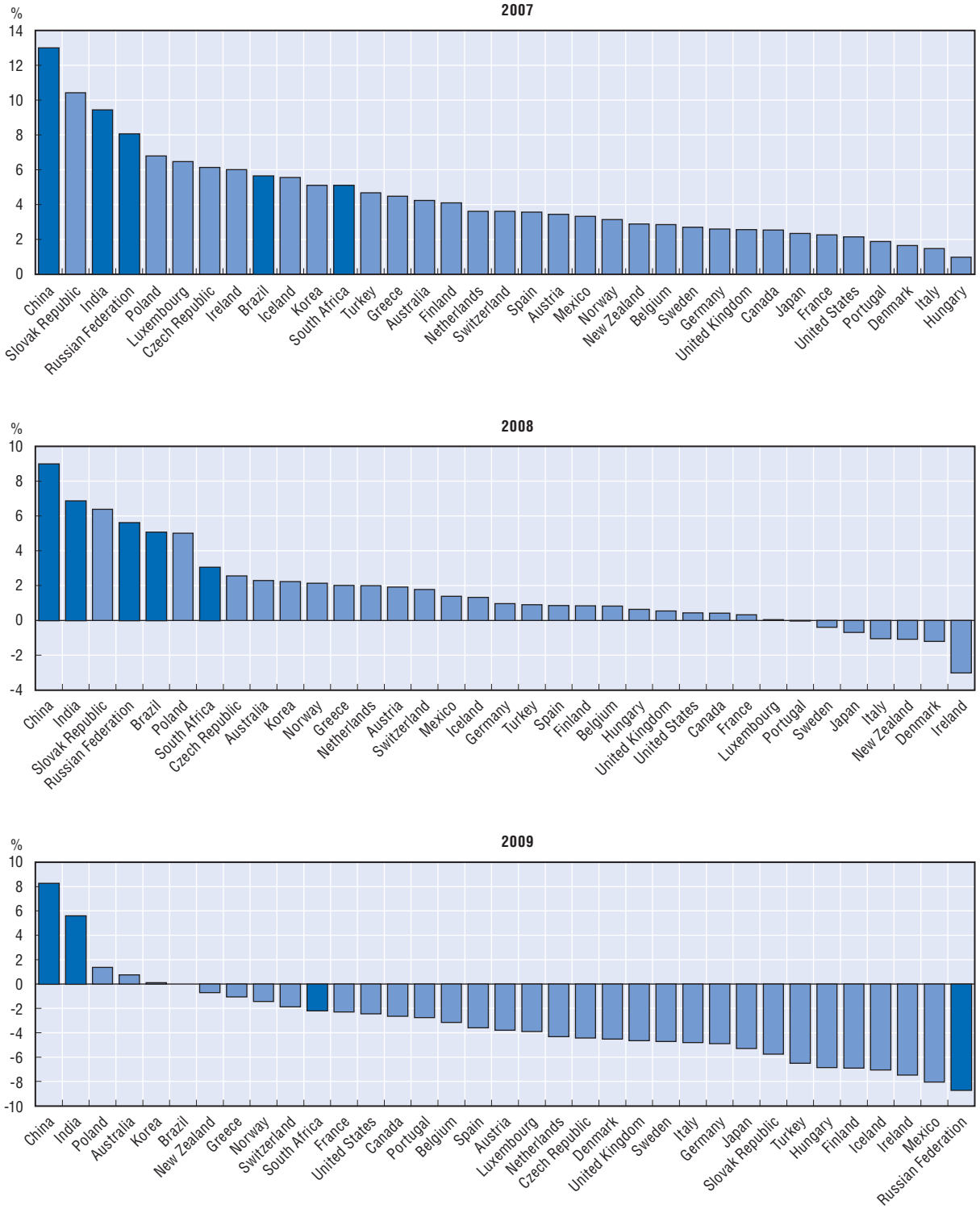
Growth rate compared to previous quarter, seasonally adjusted



StatLink http://dx.doi.org/10.1787/837786062215

A.4. Global economic crisis: GDP growth

Figure A.4.2. **Real GDP growth**



StatLink http://dx.doi.org/10.1787/837820507733

A.5. Impact of the crisis on international trade

The decline in international trade in 2008 triggered by the crisis has been the deepest decline on record, much deeper than during the Great Depression. The fact that the downturn was steeper in terms of value than of volume suggests that a "price effect" also played a part in some countries. The scale of the decline reflects the increasing interdependence of trade, which can accelerate the spread of cyclical effects. Hence, the recession caused by the crisis intensified the drop in world trade, which resulted from the concurrent decline of trade flows in almost every country of the world.

In 2008, trade flows in goods generated deficits both in the United States and in the euro area. While Japan still recorded a surplus it was four-and-a-half times smaller than in 2007; in the last quarter of 2008 Japan also displayed a deficit. In the United States, the 2008 deficit remained at the same level as in 2007 as a result of a faster decline in imports, particularly in the last quarter. In the euro area, the balance of trade in goods remained positive in 2008, but surpluses were lower by a factor of five, brought down by trade deficits between August and December.

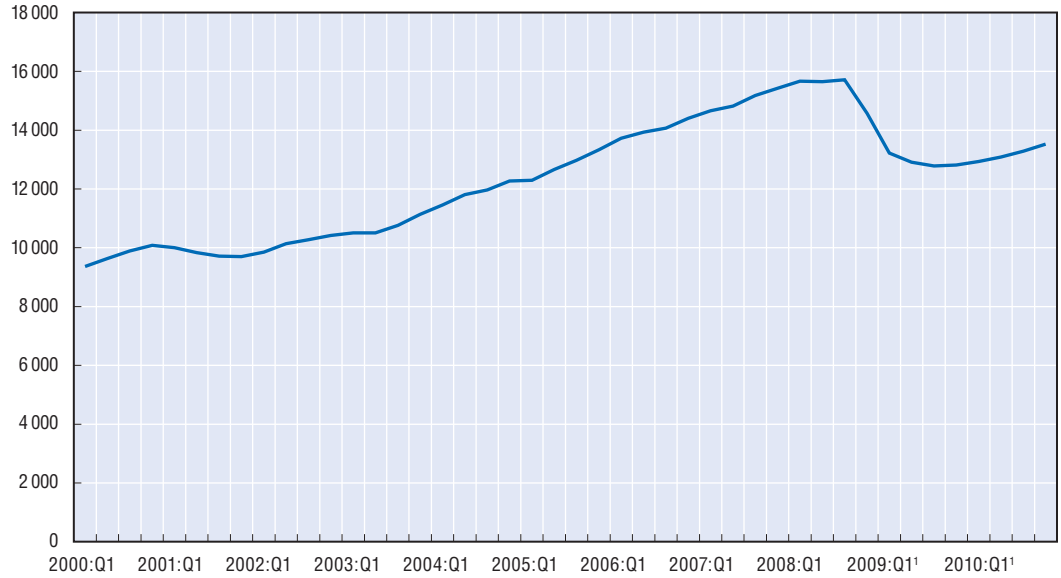
In the first quarter of 2009, world trade picked up again. Trade balances in goods began also to recover slightly especially in Japan and the euro area. International Monetary Fund projections also suggest a slow recovery in trade volumes of only 2.5% in 2010. The regions expected to lead the recovery are the BRICs (Brazil, the Russian Federation, India and China), and the driving sectors are expected to be pharmaceuticals, agribusiness and other services, which are less countercyclical than investment goods.

Sources

- OECD, *OECD Economic Outlook No. 85*, June 2009.
- OECD, *Monthly Statistics on International Trade*, January 2010.

Figure A.5.1. **Trends in world trade volume**

USD billion, 2005 prices



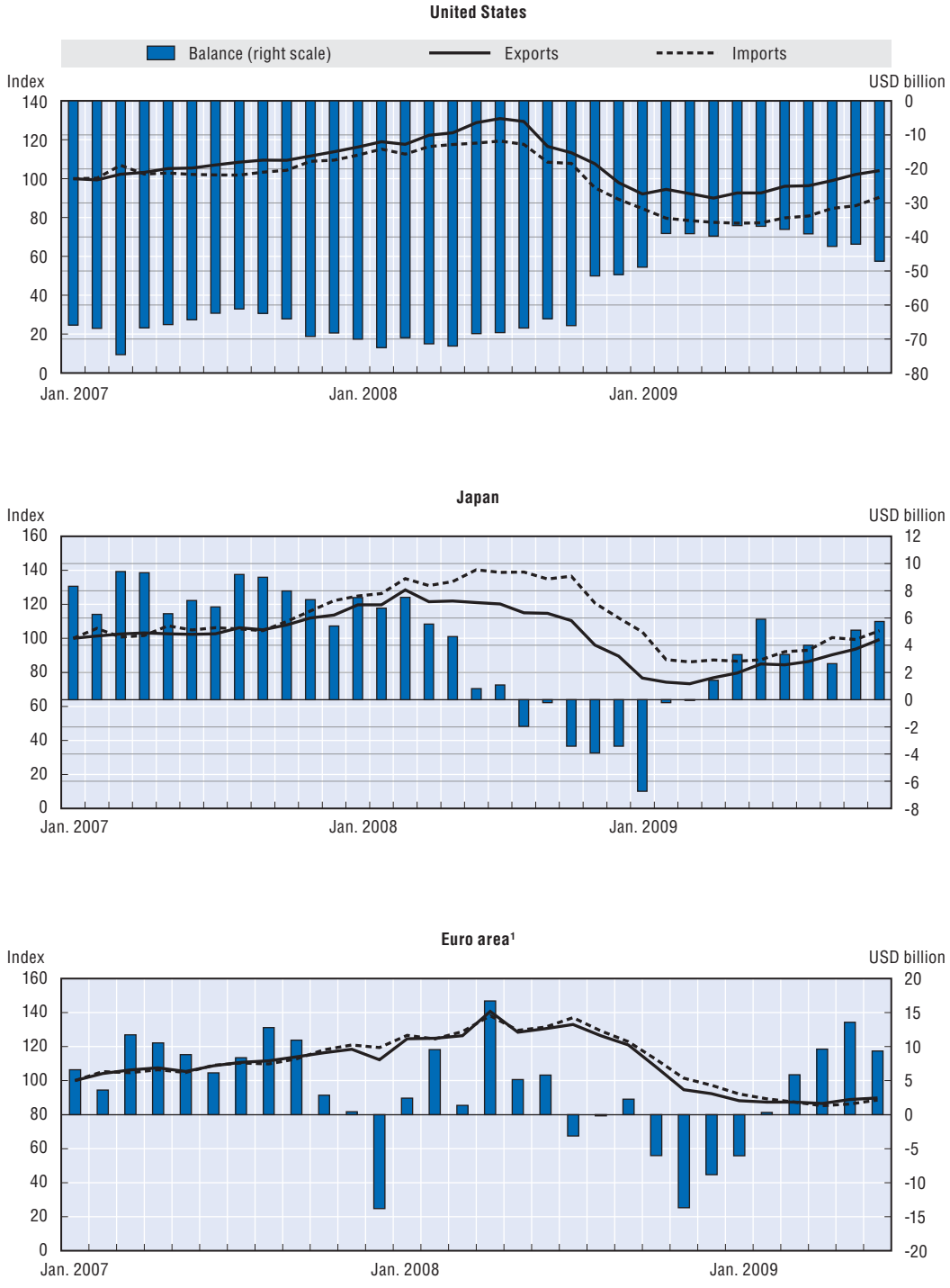
1. Forecasts.

StatLink http://dx.doi.org/10.1787/837837844021

A.5. Impact of the crisis on international trade

Figure A.5.2. **Trends in monthly trade balance of goods since January 2007**

Index January 2007 = 100 and billion current USD



1. Excluding intra-euro zone trade.

StatLink http://dx.doi.org/10.1787/837844825261

A.6. Synchronisation of collapse in international trade

The dramatic collapse in world trade in 2008 seems to have resulted from strongly synchronised drops in trade across countries due to the combined effects of several factors: the credit crunch, the spread of global value chains, and falling consumer and producer confidence.

The drop in trade at the start of the crisis was similar to past downturns for individual countries, but what is remarkable is the number of countries simultaneously reporting drastic decreases in trade. Global interdependence and interaction among countries has strengthened crisis propagation mechanisms and enhanced the impact on individual countries.

The degree of synchronisation is clear from an analysis of the number of countries with negative monthly year-on-year growth in imports and exports. By the end of 2008, 90% of OECD countries showed a decline in exports and imports of more than 10%. This share reached 100% at the end of the first quarter of 2009.

Drops in growth of exports of more than 10% occurred in more than 90% of the OECD countries in seven out of the nine months since the beginning of the crisis. The situation is the same on the import side: all OECD countries registered negative growth of imports of more than 10% from January through June 2009. The synchronous fall in trade flows across countries enhanced the fall in trade in individual countries and contributed significantly to the dramatic collapse of trade at the aggregate level.

More detailed data show that trade has not collapsed evenly across all products. The largest contributor is the drop in machinery and transport equipment, followed by mineral fuels and related products, manufactured goods and chemicals. Trade in services (based on quarterly data, not shown in the graphs) has been more resilient than the trade in goods.

Source

- Araujo, S. and J. Oliveira Martins (2009), "The Great Synchronisation: tracking the trade collapse with high-frequency data", *www.voxeu.org* (*www.voxeu.org/index.php?q=node/4290*).

Synchronisation of trade flows

This synchronisation is calculated as the number of OECD countries that exhibit negative growth in trade flows over the period 1998-2009. Monthly year-on-year growth rates have been calculated for exports and imports that are either:

i) negative;

ii) below –5%;

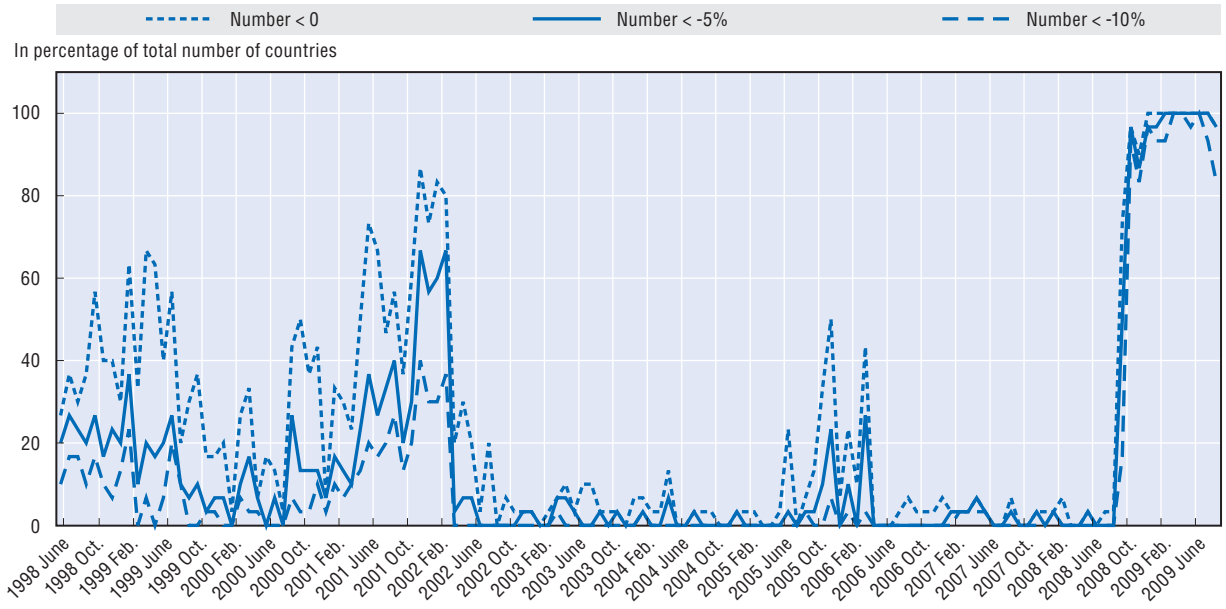
iii) below –10%.

The *OECD Monthly Statistics on International Trade Database* (for goods) is used to calculate the growth rate for the 30 OECD member countries. The graphs show the percentage of the 30 OECD countries that exhibit growth rates which are negative, below –5% and below –10%, respectively.

A.6. Synchronisation of collapse in international trade

Figure A.6.1. **Number of magnitudes of decline in monthly export growth rates (year-on-year)**

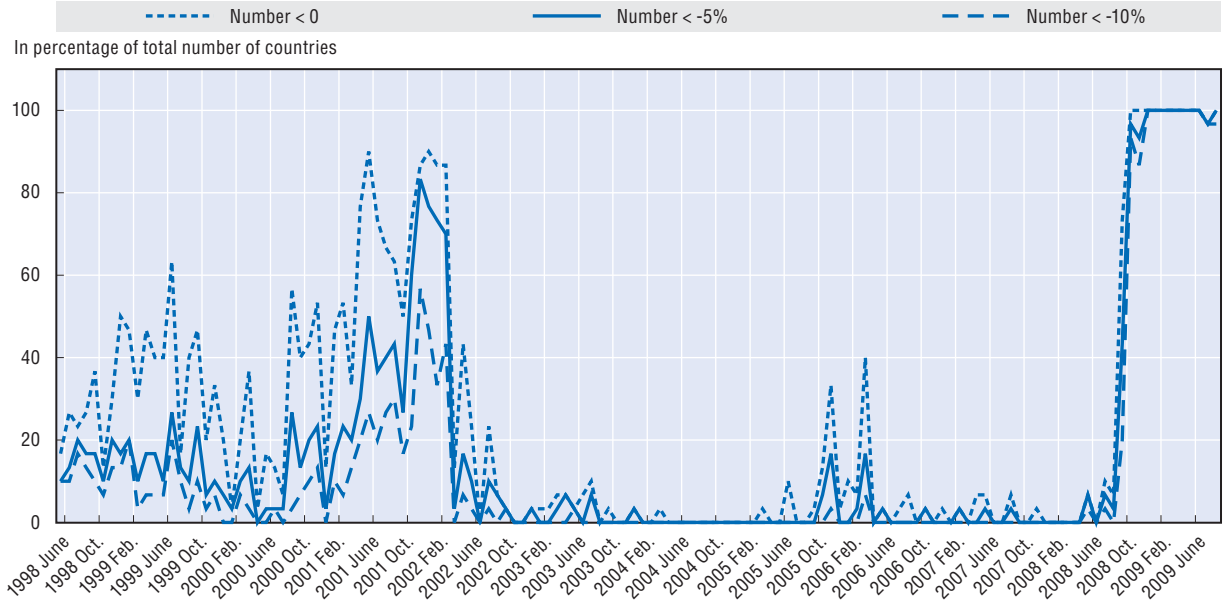
Percentage of total number of countries



StatLink http://dx.doi.org/10.1787/838045556643

Figure A.6.2. **Magnitudes of decline in monthly import growth rate (year-on-year)**

Percentage of total number of countries



StatLink http://dx.doi.org/10.1787/838073584746

A.7. Impact of the crisis on foreign direct investment

In 2008, inward foreign direct investment (FDI) was down overall in developed countries, particularly in the OECD area (–35%), but increased in non-OECD countries (+13%), particularly in Asia. FDI declined in the European Union by around 43% while it increased in Japan by 11%. In contrast, foreign direct investment increased by some 16% in the United States in spite of the crisis.

That increase in the United States, particularly in the second and fourth quarters of 2008, was essentially attributable to loans by foreign parent companies to subsidiaries in the United States. Plummeting profits, the credit crunch and a higher dollar from the fourth quarter onwards caused serious liquidity problems for foreign subsidiaries, which sought help from their parent companies. At the same time, the value of mergers and acquisitions declined by 18% as a result of problems for financing buy-outs and the fall in asset values following the stock market collapse.

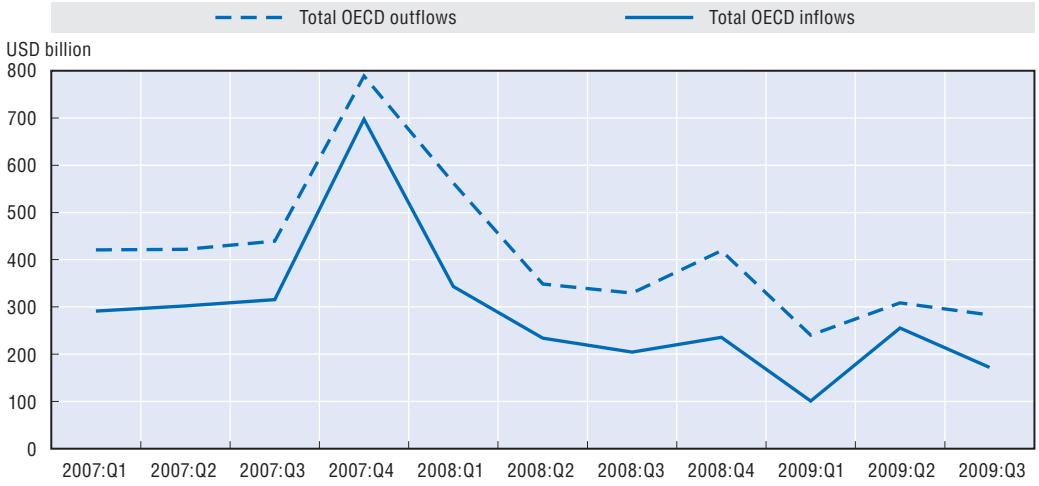
Quarterly data on FDI show that the overall decline in international investment has continued in 2009 in the OECD area. Inflows in and outflows from OECD countries dropped fell below their 2008 levels and the slight recovery started in the second quarter seems not be sustained in the third quarter of 2009.

Preliminary OECD projections suggest recovery in FDI flows is expected to start slowly in 2010 and speed up only in 2011. If FDI policies remain open, the exit of public/government funds from sectors such as financial services following the crisis might spur a new surge in cross-border M&As.

Sources

- *OECD International Direct Investment Database*, January 2010.
- OECD, *Main Economic Indicators Database*, January 2010.
- International Monetary Fund, *Balance of Payments Statistics*, January 2010.

Figure A.7.1. **Total OECD[1] outflows and inflows of FDI, Q1 2007 to Q3 2009**



1. Excluding Australia.

StatLink http://dx.doi.org/10.1787/838127533368

A.7. Impact of the crisis on foreign direct investment

Figure A.7.2. **Inward FDI flows by development level**



StatLink http://dx.doi.org/10.1787/838150670704

A.8. Impact of the crisis on mergers and acquisitions

■ The fall in international investment during/after the crisis is also reflected in recent figures on mergers and acquisitions (M&As). International M&As are on track to decline by more than 50% in 2009 from 2008. However, there are major differences across countries and regional zones.

■ M&A activity by firms based in the OECD area has fallen especially sharply, from USD 1 trillion to USD 454 billion, a decline of almost 60%.

■ Both outward and inward M&A activity by emerging countries is also forecast to fall strongly in 2009. International M&A activity by companies based in emerging countries increased by 30% between 2007 and 2008, but estimates indicate that it fell by 62% between 2008 and 2009. International M&As by companies based in Brazil, China, India, Indonesia, Russia and South Africa dropped from USD 121 billion in 2008 to USD 46 billion in 2009.

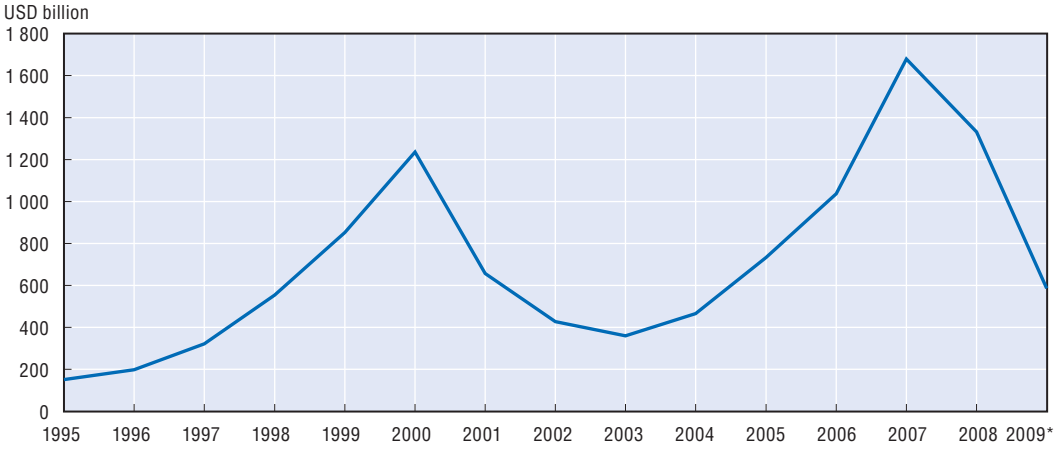
■ Inward M&A activity into these emerging countries also fell in 2009 by almost 40%.

Sources

- *OECD Investment Newsletter*, December 2009.
- *Dealogic M&A Database*.

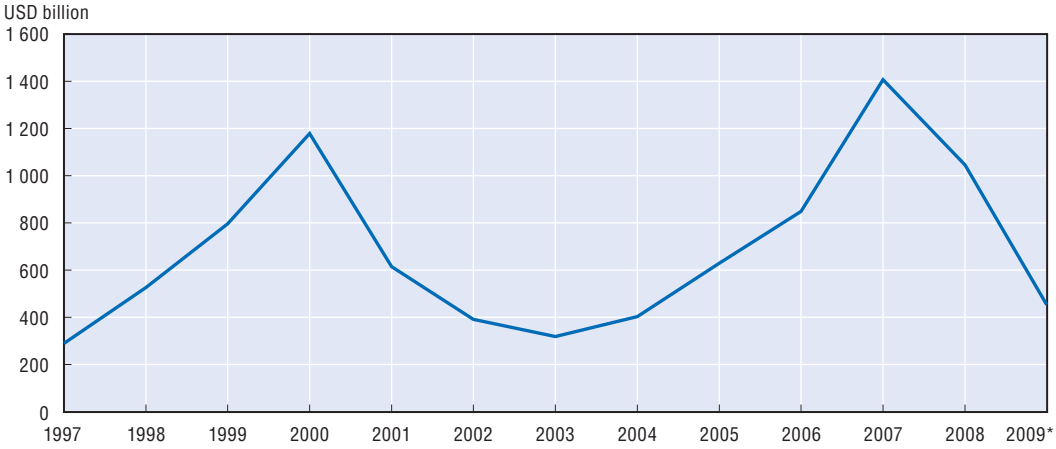
A.8. Impact of the crisis on mergers and acquisitions

Figure A.8.1. **International mergers and acquisitions, world**



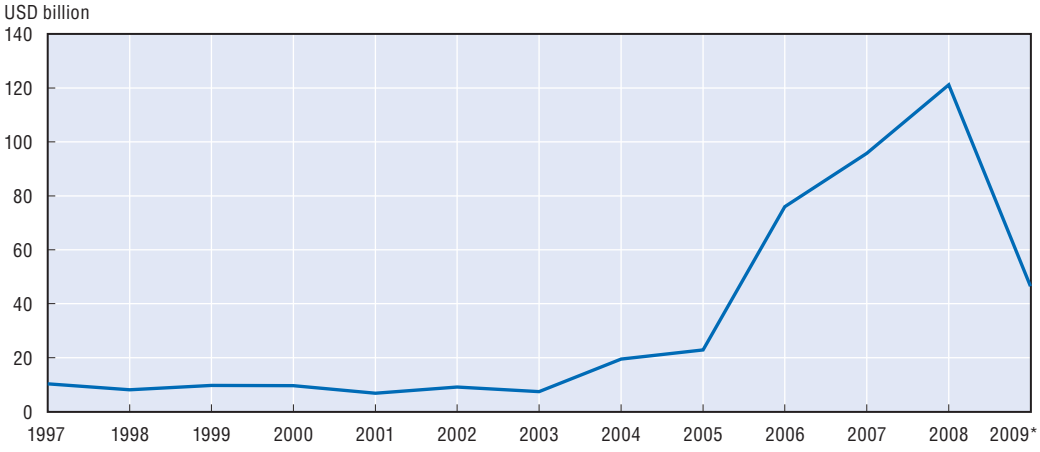
StatLink http://dx.doi.org/10.1787/838155668143

Figure A.8.2. **International M&A activity by firms based in the OECD area**



StatLink http://dx.doi.org/10.1787/838165361721

Figure A.8.3. **International M&A activity by firms based in six major emerging economies**[1]



StatLink http://dx.doi.org/10.1787/838167335161

* Forecast based upon completed international M&As through 26 November 2009.

1. Brazil, China, India, Indonesia, Russian Federation and South Africa.

A.9. Multinational enterprises and the crisis

■ Foreign affiliates contribute to a host country's international competitiveness through several channels. They provide access to new markets and new technologies for domestic suppliers and buyers along the value chain, they generate knowledge spillovers to domestic firms, and they invest a higher share of their revenue in research and development (R&D).

■ Over 1996-2007, trends in employment of foreign affiliates in the manufacturing sector have roughly paralleled total manufacturing employment in OECD countries. However, employment of foreign affiliates dropped more strongly in the aftermath of the ICT crisis in early 2000. If this trend recurs in the current crisis, losses of manufacturing jobs will be larger in foreign affiliates than in domestic firms.

■ Employment under foreign control has especially followed trends in total manufacturing employment in Norway, Italy and the United States. In these three countries, manufacturing employment in foreign affiliates is likely to be more affected than in other countries. In Japan, employment in foreign affiliates has been less responsive to the employment cycle in manufacturing, but in any case, the weight of foreign affiliates in employment is so small as to be negligible.

■ Responsiveness is measured as the estimated elasticity of foreign affiliates' manufacturing employment to total manufacturing employment. The estimate is based on an ordinary least squares (OLS) regression on the first-order differences of natural logs. Only coefficients significant at the 10% level and below are reported.

Source

- OECD, calculations based on *AFA Database*, January 2010.

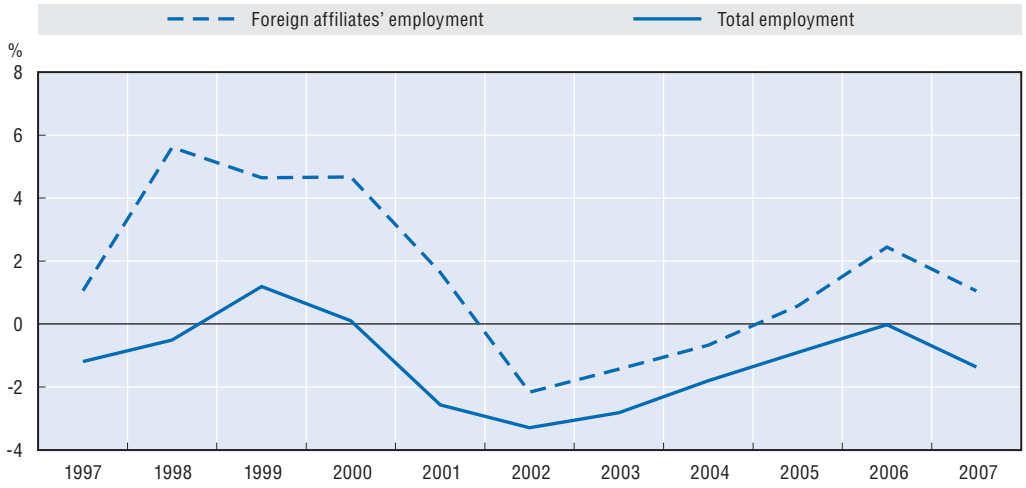
For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris.

A.9. Multinational enterprises and the crisis

Figure A.9.1. **Changes in foreign affiliates' manufacturing employment over the business cycle, OECD**[1]

1996-2007

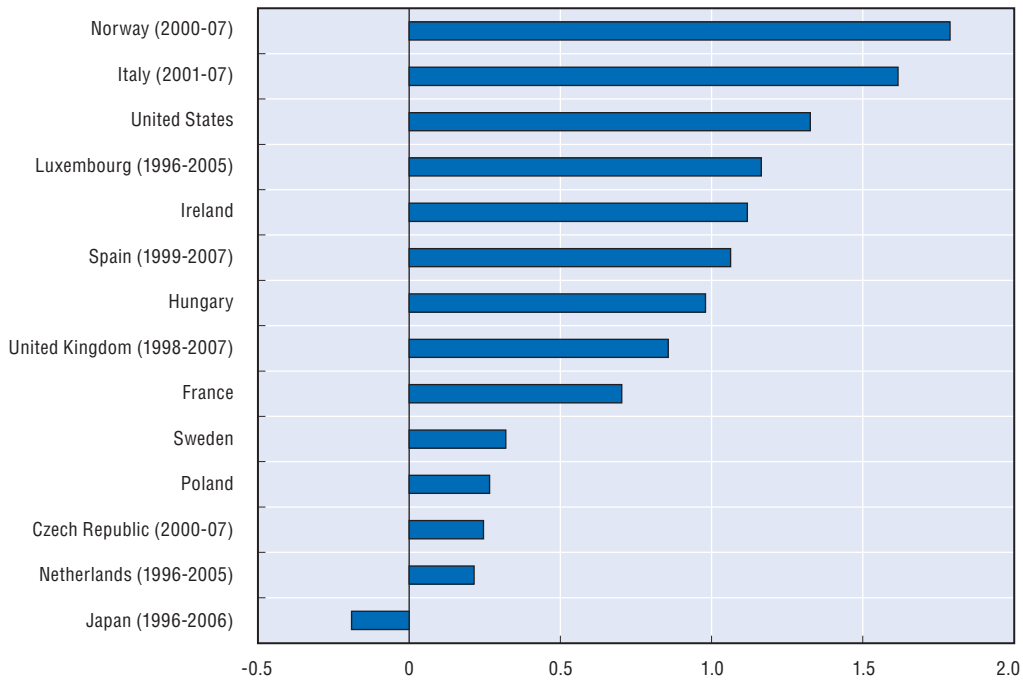


1. Aggregate OECD includes the Czech Republic, Finland, France, Germany, Hungary, Ireland, Italy, Japan, Luxembourg, the Netherlands, Norway, Poland, Portugal, the Slovak Republic, Spain, Sweden, Switzerland, the United Kingdom and the United States.

StatLink http://dx.doi.org/10.1787/838213656168

Figure A.9.2. **Responsiveness of foreign affiliates' manufacturing employment to business cycles**

1996-2007



StatLink http://dx.doi.org/10.1787/838216821277

A.10. Global value chains and the crisis

The link between the economic crisis and global value chains is not straightforward and has recently received a lot of attention in policy discussions. However data on the effects of the crisis are scarce. Figures on international trade and foreign direct investment have decreased dramatically in the aftermath of the crisis (see earlier), and some data also show that the activities of multinationals have been hard hit by the crisis.

The quarterly survey of multinationals' affiliates in Japan shows for example a large drop in the activities of multinationals relative to the same quarter in the previous year. Sales to both the local "home" market and foreign markets have dropped significantly as has employment by affiliates. Preliminary figures for the second quarter of 2009 published by METI show that affiliates' employment in the manufacturing sector across all regions has been steadily decreasing and is now 14% below what it was in the second quarter of 2007.

A number of studies have discussed the role of global value chains and showed that the impact of the crisis on trade and investment has been amplified by the spread of global value chains. The argument is that vertical specialisation has resulted in goods and services being produced sequentially in different countries. Intermediates such as parts and components cross borders several times before the final product is sold to the final customer. The result is larger drops in trade than in GDP. Empirical evidence seems to suggest that the industries that have been most affected by the crisis are also those characterised by internal production networks.

Recent research casts doubt on this view by showing that global value chains do not fully account for the dramatic drop in trade. They have certainly contributed to the so-called multiplier effect of trade *vis-à-vis* GDP, but the causality is not always clear. Other factors have also contributed to the rising GDP elasticity of trade, composition effects in the first place, since trade is mainly in manufacturing while services account for the largest part of GDP. Additional factors, such as the collapse in internal demand and production, the fiscal stimulus plans of national governments which were more targeted to the non-tradable sector, the rise of "murky" protectionism, and the credit crunch which has directly aggravated problems in trade finance, are also at work.

From the opposite perspective, the impact of the crisis on global value chains is not clear. The economic crisis and the corresponding drop in trade and foreign direct investment (FDI) might be damaging to firms that are (heavily) dependent on sourcing from overseas. Additionally, it might sever linkages between industries in different countries. Companies might reconsider their investment strategies and retrench to core markets and key suppliers might face bankruptcy.

Trade flows within supply chains might however be more resilient to adverse shocks such as the economic crisis, since the development of global production networks entails large, often sunk, costs. Companies will consider alternatives very carefully before taking irrevocable steps to reduce their global value chains. Empirical evidence on French exporting firms shows that most of the trade collapse occurred in their volumes rather than in the number of exporters, a clear sign that the major adjustments are taking place along the intensive margin (*i.e.* reducing volumes) instead of along the extensive margin (*i.e.* reducing the number of suppliers). The same results also show that French exporters belonging to industries that largely rely on intermediate imports have underperformed during the crisis.

A lot of questions remain about the interdependence of the economic crisis and global value chains. For example, are the large drops in export volumes of individual companies only a short-term phenomenon? Will many companies exit in the longer run? Will global value chains take some time to pick up again if networks are reduced by the crisis, as large sunk costs and time are needed to set up international production networks.

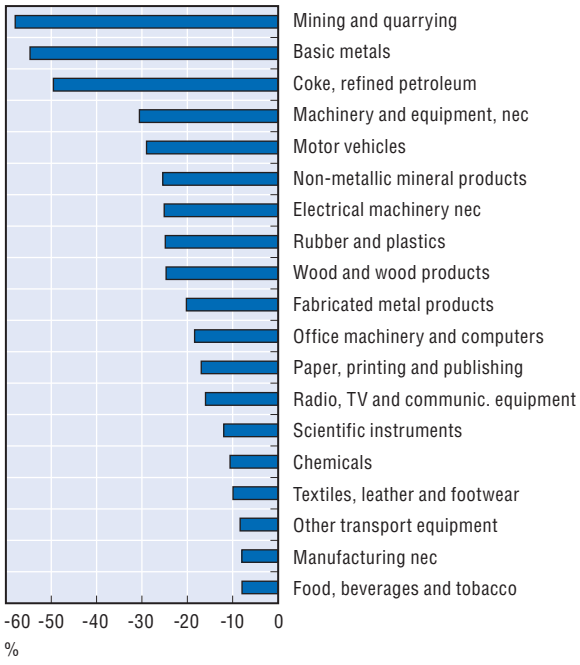
Sources

- Eurostat, *NewCronos Database*.
- *OECD Input-Output Database*, January 2010.
- OECD, *Bilateral Trade Database*, January 2010.
- Bricongne, J.-C., L. Fontagné, G. Gaullier, D. Taglioni and V. Vicard (2009), "French Exports in Turmoil", CEPII working paper.
- Altomonte, C. and G.I.P. Ottaviano (2009), "Resilient to the Crisis? Global Supply Chains and Trade Flows", *www.voxeu.org* (*www.voxeu.org/index.php?q=node/4289*).

A.10. Global value chains and the crisis

Figure A.10.1. **Drop in imports of goods by EU27 between July 2008 and July 2009**

Growth rate, in percentage

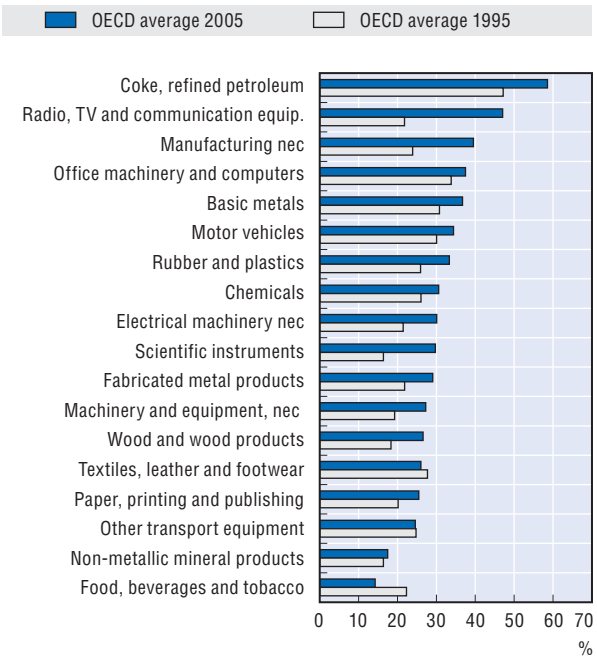


Note: Based on EU data, large product categories classification (SITC Rev.3) does not fully correspond with industry classification.

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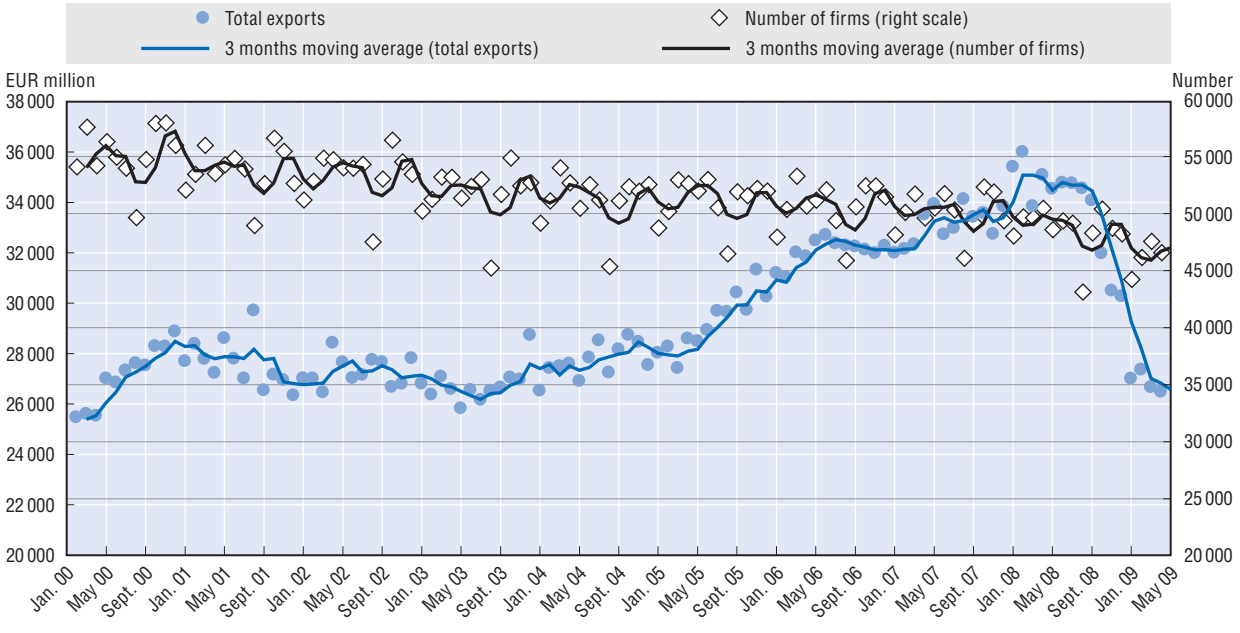
Figure A.10.2. **Import content of exports, manufacturing**

Percentages



StatLink http://dx.doi.org/10.1787/838252766633

Figure A.10.3. **Total value of French exports and total number of French exporters, January 2000 to April 2009**



StatLink http://dx.doi.org/10.1787/838320087688


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PART II

Globalisation of Trade and Investment

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B. TRENDS IN INTERNATIONAL TRADE AND INVESTMENT

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B.1. International trade and investment flows

International trade and investment flows are the primary drivers of globalisation. Measured in the balance of payments, current accounts encompass exports and imports of goods and services, along with all types of income generated by international investment. The three categories of international investment are: portfolio investment, direct investment and other investment. Because of their particular nature, flows involving derivative instruments are dealt with separately.

Financial transactions (portfolio investment, direct investment and other investment) have posted the highest growth rates and constituted the most dynamic segment of international transactions since the early 1990s. The upsurge in all three categories of investment has been especially sharp since the latter half of the 1990s.

These investment flows have been highly volatile. Portfolio investment, for example, slumped in the early 1990s, tripled between 1995 and 1999, then declined until 2002 before rising steeply until 2006 and declining rapidly in 2008 to the level of 2002.

Foreign direct investment, after a spectacular upswing in 2000 which was largely due to an exceptional wave of mergers and acquisitions, declined in 2002, then rose until 2007, followed by a smaller drop than in the two other categories of investments. In value, direct investment amounts to roughly a third of portfolio or other investment. It plays a stabilising role in the structure of business capital.

Growth in trade in goods and services was more stable over the period, with roughly similar rates in the two categories. International trade in goods has long been four times trade in services.

Sources

- International Monetary Fund, *Balance of Payments Statistics*.
- OECD, *National Accounts of OECD Countries Database*, December 2009.

For further reading

- World Trade Organization (2002), *Manual on Statistics of International Trade in Services* (MSITS).
- International Monetary Fund (1995), *Balance of Payments Manual*, 5th edition (BPM5).

Main components of international trade and investment

Balance of payments current account

Trade in goods and services. Data relating to trade in goods and services correspond to each country's exports to, and imports from, the rest of the world. These data are collected to determine the balance of payments. Data relating to international trade in goods are also collected in customs surveys but are generally not systematically comparable to balance of payment data. Since trade data need to be compared with data on international investment, the balance of payments has been chosen as source data to ensure comparability of trade and investment data.

Investment income. This covers receipts and payments on external financial assets and liabilities, including receipts and payments on portfolio investment, direct investment and other investments, and receipts on reserve assets.

Balance of payments financial account

Foreign direct investment. Direct investment is a category of international investment whereby the investor holds at least 10% of the ordinary shares or voting rights in the non-resident entity with the objective of establishing a "lasting interest". This implies the existence of a long-term relation between the direct investor and the direct investment enterprise, and a significant degree of influence by the direct investor in the management of the non-resident direct investment enterprise. A direct investment relationship does not necessarily require complete control.

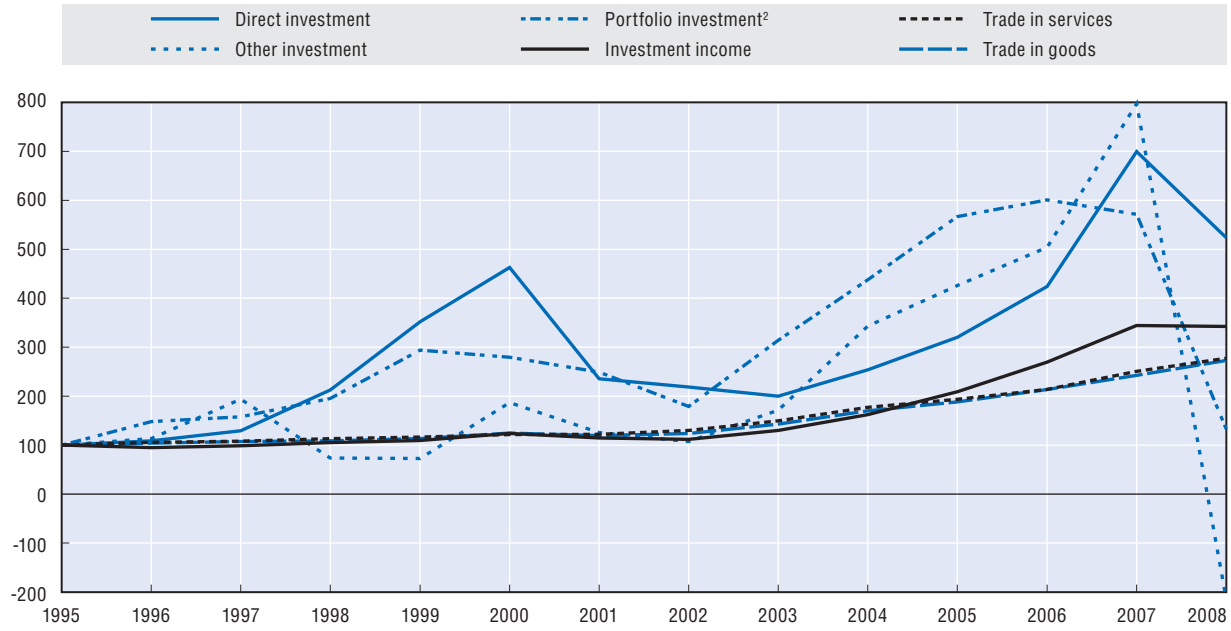
Portfolio investments include equity securities and debt securities in the form of bonds and notes and money market instruments. In cases where the equity securities held by foreign investors account for less than 10% of the capital (ordinary shares or voting rights) of an enterprise, the investment is classified as a "portfolio investment". This type of investment usually corresponds to "short-term" investments where the investor does not intend to influence the management of the firm.

Other investment. This is a residual category that covers all financial transactions not covered by direct investment, portfolio investment or reserve assets. It includes trade credits, loans, currency and deposits, and other assets and liabilities.

B.1. International trade and investment flows

Figure B.1.1. **Trends in international trade and investment components,[1] OECD**

1995 = 100, current prices



1. Average imports + exports or average assets + liabilities.
2. Excluding financial derivatives.

StatLink http://dx.doi.org/10.1787/838328885725

Figure B.1.2. **Average of the main components of the current account as a percentage of GDP, OECD**

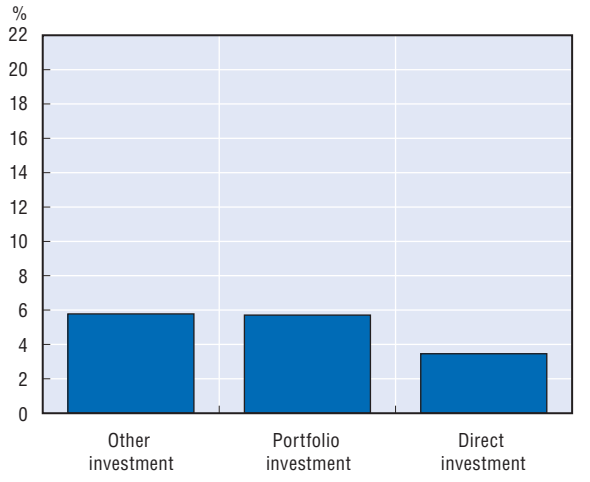
Gross basis, average 2005-08



StatLink http://dx.doi.org/10.1787/838338838771

Figure B.1.3. **Average of the main components of the financial account as a percentage of GDP, OECD**

Net basis, average 2005-08



StatLink http://dx.doi.org/10.1787/838368835021

B.2. Trade of goods

Since 2003, Germany has been the OECD's leading exporter of goods, and the United States has been the foremost importer. In recent years some non-OECD countries also show strong trade performance in goods, becoming large exporters as well importers of goods.

Theoretically, the larger a country, the greater the value of its exports and imports. In contrast, the ratios of exports and imports to GDP are generally inversely proportional to a country's size.

Despite the difference in size between Germany and the United States, the small differential between German and US exports stems partly from their industrial structures. In Germany, manufacturing industries account for almost double the share of GDP than they do in the United States. Moreover, the bulk of German exports are capital goods for which demand is especially strong from emerging economies.

Source

- International Monetary Fund, *Balance of Payments Statistics*.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris.
- International Monetary Fund (1995), *Balance of Payments Manual*, 5th edition(BPM5).

International trade in the context of the balance of payments

Three sources of data on international trade are used in this publication:

- balances of payments;
- customs data;
- data on the trade of multinational firms.

The first two sources involve data classified by product, whereas statistics on the trade of multinational firms are compiled by industry. There are two essential differences between trade data formulated for the balance of payments and customs data, even though both are presented at the product level:

a) The import values provided by customs authorities include the cost of freight and insurance. This is not the case for balance of payments data. Expenditures on these costs are posted to other items of the balance of payments, which are included among services.

b) The date on which a commercial transaction is recorded in customs statistics corresponds to the date on which the goods in question cross the border. In contrast, for the balance of payments, the relevant date is the one on which the contract is agreed.

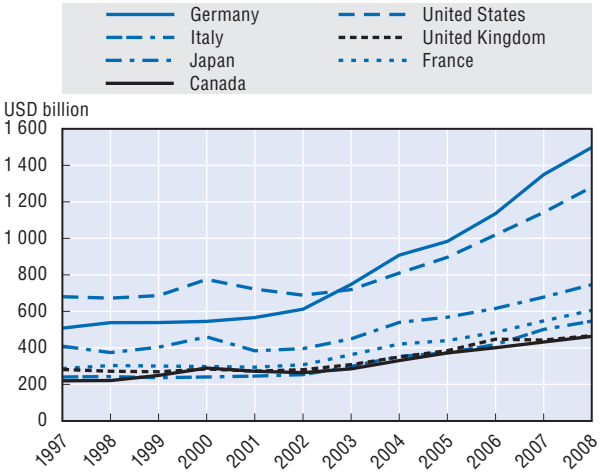
From this standpoint, established rules for the balance of payments eliminate two major sources of the asymmetry that typifies customs data. In customs data, the values of imports reported by an importing country are generally greater than the values reported by the partner exporting country, insofar as import values also include the cost of insurance and freight, which are not included for the exports.

A second reason why customs data are not symmetrical is that products shipped from one country to another are not recorded at the same time by both countries' customs authorities. This recording gap is essentially due to shipping time, but it can also result from administrative differences and the statistical practices of the two countries involved.

Another difference between customs and balance of payments data involves the level of aggregation and geographical references. As a rule, the balance of payments data are too aggregated and do not furnish information on each bilateral flow, while customs data do. A more detailed geographical breakdown was introduced recently in balance of payments statistics in respect of services, which are not recorded by customs authorities.

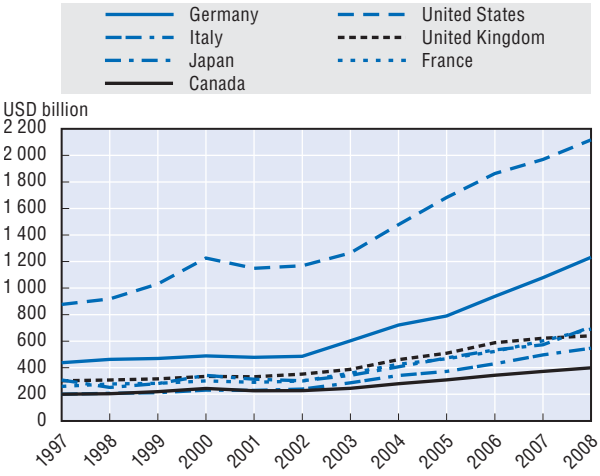
B.2. Trade of goods

Figure B.2.1. **G7 countries' exports of goods, 1997-2008**



StatLink http://dx.doi.org/10.1787/838375187321

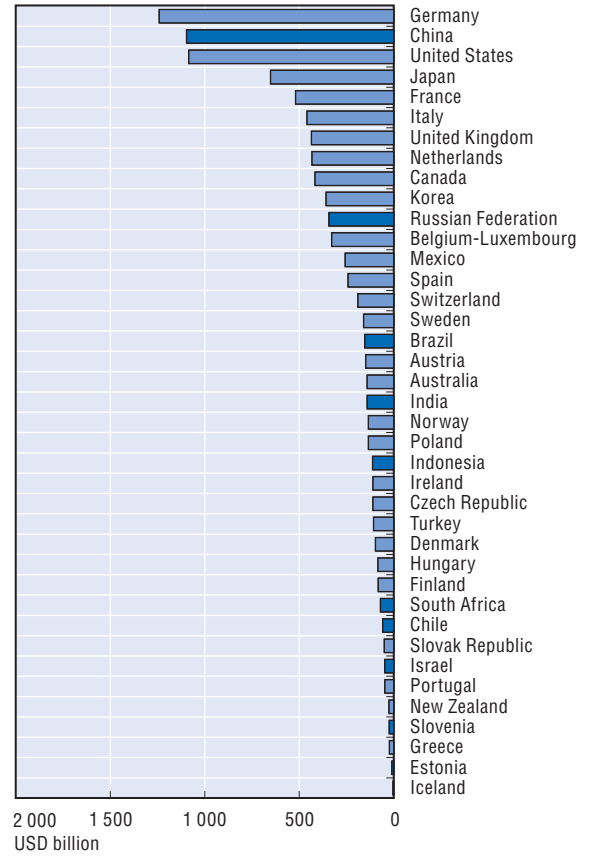
Figure B.2.2. **G7 countries' imports of goods, 1997-2008**



StatLink http://dx.doi.org/10.1787/838381208002

Figure B.2.3. **Exports of goods, 2005-08**

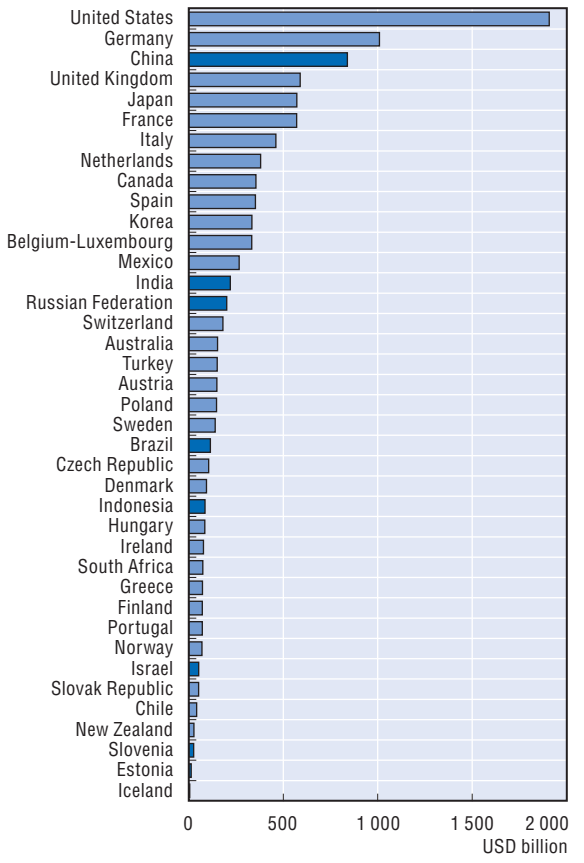
Average



StatLink http://dx.doi.org/10.1787/838401527351

Figure B.2.4. **Imports of goods, 2005-08**

Average



StatLink http://dx.doi.org/10.1787/838442510050

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

B.3. Trade of services

While OECD economies are increasingly geared towards services (in many, services account for two-thirds of GDP), trade in services remains quite limited. Many service activities require a local presence and do not lend themselves to being traded internationally. Moreover, services that can be exported or imported are still subject to numerous restrictions, as the Doha Round accords of the General Agreement on Trade in Services (GATS) have yet to be ratified.

The United States, simultaneously the leading exporter and importer of services, exports only two-fifths as much in services as in goods and imports five times more goods than services. As a result, for 2005-08, the trade balance for trade in services, which averaged a surplus of USD 105 billion, could not offset the USD 823 billion average deficit on trade in goods.

The United Kingdom ranks second in exports of services but third in imports after Germany. Between 2005 and 2008, UK trade in services generated a surplus of USD 69 billion but a USD 155 billion deficit in trade in goods.

Germany, despite its rank as the third-largest exporter of services between 2005 and 2008, recorded a deficit of USD 37.4 billion, which was amply offset by a USD 232 billion surplus in trade in goods.

In Japan, trade surpluses on goods, amounting to USD 79.5 billion over the review period, more than made up for the USD 21 billion deficit generated by trade in services.

Other countries that ran notable deficits on their trade in services include Canada, Korea and, to a lesser extent, Ireland and Mexico. Some Mediterranean countries (Greece, Portugal, Spain and Turkey) generated surpluses on their balance of trade in services, thanks in part to tourism. However, these did not offset their deficits on trade in goods.

Non-OECD economies showing strong trade performance in services are China, the Russian Federation and India. While this is directly related to their (economic) size, India's large exports and imports of services are closely linked to their information and communication technology activities.

Source

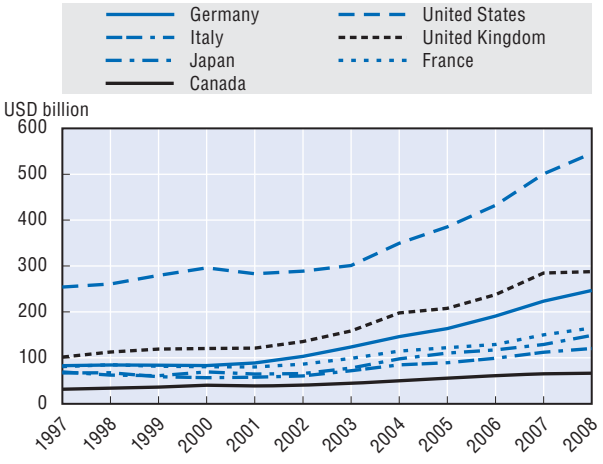
- International Monetary Fund, *Balance of Payments Statistics*.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris.
- World Trade Organization (2002), *Manual on Statistics of International Trade in Services* (MSITS).
- International Monetary Fund (1995), *Balance of Payments Manual*, 5th edition (BPM5).

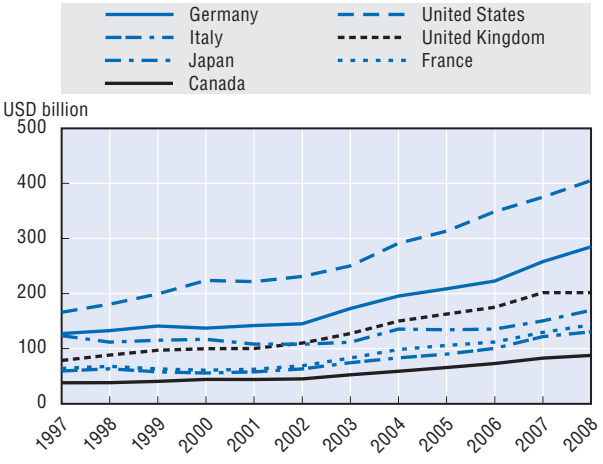
B.3. Trade of services

Figure B.3.1. **G7 countries' exports of services, 1997-2008**



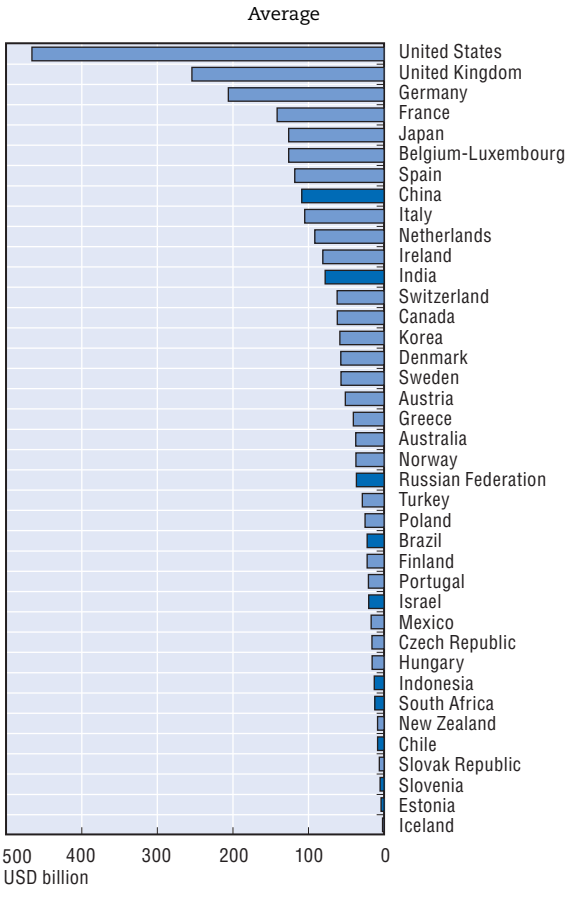
StatLink http://dx.doi.org/10.1787/838477151773

Figure B.3.2. **G7 countries' imports of service, 1997-2008**



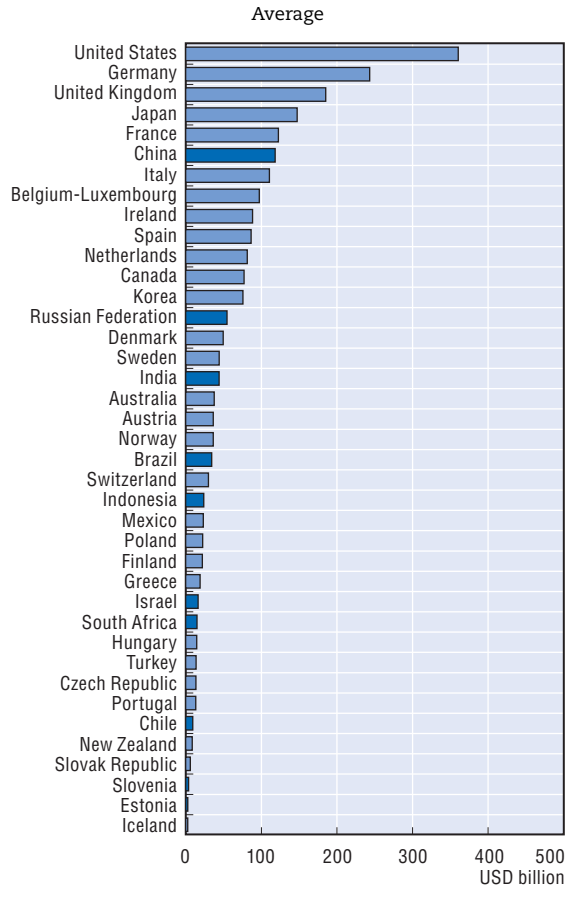
StatLink http://dx.doi.org/10.1787/838482573411

Figure B.3.3. **Exports of services, 2005-08**



StatLink http://dx.doi.org/10.1787/838542155283

Figure B.3.4. **Imports of services, 2005-08**



StatLink http://dx.doi.org/10.1787/838552315365

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.



B.4. Portfolio investment flows

■ Portfolio investment is quite volatile, but it accounts on average for a third of the aggregate value of all investment categories.

■ In 2008, inward portfolio investment in the United States dropped to the level of 2003. Other countries (the United Kingdom, Germany, Belgium-Luxembourg, France and Ireland) took in the bulk of portfolio investment, but in these countries the values of assets held by residents and of liabilities held by non-residents were more evenly balanced.

■ Between 2000 and 2003 Ireland and Japan ranked first in portfolio investment assets. Between 2005 and 2008, France ranked first, along with the United States.

Source

- International Monetary Fund, *Balance of Payments Statistics*.

For further reading

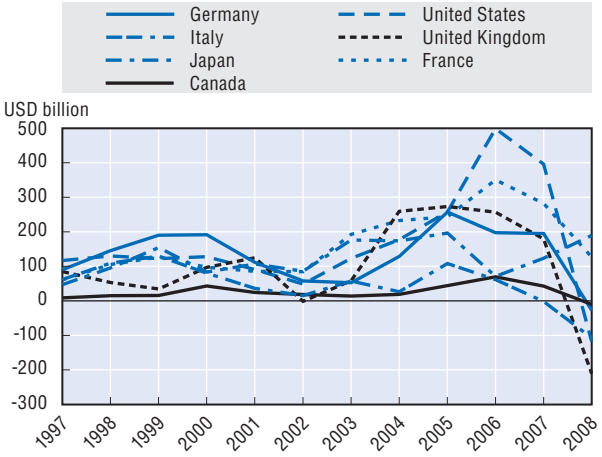
- International Monetary Fund, *Balance of Payments Manual*, 5th edition (BPM5).

Content of portfolio investment

Equity securities	Debt securities
• Shares • Stocks • Participation certificates (for example: American Depository Receipts or ADR certificates) • Preferred stock and shares that provide for participation in the distribution of residual earnings or in the residual value upon liquidation (participating preference shares) • Mutual funds	1. Bonds and other debt securities, such as: • Non-participating preferred stocks and shares • Convertible bonds • Bonds with optional maturity dates • Negotiable certificates of deposit • Dual currency bonds • Floating rate and indexed bonds • Collateralised mortgage obligations (CMOs) and participation certificates 2. Money market instruments or negotiable debt securities, such as: • Treasury bills • Commercial and finance paper • Bankers' acceptances • Negotiable certificates of deposit with original maturities of one year or less • Short-term notes issued under note issuance facilities (NIFs)

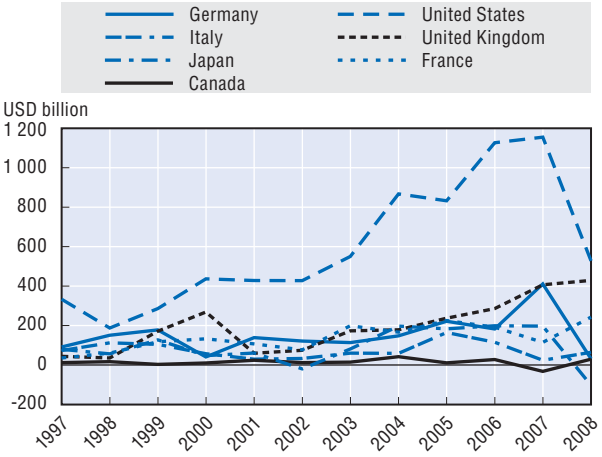
B.4. Portfolio investment flows

Figure B.4.1. **G7 countries' assets,[1] 1997-2008**



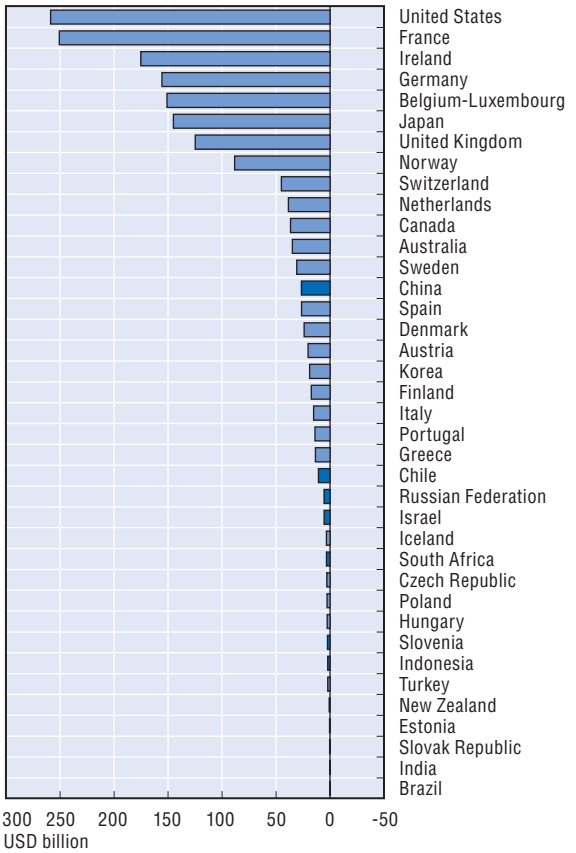
StatLink http://dx.doi.org/10.1787/838582626105

Figure B.4.2. **G7 countries' liabilities,[2] 1997-2008**



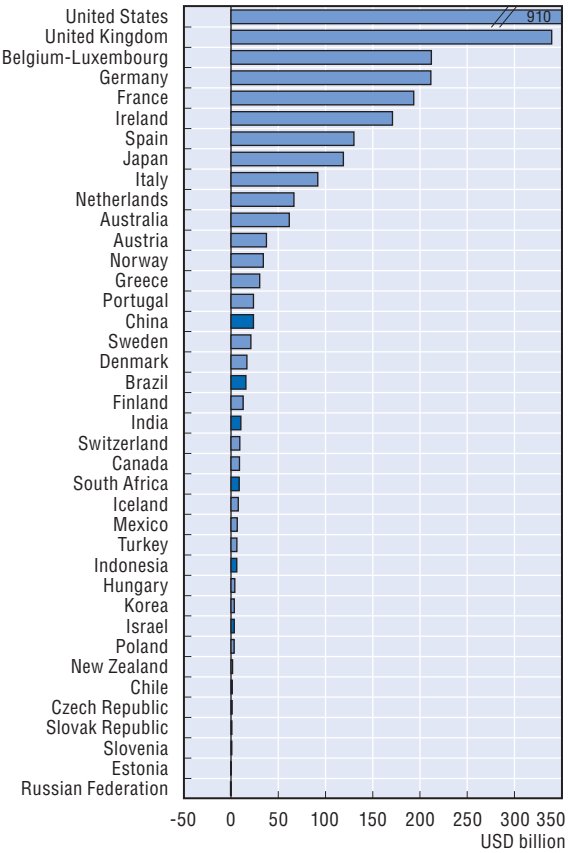
StatLink http://dx.doi.org/10.1787/838624658838

Figure B.4.3. **Average assets,[1] 2005-08**



StatLink http://dx.doi.org/10.1787/838645028774

Figure B.4.4. **Average liabilities,[2] 2005-08**



StatLink http://dx.doi.org/10.1787/838681542018

1. Assets = outward investment flows.
2. Liabilities = inward investment flows.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

B.5. Foreign direct investment flows

■ Since the latter half of the 1980s, foreign direct investment has played a fundamental role in international economic integration. Worldwide it has been the most dynamic factor in industrial restructuring.

■ However, the bulk of direct investment over the past 15 years corresponds to acquisitions, *i.e.* to transfers of ownership, rather than creation of new businesses or expansion of the capacities of existing firms.

■ The scope of inward direct investment depends on a host of factors: size of the domestic market, skills of the workforce and quality of infrastructure, labour costs, taxation, the level of technology, and the development of the banking and financial system.

■ The United States is not only the leading investor but also the leading host country. Between 2005 and 2008, Luxembourg continuously ranked second, in absolute value, as both host and investor. This is due to the presence in Luxembourg of foreign financial holding companies that channel their investment through that country. In Europe, over the period, Luxembourg was the leading host country for foreign direct investment, followed by the United Kingdom and France.

■ Between 2005 and 2008, the OECD area continued to be a net exporter of direct investment capital. Strong contributors were the United States, Luxembourg, France, the United Kingdom and Germany. Among the major countries, Japan continued to record a wide gap between assets and liabilities, a pattern that has been present since 2000.

■ Non-OECD countries such as China and India have become noteworthy host countries for foreign direct investment, with significant amounts of inward flows. In recent years, some non-OECD countries have become active investors as well.

Source

- International Monetary Fund, B*alance of Payments Statistics*.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris.
- OECD (1996), *OECD Benchmark Definition of Foreign Direct Investment:* 4th edition, OECD, Paris.
- International Monetary Fund (1995), *Balance of Payments Manual*, 5th edition (BPM5).

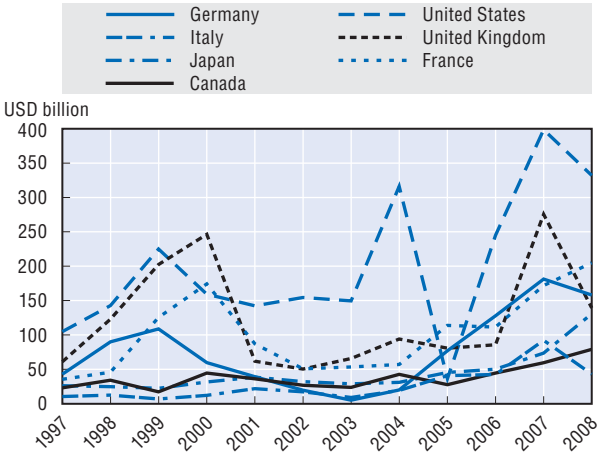
Foreign direct investment flows

Foreign investment is said to be "direct" if the investor resident in another economy holds at least 10% of the ordinary shares or voting rights of the firm in which it has made the investment. The 10% threshold means that the direct investor is in a position to influence the management of the firm and to play a role in its affairs, without necessarily wielding control over the firm.

Direct investment is measured in terms of flows and stocks. Direct investment flows in the reporting economy or abroad comprise: equity capital (assets, liabilities), reinvested earnings (net) and other capital (assets, liabilities). Direct investment enterprises are entities that are either directly or indirectly owned by the direct investor. A direct investment enterprise may be: *a)* a subsidiary: an enterprise of which more than 50% is owned by a non-resident investor; *b)* an associate: an enterprise of which 10% to 50% is owned by a non-resident investor; or *c)* a branch or an unincorporated enterprise wholly or jointly owned by a non-resident.

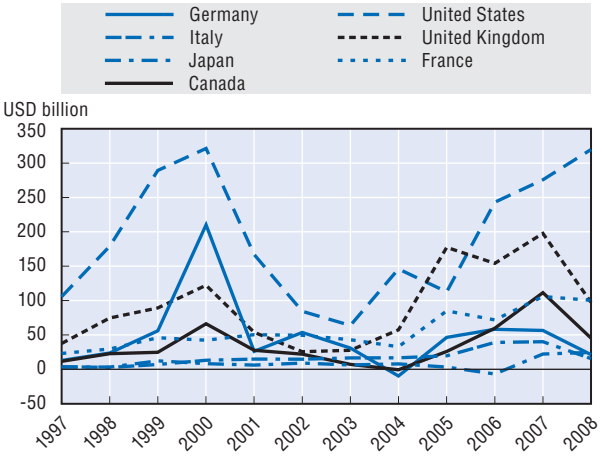
B.5. Foreign direct investment flows

Figure B.5.1. **G7 countries' assets,[1] 1997-2008**



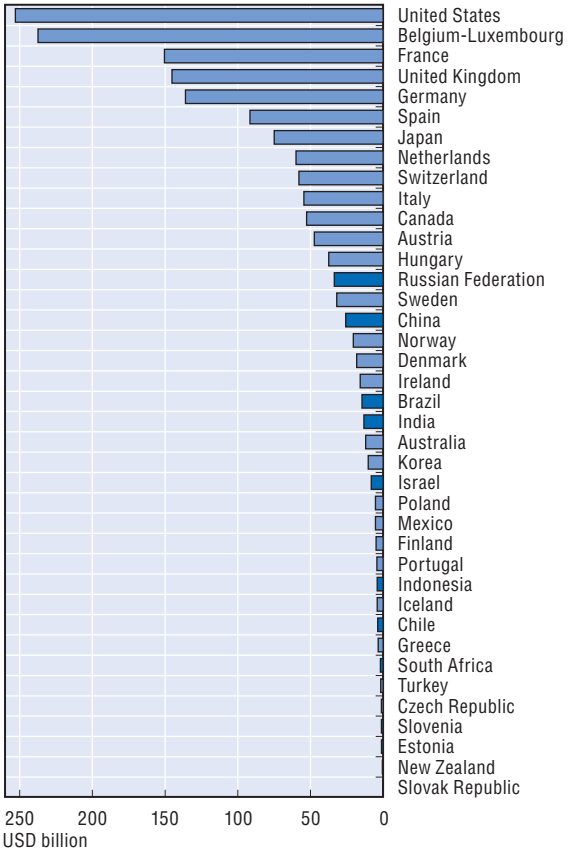
StatLink http://dx.doi.org/10.1787/838742687784

Figure B.5.2. **G7 countries' liabilities,[2] 1997-2008**



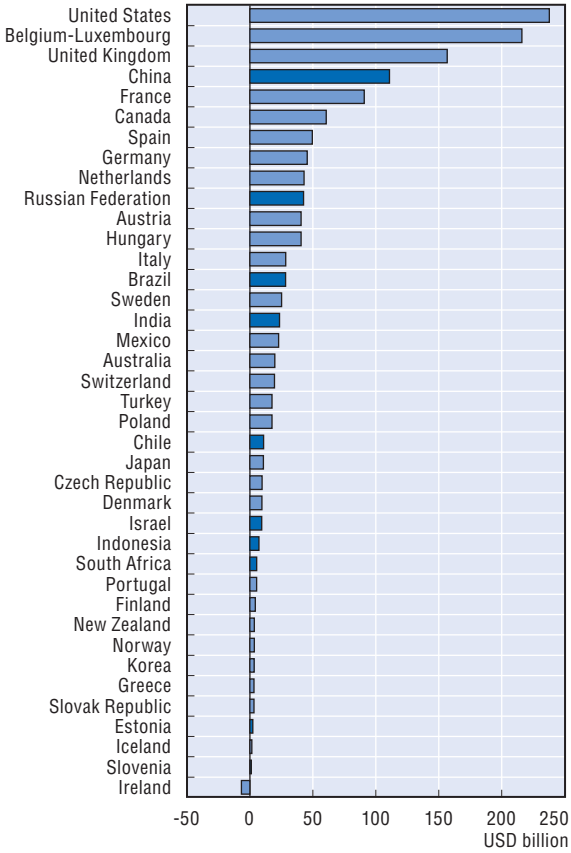
StatLink http://dx.doi.org/10.1787/838767535245

Figure B.5.3. **Average assets,[1] 2005-08**



StatLink http://dx.doi.org/10.1787/838810453283

Figure B.5.4. **Average liabilities,[2] 2005-08**



StatLink http://dx.doi.org/10.1787/838835017007

1. Assets = outward investment flows.
2. Liabilities = inward investment flows.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.



B.6. Other investment flows

■ Between 2005 and 2008, other investment flows took on greater importance than at the beginning of the 2000s. Their average value is now close to that of portfolio investment and nearly twice that of direct investment.

■ The figures show that two countries occupy a dominant position in this regard: the United States and the United Kingdom. Between 2000 and 2007 the United Kingdom led the United States in average assets and liabilities in this investment category. However, in both countries, these assets and liabilities dropped dramatically in 2007 and 2008.

■ Luxembourg also plays an important role in these investment flows and ranks just behind the United States and Germany (in terms of assets) and behind the United States and France (in terms of liabilities).

■ In 2006, Japan recorded a negative value for liabilities. Over the earlier period, asset values had been negative as well, especially in 1999 and 2003.

Source

- International Monetary Fund, *Balance of Payments Statistics*.

For further reading

- International Monetary Fund, *Balance of Payments Manual*, 5th edition (BPM5).

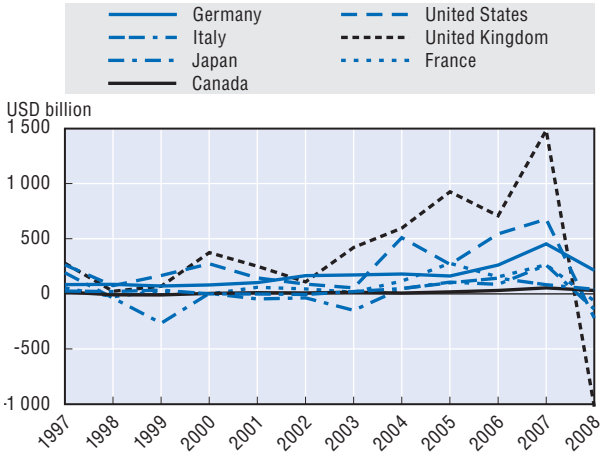
Other investment flows

Other investment flows cover short- and long-term trade credits; loans [including use of International Monetary Fund (IMF) credits, loans from the IMF, and loans associated with financial leases]; currency and deposits (transferable and other – such as savings and term deposits, savings and loan shares, shares in credit unions, etc.); and other accounts receivable and payable. Transactions covered under direct investment are excluded.

The traditional distinction, which is based on original contractual maturity of more than one year or one year or less, between long- and short-term assets and liabilities applies only to other investment. In recent years, the significance of this distinction has clearly diminished for many domestic and international transactions. Consequently, the long- and short-term distinction is accorded less importance in the *IMF Balance of Payments Manual*. However, because the maturity factor remains important for specific purposes – analysis of external debt, for example – it is retained for other investment.

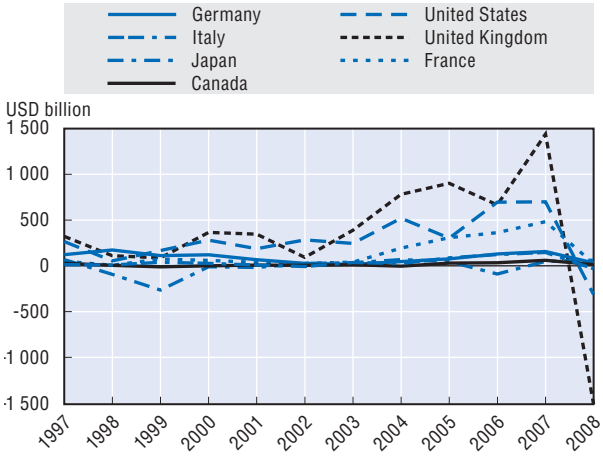
B.6. Other investment flows

Figure B.6.1. **G7 countries' assets,[1] 1997-2008**



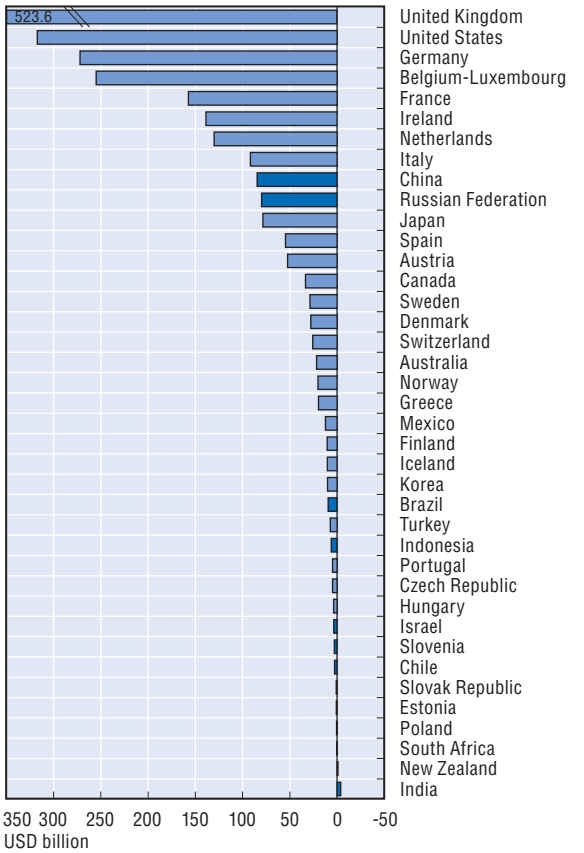
StatLink http://dx.doi.org/10.1787/838840010143

Figure B.6.2. **G7 countries' liabilities,[2] 1997-2008**



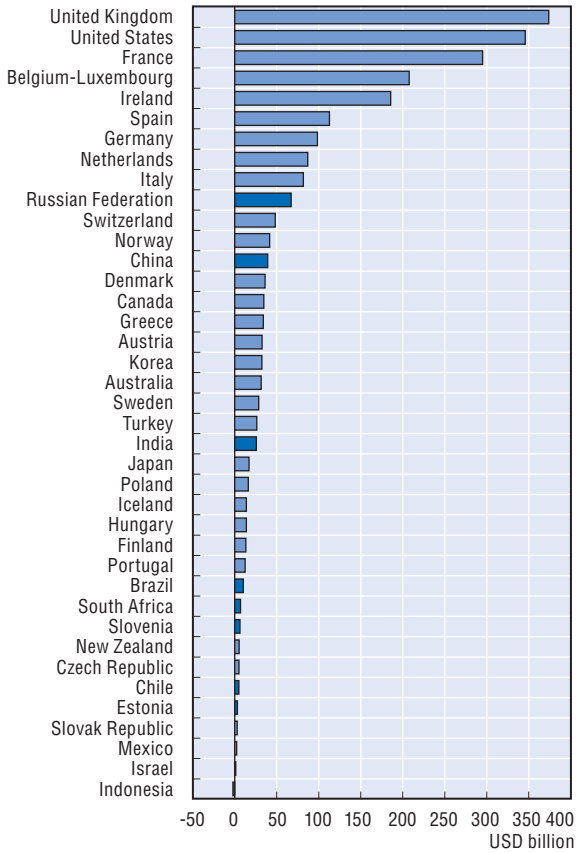
StatLink http://dx.doi.org/10.1787/838847263148

Figure B.6.3. **Average assets,[1] 2005-08**



StatLink http://dx.doi.org/10.1787/840047713484

Figure B.6.4. **Average liabilities,[2] 2005-08**



StatLink http://dx.doi.org/10.1787/840064585834

1. Assets = outward investment flows.
2. Liabilities = inward investment flows.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

B.7. Investment income flows

■ Investment income relates to all three categories of investment: portfolio investment, direct investment and other investment. Since 1997, the United States has generated the largest net income (credits minus debits) in absolute value. The bulk of US income stems from direct investment and, to a lesser extent, from other investment, whereas net income from portfolio investment is negative.

■ The United Kingdom generates the second largest investment income derived exclusively from direct investment; net income from both other investment categories is negative. The same holds true for France. Japan's overall positive income is attributable to portfolio investments and Germany's to other investment. Since 2005 Canada has recorded net losses on all three categories of investment.

■ If net investment income is compared not in absolute value but relative to countries' GDP, the gains recorded in 2008 by the United States and the United Kingdom amount to only 0.9% and 2.7% of their respective GDP. In 2008, Japan, with 3.1%, had the largest positive net investment income relative to GDP, followed by Sweden (2.3%), Denmark (2.1%) and Germany (1.7%).

■ The largest net investment loss in 2008, relative to GDP, was incurred by Ireland (–14.4%).

Sources

- International Monetary Fund, *Balance of Payments Statistics*.
- OECD, *National Accounts of OECD Countries Database*, December 2009.

For further reading

- International Monetary Fund (1995), *Balance of Payments Manual*, 5th edition (BPM5).

Investment income

Investment income – property income in the System of National Accounts (SNA) – covers income derived from a resident entity's ownership of foreign financial assets. The most common types of investment income are income on equity (dividends) and income on debt (interest). Dividends, including stock dividends, are the distribution of earnings allocated to shares and other forms of participation in the equity of incorporated private enterprises, co-operatives and public corporations. Interest, including discounts in lieu of interest, comprises income on loans and debt securities (*i.e.* such financial claims as bank deposits, bills, bond notes and trade advances). Net interest flows arising from interest rate swaps also are included. The components of investment income are classified as direct investment, portfolio investment and other investment income.

Direct investment income is broken down into income on equity (dividends, branch profits and reinvested earnings) and income on debt (interest).

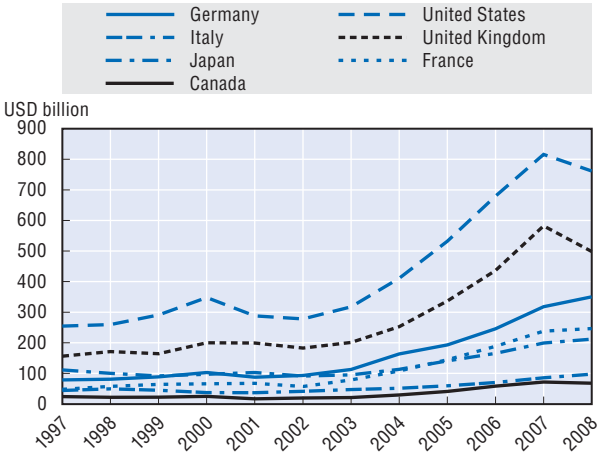
Portfolio investment income comprises income transactions between residents and non-residents and is derived from holdings of shares, bond notes and money market instruments, and associated financial derivatives. It is broken down into income on equity (dividends) and income on debt (interest).

Other investment income covers interest receipts and payments on all other resident claims (assets) on and liabilities to non-residents respectively. This category also includes, in principle, imputed income to households from net equity in life insurance reserves and in pension funds.

Source: International Monetary Fund Balance of Payments Manual, 5th edition, § 274-281.

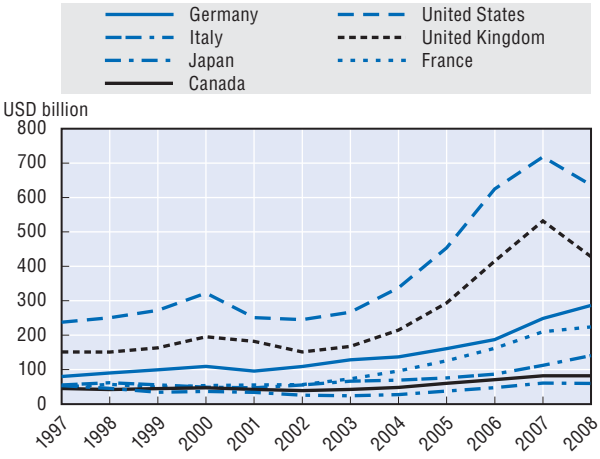
B.7. Investment income flows

Figure B.7.1. **G7 countries' credit flows, 1997-2008**



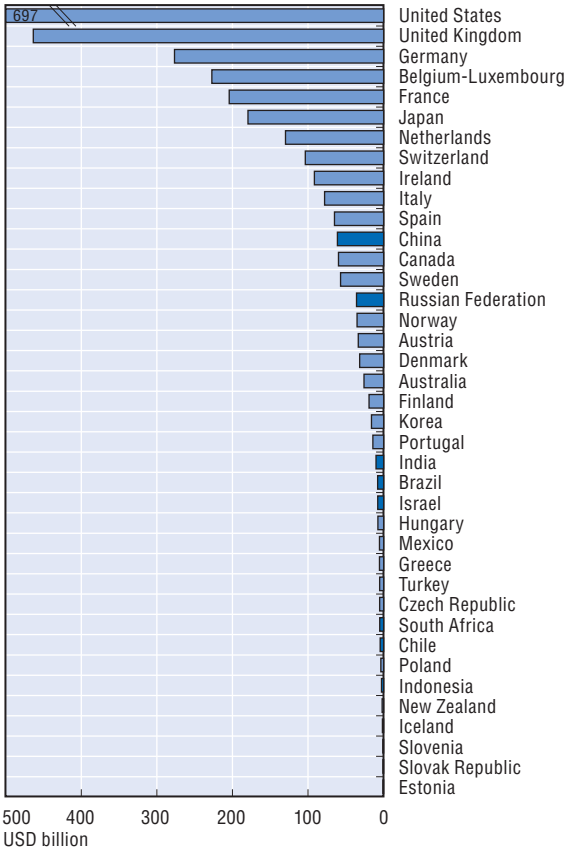
StatLink http://dx.doi.org/10.1787/840072036161

Figure B.7.2. **G7 countries' debit flows, 1997-2008**



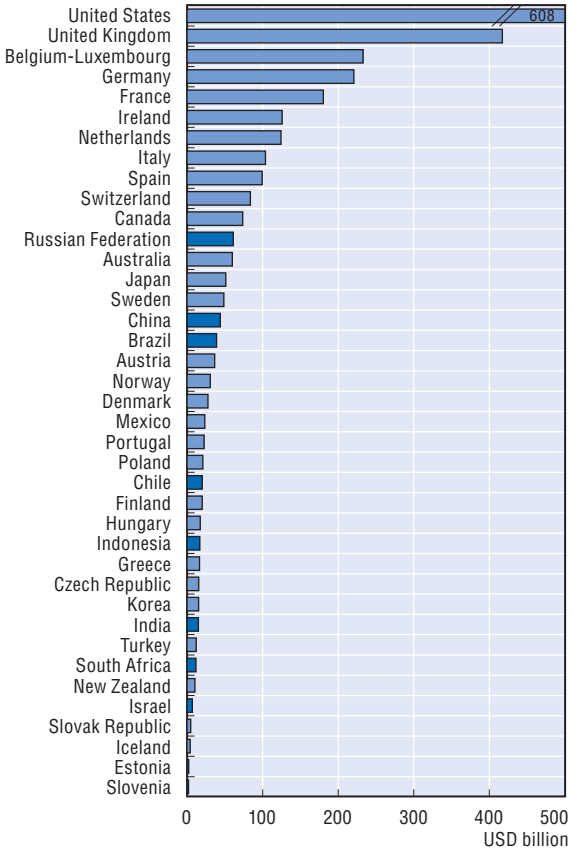
StatLink http://dx.doi.org/10.1787/840140848800

Figure B.7.3. **Average credit flows, 2005-08**



StatLink http://dx.doi.org/10.1787/840224870354

Figure B.7.4. **Average debit flows, 2005-08**



StatLink http://dx.doi.org/10.1787/840253318867

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602.*

B.8. Current account and financial account balances

■ Following the double-entry accounting rules for establishing the balance of payments, the sum of the current account and the capital and financial account is theoretically equal to zero. As a result, the current balance and the balance of the financial account are theoretically symmetrical. Nevertheless, because data are in many cases compiled independently from different sources, this may not be the case.

■ Eleven OECD countries run surpluses on their current accounts, mainly Germany, Japan, Switzerland, Norway, the Netherlands and Sweden. For all except Switzerland, the main source of the surplus is the trade balance for goods. Savings are significantly larger than investments in these countries.

■ In 2008, the current account deficit of the United States exceeded USD 570 billion. Since 2003, the current deficit of Spain has deteriorated and is now second to that of the United States, and the amount is greater than that recorded by most countries.

■ However, if current account deficits are expressed relative to GDP, the countries with the largest deficits are Iceland, Greece and Portugal.

Sources

- International Monetary Fund, *Balance of Payments Statistics*.
- OECD, *National Accounts of OECD Countries Database*, December 2009.

For further reading

- International Monetary Fund (1995), *Balance of Payments Manual*, 5th edition (BPM5).

The current account and the financial account

Current account

A country's current account balance (CAB) equals: CAB = X – M + NY + NCT = S – I, where:

X = exports of goods and services

M = imports of goods and services

NY = net income from abroad

NCT = net current transfers

S = gross domestic saving

I = gross domestic investment

It can be shown (see Chapter III of the International Monetary Fund's *Balance of Payments Manual*, BPM5) that the balance of trade in goods and services plus net investment income from abroad and net current transfers is equal to gross domestic saving and to gross domestic investment. Consequently, an increase in domestic investment relative to domestic saving will have the same short-term effect on the current balance as a decline in saving relative to investment. In the longer term, a rise in the surplus or reduction of the deficit must necessarily be counterbalanced by a rise in saving relative to domestic investment.

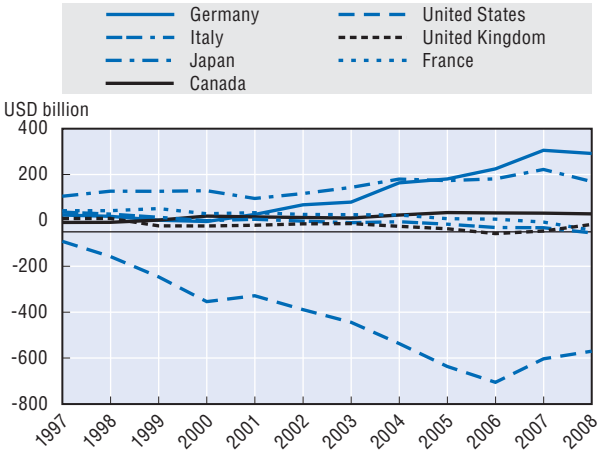
Financial account

The financial account can be broken down into two major categories: *a)* financial operations *per se*, consisting of direct investment, portfolio investment and other investment, which in turn comprise commercial credit, loans and deposits; and *b)* transactions involving reserve assets. There are direct linkages between the components of international transactions. For example, because goods imports are in many cases financed by non-residents, a rise in imports is counterbalanced by a financial inflow.

The basic principle of double-entry accounting for the balance of payments assumes that the sum of transactions in the current account and the capital and financial account, including transactions involving reserve assets, is theoretically equal to zero.

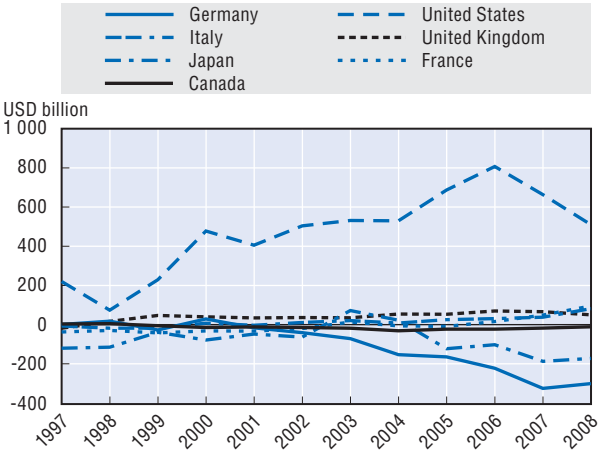
B.8. Current account and financial account balances

Figure B.8.1. **G7 countries' current account balance, 1997-2008**



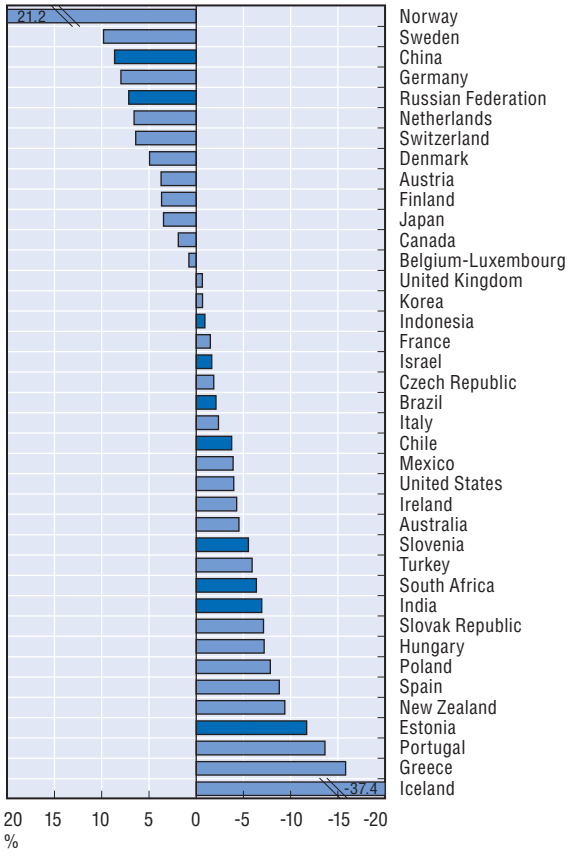
StatLink http://dx.doi.org/10.1787/840275036832

Figure B.8.2. **G7 countries' financial account balance, 1997-2008**



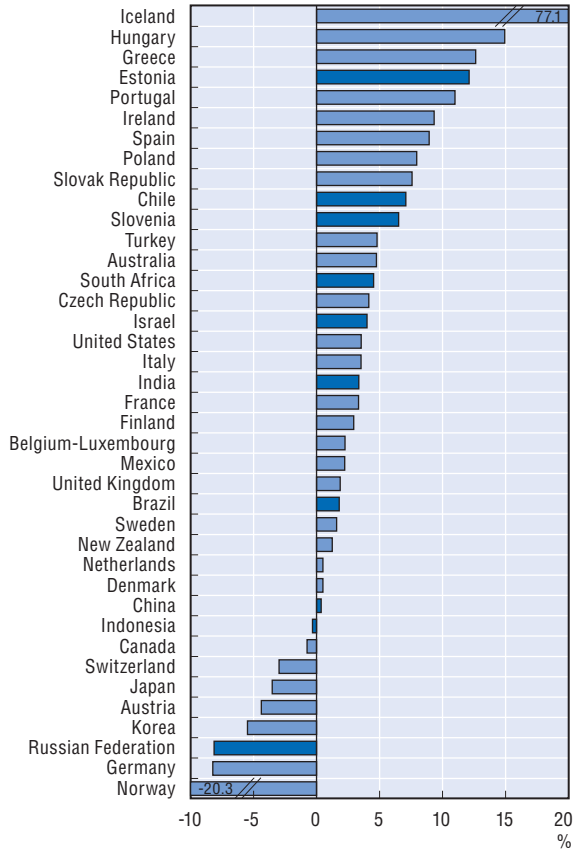
StatLink http://dx.doi.org/10.1787/840332861730

Figure B.8.3. **Current account balance as a percentage of GDP, 2008**



StatLink http://dx.doi.org/10.1787/840350688224

Figure B.8.4. **Financial account balance as a percentage of GDP, 2008**



StatLink http://dx.doi.org/10.1787/840380437162

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

C. INTERNATIONAL TRADE OF GOODS AND SERVICES

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C.1. Trade as a percentage of GDP

International trade in goods and services illustrates countries' integration into the world economy. In relation to their gross domestic product (GDP), small countries are generally more integrated. They tend to specialise in a limited number of sectors and, to satisfy domestic demand, they need to import and export more goods and services than larger countries. Size alone, however, does not determine the level of trade integration.

The ratio of exports and imports to GDP, in current prices, increased between 2000 and 2007 in 21 out of 30 OECD countries. The largest increases within OECD countries were in the Slovak Republic (+20 percentage points) and Luxembourg (+17 percentage points), while Ireland's (–22 percentage points) and Canada's (–26 percentage points) trade-to-GDP-ratios decreased the most. Luxembourg remained the OECD member country with the highest trade-to-GDP ratio at 327% in 2007, owing to financial services. The OECD countries with the lowest ratios were the United States (29% in 2007) and Japan (33%), in part because, in general, larger economies depend less on external markets to satisfy domestic demand. For its part, Estonia, a very small economy, has the highest import penetration rate of all OECD accession countries.

In 2007, the average OECD-area trade-to-GDP ratio for goods was 70%, up from 66% in 2000. OECD-area trade in services was only 26.5% of GDP. The relatively minor role of services in international trade contrasts with their contribution to the domestic economies of member countries, where the proportion of total value added is around 70% and rising.

Growth rates of goods and services trade show the very strong performance of the OECD accession and enhanced engagement countries. China, India, the Russian Federation, Estonia and Slovenia all showed significant higher growth rates than the OECD average. In addition, some OECD member countries, especially in eastern Europe, showed strong trade performance, probably owing to their integration in the European Union. This development is also reflected in the import penetration rates for goods for these countries (see Section C.10).

Sources

- *OECD Trade Indicators*, May 2009.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, 2009.

For further reading

- OECD Trade Indicators, *www.oecd.org/std/its/tradeindicators*.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, *http://unstats.un.org/unsd/snaama*.

Average trade-to-GDP ratio

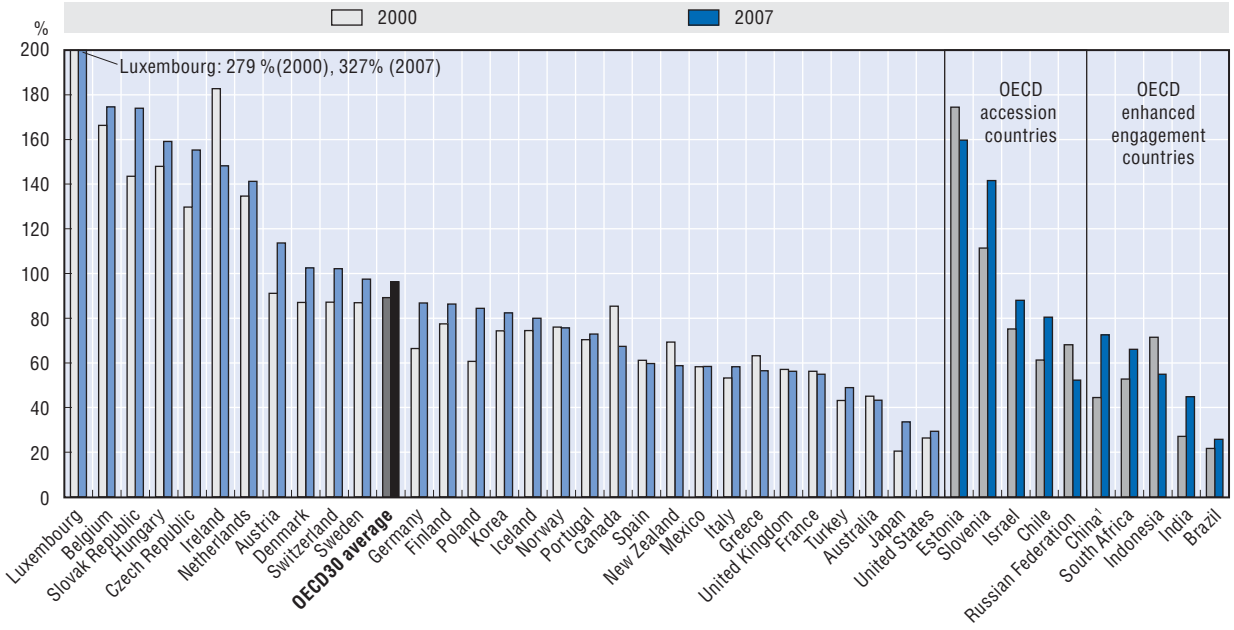
The most frequently used indicator of the importance of international transactions relative to domestic wealth creation is the trade-to-GDP ratio, which is the average share of exports and imports of goods and services in GDP.

International trade tends to be more important for countries that are small (in terms of size or population) and surrounded by neighbouring countries with open trade regimes than for large, relatively self-sufficient countries or those that are geographically isolated and thus penalised by high transport costs. Other factors also help explain differences in trade-to-GDP ratios across countries, such as history, culture, (trade) policy, the structure of the economy (especially the weight of non-tradable services in GDP), re-exports and the presence of multinational firms (intra-firm trade).

The trade-to-GDP ratio is often called the trade openness ratio. However, the term "openness" to international competition may be somewhat misleading. In fact, a low ratio does not necessarily imply high (tariff or non-tariff) obstacles to foreign trade, but may be due to the factors mentioned above, especially size and geographic remoteness from potential trading partners.

C.1. Trade as a percentage of GDP

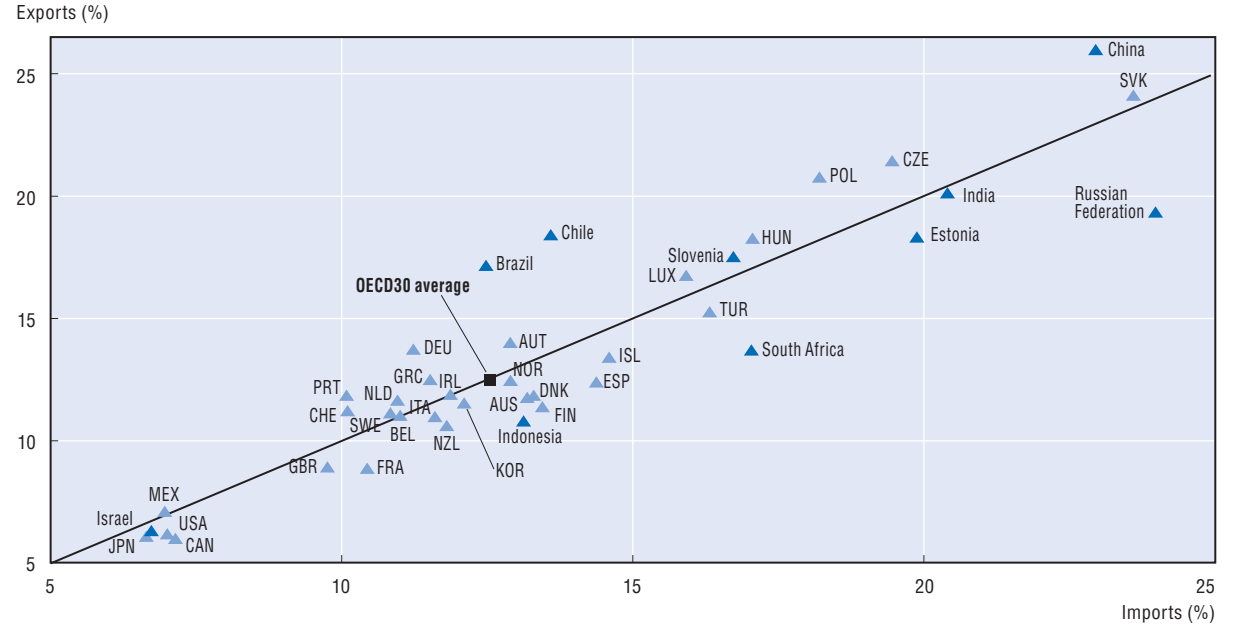
Figure C.1.1. **Sum of exports and imports of goods and services as a percentage of GDP, 2000 and 2007**



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Figure C.1.2. **Trade in goods and services**

Average annual growth rate 2000-07 at current prices



StatLink http://dx.doi.org/10.1787/840410504674

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

C.2. Trade balance as a percentage of GDP

■ Trade balance data for 2000 and 2007 for OECD countries, OECD accession countries and countries of the Enhanced Engagement Programme (EEP) vary widely. Some countries are in surplus or in deficit in both years. Countries' surpluses or deficits may deteriorate, improve or remain stable.

■ The changes are due first to different export and import trends. In the Czech Republic, the Slovak Republic and China, the trade balance improved because of growth of exports. In the United States, the trade balance deteriorated because of the sharp rise in imports. In Estonia and India where the balance deteriorated, exports and imports expanded at the same pace but because the export/import ratio was significantly lower than 1, the deficits widened.

■ For the merchandise trade balance, the highest ratios in 2007 were in Norway (14.0%) and Ireland (11.8%). The highest negative ratios were in Greece (–18.7%) and Spain (–8.5%). In both countries, this was mainly due to a large trade deficit in machinery and transport equipment.

■ For services trade, Luxembourg showed the highest trade-balance-to-GDP ratio in 2007 with 40.5% (33.5% in 2000), followed by Switzerland with 8.5% (6.8% in 2000). Iceland had the highest negative values (–4.0% in 2007).

Sources

- *OECD Trade Indicators*, May 2009.
- United Nations Statistics Division, *National Accounts Main Aggregates Database,* 2009.

For further reading

- OECD Trade Indicators, *www.oecd.org/std/its/tradeindicators*.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, *unstats.un.org/unsd/snaama*.

Trade balance, export-import ratio and international competitiveness

The trade balance (exports less imports) is probably the macroeconomic indicator most frequently used to gauge the competitiveness of a country or of a sector or product at national level. The export-import ratio (exports to imports) is also used. The two measurements are not alternatives but complements, given that one can improve and the other deteriorate at the same time.

The interpretation of trade balances needs to take account of the factors that influence it. The most important may be:

1. *Improvement of price-competitiveness and structural competitiveness*

The main question is to what extent an improved trade balance or import-export ratio may be attributable to improved competitiveness or other factors. An improvement in relative prices can contribute to trade surpluses but this will also depend on the factors responsible. If, for example, the improvement is the outcome of more efficient control of production costs or an improvement in non-price factors (structural competitiveness) such as innovation, product quality, etc., then this result does reflect improved competitiveness. The factors mentioned below, on the other hand, can help improve the trade balance but are unrelated to competitiveness.

2. *Cyclical lag*

When export market demand grows more rapidly than a country's domestic demand, the trade balance will tend to improve as long as no other obstacles prevent export growth (*e.g.* a lack of spare capacity). In the same way, if domestic demand grows faster than export markets, other things being equal, the trade balance will tend to deteriorate. However, permanent excessive domestic consumption can be due to structural causes, mainly an imbalance between savings and investment.

3. *Terms of trade*

If the price of imported goods rises more slowly than that of exported goods, or if the import price of certain primary commodities declines (oil, raw material, food, etc.), the trade balance would improve, but the country's competitiveness would not be in any way responsible for the improvement.

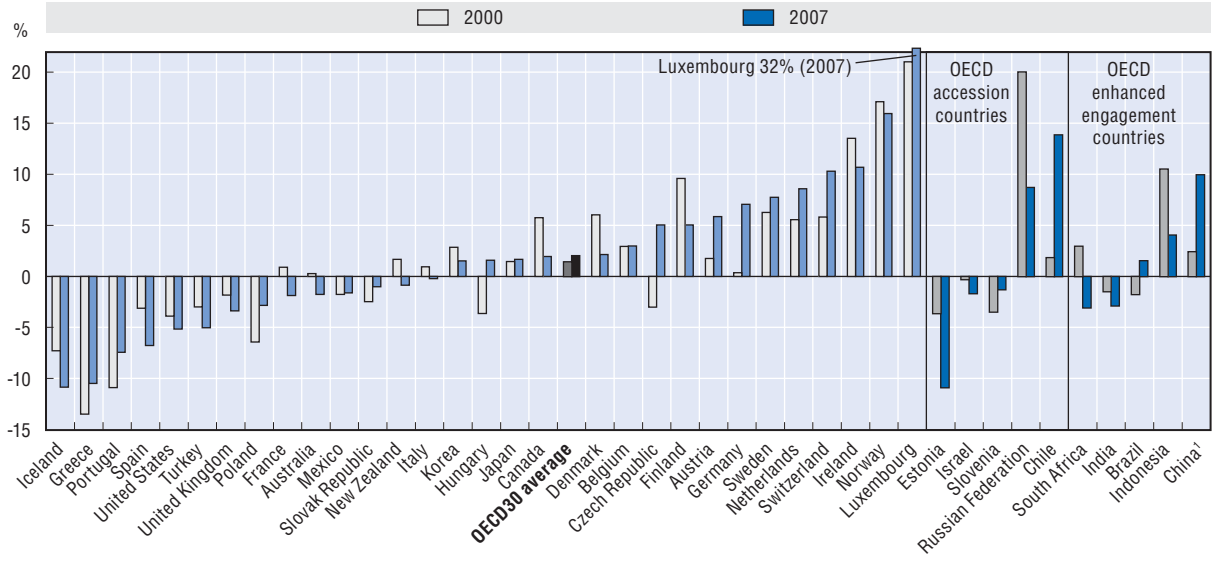
4. *Other factors*

The introduction of structural adjustment policies made necessary as a result of excessive government borrowing, for example, may be intended to increase exports and massively cut imports. The factors mentioned above are not exhaustive, but are among those that should be given prime consideration when analysing the influence of competitiveness on the trade balance.

In this document, the main results are presented but the causes and links between trade balance trends and competitiveness are not analysed.

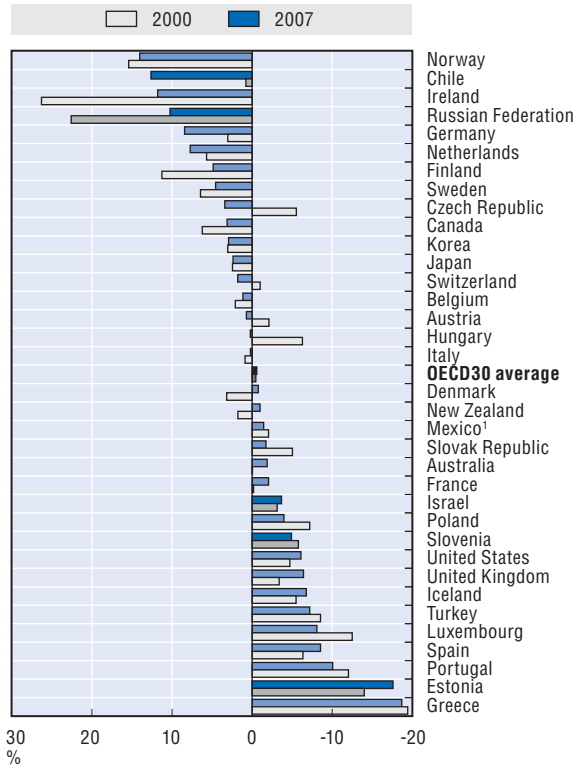
C.2. Trade balance as a percentage of GDP

Figure C.2.1. **Trade balance in goods and services**
As a percentage of GDP, 2000 and 2007



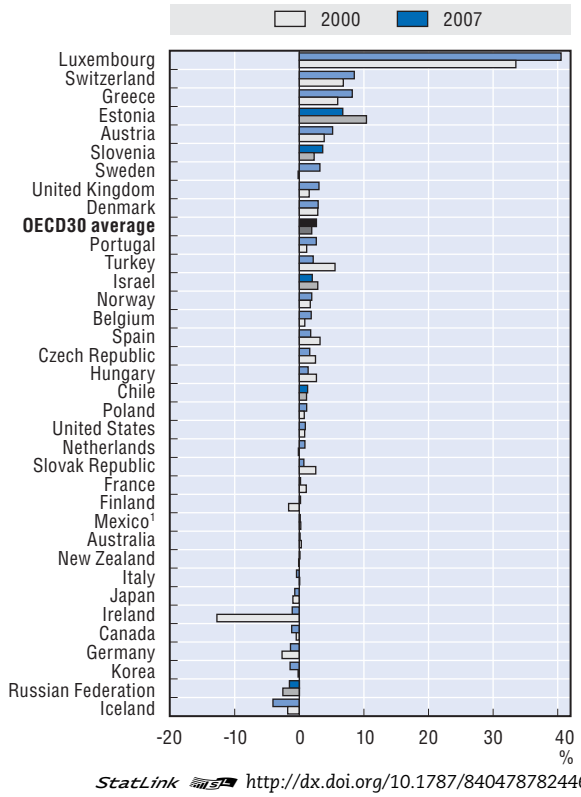
StatLink http://dx.doi.org/10.1787/840415044605

Figure C.2.2. **Trade balance in goods**
As a percentage of GDP, 2000 and 2007



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Figure C.2.3. **Trade balance in services**
As a percentage of GDP, 2000 and 2007



StatLink http://dx.doi.org/10.1787/840478782446

1. Data from the United Nations Statistics Division (National Accounts).

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

C.3. Merchandise trade with the rest of the world

■ OECD's trade deficit grew steadily during the reference period to reach USD 942 billion in 2007. A detailed analysis of the trade balance of the United States, Japan and the European Union reveals different dynamics.

■ The United States present a persistent and increasing trade deficit with the rest of the world, which reached a record USD 855 billion in 2007.

■ Japan has maintained a positive trade balance with the rest of the world (with a USD 92 billion surplus in 2007). The Japanese recession at the turn of the century particularly affected exports of computers, electronics, metals and shipbuilding; however, Japan has succeeded in preserving its trade surplus in spite of a sharply devalued US dollar relative to the Japanese yen. Japan is the second exporter of machinery and transport equipment in the OECD.

■ The EU15 did not generate trade surpluses with the rest of the world during the reference period. In 2007, the trade deficit reached USD 208 billion.

Sources

- *OECD International Trade by Commodity Statistics (ITCS) Database*, HS 1996, May 2009.
- OECD (2005), *OECD Economic Surveys: China*, OECD, Paris.

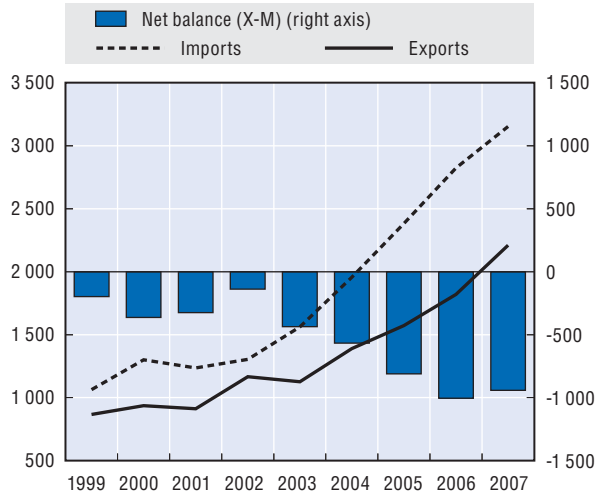
For further reading

- International Trade in Goods, *www.oecd.org/std/trade-goods*.

C.3. Merchandise trade with the rest of the world

Figure C.3.1. **OECD30 merchandise trade with the rest of the world**

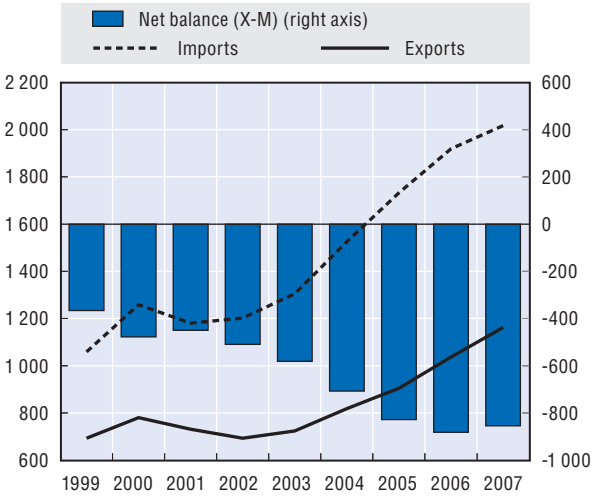
USD billion



StatLink http://dx.doi.org/10.1787/840561265321

Figure C.3.2. **US merchandise trade with the rest of the world**

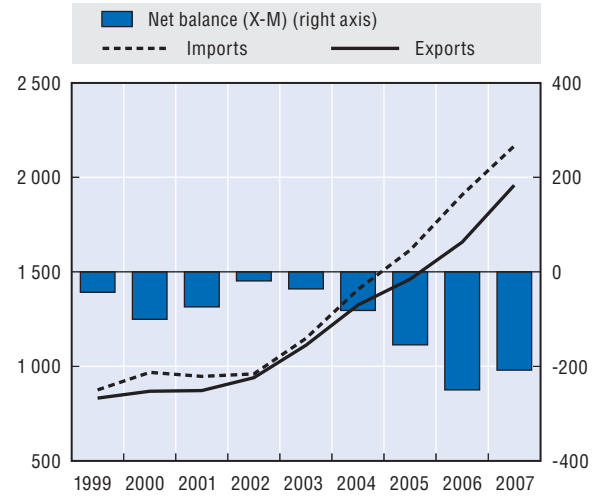
USD billion



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Figure C.3.3. **EU15 merchandise trade with the rest of the world**

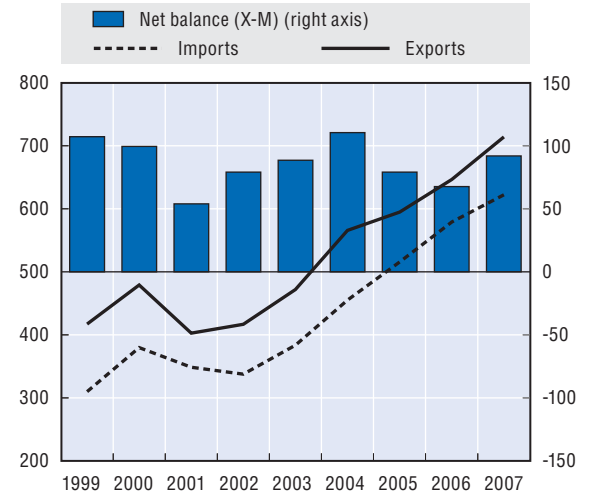
USD billion



StatLink http://dx.doi.org/10.1787/840636878010

Figure C.3.4. **Japan merchandise trade with the rest of the world**

USD billion



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C.4. Merchandise trade with partners China and Hong Kong (China)

■ The OECD area's recent trade performance is closely linked to trade with China and Hong Kong (China): (almost) half of the total OECD trade deficit is due to its deficit with these partners. The deterioration has accelerated since 2002 and exceeded USD 500 billion in 2007.

■ Imports of goods from China and Hong Kong (China) to OECD countries have grown significantly. Only Japan has succeeded in aligning its exports on its imports from China and thus in limiting its trade deficit or generating a trade surplus. China's exports consist principally of manufactured goods, of which computers, telecommunications equipment, clothing, electrical machinery and semiconductors.

■ The United States' persistent trade deficit in goods with China and Hong Kong (China) has risen steadily to reach USD 262 billion in 2007. In that year, more than one-quarter of the United States overall negative balance was due to this trade deficit (compared to only one-fifth in 1999).

■ Japan has had a trade surplus since 2002, which peaked in 2007 at USD 19 billion. Japan's relatively high level of exports to Hong Kong (China) explains why only Japan has succeeded in generating a trade surplus with China and Hong Kong (China). A look at the trade balance with mainland China alone during the same period reveals a persistent trade deficit in goods of around USD 20 billion.

■ The European Union's trade deficit with China and Hong Kong (China) has deepened since 2002. This also corresponds to the entry into force of the euro and the continuous appreciation of the European currency against the yuan. This has helped to make Chinese manufactured goods provided to European consumers competitively priced.

Sources

- *OECD International Trade by Commodity Statistics (ITCS) Database*, HS 1996, May 2009.
- OECD (2005), *OECD Economic Surveys: China*, OECD, Paris.

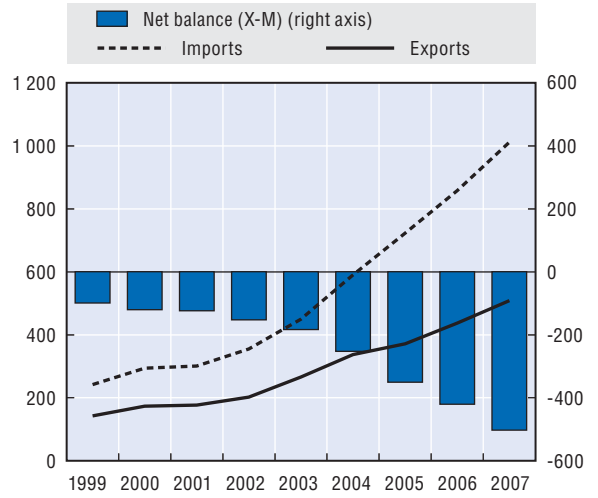
For further reading

- International Trade in Goods, *www.oecd.org/std/trade-goods*.

C.4. Merchandise trade with partners China and Hong Kong (China)

Figure C.4.1. **OECD30 merchandise trade with China and Hong Kong (China)**

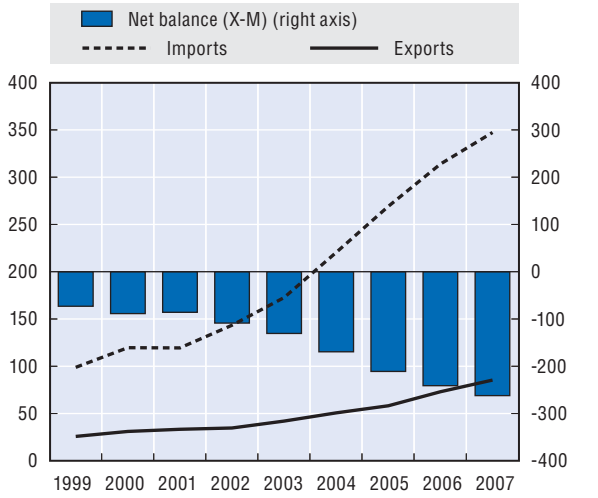
USD billion



StatLink http://dx.doi.org/10.1787/840654121730

Figure C.4.2. **US merchandise trade with China and Hong Kong (China)**

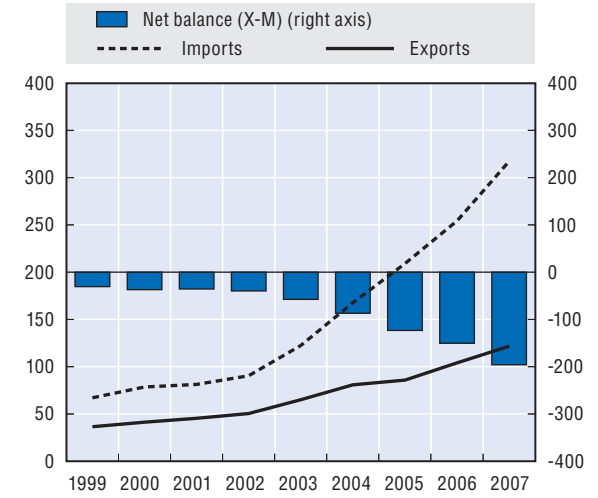
USD billion



StatLink http://dx.doi.org/10.1787/840702573560

Figure C.4.3. **EU15 merchandise trade with China and Hong Kong (China)**

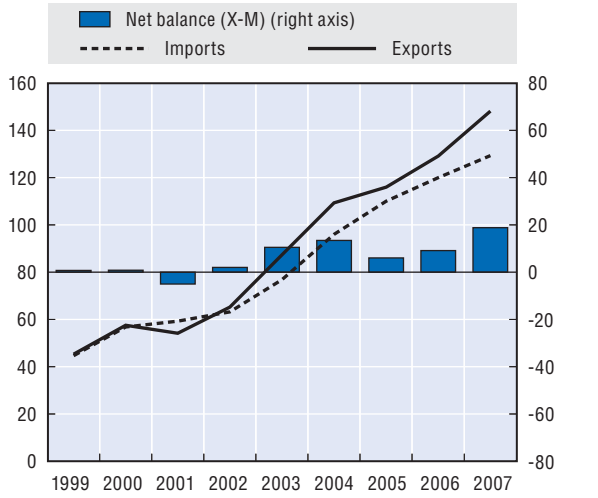
USD billion



StatLink http://dx.doi.org/10.1787/840713513260

Figure C.4.4. **Japan merchandise trade with China and Hong Kong (China)**

USD billion



StatLink http://dx.doi.org/10.1787/840718033031

C.5. World export market shares

■ The United States remained the largest exporter of goods and services in 2007 with 9.6%, despite a marked decrease of almost five percentage points between 2000 and 2007. Germany, the OECD country with the second highest share, increased its market share by almost 1.1 percentage point (from 7.9% to 9.0%) in the same period.

■ Among OECD accession countries, the Russian Federation had the largest export market share in 2007 (2.2%, up 0.8% percentage points from 2000). Israel was the only country of this group that lost market share during the period (down by 0.2 percentage points to 0.4%).

■ In 2007 the OECD country with the highest export market share for goods was Germany (10.0%, an increase of 1.2 percentage points from 2000), followed by the United States (8.8%, a decrease of 3.6 percentage points). Germany gained market share especially in manufactured articles and machinery/transport equipment. The United States lost market share for all categories of commodities except mineral fuels/lubricants. The Slovak Republic had the highest average annual growth rate for exports of goods between 2000 and 2007 (+12.8%), followed by Poland (+11.0%) and the Czech Republic (+10.1%).

■ For exports of services in 2007, the United States had the OECD's largest world export market share (14.5%, down 5.0 percentage points from 2000), followed by the United Kingdom (8.3%, up 0.4 percentage points). Ireland had the highest average annual growth (+13.2%) during this period, followed by Finland (+7.6%).

Sources

- *OECD Trade Indicators*, May 2009.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, 2009.

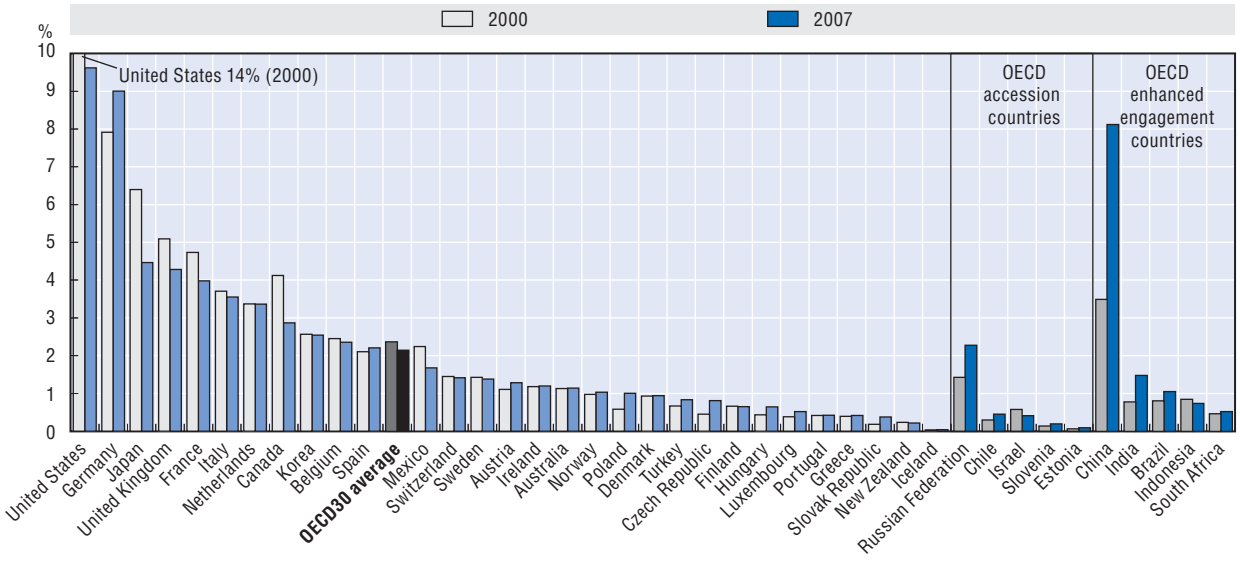
For further reading

- *OECD Trade Indicators*, *www.oecd.org/std/its/tradeindicators*.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, *unstats.un.org/unsd/snaama*.

C.5. World export market shares

Figure C.5.1. **World export market shares in goods and services, 2000 and 2007**

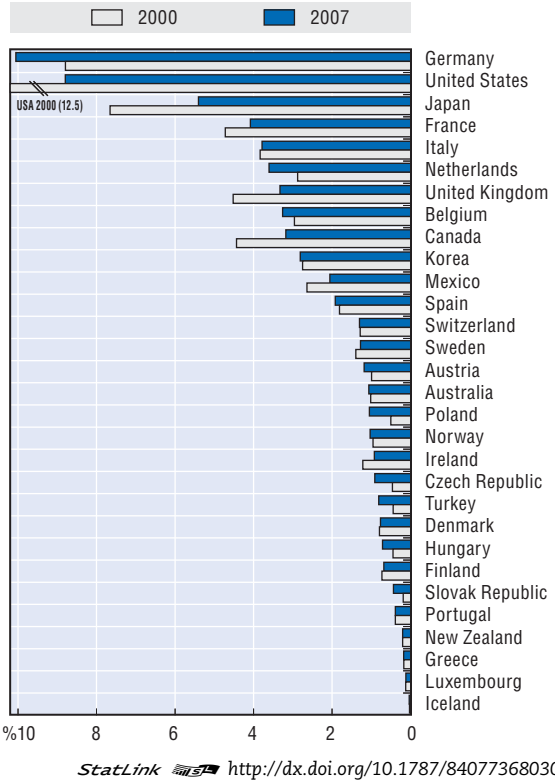
Current prices



StatLink http://dx.doi.org/10.1787/840745523132

Figure C.5.2. **World[1] export market shares in goods of OECD countries**

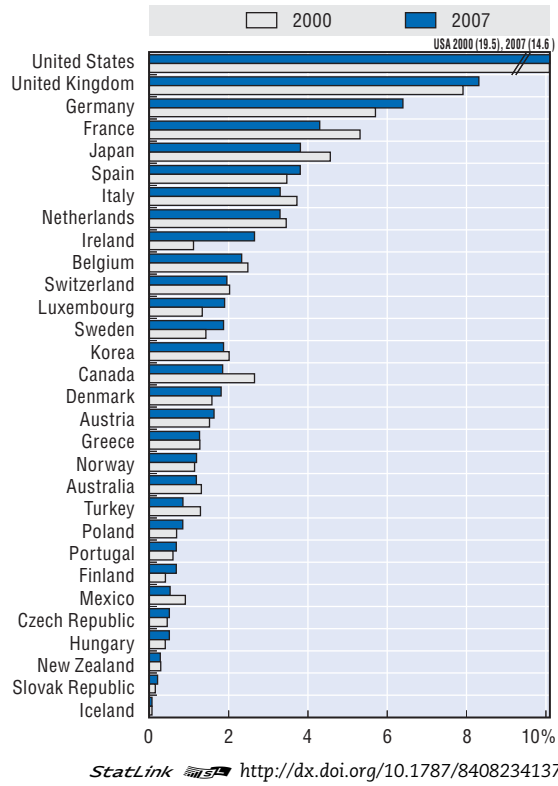
Current prices



StatLink http://dx.doi.org/10.1787/840773680304

Figure C.5.3. **World[1] export market shares in services of OECD countries**

Current prices



StatLink http://dx.doi.org/10.1787/840823413724

1. Values in world total for 2006 rather than 2007 for Venezuela, Iran and Chinese Taipei.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

C.6. World export market shares (cont.)

■ The (geometric) average annual growth rates of market shares for total trade, for 2000 to 2007, show the differences in countries' export performance. The OECD member with the highest average growth rate was the Slovak Republic (an average annual increase of 11.1%), followed by the Czech Republic (+8.7%) and Poland (+8.0%). The largest average decreases were observed in Canada (–5%), Japan (–5%) and the United States (–4.9%).

■ Among the OECD accession countries and the countries of the OECD Enhanced Engagement Programme, China and India increased their export market shares the most, with annual increases of with +12.8% and +9.7%, respectively.

■ In 2007, the United States was the OECD's top exporter for food and live animals, crude materials and miscellaneous manufactured articles and was in second place for chemicals and related products and machinery and transport equipment.

■ Other leading OECD exporters are Germany (chemicals, manufactured goods. and machinery and equipment), France (food and beverages and tobacco), Norway (mineral fuels) and the Netherlands (animal and vegetable oils).

Sources

- *OECD Trade Indicators*, May 2009.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, 2009.

For further reading

- *OECD Trade Indicators*, *www.oecd.org/std/its/tradeindicators*.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, *unstats.un.org/unsd/snaama*.

Export market shares and competitiveness

Export market shares (XMS_{ij}) for a country *i* and a product *j* concern the share of exports (X_{ij}) of products *j* by firms in country *i* in relation to world exports of the product or by reference area (in this document, the world, $i = 1…n$).

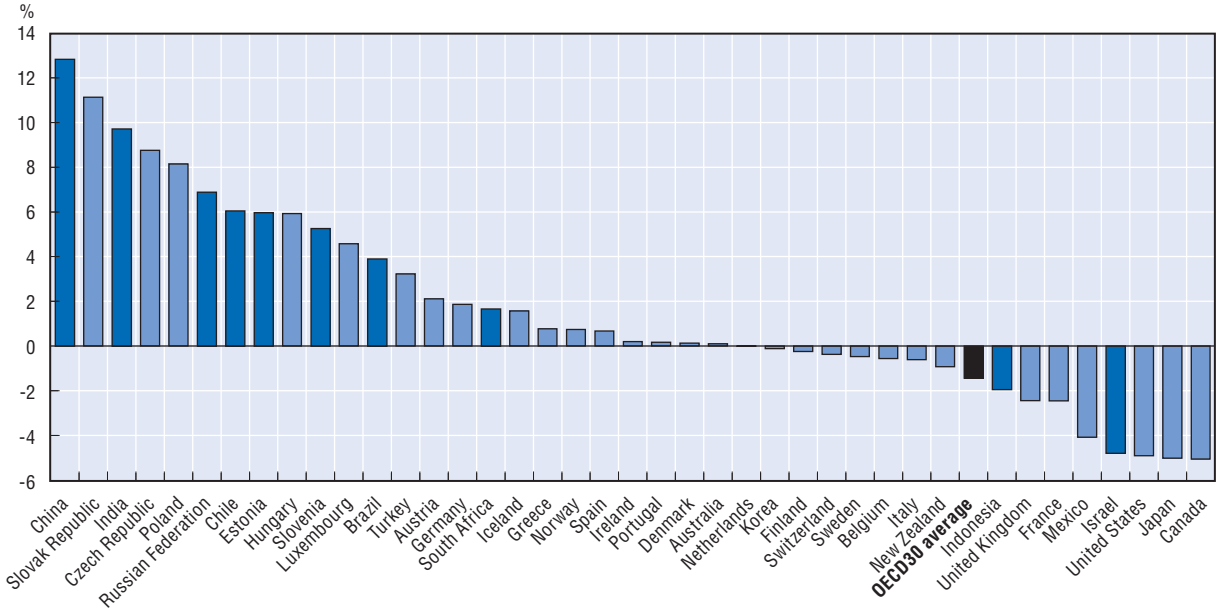
$$XMS_{ij} = \frac{100X_{ij}}{\Sigma_{i=1}^{n} X_{ij}}$$

Traditionally, firms have tended to establish a direct link between trends in their export market shares and competitiveness. However, a direct link between export market shares and competitiveness is not obvious since many factors directly or indirectly affect export market shares (foreign direct investment, firms' strategic choices, changes in specialisation, exchange rate fluctuations).

C.6. World export market shares (cont.)

Figure C.6.1. **World export market shares in goods and services**

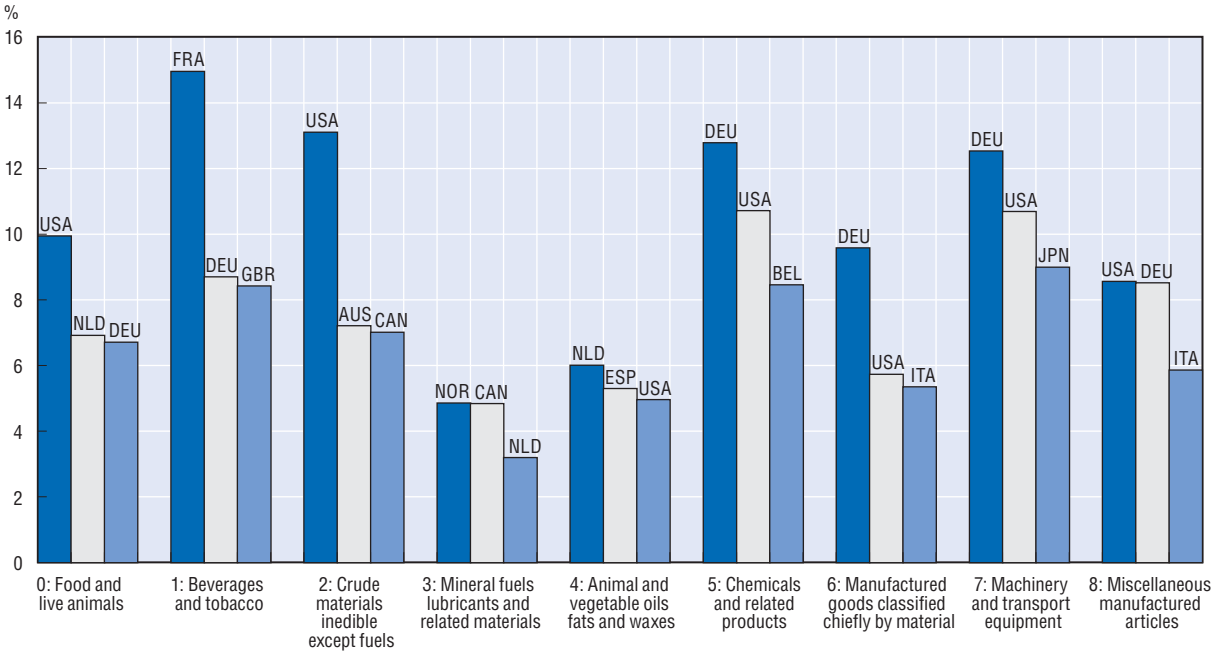
Average annual growth rate 2000-07, current prices, in percentage



StatLink http://dx.doi.org/10.1787/840855776481

Figure C.6.2. **Top three OECD exporters of goods, by category of commodities, 2007**

World export market shares, current prices in percentage



StatLink http://dx.doi.org/10.1787/840861067658

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

C.7. Geographical distribution of shares of exports of goods

In 2007, Germany was the largest exporter of goods to the European Union (EU25) with an export market share of 17.7%, slightly higher than in 2000 (16.4%). During the same period, France, the United Kingdom, the United States and Japan recorded losses in export market shares. The export shares of the Netherlands and Belgium increased notably, as did those of Poland, the Czech Republic and Hungary. China and the Russian Federation with 5.2% and 3.4%, respectively, of total exports to the European market also had significant increases.

For the United States' domestic market, exports from Canada, Mexico and Japan accounted for about 47.5% of the total in 2007. This aggregate share has declined sharply from about 58.1% in 2000. NAFTA agreements have nonetheless secured for Canada and Mexico the highest shares of exports. Since 2000, however, China's share of exports to the United States has grown at an average annual rate of 15.7% to reach 15.8% of the total in 2007. China has thus surpassed Japan in terms of relative export shares to the United States.

The United States' share of exports to the Japanese market decreased from 29.6% in 2000 to 17.9% in 2007. At the same time, China's exports recorded a significant increase, from 18.9% in 2000 to 29.1% in 2007. Between 2000 and 2007, Australia is the only OECD country with a significant increase in its share of exports to Japan. This is probably related to Australia's specialisation in the production of raw materials and Japan's strong demand owing to its meagre natural resources.

Sources

- OECD, *International Trade by Commodity Statistics (ITCS) Database*, May 2009.
- *UN Comtrade Database*, 2009.

For further reading

- *International Trade in Goods*, *www.oecd.org/std/trade-goods*.

Geographical distribution of export shares

For each OECD country, accession country or enhanced engagement country i, the export shares XS_i referring to another country *j* of the same grouping are measured as follows:

$$XS_i^j = 100 \frac{X_i^j}{\Sigma_i^n X_i^j}$$ with $n = 40$ (total number of OECD countries, accession countries and enhanced engagement countries) and $i \neq j$.

where

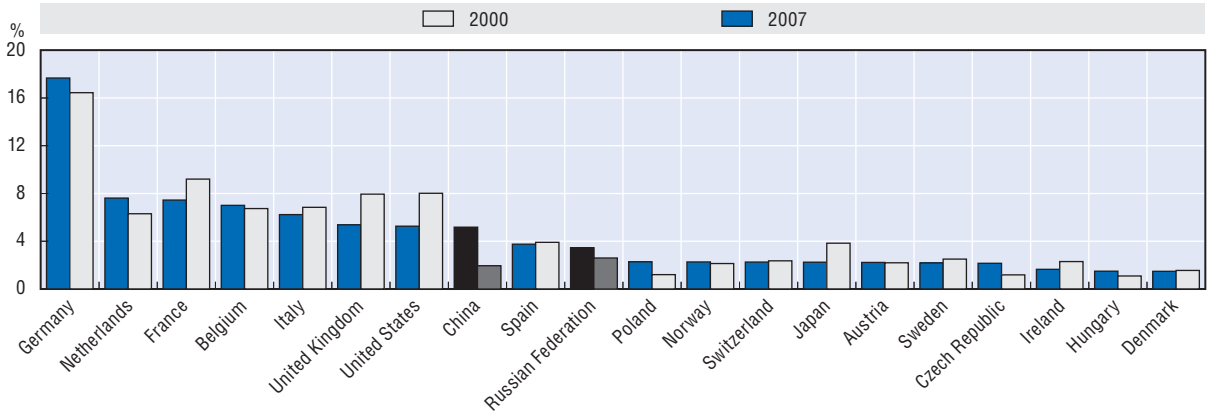
XS_i^j ; export shares of country *i* in country *j*;

$\Sigma_i^n X_i^j$: total exports of 39 countries (except exports of country *j*) destined for country *j* (40 countries if *j* is neither an OECD country, an accession country or an enhanced country).

C.7. Geographical distribution of shares of exports of goods

Figure C.7.1. **Highest shares of goods exported to EU25 by OECD+,[1] 2000 and 2007**

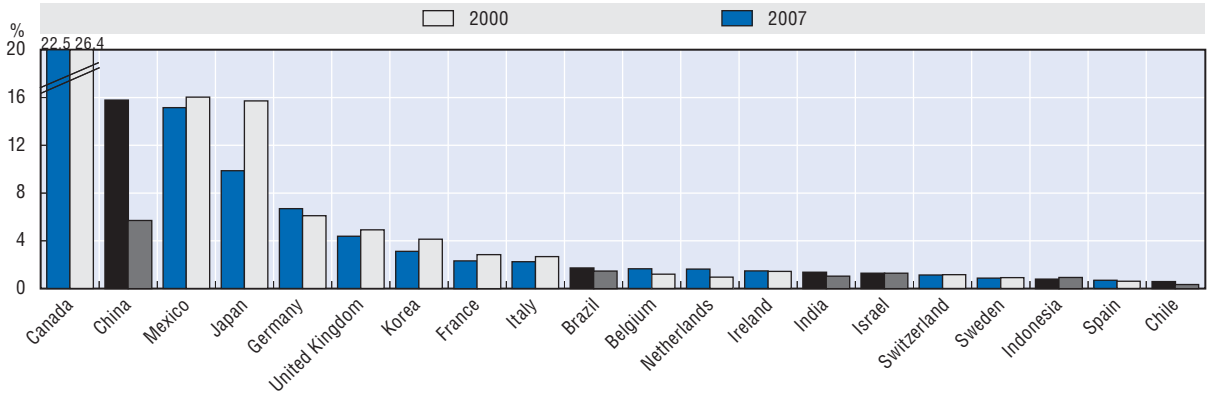
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/840867385488

Figure C.7.2. **Highest shares of goods exported to the United States by OECD+,[1] 2000 and 2007**

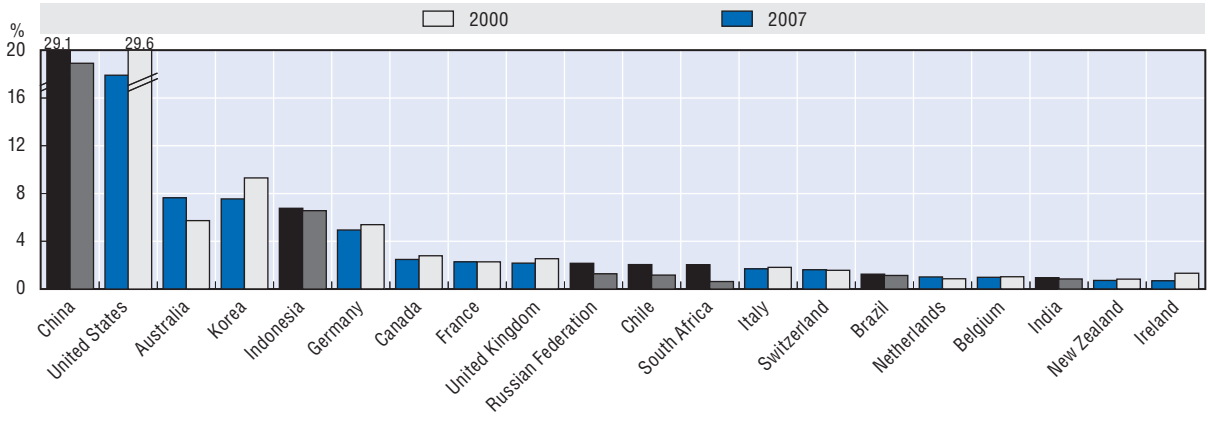
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841072138766

Figure C.7.3. **Highest shares of goods exported to Japan by OECD+,[1] 2000 and 2007**

Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841074002111

1. OECD+ groups OECD, accession countries and enhanced engagement countries (40 countries).

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

C.8. Geographical distribution of shares of export of goods (*cont.*)

■ Between 2000 and 2007, some OECD countries lost large shares of exports to India: Belgium (from 12.1% to 6.0%), the United Kingdom (from 11.8% to 4.8%) and Japan (from 9.4% to 5.1%). In contrast, China's export shares increased from 5.9% in 2000 to 19.7% in 2007. This trend illustrates the growing "south-south" trade that is gradually replacing traditional trade links.

■ OECD countries have generally lost relative export shares to China and Hong Kong (China). Leading global exporters, specialisation in exports of raw materials and geographical proximity can explain the still good performances of Germany, Australia and Korea, respectively, for exports to the Chinese market. Among OECD countries, Japan remained the most important exporter to China (including Hong Kong, China). However, there has been a relative decrease of its shares of exports to the Chinese market (from 30.1% to 25.5%) during the reference period.

■ From 2000 to 2007, Japan and the United States experienced a decrease in their shares of exports to Asia from 21.2% to 16.1% and from 21.6% to 13.7%, respectively. Small central European exporters such as the Slovak Republic, Poland and Hungary are gaining market shares in Asia. China's export shares have jumped from 13.5% to 24.0%. Due to the diversity of its economic base, India's trade volume with the rest of Asia is still low has increased from 1.2% in 2000 to 2.1% in 2007.

Sources

- OECD, *International Trade by Commodity Statistics Database*, May 2009.
- *UN Comtrade Database*, 2009.

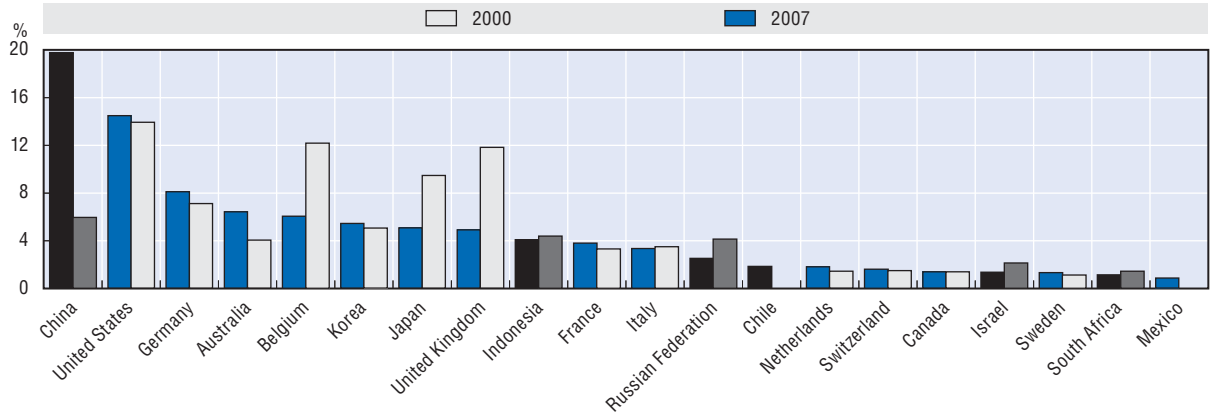
For further reading

- *International Trade in Goods*, *www.oecd.org/std/trade-goods*.

C.8. Geographical distribution of shares of export of goods (cont.)

Figure C.8.1. **Highest shares of goods exported to India by OECD+,[1] 2000 and 2007**

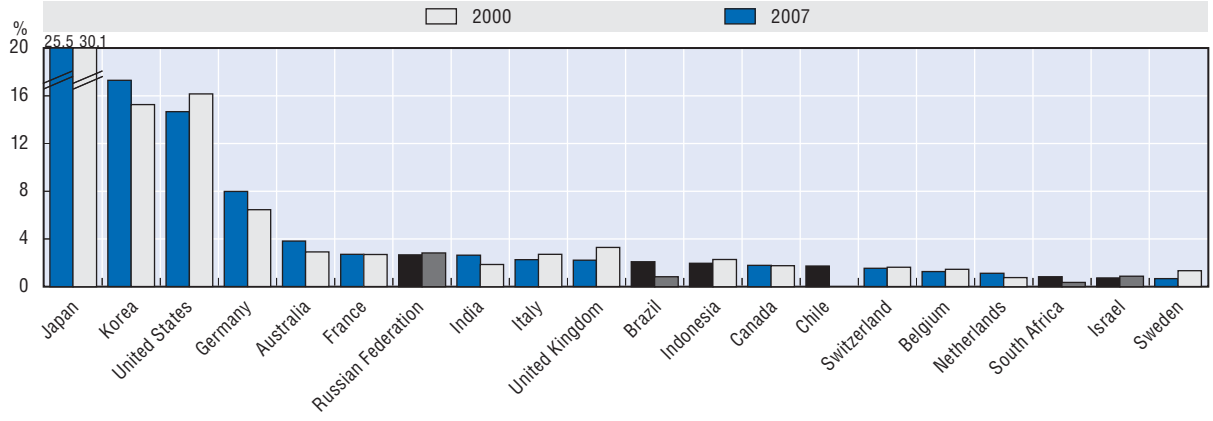
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841074666420

Figure C.8.2. **Highest shares of goods exported to China and Hong Kong (China) by OECD+,[1] 2000 and 2007**

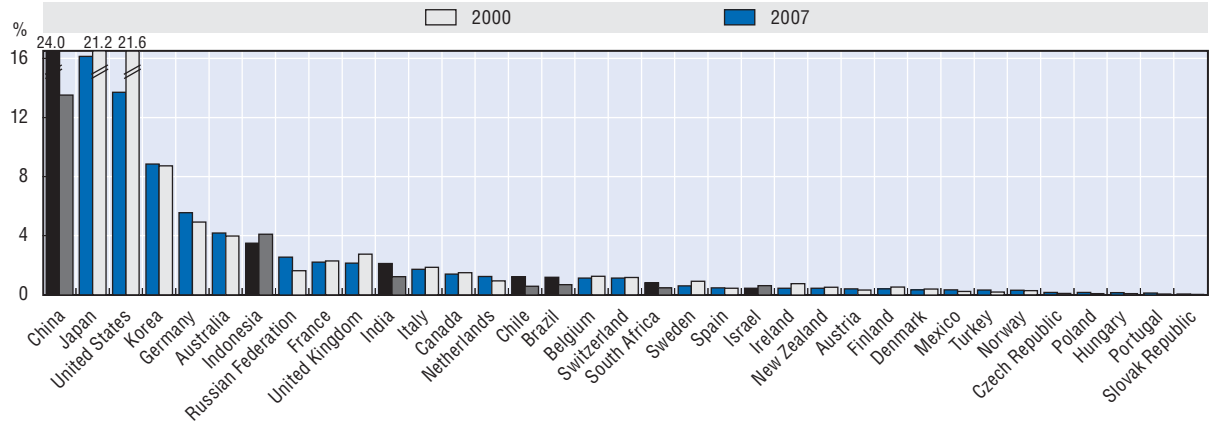
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841088310562

Figure C.8.3. **Highest shares of goods exported to Asia by OECD+,[1] 2000 and 2007**

Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841156313221

1. OECD+ groups OECD, accession countries and enhanced engagement countries (40 countries).

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

C.9. Geographical distribution of shares of exports in services

■ The United States is by far the largest OECD exporter of services (relative to available OECD countries in 2000 and 2006) to the European Union. Its share has however weakened, from 26.6% in 2000 to 22.6% in 2006. The United Kingdom, Germany, Spain and Japan have instead slightly improved their export shares over the period.

■ The United Kingdom increased its relative share of services exports to the United States from 17.0% to 20.2% during the reference period. This reflects the United Kingdom's specialisation in insurance and financial services for the rest of the world, including the United States, and the growing importance of these service activities in the globalised economy.

■ Canada's and France's relative export shares to the United States have decreased while Ireland, Germany, Norway and Denmark have improved their relative export shares. Ireland's improvement (from 1.1% to 4.2%) is due to its specialisation in computer and information services, also a crucial service activity in the integrated world economy. At the same time, however, Ireland pays very large royalties and licence fees to the rest of the world (half of the total goes to the United States).

■ The United States leads in exports of services to Japan, with about 56.0%. Other important service exporters to Japan include the United Kingdom, Korea, Germany, France and Australia. Korea registered the most important loss of export shares during the reference period (from 11.9% in 2000 to 8.7% in 2006).

■ The United States accounted for 41.3% of services exports to India in 2006, down from 46.2% in 2000. The United Kingdom, Germany and Australia have improved their relative export shares to India.

■ The OECD's leading exporters of services to China are the United States and Japan (27.9% and 18.2% in 2006, respectively). However, their shares have declined since 2000 (34.4% and 24.2%, respectively). Korea, Germany, the United Kingdom, France, Sweden and Australia have gained export shares while Canada, Austria and Italy have lost shares.

■ In Asia, the United States still has the bulk of services exports with 41.5% of the total (down from 50.7% in 2000). Japan, the United Kingdom, Germany, France, the Netherlands, Denmark and Australia have seen their relative market shares expand over the period.

Source

- OECD, *Database on Trade in Services by Partner Country*, May 2009.

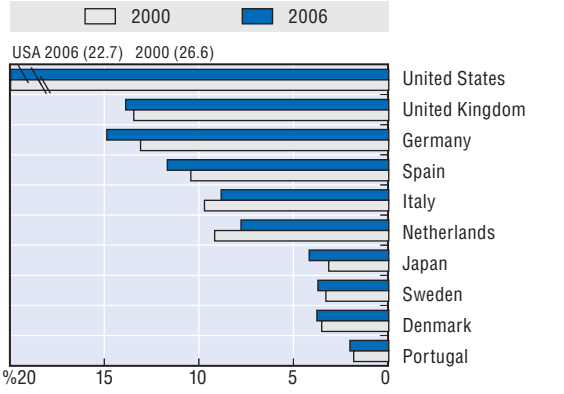
For further reading

- *International Trade in Services*, *www.oecd.org/std/trade-services*.

C.9. Geographical distribution of shares of exports in services

Figure C.9.1. **Shares of services[1] exported to the EU25, 2000 and 2006**

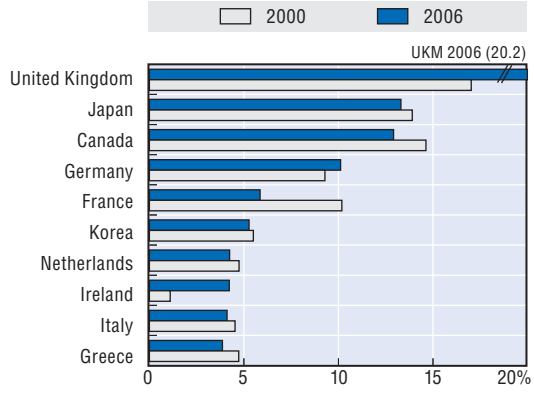
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841178673683

Figure C.9.2. **Shares of services[1] exported to the United States, 2000 and 2006**

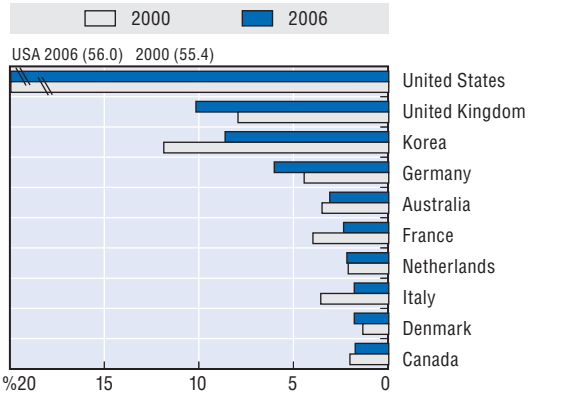
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841188115272

Figure C.9.3. **Shares of services[1] exported to Japan, 2000 and 2006**

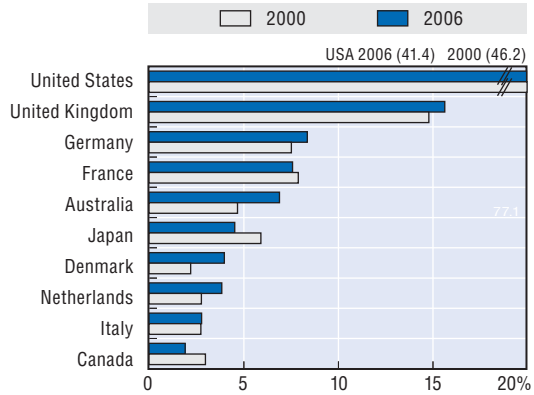
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841224723532

Figure C.9.4. **Shares of services[1] exported to India, 2000 and 2006**

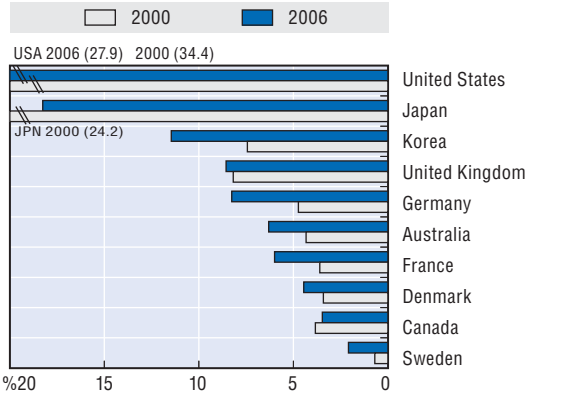
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841322640128

Figure C.9.5. **Shares of services[1] exported to China and Hong Kong (China), 2000 and 2006**

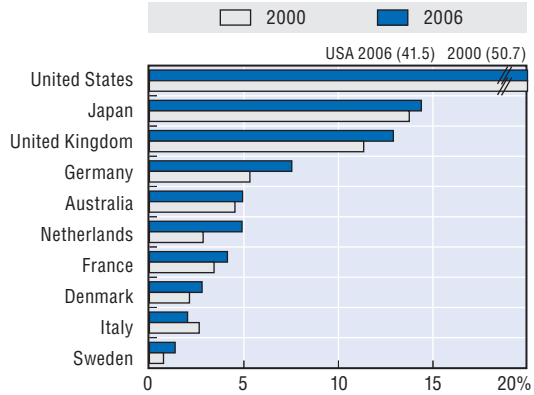
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841331154153

Figure C.9.6. **Shares of services[1] exported to Asia, 2000 and 2006**

Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841351572730

1. Ten highest shares of exports in services in OECD countries for which data are available.

C.10. Import penetration of goods and services

■ The highest penetration of imports of goods and services is observed in smaller countries such as Luxembourg (import penetration rate of 218% in 2007), Belgium (88%), the Slovak Republic (86%), Hungary (80%) and Ireland (78%). Import penetration is lowest in larger countries such as the Japan (16.2%) and the United States (16.4%).

■ Among OECD accession countries, Estonia had the highest import penetration rate (77% in 2007), followed by Slovenia (70%). While the import penetration rates of Slovenia, Israel and Chile increased between 2000 and 2007, the rates of Estonia and especially of the Russian Federation decreased.

■ Of the OECD enhanced engagement countries, China had the highest import penetration rate (35% in 2007, up by 13 percentage points from 2000), followed by South Africa (33%). India's import penetration rate also showed a rather strong increase (25% in 2007, up by 12 percentage points from 2000).

■ Import penetration rates for goods from OECD countries for 2000 and 2007 show that the Slovak Republic had the highest import penetration rate (78% in 2007, up by 16 percentage points from 2000). Distinct negative changes in the ratios were observed for Ireland (–22 percentage points from 2000) and Canada (–8 percentage points). For these countries the reason was not decreasing import values but the fact that their gross domestic product (GDP) increased significantly more than the value of imports. The opposite was true for the Slovak Republic, where imports increased more than GDP.

■ The import penetration rates for trade of services show Luxembourg to have by far the highest degree of import penetration (150%, up by 55 percentage points from 2000). The OECD countries with the lowest import penetration of services were Mexico (1.6%), Turkey (2%), the United States (2.7%) and Japan (3%).

Sources

- OECD, *Trade Indicators Database*, May 2009.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, 2009.

For further reading

- *OECD Trade Indicators*, *www.oecd.org/std/its/tradeindicators*.
- United Nations Statistics Division, *National Accounts Main Aggregates Database*, *unstats.un.org/unsd/snaama*.

The rate of import penetration

The rate of import penetration (MP_{ij}) for a country *i* and a product *j* corresponds to the share of domestic demand (D_{ij}) in country *i* for product *j*, which is met by imports M_{ij}.

$MP_{ij} = 100\ M_{ij}/D_{ij}$. If *P*, *X* and *M* stand respectively for a country's output, export and imports, its domestic demand, *D* will be equal to $D = P - X + M$ and then the import penetration in country *i* for product *j* will be

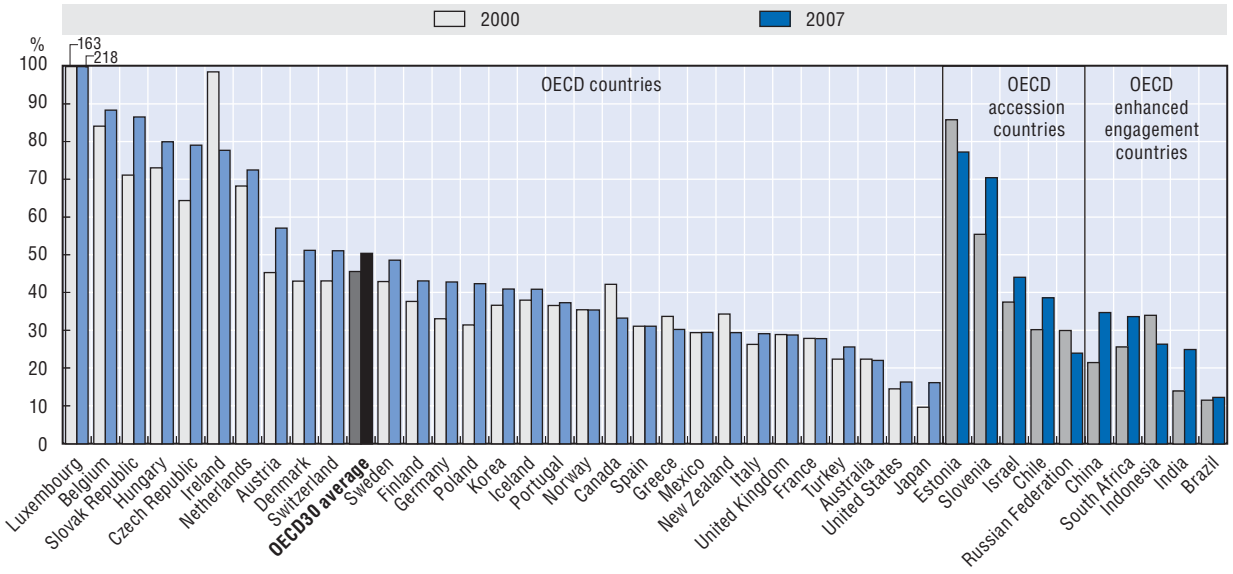
$MP_{ij} = 100\ M_{ij}/(P_{ij} - X_{ij} + M_{ij})$.

Competitiveness on the domestic market, as measured by the rate of import penetration, is based on the notion that a national industry endeavours to win, or at least keep, its shares in its own market. A low import penetration rate does not necessarily reflect import barriers but may be due to a good matching of output to domestic demand by highly competitive domestic firms capable of confronting foreign competition. Conversely, a high import penetration rate may reflect weak competitiveness on the part of domestic firms, especially when the export ratio is low. The size of the countries involved is also very important. The level of import penetration is usually greater in small countries because they are more open to the world economy and because of the way they specialise. As they are unable to specialise in many sectors, they become more dependent on imports. In the longer term, however, if the import penetration rate rises faster than domestic demand and is not accompanied by equivalent gains in export markets, this could indicate some deterioration of competitiveness.

C.10. Import penetration of goods and services

Figure C.10.1. **Import penetration of goods and services, 2000 and 2007**

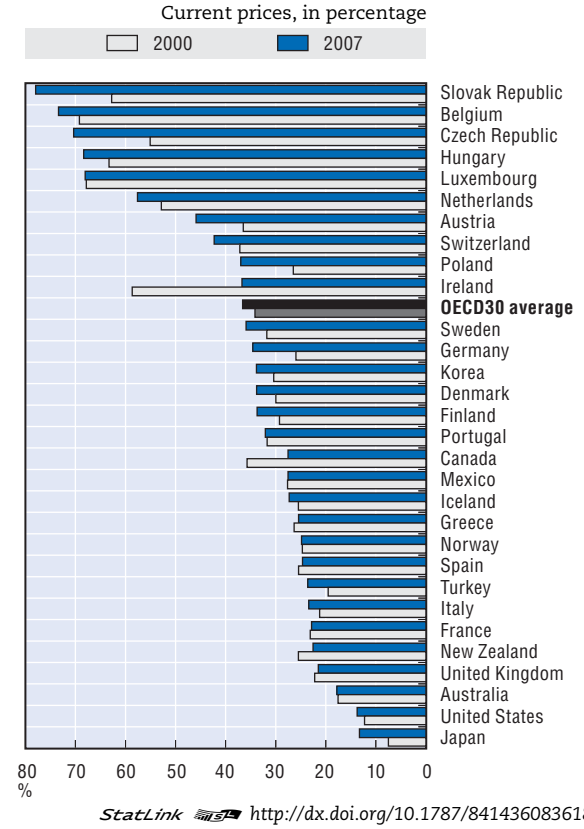
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841351801071

Figure C.10.2. **Import penetration of goods, 2000 and 2007**

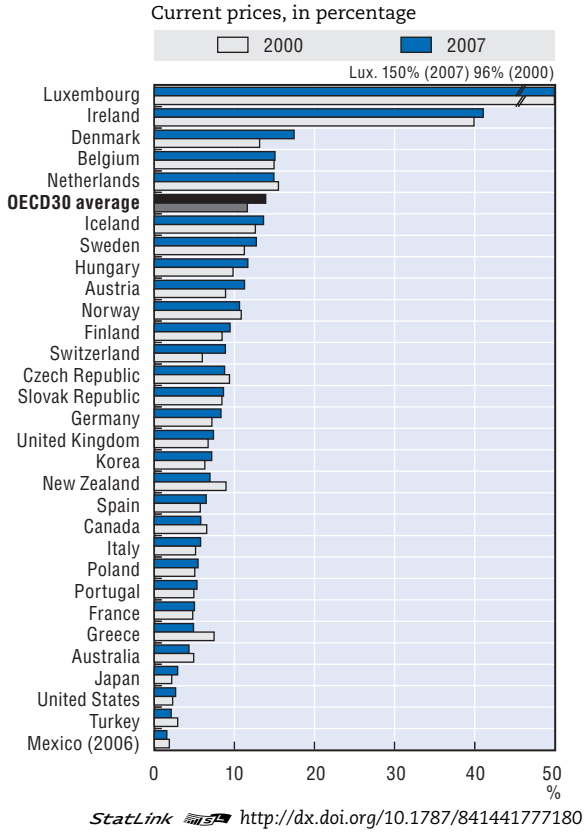
Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841436083618

Figure C.10.3. **Import penetration of services, 2000 and 2007**

Current prices, in percentage



StatLink http://dx.doi.org/10.1787/841441777180

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

C.11. Sensitivity of trade flows to price and income changes

The sensitivity of trade flows to price changes is measured through price elasticity. For most OECD countries, price elasticities of both imports and exports are negative and inelastic for the period from 1970 to 2006. This means that, when the price goes up, the trade volume decreases but by less than the price increase. Mexico, with an elasticity of –1.38, is the only country where imports are relatively more sensitive to a price change. Although trade flows react in general rather insensitively to prices changes, relative sizes of the sensitivity vary significantly. For imports, the price elasticities of eight countries are less than 0.2 in absolute terms and those of seven countries are more than 0.4 in absolute terms. Furthermore, export elasticities of two countries are less than 0.2 and those of ten countries are more than 0.4.

Sensitivity of trade flows to income changes is measured by income elasticity. For all OECD countries both imports and exports are very sensitive to changes in domestic and external income, respectively. Income elasticities of imports and exports range between 1.5 and 4, with import elasticity being more uniform across countries. For two-thirds of OECD countries, import income elasticities are higher than those of exports. Eight countries, including Ireland, Korea, Luxembourg and Turkey, are exceptions; they show significantly higher income elasticities of exports.

Sources

- OECD, *Annual National Accounts Database*.
- World Bank, *World Development Indicators Database*.

Trade elasticity

Trade elasticity reveals the impact of changes in internal or external conditions on volume of imports and exports or terms of trade. They are calculated as a ratio of the percentage change in quantity (import or export) to the percentage change in price or income. If the elasticity of external demand price is low, for example, changes in external conditions or changes in exchange rates are unlikely to have much impact on the current accounts or the growth of an economy. In addition to the size, stability of the elasticity is also important. If it is unstable, the effect of such changes on the economic movement cannot be determined with any degree of confidence.

The *OECD's National Account Database* was used to extract data on imports and exports (both volume and value) and total gross national income (GNI) for each OECD member country. Imports and exports include both goods and services. The *World Development Indicators Database* was used to collect data on world GNI. All the information is in annual frequency for 1970-2006 and valued in US dollars. The import and export prices are estimated as a ratio between imports and exports at current and constant prices, respectively. Eastern European OECD member countries, *i.e.* the Czech Republic, Hungary, Poland and the Slovak Republic, are excluded from the analysis because of the shorter length of their time series. Basic equations utilised to estimate import and export elasticity are as follows:

$M_t = F[M_{t-1}, DD_t, P_{m,t}]$, where M_t is imports, DD_t is domestic income and $P_{m,t}$ is import price; and

$X_t = F[X_{t-1}, DW_t, P_{x,t}]$ where X_t is exports, DW_t is external income and $P_{x,t}$ is export price.

A Generalized Least Square model was used to estimate import (export) elasticity, with lagged import (export), import (export) prices and domestic (external) income as explanatory variables. Volume data were used for both imports and exports and domestic and external income. Size of elasticities of imports and exports seems to be very sensitive to inclusion or exclusion of lagged dependent variables or trend.

C.11. Sensitivity of trade flows to price and income changes

Figure C.11.1. **Import elasticity of price, 1970-2006**

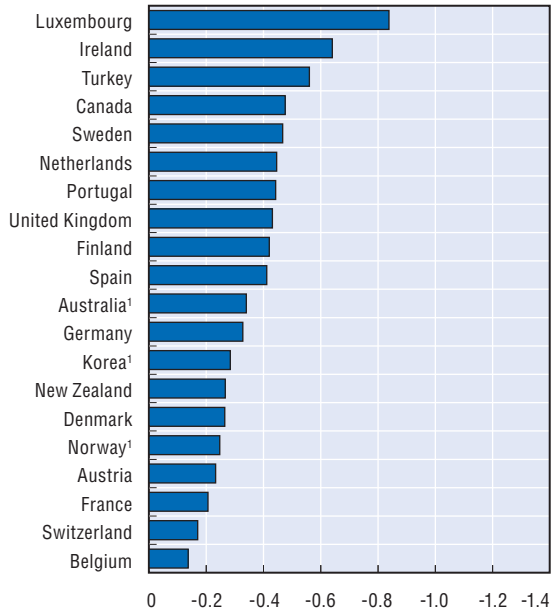


Note: Estimates for Australia, Greece, Korea, New Zealand and Switzerland are not included as their values are of no statistical significance.

1. Estimates are significant at the 10% level.

StatLink http://dx.doi.org/10.1787/841471650284

Figure C.11.2. **Export elasticity of price, 1970-2006**

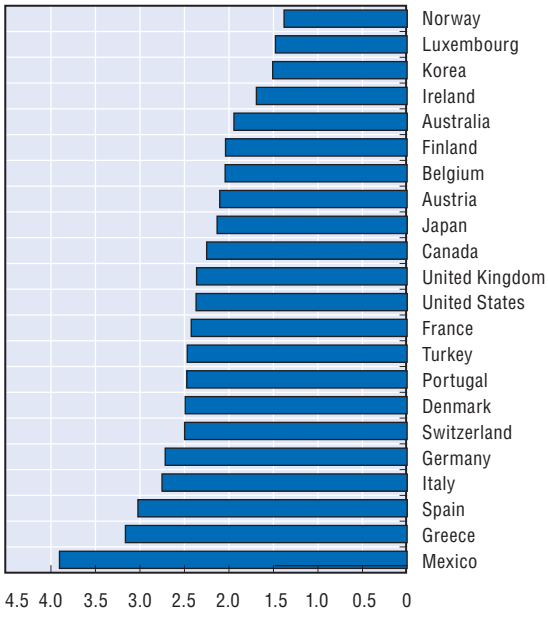


Note: Estimates for Greece, Iceland, Italy, Japan, Mexico and United States are not included as their values are of no statistical significance.

1. Estimates are significant at the 10% level.

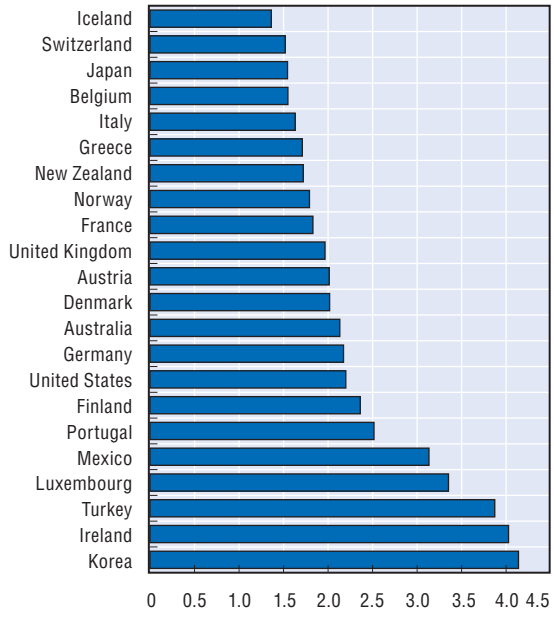
StatLink http://dx.doi.org/10.1787/841553876131

Figure C.11.3. **Import elasticity of income, 1970-2006**



StatLink http://dx.doi.org/10.1787/841688436666

Figure C.11.4. **Export elasticity of income, 1970-2006**



StatLink http://dx.doi.org/10.1787/841702180138

C.12. Intra-regional trade

■ Intra-regional trade has become more prominent following the increase in regional integration agreements in some major areas (EU, NAFTA, ASEAN and MERCOSUR). Nevertheless the share of intra-regional trade in world trade (which also depends on the number of member countries and the trade size of the region) has not grown significantly in recent years.

■ Intra-regional trade among member countries of the European Union (EU27) represents more than 25% of world merchandise trade. This share has fluctuated over 1999-2007, with a downward trend after 2003. NAFTA's intra-regional trade has declined continuously since 2001 and amounted to less than 7% of world trade in 2007. The shares of intra-regional trade in ASEAN and MERCOSUR are very small but have followed an upward trend in the last few years, reflecting, among other things, the more rapid growth of their member countries.

■ The same picture emerges when analysing intra-regional trade shares, *i.e.* the share of intra-regional trade in the total trade of regions instead the total world (Other things being equal, larger regions – in terms of total trade and/or number of member countries – tend to have higher intra-regional trade shares, as shown by the European Union and NAFTA).

■ The share of intra-regional trade of the EU15 declined from around 64% in the early 1990s to less than 62% in 2000-03. The 2004 enlargement translated into an upward adjustment of this indicator, which remained quite stable around 66% in the following two years. The other three regions' intra-regional trade shares show a more or less pronounced upward trend in the 1990s, which has only continued in the current decade for ASEAN. NAFTA's intra-regional trade share has fallen back to its level of the early 1990s, due to the relatively slow growth of its total trade and to the nominal impact of the dollar depreciation. In the case of MERCOSUR, the financial crises in Brazil and Argentina brought about a sharp fall in the intra-regional trade share. The upward trend has resumed since 2003.

Source

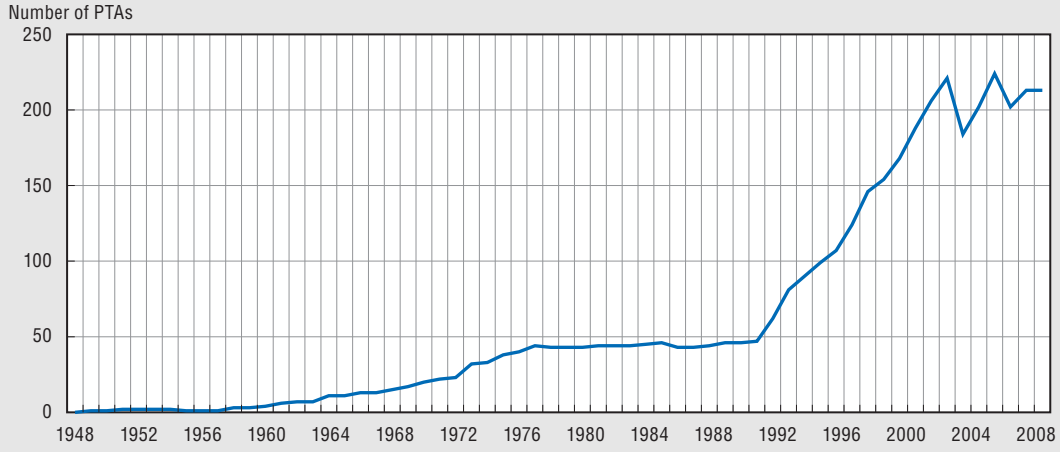
- WTO, *International Trade Statistics 2008*, *www.wto.org/english/res_e/statis_e/its2008_e/its08_toc_e.htm*.

Number of preferential trade agreements notified to the GATT/WTO

Many indicators can be used to measure the empirical relevance of regional integration processes, considering either the number of agreements, or the value of trade among their member countries.

The WTO Secretariat keeps the count of the bilateral, plurilateral and regional preferential trade agreements in force, which have been notified by GATT/WTO member countries, in compliance with their obligations under GATT Article XXIV, the "Enabling Clause" and GATS Article V This count does not include agreements in force that are still to be notified, signed agreements that have not yet entered into force, agreements under negotiation or simply at the stage of proposal, and agreements among countries that are not members of the WTO.

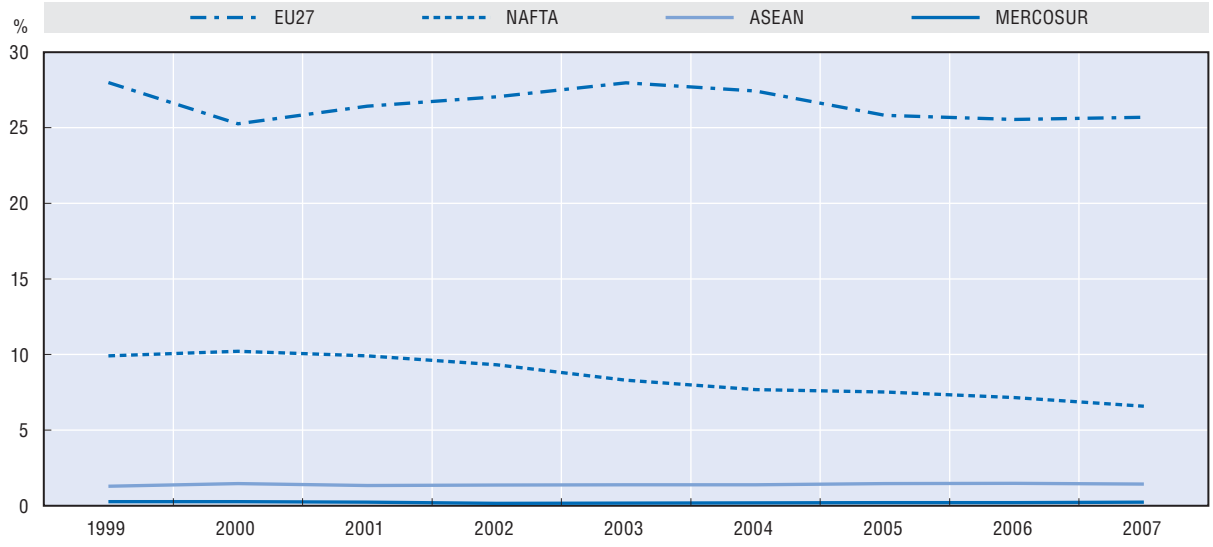
Figure C.12.1. **Preferential trade agreements notified to the GATT/WTO and in force, by date of entry into force, 1948-2008**



StatLink http://dx.doi.org/10.1787/841722002678

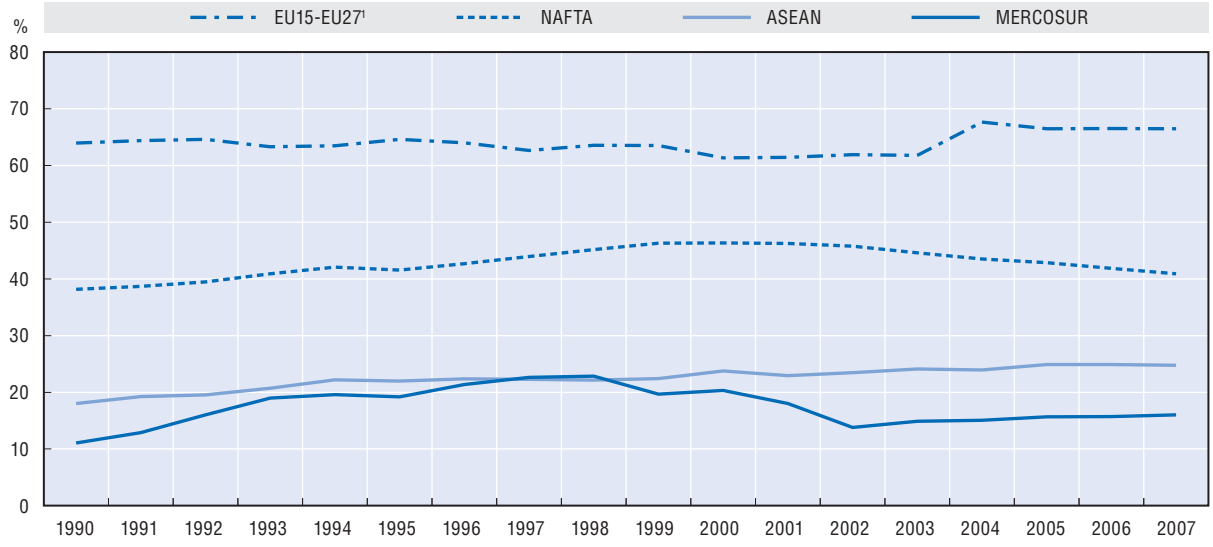
C.12. Intra-regional trade

Figure C.12.2. **World trade shares of intra-regional trade, by region**



StatLink http://dx.doi.org/10.1787/841748477043

Figure C.12.3. **Intra-regional trade shares, by region**



1. EU15 for 1990-2003, EU27 for 2004-07.

StatLink http://dx.doi.org/10.1787/841755508461

D. FOREIGN DIRECT INVESTMENT

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D.1. General foreign direct investment trends

Foreign direct investment transactions inform about inward and outward investments within a given period. Both inflows and outflows are estimated after deducting disinvestments and reimbursement of intercompany loans from new investments. The difference between inflows and outflows indicates whether a country is a net exporter or importer of capital in the form of FDI; this is referred to as total net flows. As shown in figure D.1.1, the OECD area is traditionally an exporter of FDI capital as total FDI outflows from the region are higher than total inflows.

Investment flows over the past ten years or so have witnessed significant fluctuations. Preliminary data for 2008 indicate a 35% decrease of FDI inflows to the OECD from 2007 (from USD 1 583 billion in 2007 to USD 1 021 billion in 2008). FDI outflows from the region decreased by 19% (from USD 2 024 billion in 2007 to USD 1 631 billion in 2008). This sharp decline of the investment activity, due largely to financial crisis, is the second sharp drop in less than ten years and is likely to continue significantly in 2009.

The FDI flows in 2007 represented an all-time high for OECD countries, even above the investment boom of 1998-2000 which was due to large volumes of cross-border mergers and acquisitions.

In spite of the decline of FDI in 2008, inflows to the OECD are only slightly below the 2000 peak and outflows are still 30% higher than in 2000. OECD countries therefore maintained a significant level of investment activity for the first three quarters of 2008 and continued to be net exporters of FDI capital. Investments in non-OECD countries increased. Nonetheless, the overall decline of FDI recorded in the fourth quarter of 2008 continued in 2009. Estimates indicate that investments in non-OECD countries will be substantially lower.

The relative importance of FDI in countries which traditionally host special purpose entities is once again significant in 2005-08 due mostly to funds in transit on behalf of multinational companies.

While inflows and outflows of the United States and the United Kingdom are very similar as a percentage of GDP, the shares of inward and outward FDI differ for most countries. Some countries have a more prominent position as investors abroad, such as Ireland, Norway, Spain, Germany, France, Sweden, Austria, Japan and Italy. Others are rather recipients of FDI, such as the Czech Republic, the Slovak Republic, Hungary, Poland, Turkey, New Zealand and Australia.

Source

- *OECD International Direct Investment database*.

For further reading

- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation*.

Direct investment, direct investment enterprise and direct investor

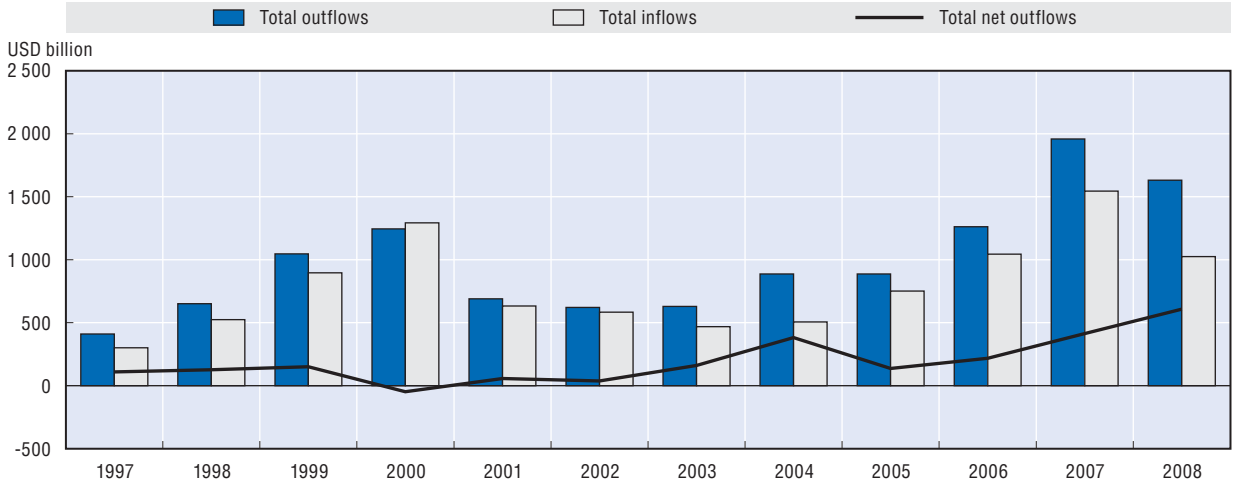
Foreign Direct Investment (FDI) reflects the objective of establishing a lasting interest by a resident enterprise in one economy (direct investor) in an enterprise (direct investment enterprise) that is resident in an economy other than that of the direct investor. The lasting interest implies the existence of a long-term relationship between the direct investor and the direct investment enterprise and a significant degree of influence on the management of the enterprise. The direct or indirect ownership of 10% or more of the voting power of an enterprise resident in one economy by an investor resident in another economy is evidence of such a relationship.

A *direct investor* is an entity (an institutional unit) resident in one economy that has acquired, either directly or indirectly, at least 10% of the voting power of a corporation (enterprise), or equivalent for an unincorporated enterprise, resident in another economy. A direct investor could be classified to any sector of the economy and could be an individual; a group of related individuals; an incorporated or unincorporated enterprise; a public or private enterprise; a group of related enterprises; a government body; an estate, trust or other societal organisation.

A *direct investment enterprise* is an enterprise resident in one economy and in which an investor resident in another economy owns, either directly or indirectly, 10% or more of its voting power if it is incorporated or the equivalent for an unincorporated enterprise.

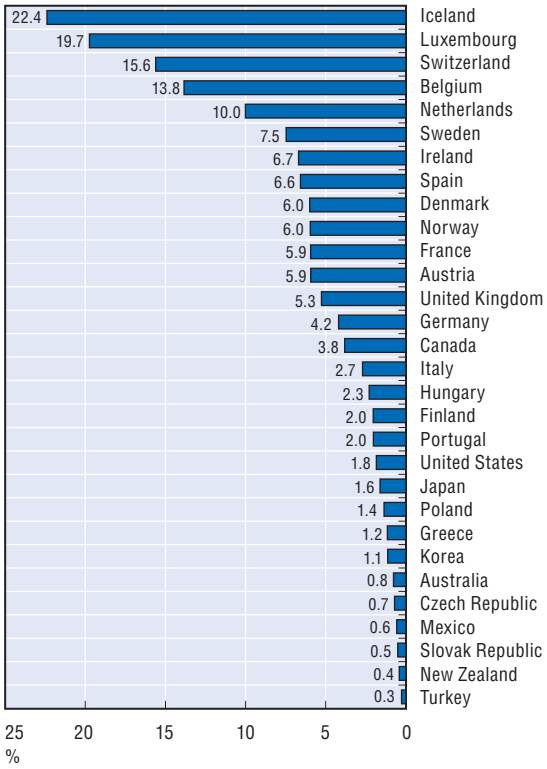
D.1. General foreign direct investment trends

Figure D.1.1. **Total FDI flows to and from OECD countries**



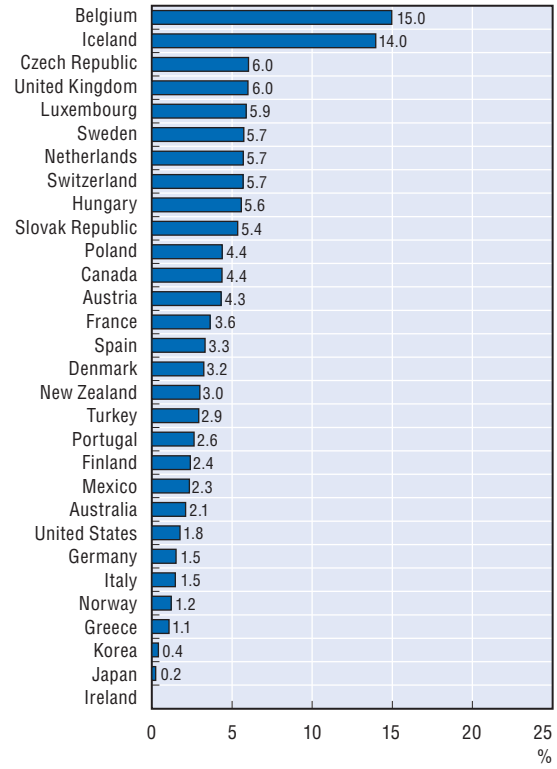
StatLink http://dx.doi.org/10.1787/http://dx.doi.org/10.1787/841758378185

Figure D.1.2. **FDI outflows from OECD countries as a percentage of GDP, average 2005-08**



StatLink http://dx.doi.org/10.1787/841777732845

Figure D.1.3. **FDI inflows to OECD countries as a percentage of GDP, average 2005-08**[1]



1. Ireland: average inflows are negative (–4.7 USD billion).

StatLink http://dx.doi.org/10.1787/841785142420

D.2. Foreign direct investment flows by type of financing

Foreign direct investment comprises three types of transactions: equity finance, reinvestment of earnings and intercompany loans.

Equity finance relates to the ownership of shares representing more than 10% of the voting power, hence providing the basic criteria for the establishment of a direct investment relationship between the direct investor and the direct investment enterprise.

On average, equity finance accounts for more than 50% of OECD investments. Over the past decade, the share of equity finance in FDI inflows fluctuated between 54% in 1997 (USD 155 billion) to 77% in 2003 (USD 363 billion) and it stood at 59% in 2007 (USD 994 billion). Equity investment represented 52% of investment outflows in 1997 (USD 209 billion) rising to 75% in 2000 (USD 772 billion) when FDI reached unprecedented high levels due to the boom in cross-border mergers and acquisitions. This share went down to 54% in 2007 (USD 1 119 billion).

The data for the past four years indicate that for most OECD countries equity investment represents, on average, 50% to 75% of outflows. The share of equity financing in OECD investments fell to 51% in 2008 for inflows (USD 500 billion) and 41% for outflows (USD 650 billion).

Earnings that are not distributed in the form of dividends are reinvested in the direct investment enterprise which may be a negative value if dividends distributed are higher than earnings. Their share of reinvestment of earnings became increasingly important in recent years reaching, on average, around 30% of OECD investments in 2008. Historically, OECD investors reinvest a higher share of their earnings abroad as compared to reinvestment of earnings by foreign investors in resident enterprises.

The third component of FDI flows relates to intercompany loans extended by the parent or between affiliated enterprises which constitute temporary financing that are subject to reimbursements to the lender for whom they usually generate interest income.

Intercompany loans represent on average a significant share of total inflows, *e.g.* more than 50% in several countries such as Australia, Canada and France, over the period 2005-2008. In contrast to equity, they can feature substantial fluctuations due to reimbursements of loans and consequently impact overall investment figures.

Source

- *OECD International Direct Investment Database*.

For further reading

- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation*.

Foreign direct investment transactions

Direct investment flows are cross-border transactions within a given period between affiliated enterprises that are in a direct investment relationship: *i)* outflows are investments by resident direct investors abroad; and *ii)* inflows are investments by non-resident direct investors in the reporting economy. Transactions between residents of the same economy are excluded. Direct investment financial flows are composed of *equity capital*, *reinvestment of earnings* (and undistributed branch profits) and *other capital* (inter-company loans).

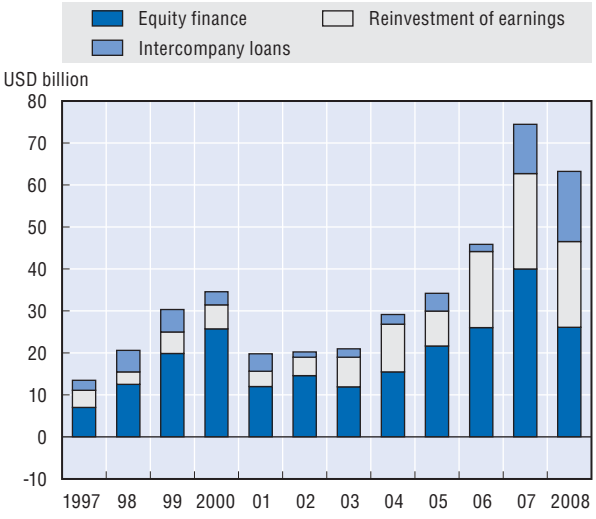
Equity capital comprises: *i)* equity in branches; *ii)* all shares in subsidiaries and associates (except non-participating preference shares; and *iii)* other capital contributions, including non-cash acquisitions of equity (such as through the provision of capital equipment). Ownership of equity is usually evidenced by shares, stocks, participations, depositary receipts or similar documents.

Reinvestment of earnings (and undistributed branch profit)s comprise the earnings on equity accruing to direct investors less distributed earnings, proportionate to the percentage ownership of the equity owned by the direct investor(s). Reinvested earnings are also included in direct investment income because reinvested earnings are not actually distributed to the direct investor but rather increase the direct investor's investment in its affiliate.

Other capital: covers the borrowing or lending of funds between *affiliated direct investment enterprises*. The instruments covered include loans, debt securities, suppliers' (trade) credits, financial leases, and non-participating preference shares which are treated as debt securities.

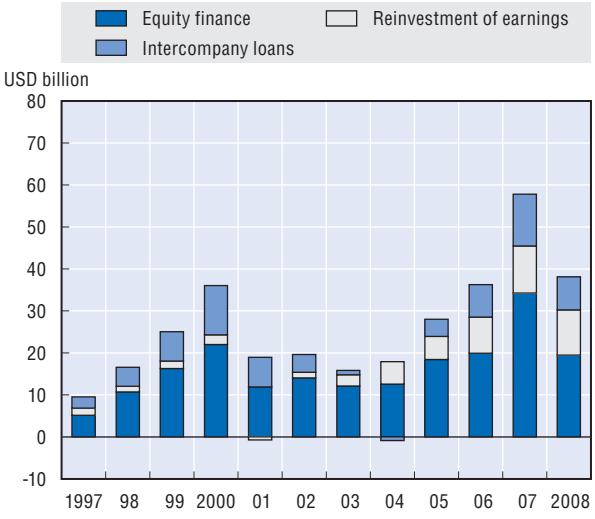
D.2. Foreign direct investment flows by type of financing

Figure D.2.1. **FDI outflows by type of financing, OECD average, 1997-2008**



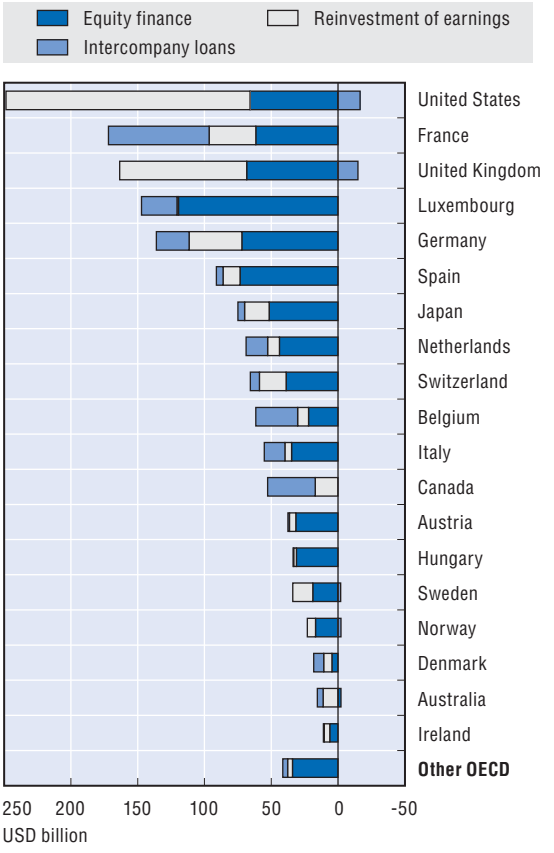
StatLink http://dx.doi.org/10.1787/841787404883

Figure D.2.2. **FDI inflows by type of financing, OECD average, 1997-2008**



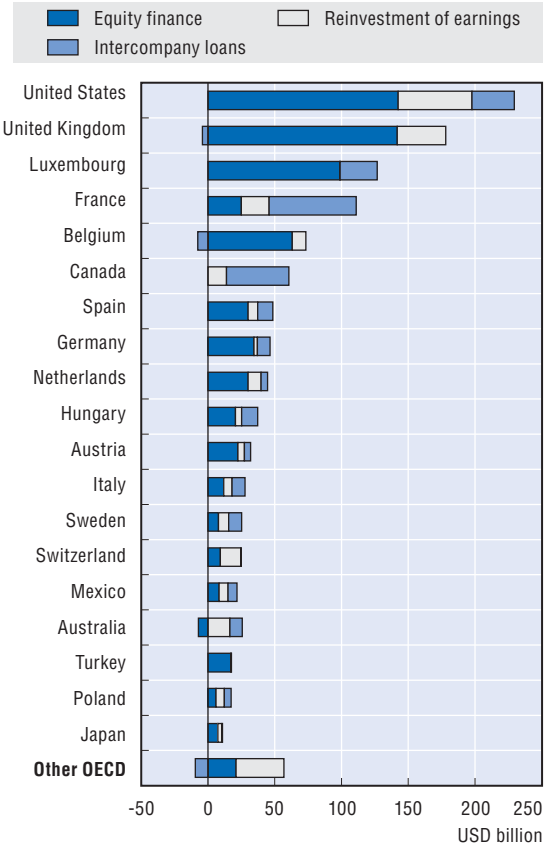
StatLink http://dx.doi.org/10.1787/841802411156

Figure D.2.3. **FDI outflows by type of financing, average 2005-08**



StatLink http://dx.doi.org/10.1787/841803685455

Figure D.2.4. **FDI inflows by type of financing, average 2005-08**



StatLink http://dx.doi.org/10.1787/841808254170



D.3. Foreign direct investment stocks

The underlying motivation of direct investment is to establish a long-term relationship between the direct investor and the direct investment enterprise. FDI stocks provide the basis for structural analysis of investments accumulated over time. Expressed as a percentage of GDP, FDI stocks provide comparative analysis across countries of the extent of the FDI relationship between the direct investor and the direct investment enterprise.

Figure D.3.1 shows the relative importance of the position of OECD countries as home or host of direct investments in 2007 while Figures D.3.2 and D.3.3 provide the ranking of inward and outward FDI positions by relative importance measured as a percentage of their GDP.

In terms of real levels of investment stocks, the United States is the largest host and investor country representing around 25% of total OECD investments. Nevertheless, in comparison to the size of its economy, United States' foreign investment from abroad represented only 18% of its GDP and its outward investments 24%.

All other G7 countries also exhibit relatively more important outward investments in 2007 than inward investments. For the United Kingdom, France, Japan and Italy the difference between the relative size of outward/inward investments was 20%, 13%, 9% and 7%, respectively. FDI stocks of Canada and Germany represent more than 30% of their GDP.

Outward investments of northern European countries, Iceland, Denmark, Finland, Norway and Sweden were also relatively more important in 2007 than their inward investment stocks.

In contrast, some smaller OECD economies are primarily recipients of FDI. Their ranking by relative importance as host of FDI, measured as a percentage of GDP, is as follows: Hungary (72%), the Czech Republic (65%), the Slovak Republic (54%) Poland (41%) and Turkey (24%). Their outward investments were relatively small, with the exception of Hungary (13%).

FDI positions of special purpose entities which account largely for funds in transit are included in FDI statistics. The positions of economies which traditionally host SPEs, such as Belgium, the Netherlands or Switzerland, represent ratios which are not fully comparable to the ratios calculated for other economies.

Source

- *OECD International Direct Investment Database*.

For further reading

- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation*.

Foreign direct investment positions (stocks)

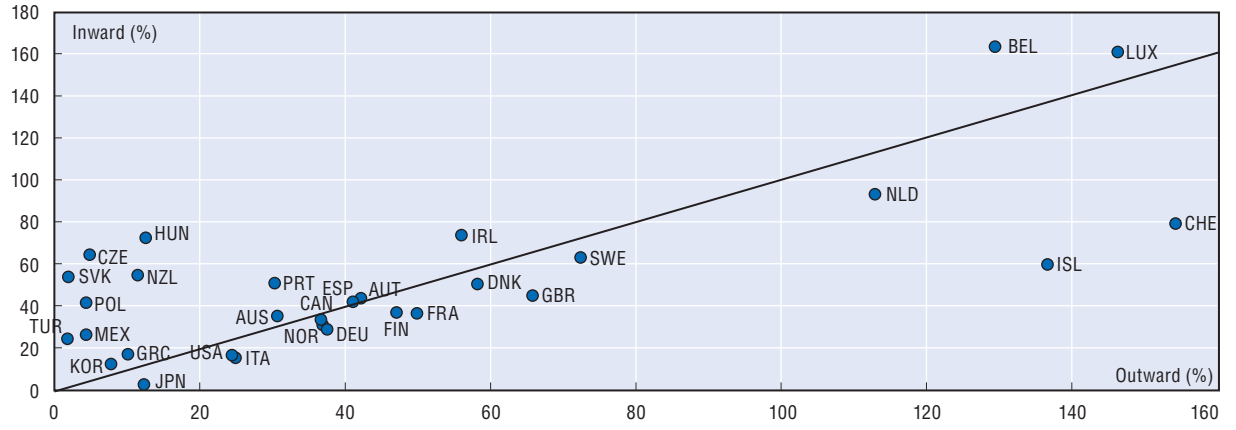
Direct investment position data are stock data showing an economy's direct investment assets and liabilities at a given point in time. For annual data, statistics may be based on calendar years or fiscal years when the latter is different from the calendar year.

According to international standards, assets and liabilities should be valued at market prices prevailing on the date they are recorded in the statistics. Most OECD countries deviate from this recommendation and establish their FDI position statistics according to book values which represent values recorded in the balance sheets of direct investors. Depending on the type of book values applied, the results will vary significantly. Book values which are not based on revaluations but reflect for example historical costs are not in line with market valuation concepts.

Data relating the positions of special purpose entities are included in FDI positions.

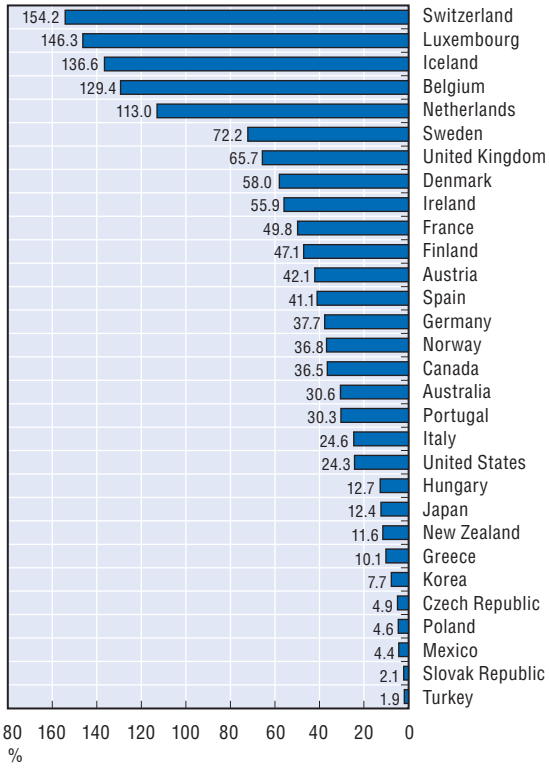
D.3. Foreign direct investment stocks

Figure D.3.1. **Inward and outward stocks of direct investment as a percentage of GDP, 2007**



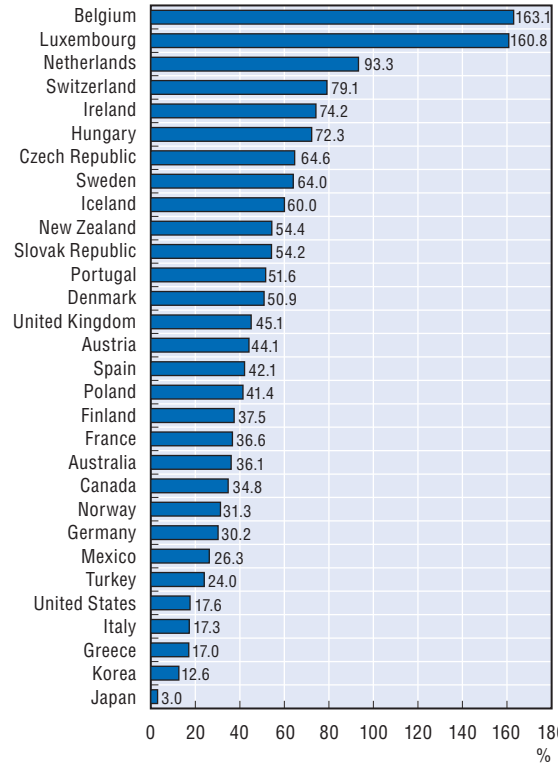
StatLink http://dx.doi.org/10.1787/841880418876

Figure D.3.2. **Outward FDI position of OECD countries as a percentage of GDP, 2007**



StatLink http://dx.doi.org/10.1787/842005573425

Figure D.3.3. **Inward FDI position of OECD countries as a percentage of GDP, 2007**



StatLink http://dx.doi.org/10.1787/842013502433



D.4. Source and destination of foreign direct investment stocks

The analysis by partner country indicates the interdependence of economies. OECD countries' overseas investments are traditionally concentrated on investments in non-resident enterprises located within the OECD area. Non-OECD countries attract only a smaller portion of OECD capital and their share in the total outward investment position of OECD countries has grown more slowly than overall investments in the OECD area.

In consequence, direct investment enterprises residing in the OECD area are, to a very large extent, financed by OECD countries while the share of investments from non-OECD countries remain rather limited. Taking into account funds in transfer, 35% of investments in the OECD were held in the Netherlands, Austria, Luxembourg, Belgium, Switzerland and Denmark.

However, it is likely that the final destination is a non-OECD country. Once we exclude such funds, the share of non-OECD countries is 15%. By the end of 2007 the United States and the United Kingdom together accounted for the largest share of outward (39%) and inward (34%) direct investment stocks of OECD countries.

The combined investments of the United States, the United Kingdom and France accounted for 50% of OECD investments.

In 2007, 55% of outward FDI stocks of the United States were in the European Union followed by 26% in the American continent of which 12% was in Canada and Mexico. Its investments in China stood at USD 28 billion and USD 42 billion was invested in Brazil. However, these figures are likely to be underestimated due to statistical methodology which does not take into account investments *via* financial centres which is common practice for multinational enterprises.

Germany accounts for around 9% of investment stocks; its investments in other OECD countries represent 8.7% of OECD investments and 4.6% of investments in non-OECD countries. Italy and Spain combined hold 8.5% of OECD outward investments which account for 9.6% of investment in OECD and 7% in non-OECD countries.

Some smaller economies are mostly hosts of FDI. When counted together, investments of the Czech Republic, Iceland, Korea, New Zealand, Poland, Portugal, the Slovak Republic and Turkey account only for 1.3% of OECD's outward stocks. Most of their investments are in non-OECD countries accounting for 2.8% of the total.

Source

- *OECD International Direct Investment Database*.

For further reading

- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation*.

Geographic allocation

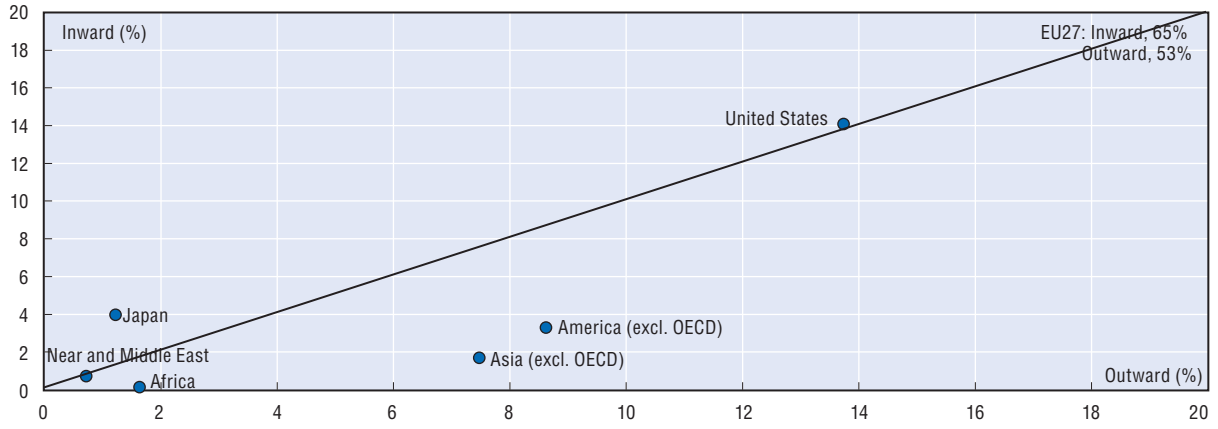
Partner country statistics are not usually symmetrical when comparing bilateral data depending on the principles applied as well as the method for identification of the partner country.

Geographic classification*:** The recommended methodology for direct investment position data should ideally be determined according to the debtor/creditor principle (as opposed to transactor principle). ***Country identification for direct investment positions are recorded primarily in respect of the immediate host or investing country. However, many analysts are also interested in the ultimate source and destination of investments excluding funds in transit.

The ***debtor/creditor principle*** allocates transactions resulting from changes in the financial claims of the compiling economy to the country or residence of the non-resident debtor, and transactions resulting in changes in the financial liabilities of the compiling economy to the country of residence of the non-resident creditor, even if the amounts are paid to or received from a different country. The ***transactor principle*** allocates transactions resulting from changes in the financial claims and liabilities of the compiling economy to the country of residence of the non-resident party to the transaction (the transactor), even if this is not the country of residence of the direct investment enterprise or direct investor.

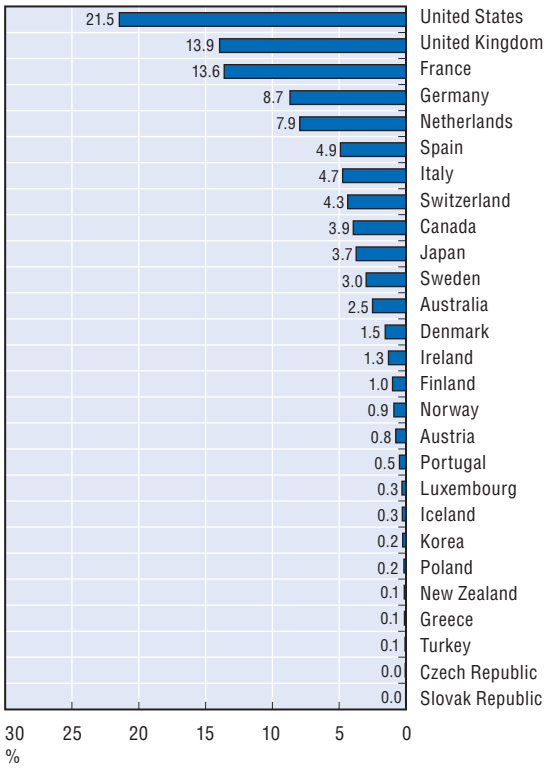
D.4. Source and destination of foreign direct investment stocks

Figure D.4.1. **Distribution of inward and outward stocks of direct investment as a percentage of total OECD investments, 2007**



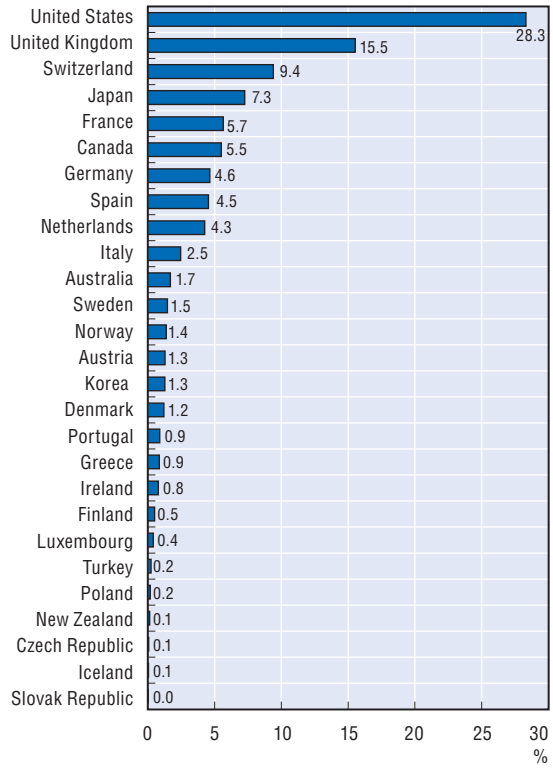
StatLink http://dx.doi.org/10.1787/842035081412

Figure D.4.2. **OECD[1] outward investment to OECD countries as a percentage of total outward FDI stocks, 2007[2]**



StatLink http://dx.doi.org/10.1787/842035352500

Figure D.4.3. **OECD[1] outward investment to non-OECD countries as a percentage of total outward FDI stocks, 2007[2]**



StatLink http://dx.doi.org/10.1787/842051032120

1. Data are not available for Belgium and Hungary.
2. 2006 for Austria, Germany, Korea, Luxembourg and Norway.

D.5. Foreign direct investment stocks in manufacturing industries

Detailed foreign direct investment positions classified by industry sectors are compiled by the OECD. These series enable measures of the contribution of various sectors of individual countries to the global economy, as well as measures of the dependence of host economies on sectors of investment from abroad. For the convenience of the present document, industries are aggregated into two main categories: *a)* manufacturing; and *b)* services (see next section). A sector not covered in the analysis is the primary sector. In addition, confidential data which cannot be disclosed to the public are included in category "unallocated".

As shown in figures D.5.1 and D.5.2, over the past two decades the stock of OECD investments in absolute amounts were multiplied at end 2006 by four from their 1990 level for outward investment (from USD 645 billion in 1990 to USD 2 600 billion in 2006) and by more than four for inward investments (from USD 484 billion in 1990 to USD to over 2 000 billion in 2006). These increases in levels are in line with overall increases in investment.

Nevertheless, the relative importance of investments in manufacturing industries substantially diminished over the same period. The share of OECD investment in manufacturing industries dropped from around 40% of investments in 1986, to 25% in 2000 and to 24% in 2007.

With respect to the share of individual countries' investments in manufacturing, the most spectacular decrease of inward investments was observed in Turkey (–24 per cent) and, to a lesser extent, Iceland and Austria (–17 and –16 per cent respectively). A decrease of outward investments is also observed for Turkey and Iceland, but less so than for the Slovak Republic (–19 per cent).

While investments in manufacturing in the United States represented 34% of total inward investments at end-2007, resident investors' holdings in manufacturing subsidiaries abroad represented only 19% of the total. There is no single country where inward investments in manufacturing industries accounted for more than 45%. The highest was the Slovak Republic at 43%, followed by Canada at 39% and Iceland and Japan at 37%. Although some countries indicate higher share of manufacturing for outward investment, some country data may be in parts relating to the industry of the direct investor rather than to that of the direct investment enterprise.

Source

- *OECD International Direct Investment Database*.

For further reading

- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation*.

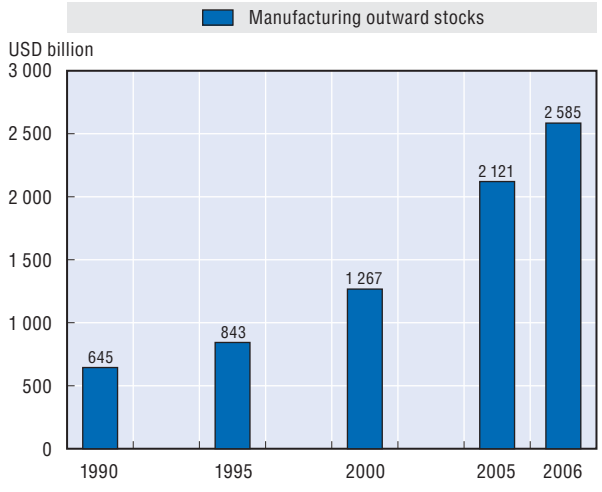
Industrial classifications

Foreign direct investment should be allocated according to the industry of the direct investment enterprise: for inward investments the industry of the resident direct investment enterprise and for outward investment the industry of the non-resident direct investment enterprise. The allocation to an industry should represent the main economic activity of the enterprise. The industrial classification should be based at least on main sections identified by *the United Nations International Standard Industrial Classification of All Economic Activity, 3rd revision (ISIC3)*.

There are many deviations from this basic concept, in particular for outward investments. A number of OECD countries report their outward investments according to the industry of the resident direct investor which does not necessarily have the same principle economic activity as its non-resident affiliates. Although both presentations are of interest for different analytical purposes, deviation from the core recommendation increases the difficulties for bilateral comparisons.

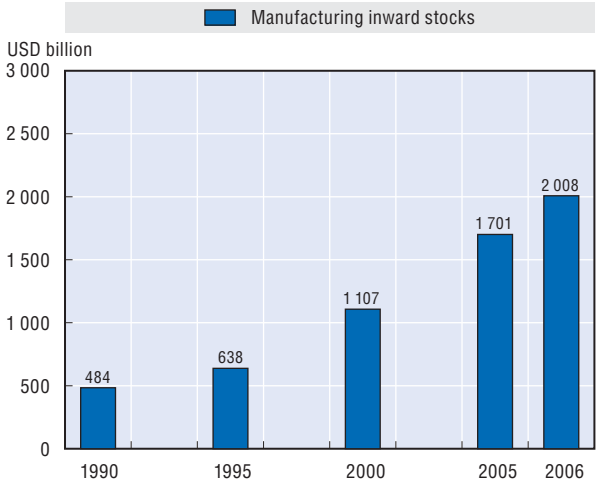
D.5. Foreign direct investment stocks in manufacturing industries

Figure D.5.1. **OECD manufacturing outward positions**



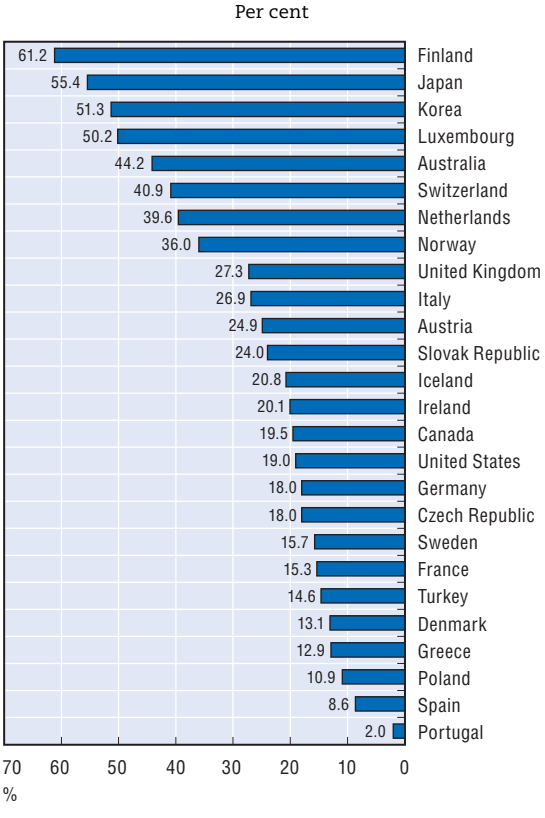
StatLink http://dx.doi.org/10.1787/842081440116

Figure D.5.2. **OECD manufacturing inward positions**



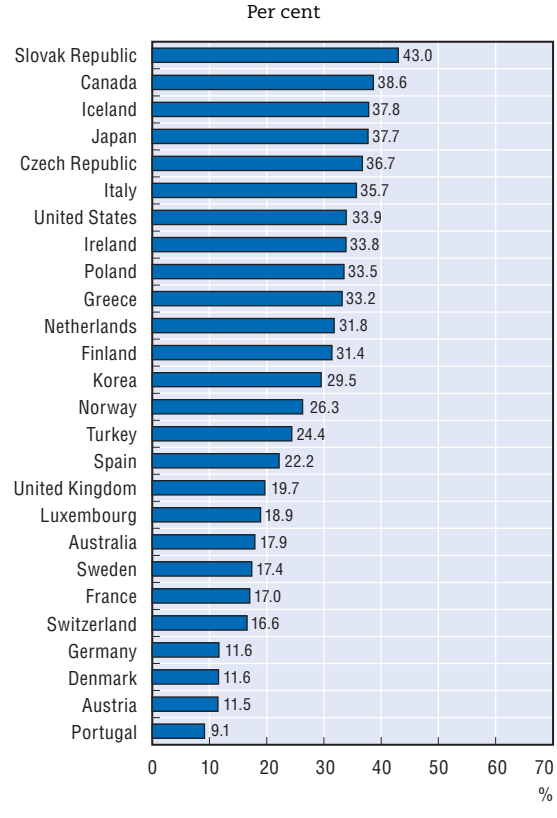
StatLink http://dx.doi.org/10.1787/842105781663

Figure D.5.3. **Share of the manufacturing sector in the total outward FDI positions of OECD countries,[1] 2007[2]**



StatLink http://dx.doi.org/10.1787/842147815706

Figure D.5.4. **Share of the manufacturing sector in the total inward FDI positions of OECD countries,[1] 2007[2]**



StatLink http://dx.doi.org/10.1787/842172343322

1. The breakdown is not available for Belgium, Hungary, Mexico and New Zealand.
2. Or most recent available year.



D.6. Foreign direct investment stocks in service industries

The relative decline in investments in manufacturing industries (see previous section) was offset by increase of investments in services sector. The share of investments became more pronounced as from the mid 1990s, accounting for around 40% of total OECD investment stocks (inward investments at USD 760 billion and outward investments at USD 950 billion).

In line with the overall increase in cross-border investments, absolute levels of FDI in services industries reached historically high levels for both inward and outward investments (to USD 4 670 billion and USD 5 400 billion, respectively). Between 1995 and 2006, the investment stock of OECD countries in services grew annually by 18% for inward investments and by 17% in average for outward investments.

It should be noted that financial and business services are boosted by their recourse to SPEs and holding companies which are more and more involved in the investment of multinational enterprises. Between 2005 and 2006, inward and outward investments in the financial intermediation sector have increased by more than 25% to reach USD 1 720 billion, and USD 2 560 billion, respectively. This trend is observed again in 2007 for the countries for which data are available. Inward investments of countries which traditionally host SPEs are mostly in the services sector, for example representing more than 80% in Austria, Switzerland, and Luxembourg and more than 60% in the Netherlands. For an economically meaningful analysis it is, therefore, preferable to consider FDI series excluding investments *via* Special Purpose entities.

Source

- *OECD International Direct Investment Database.*

For further reading

- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation.*

Coverage of service sectors

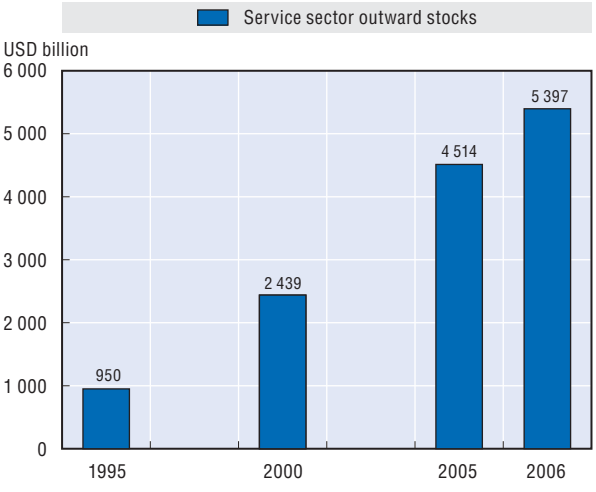
Statistics are based on the industrial classification identified by *the United Nations International Standard Industrial Classification of All Economic Activity (ISIC)* (see also Box on industry classification under C.5).

The "services" sector in the present publication has a broad coverage which is the following:

Electricity, gas and water	Financial activities
Construction	Monetary institutions
Trade and repairs	Other financial institutions
Hotels and restaurants	Insurance and activities auxiliary to insurance
Transport and communication	Other financial institutions and insurance act.
Land, sea and air transport	Real estate and business activities
Telecommunications	Other services

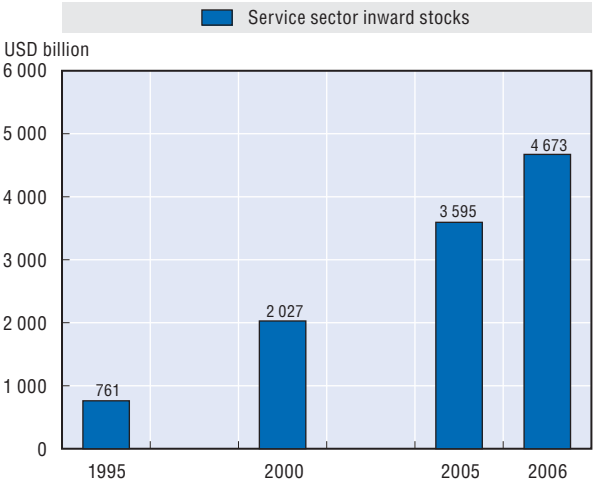
D.6. Foreign direct investment stocks in service industries

Figure D.6.1. **OECD service sector outward positions**



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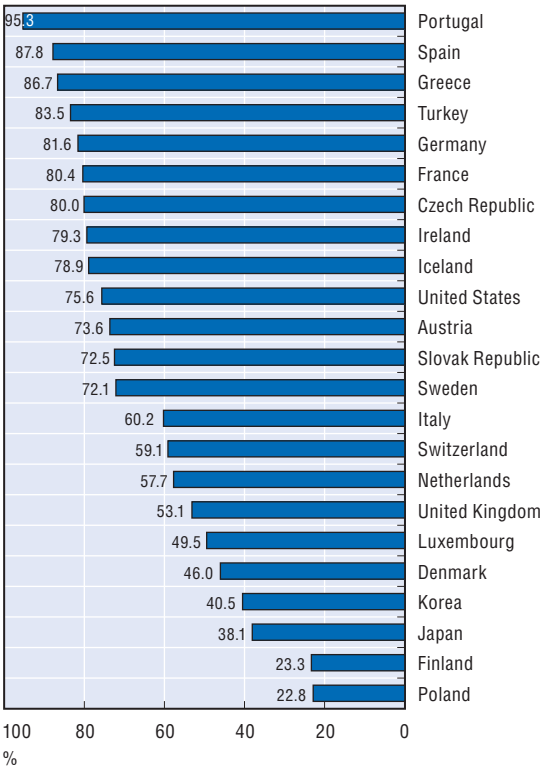
Figure D.6.2. **OECD service sector inward positions**



StatLink http://dx.doi.org/10.1787/842268305841

Figure D.6.3. **Share of the service sector in the total outward FDI positions of OECD countries**[1]

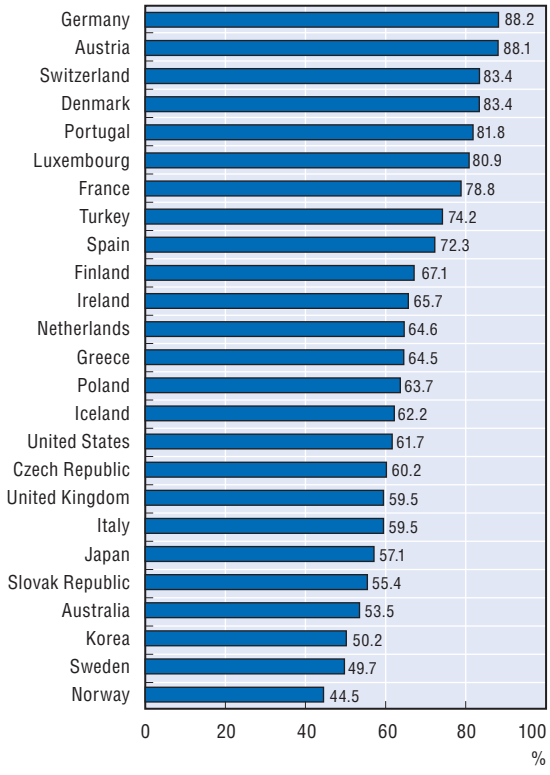
Per cent, 2007[2]



StatLink http://dx.doi.org/10.1787/842274671355

Figure D.6.4. **Share of the service sector in the total inward FDI positions of OECD countries**[1]

Per cent, 2007[2]



StatLink http://dx.doi.org/10.1787/842285063554

1. The breakdown is not available for Australia, Belgium, Canada, Hungary, Mexico, New Zealand and Norway.
2. Or most recent available year.

D.7. Foreign direct investment income

Net direct investment income is measured after netting income of resident direct investment enterprises (debits) and income of affiliates abroad (credits). Equity income forms the largest share of direct investment income.

Earnings which are reinvested in the direct investment enterprise are calculated after deducting dividends (and distributed branch profits) distributed to shareholders. It is common to observe negative values for reinvestment of earnings when dividends distributed to shareholders are larger than the earnings of the enterprise. It is to note that the amount of dividends distributed is generally based on the decision of the management of the enterprise. These negative values are observed in numerous cases representing analytical difficulties due to the methodology applied to the calculation of reinvestment of earnings.

In dollar amounts, dividends distributed to shareholders of OECD's affiliated direct investment enterprises abroad were higher than those distributed in resident direct investment enterprises (USD 475 billion in 2007). This is in line with OECD's position as net investor abroad. However, over the decade, their relative importance was on average 51% of direct investment income (40.9% in 2007). This is lower than dividends distributed in OECD countries hosting FDI, which were on average 58% (USD 380 billion in 2007, representing 47% of total direct investment income).

OECD investors have reinvested abroad their earnings from FDI more than foreign investors have done in the region. On average reinvestment of earnings was 43% of total direct investment income and was 30% more than dividends distributed in 2007 (USD 625 billion or 54% of total). In contrast, reinvestment of earnings by non-resident investors in OECD accounted for 25% on average but almost equalled dividends in 2007 (USD 334 billion, 41% of total).

Income on debt relates to interest paid or received for intercompany loans which are also part of direct investment income. Their share of direct investment income is generally much smaller than equity income. Over the past decade interest income from affiliates abroad was on average 6.5% of overall direct investment income. In contrast, income received by non-resident investors from resident direct investment enterprises in the OECD was on average 17% (exceptionally in 2001 they accounted for 31%). The highest level of interest income abroad was USD 60 billion in 2007 (5% of total) and USD 104 billion the same year for inward investment.

Source

- *OECD International Direct Investment Database*.

For further reading

- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation*.

Direct investment income

Direct investment income comprises income on equity and income on debt accruing to a direct investor resident in one economy from the ownership of direct investment capital in an enterprise in another economy. It is closely related to the concept of FDI stocks.

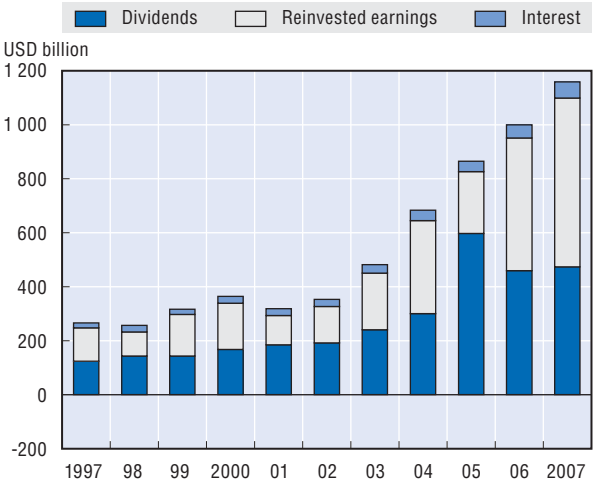
Income on equity comprises: *i)* dividends and distributed branch profits; and *ii)* reinvested earnings and undistributed branch profits.

Dividends are the distribution of earnings allocated to shares and other forms of participation in the equity of incorporated private enterprises, co-operatives, and public corporations. These can be recorded on the date they are payable, on the date they are paid, or at some other point in time and can be recorded either gross or net of withholding taxes. ***Reinvested earnings and undistributed branch profits*** comprise, in proportion to equity held, direct investors' shares of *i)* earnings that foreign subsidiaries and associated enterprises do not distribute as dividends (*reinvested earnings*), and earnings that branches and other unincorporated enterprises do not remit to direct investors (*undistributed branch profits*).

Income on debt (interest) consists of interest payable on inter-company debt to/from direct investors from/to associated enterprises abroad. It covers interest on the borrowing and lending of funds (including debt securities and suppliers' credits) between direct investors and direct investment enterprises.

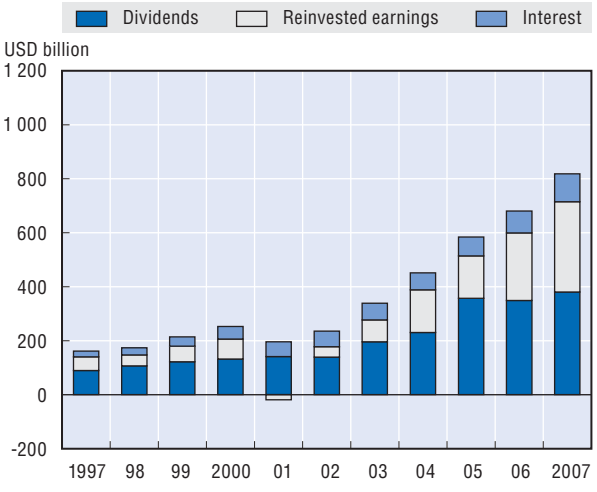
D.7. Foreign direct investment income

Figure D.7.1. **Distribution of earnings of FDI enterprises abroad, OECD, 1997-2007**



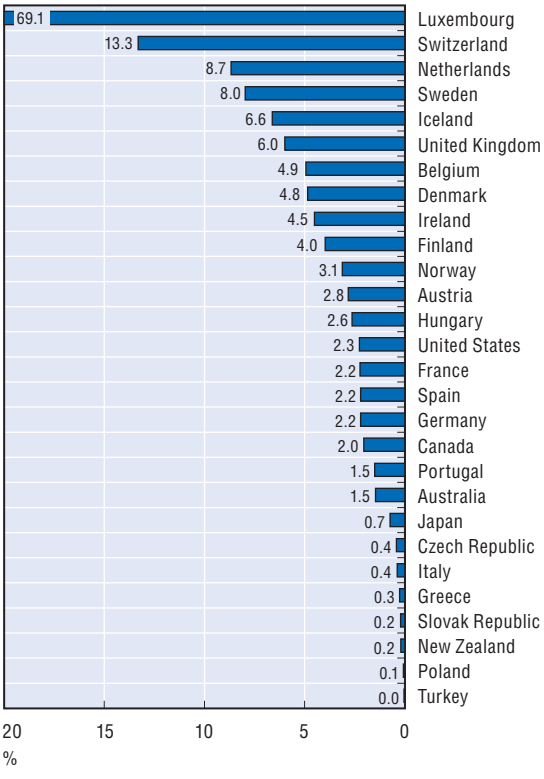
StatLink http://dx.doi.org/10.1787/842302865540

Figure D.7.2. **Distribution of earnings of FDI enterprises in reporting country, OECD, 1997-2007**



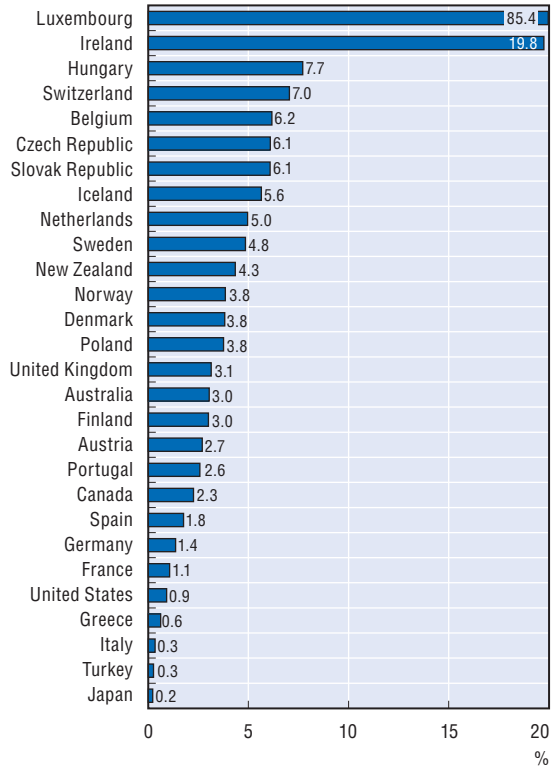
StatLink http://dx.doi.org/10.1787/842303665434

Figure D.7.3. **Income of OECD direct investment enterprises abroad as a percentage of GDP,[1] average 2004-07**



StatLink http://dx.doi.org/10.1787/842325762072

Figure D.7.4. **Income of OECD resident direct investment enterprises as a percentage of GDP,[1] average 2004-07**



StatLink http://dx.doi.org/10.1787/842327546160

1. Excluding Korea and Mexico.



D.8. Rate of return on direct investment

The rate of return on direct investment is calculated as a ratio of direct investment income to direct investment positions at a given point in time. This indicator contributes to the analysis of the profitability of enterprises even though other information is necessary for a complete assessment.

Over the past decade the rate of return on OECD outward direct investment was on average 7.6% while it was 6.4% for inward investments. The highest rate was recorded in 2005 for both inward and outward investments (9.6% and 7.9%, respectively) implying the highest profitability rate of direct investment enterprises at home and host countries. Even though these rates were lower in 2008 (9% for outward investment and 8% for inward investment), they remained above average rates.

Foreign affiliates of Swedish and United States investors had significantly higher returns (12.5% and 11.8%, respectively) as compared to resident direct investment enterprises in these countries 8.2% and 6.2% respectively). German and French investments abroad were also more profitable than inward investments but differentials were not more than 1.5%.

On the other hand, direct investment enterprises resident in Japan recorder higher rates of return in 2007 (11.1%) as opposed to those of affiliates abroad, at 8.3%. This was also the case in some other countries such as Finland, Slovak Republic and Poland.

Source

- *OECD International Direct Investment database.*

For further reading

- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation.*

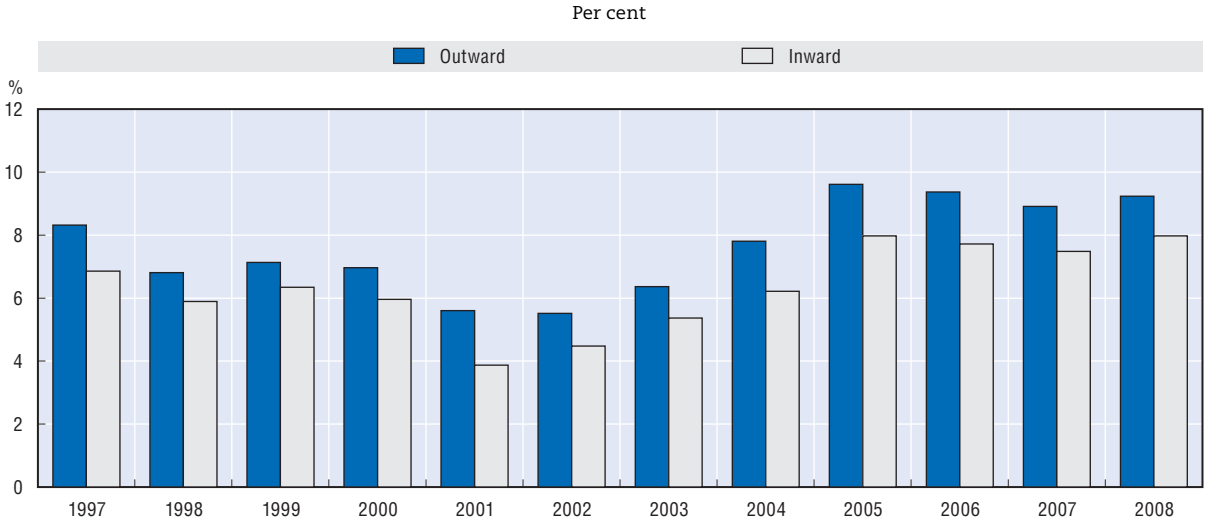
Rate of return on direct investment

Rate of return on direct investment is an indicator which is based on FDI income and provides information on the profitability of direct investment enterprises. It is calculated as the ratio of direct investment income to direct investment position (stocks) in respect of both inward and outward investment (see also notes in the previous section).

For example, when the rate of return of inward FDI [FDI equity income debits – *i.e.* debits for *a)* dividends and distributed branch profits, plus *b)* reinvested earnings and undistributed branch profits – as a per cent of total inward FDI positions] increases, it implies that the resident direct investment enterprises are more profitable and are more and more competitive for investors. However, observations based purely on the results of the statistical ratios are not sufficient to draw conclusions on the competitiveness of enterprises (or an economy). Many other factors should also be taken into account such as cyclical or structural factors, developments in that sector of economic activity as well as other factors related to the global strategy of the investing enterprise(s).

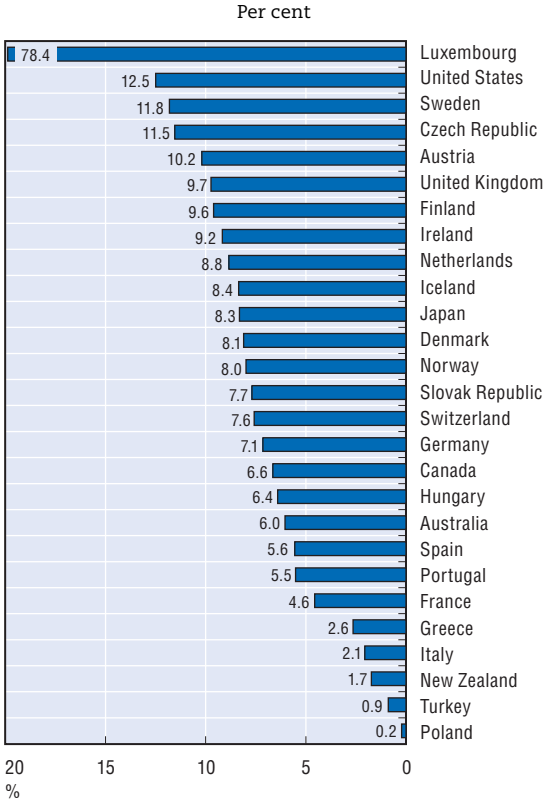
D.8. Rate of return on direct investment

Figure D.8.1. **Rate of return on direct investment[1] in OECD countries**



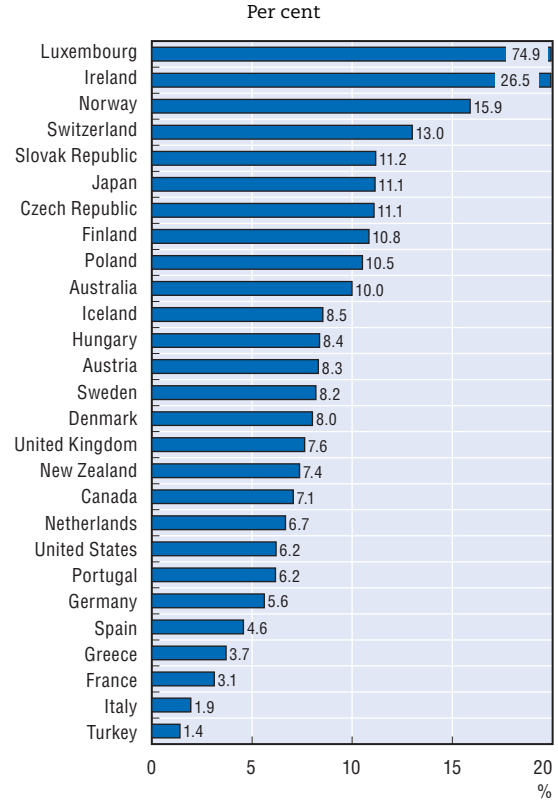
StatLink http://dx.doi.org/10.1787/842334423141

Figure D.8.2. **Rate of return on outward direct investment[1] in OECD countries, 2007[2]**



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Figure D.8.3. **Rate of return on inward direct investment[1] in OECD countries, 2007[2]**



StatLink http://dx.doi.org/10.1787/842356670402

1. Excluding Belgium, Korea and Mexico.
2. 2006 for Austria, Germany, New Zealand and Norway.

D.9. Direct investment dividends

This indicator usually contributes to the assessment of the profitability of direct investment enterprises, along with the analysis of reinvestment of earnings. It is calculated: *a)* as a ratio of dividends paid by resident enterprises to their non-resident direct investors (debits) over inward FDI positions; and *b* as a ratio of dividends received by resident investors from foreign affiliates (credits) over outward FDI positions. Increases in the ratios generally imply improvements in the profitability of enterprises. However, a complete assessment of the profitability of enterprises cannot be based solely on statistical observations but have to be complemented by other factors.

Trends in distribution of dividends can be extremely volatile and do not generally follow trends in FDI positions. The amount of dividends to be distributed results from the decision of the management taking also into account factors which may not be directly linked to FDI trends.

Inward FDI stocks of OECD countries reached USD 14 trillion at end-2007 (around 15% increase from 2006) while dividends distributed to shareholders decreased by around 8%. This development contrasts with 2005 when both stock of inward investments and dividends distributed to foreign investors both increased by more than 50%. Likewise, outward investment stocks of OECD countries increased by 22% in 2006 when dividends received by OECD investors from their foreign affiliates decreased by 21%. This difference was less significant in 2007 when outward FDI grew by 24% and dividends increased only by 8%.

The dividends distributed to direct investors in OECD countries as a whole are higher for outward investments as compared to inward investments. However, the difference is generally not very significant. For instance, in the recent years, the ratio is within the range of 3% to 3.5%.

The rate of return on dividends is strikingly different depending on whether a country attracts FDI rather than being an investor itself. As demonstrated in Figures D.9.3 and D.9.4 the rate of return on dividends for direct investment enterprises resident in Ireland was 15% for the period 2004-07 while the return from foreign affiliates of Irish investors was only 0.2%.

Amongst large OECD economies, the rate of return on dividends of direct investment enterprises resident in the United States was 2.5% for the same period while for affiliates abroad recorded 5.1%, boosted by the high rate of return in 2005 (11%). Likewise, foreign affiliates of United Kingdom investors recorded higher rates of return (4.6%) as opposed to resident direct investment enterprises (3.4%). Both France and Germany exhibit similar rates of return but with smaller differences between dividends distributed to foreign affiliates and those received by resident direct investment enterprises. In contrast, enterprises resident in Canada recorded 3.9% while the rate of return of foreign affiliates was 2.2%.

Source

- *OECD International Direct Investment Database.*

For further reading

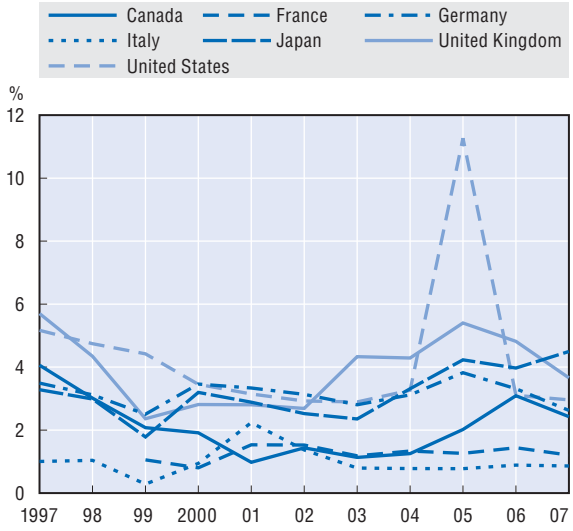
- OECD, *OECD Benchmark Definition of Foreign Direct Investment: 3rd Edition* (1995).
- IMF, *Balance of Payments Manual: 5th edition* (1995).
- OECD (2005), *Measuring Globalisation – OECD Handbook on Economic Globalisation Indicators*, OECD, Paris. Available at: *www.oecd.org/sti/measuring-globalisation.*

Dividends distributed to direct investors

Dividends are the distribution of earnings allocated to shares and other forms of participation in the equity of incorporated private enterprises, co-operatives, and public corporations. They are paid according to the discretionary decision of the incorporated enterprise. Dividends comprise all dividends that are declared payable to the direct investor within an accounting period less dividends declared payable by the direct investor to the direct investment enterprise. They can be recorded on the date they are payable, on the date they are paid, or at some other point in time and should be recorded gross of withholding taxes. When dividends and profits remitted by the direct investor are denominated in foreign currency, the amounts should be converted at the closing midmarket spot exchange rate on the day they are received.

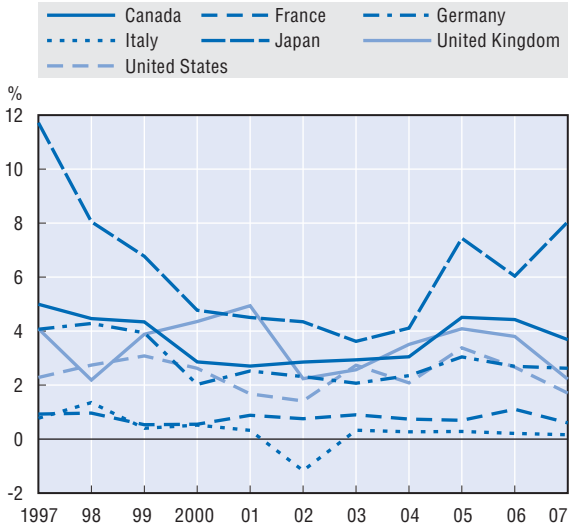
D.9. Direct investment dividends

Figure D.9.1. **Dividends received from foreign affiliates as a percentage of outward FDI position, 1997-2007, G7 countries**



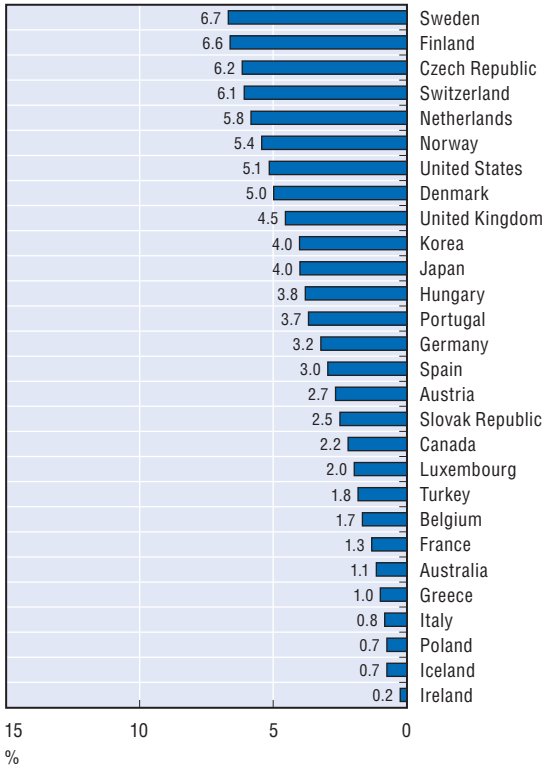
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Figure D.9.2. **Dividends paid to foreign investors as a percentage of inward FDI position, 1997-2007, G7 countries**



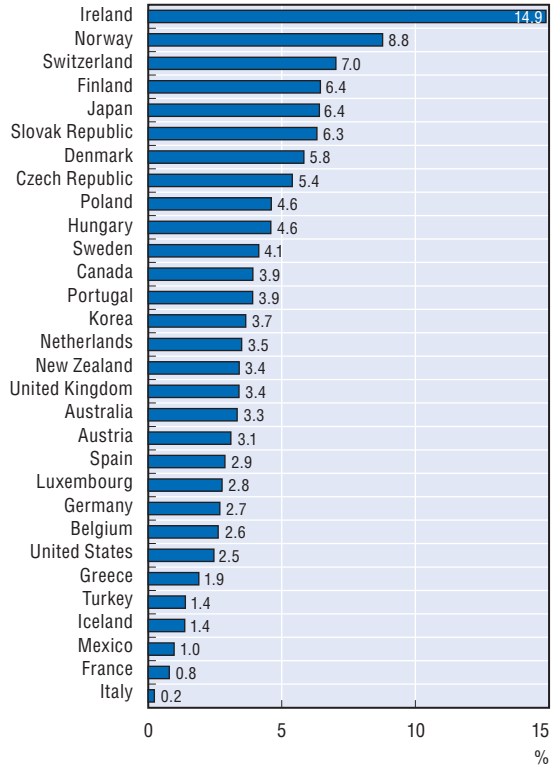
StatLink http://dx.doi.org/10.1787/842372863737

Figure D.9.3. **Dividends received from foreign affiliates as a percentage of outward FDI position, average 2004-07**



StatLink http://dx.doi.org/10.1787/842432516711

Figure D.9.4. **Dividends paid to foreign investors as a percentage of inward FDI position, average 2004-07**



StatLink http://dx.doi.org/10.1787/842433812554



D.10. Cross-border mergers and acquisitions

Mergers and acquisitions (M&As) refer to the change of ownership in existing enterprises to achieve strategic and financial objectives. Enterprises engage in cross-border M&As for several reasons: to strengthen their market position by expanding their businesses to other opportunities on the global market; to obtain a critical size in the world market; to exploit other firms' complementary assets such as innovations, technology, etc.; to access other advantages such as company reputation, economies of scale, brands or design; to diversify products and markets, etc.

Even though M&A statistics do not follow the same methodology as FDI statistics, they demonstrate similar trends while M&As represent the most common form of FDI. Both FDI flows and cross-border M&As reached their peaks in 2000 and 2007.

Over the period 1997-2008, the United States and the United Kingdom were the two leading countries in cross-border operations followed by Germany and France. After the peak in 2007, M&As recorded sharp declines, a trend which is also reflected in most recent FDI statistics.

On average, the United States was the main target country in the period 2005-08 representing almost 25% of the OECD area followed by the United Kingdom accounting for 17%. Canada, Germany and the Netherlands come next, each accounting for 7% of OECD total). Regarding M&As abroad, the United States and the United Kingdom also lead, accounting respectively for 19% and 15% of the OECD total on average over the period. France and Germany (on average at 10% and 9% respectively) confirm the strong presence of continental European investors.

Source

- Dealogic.

Cross-border mergers and acquisitions

A merger is an operation in which two or more companies decide to pool their assets to form a single company. In the process, one or more companies disappear completely. An acquisition does not constitute a merger if the acquired company does not disappear. Mergers are less frequent than acquisitions.

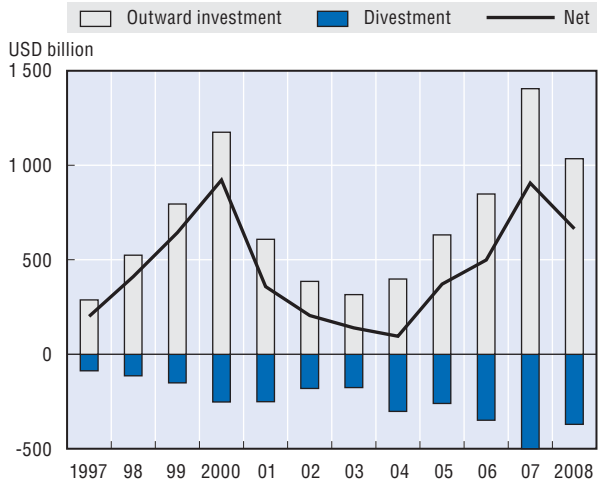
Cross-border mergers and acquisitions can either be inward or outward. Inward cross-border mergers and acquisitions imply an inward capital movement through the sale of domestic firms to foreign investors, while outward cross-border mergers and acquisitions imply an outward capital movement through the purchase of all or parts of foreign firms.

The data are taken from the Mergers and Acquisitions Global database (Dealogic). The definitions and methodology used for OECD's FDI statistics and Dealogic's M&A statistics are not compatible. Therefore direct comparison between FDI and M&A data used in the present document is not possible. However, M&A data provide meaningful indicators to project FDI.

An analysis of mergers and acquisitions can be found in OECD(2001), New Patterns of Industrial Globalisation: Cross-border M&As and Alliances, OECD, Paris; and in Nam-Hoon Kang and Sara Johansson, "Cross-border Mergers and Acquisitions: Their Role in Industrial Globalisation", STI Working Paper 2000/1, as well as in *International Investment Perspectives*, No. 1, OECD, 2002.

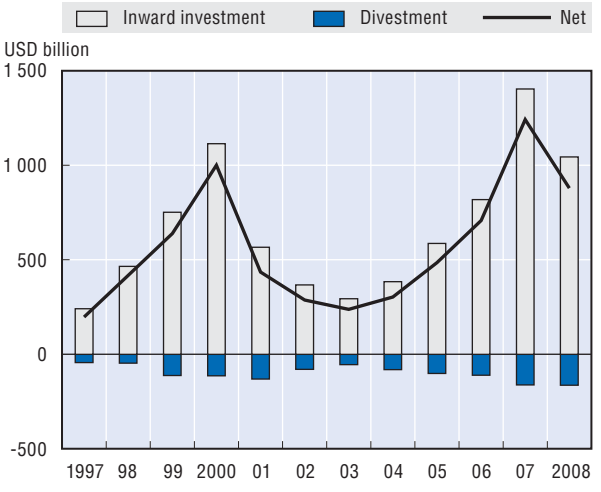
D.10. Cross-border mergers and acquisitions

Figure D.10.1. **Outward cross-border mergers and acquisitions by OECD countries, 1997-2008**



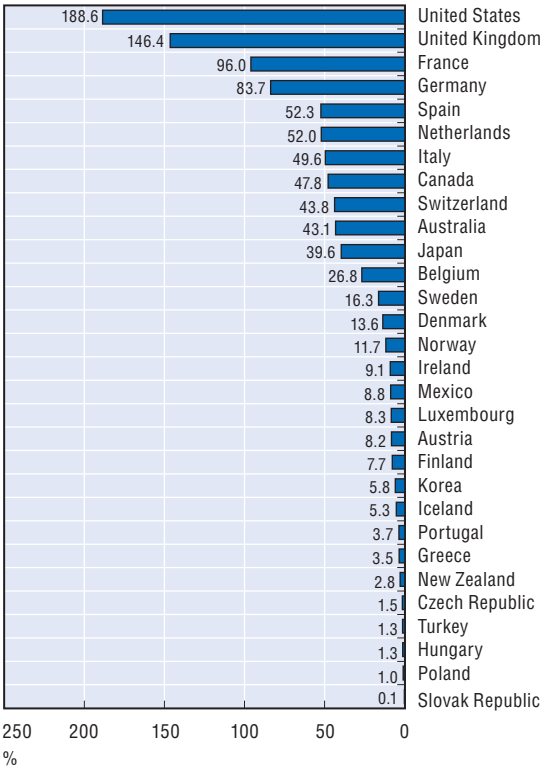
StatLink http://dx.doi.org/10.1787/842507100835

Figure D.10.2. **Inward cross-border mergers and acquisitions by OECD countries, 1997-2008**



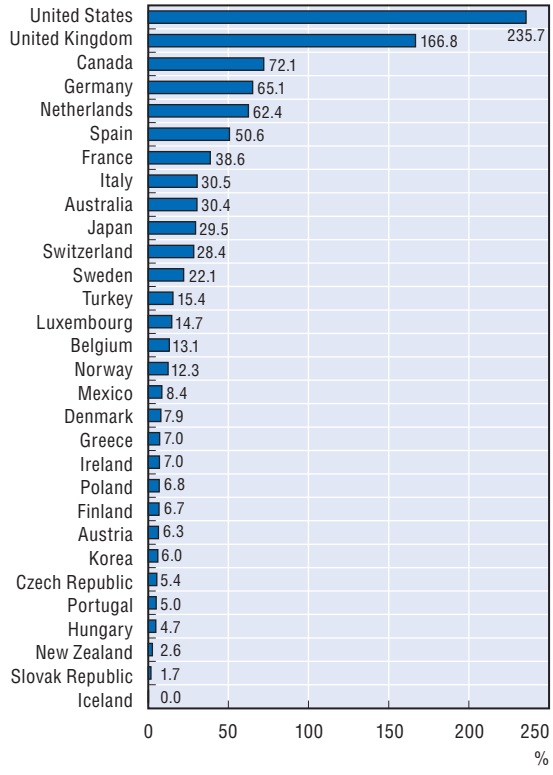
StatLink http://dx.doi.org/10.1787/842512875636

Figure D.10.3. **Outward cross-border mergers and acquisitions by OECD countries, average 2005-08**



StatLink http://dx.doi.org/10.1787/842517277050

Figure D.10.4. **Inward cross-border mergers and acquisitions by OECD countries, average 2005-08**



StatLink http://dx.doi.org/10.1787/842523080508

E. PORTFOLIO INVESTMENT

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E.2. Portfolio assets by type of instrument and by currency. 108
E.3. Portfolio holdings by issuing country 110



E.1. Portfolio investment holdings (stocks)

This section relates to cross-border portfolio asset holdings (stocks) but does not deal with liabilities. For trends of portfolio investment flows see Section B.5.

The stock of cross-border portfolio investments holdings has marked more than 20% annual growth on average over the past decade. The most striking increase was in 2003 when the overall portfolio holdings grew by 35% from the level of the previous year when they reached USD 19 trillion. Following a slowdown in 2005, cross-border portfolio activity picked up significantly in 2006 when the annual growth marked 27% (reaching USD 33 trillion) and 21% in 2007 (reaching USD 40 trillion).

Historically, OECD countries are the main holders of portfolio assets. During the past decade more than 80% of portfolio assets were held by OECD countries. The increase of OECD holdings over a period of five years between 1997 and 2002 more than doubled to USD 12 trillion while holdings over the second half of the decade were multiplied by more than 2.5. The amount of OECD cross-border portfolio assets at end-2003 represented an annual growth of more than 35% when assets reached USD 16 trillion. This increase, in line with the overall growth of portfolio assets, reached USD 33 billion at end-2007 following an increase of almost 30% in the previous year.

The United States is the primary issuer and holder of cross-border portfolio investment instruments. During the period 2004-07, on average, portfolio assets held by the United States was USD 5 trillion, representing 21% of the assets held by OECD countries (18% of world total). It is followed by the United Kingdom (USD 2.8 trillion on average or 10.5% of OECD total) and France, Japan and Luxembourg which have equal shares of total OECD investment (at around USD 2.2 trillion on average or more than 8.5%).

However, the relative importance of portfolio asset holdings measured as percentage of the GDP, provides a different ranking of OECD countries. Overall, the importance of portfolio investment increased from 22% of OECD's GDP in 1997 to 81% in 2007. Regarding individual countries, Luxembourg and Ireland take the lead in 2007. The relative importance of their holdings, which represent an unusually high proportion to the GDP, indicates the special situation of these economies regarding cross-border portfolio investment. Switzerland which occupies the third position with 248% is followed by the Netherlands (190%), Belgium (180%), and Iceland (153%) (see also Figure E.1.4).

Source

- IMF, *Co-ordinated Portfolio Investment Survey*, June 2009.

For further reading

- IMF, *Co-ordinated Portfolio Investment Survey Guide*, 2nd edition, 2002.

Cross-border portfolio investment

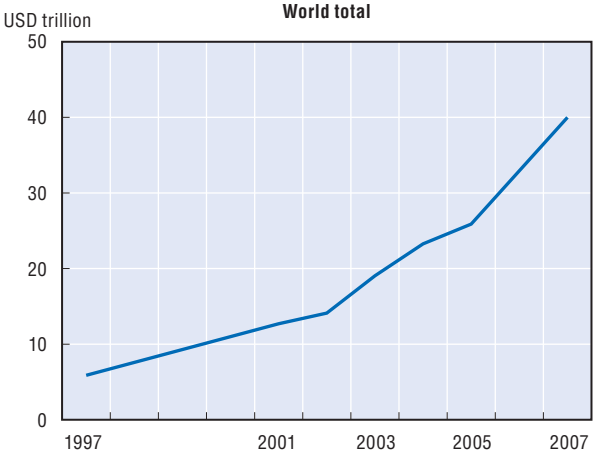
Portfolio investment includes *equity securities* and *long-term and short-term debt securities*. Instruments included in foreign direct investment, reserve assets and financial derivatives are excluded from portfolio investment.

Statistics used in this section are based on ***IMF's Co-ordinated Portfolio Investment Survey (CPIS)*** which covers portfolio *equity and debt* securities issued by non-residents and owned by residents (assets of the reporting country). In line with the *System of National Accounts*, 1993 and *Balance of Payments Manual 5th edition*, the concept of residence used for geographical allocation is determined on the basis of economic territory and the centre of interest. To ensure the inclusion of special purpose entities (such as brass plate companies, shell companies, etc.) which may be significant vehicles for portfolio investment, the legal domicile is the preferred indicator of their residence. The present section reviews only portfolio assets while the CPIS is primarily an asset survey; liabilities are derived from assets reported by partner countries.

Data can be collected by surveying: i)***end-investors*** (such as banks, security dealers, pension funds, insurance companies, mutual funds, non-financial corporations, household); ii) ***custodians*** who hold or manage securities on behalf of others; or iii) combination of ***end-investor and custodian***. They can be collected through a ***security-by-security*** approach (where the holder reports each individual holding) or an ***aggregated approach*** (aggregate reporting of holdings for each counterpart country).

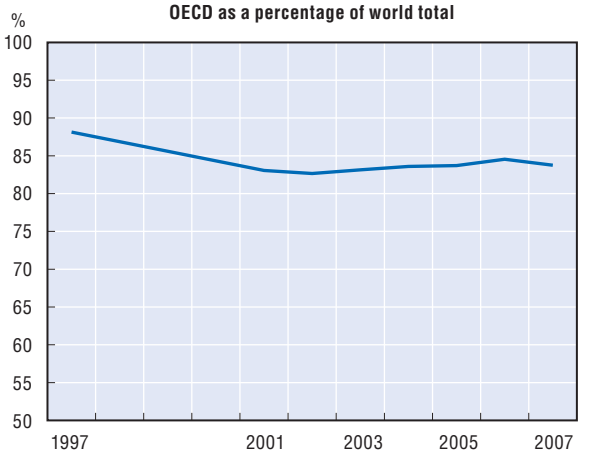
E.1. Portfolio investment holdings (stocks)

Figure E.1.1. **World total portfolio assets, 1997-2007**[1]



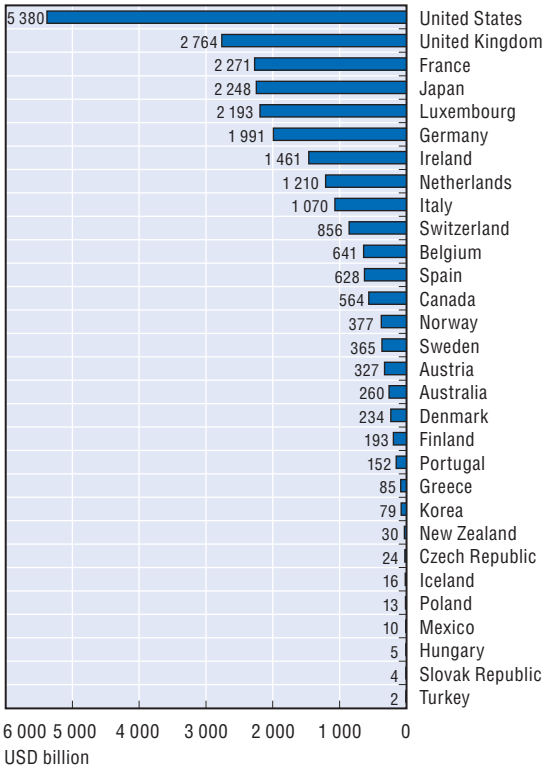
StatLink http://dx.doi.org/10.1787/842527717767

Figure E.1.2. **OECD portfolio assets as a percentage of total world assets, 1997-2007**[1]



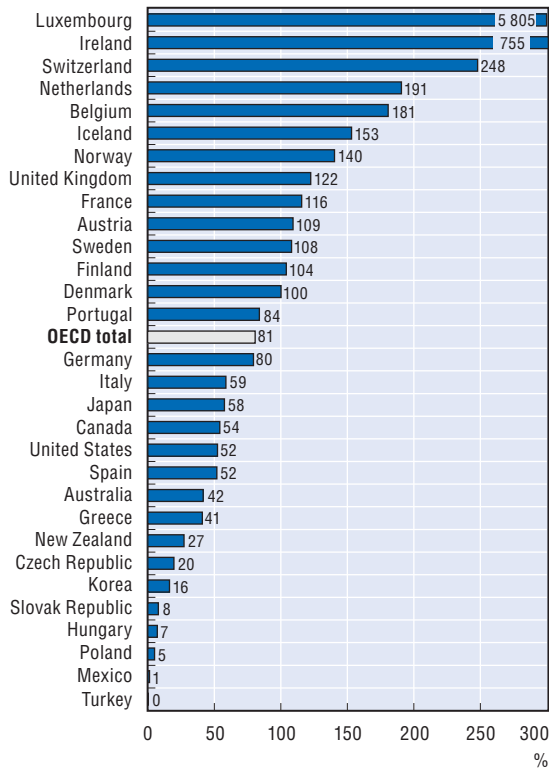
StatLink http://dx.doi.org/10.1787/842601155172

Figure E.1.3. **OECD portfolio asset, average 2004-07**



StatLink http://dx.doi.org/10.1787/842601386312

Figure E.1.4. **OECD portfolio assets as a percentage of GDP, 2007**



StatLink http://dx.doi.org/10.1787/842642604755

1. The survey does not cover 1998, 1999 and 2000.

E.2. Portfolio assets by type of instrument and by currency

Cross-border portfolio investments take the form of equity securities and debt securities which in turn are classified by maturity as short-term or long-term instruments.

During the past decade, even if the share of debt securities worldwide has been more prominent as compared to equity securities, differences in their share of overall cross-border portfolio investments are generally not too significant. In year 2002 the share of debt securities was exceptionally high representing 66% of total portfolio assets but dropped gradually to 55% of total in 2007 when, in contrast, in absolute amounts their value more than doubled reaching USD 21.6 trillion. Assets on equity securities increased from USD 2.6 trillion in 1997 to USD 17.8 trillion in 2007.

During the period 2004-07, equity securities accounted, on average, for 46% (USD 11.6 trillion) of OECD portfolio assets. In eight OECD countries, equity securities accounted for more than 50% of their total assets: Canada (80%), Hungary (78%), New Zealand (77%), United States (72%), Iceland (71%), Australia (67%), Sweden (66%), and Korea (53%).

The share of debt securities represents, on average, more than 50% of portfolio assets of the remaining twenty two OECD countries during the same period. In only eight of them debt securities account for more than 70% of total portfolio assets: Turkey (94%), Greece (86%), Japan (79%), Portugal (78%), Austria and the Slovak Republic (77%), Spain (76%), and France (72%).

OECD countries' debt security holdings are mostly long-term instruments while short-term instruments, on average, account for less than 10%. In many OECD countries short-term instruments represent less than 5% of their total holdings in debt instruments. There are, however, some exceptions. In 2007, Poland's holdings in debt securities were equally divided into short and long-term instruments. In the same year, short-term instruments accounted for 36% of debt securities held by Ireland, 18% by the United States, 14% by Luxembourg and Switzerland, 11% by Mexico and 10% by Greece.

The analysis of securities by currency of denomination also informs on the extent of globalisation of portfolio investments. Nevertheless, statistics on such breakdowns are not available for all OECD countries as shown in Figures E.2.7 and E.2.8. During the period 2003-06, portfolio assets of eight EU countries, Austria, Denmark, France, Greece, Hungary, Italy, Poland and Portugal were, for the most part, instruments denominated in Euro as opposed to the US dollar and other currencies. Portfolio holdings of two other OECD countries, Japan and Korea, were mostly instruments denominated in US dollars. In general, the share of the US dollar is more significant in equity securities while a larger share of debt securities are denominated in euros. Switzerland has a rather singular position while both equity and debt holdings are proportionally distributed between instruments denominated in US dollars, euros and other currencies.

Source

- IMF, *Co-ordinated Portfolio Investment Survey*.

For further reading

- *IMF Co-ordinated Portfolio Investment Survey Guide, 2nd edition*, 2002

Portfolio investment: types of securities

Security: a financial instrument that is designed to be traded, *i.e.*, it is characterised by its negotiability. Securities include:

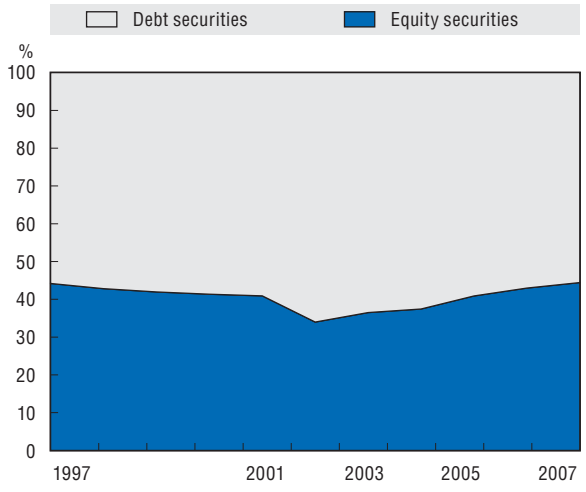
Equity securities comprise all instruments and records acknowledging, after the claims of all creditors have been met, claims on the residual values of incorporated enterprises. Shares, stocks, participations or similar documents (such as American Depositary Receipts) usually denote ownership of equity (see also B5).

Long-term debt securities cover instruments such as bonds, debentures, and notes that usually give the holder the unconditional right to a fixed money income or contractually determined variable money income and have an original term to maturity of more than one year.

Short-term debt securities cover treasury bills, commercial paper, and bankers' acceptances that generally give the holder the unconditional right to a stated fixed sum of money on a specified date. These instruments are usually traded on organised markets at a discount and have an original term to maturity of one year or less.

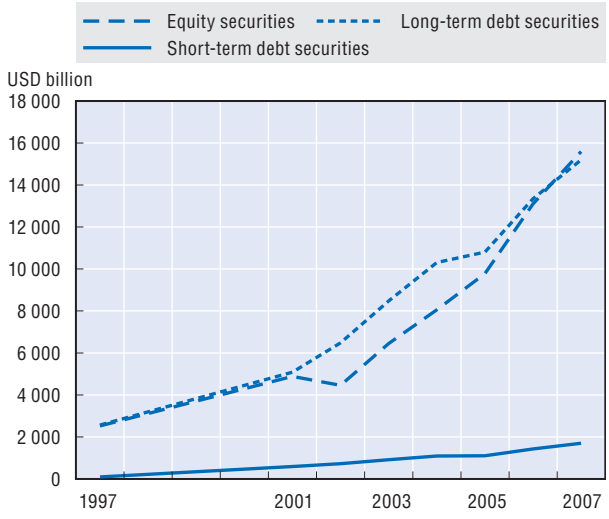
E.2. Portfolio assets by type of instrument and by currency

Figure E.2.5. **Share of equity and debt securities: in total portfolio assets, world-wide, 1997-2007**[1]



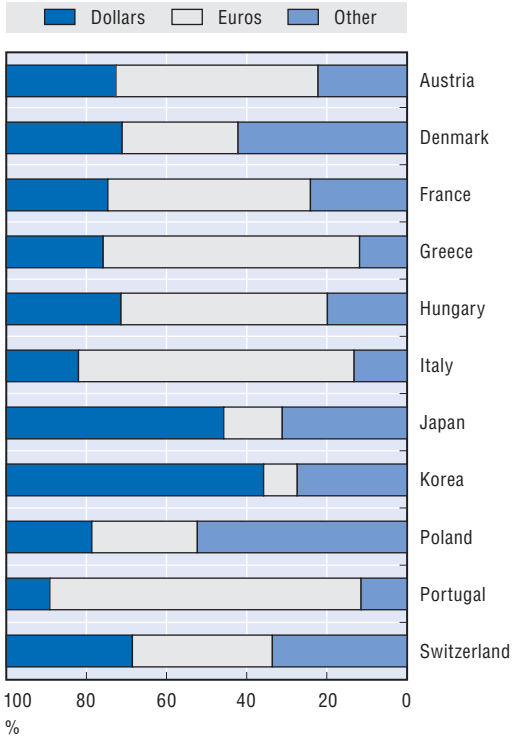
StatLink http://dx.doi.org/10.1787/842654045186

Figure E.2.6. **OECD portfolio assets by type of instrument, 1997-2007**[1]



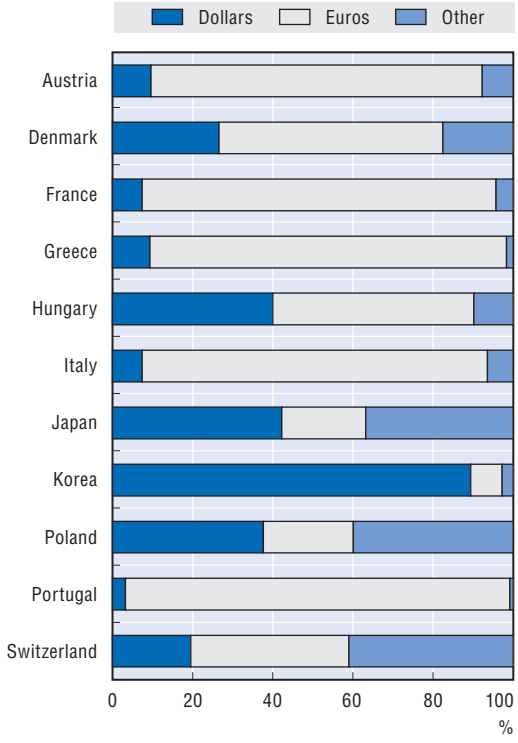
StatLink http://dx.doi.org/10.1787/842657062060

Figure E.2.7. **OECD equity securities holdings by currency of denomination, average 2003-06**



StatLink http://dx.doi.org/10.1787/842660641861

Figure E.2.8. **OECD debt securities holdings by currency of denomination, average 2003-06**



StatLink http://dx.doi.org/10.1787/842708500333

1. The survey does not cover 1998, 1999 and 2000.



E.3. Portfolio holdings by issuing country

Cross-border portfolio investments refer to investment where the investor acquires ownership of securities which are issued in a different economy. The diversification of countries issuing the securities held by a resident investor or a group of investors contributes to the analysis of the extent of globalisation of portfolio investments.

OECD countries are not only major investors of portfolio securities but are also major issuers of cross-border equity and debt securities.

Around 50% of portfolio investments by OECD member countries are traditionally in instruments issued by the European Union countries (USD 18 trillion in 2007). Around 20% are issued by the United States and 5% by Japan (USD 1.3 trillion). The remaining 8.7% (USD 8.7 trillion) are distributed across major emerging economies.

Five OECD countries, the United States, the United Kingdom, Germany, France and Luxembourg, and one non-OECD country, the Cayman Islands, account for 50% or more (USD 16 trillion) of the issues in various portfolio instruments.

In the course of the last decade, the share of the United States as issuer of portfolio instruments held by OECD countries increased from 18% in 1997 (USD 1 trillion) to 19% in 2001 but decreased to 15% at end-2007 (USD 5 trillion). The share of the United Kingdom and of Germany also declined at the end of the decade but more moderately by around 1% to 9.4% and 8.1%, respectively.

This trend was offset by the increase in the share of Luxembourg as issuer of portfolio investment instruments which increased to 6.2% of OECD holdings in 2007 (USD 2 trillion) from 2.9% in 1997. Likewise, issues of entities resident in France increased from 4.7% of OECD portfolio holdings in 1997 to 6.6% in 2007 (USD 2.1 trillion).

Among non-OECD countries issuing portfolio instruments, a number of jurisdictions which traditionally host special purpose entities account for a significant share of OECD portfolio assets. The Cayman Islands which accounted for 2.1% of OECD holdings in 1997 increased to 4.8% of the holdings in 2007. During 2004-07, it occupies the first position among non-OECD countries issuing portfolio instruments, on average, at USD 902 billion. In the second place is International Organisations at USD 304 billion followed by Bermuda (USD 230 billion) and Jersey (USD 189 billion).

Source

- IMF, *Co-ordinated Portfolio Investment Survey*.

For further reading

- IMF, *Co-ordinated Portfolio Investment Survey Guide*, 2nd edition, 2002.

Identifying the issuer of portfolio investment

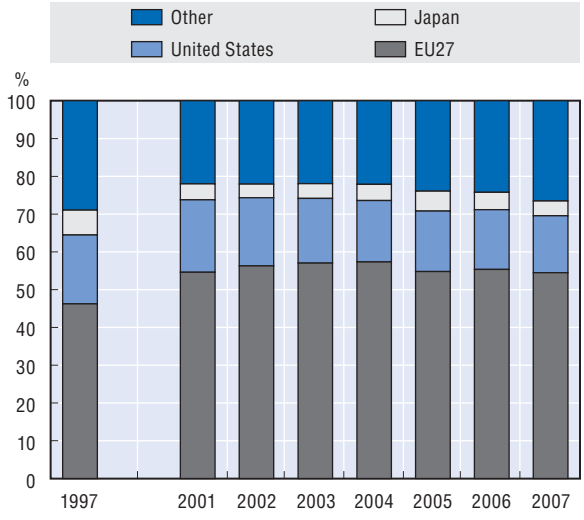
The ***issuer of a security*** could be a government agency, a public or private corporation (including financial institutions), or a branch or subsidiary of a public or private corporation (including a financial institution).

Determining the ***country of residence*** of the non-resident issuer may be difficult. To ensure consistency across countries, it is recommended that to indentify securities compilers should use coding systems of the securities industry whereby each security has its own unique identifier. These codes also allow for equity securities to identify the country of issues.

To issue securities, in particular debt securities, multinational enterprises may use special purpose entities (SPEs) which are domiciled and registered in another country even if they have no physical presence in that economy. In such instances, securities are allocated to the country in which the issuing entity is legally incorporated rather than to the country of the parent company.

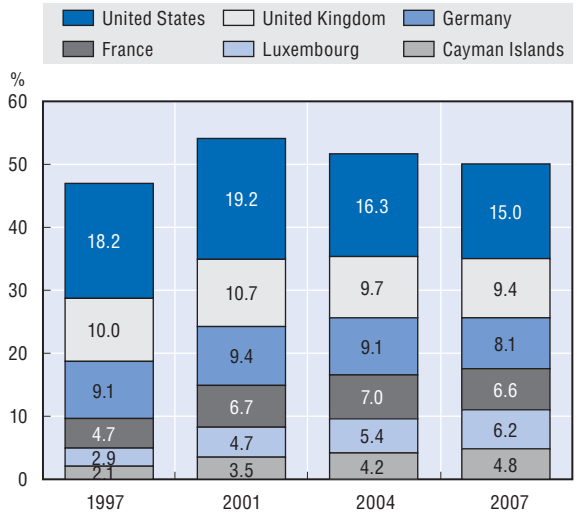
E.3. Portfolio holdings by issuing country

Figure E.3.1. **OECD portfolio assets by issuer**
1997-2007[1]



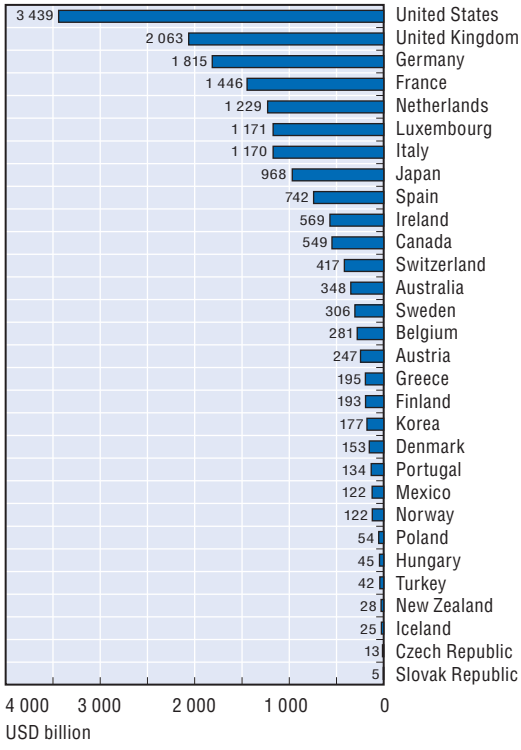
StatLink http://dx.doi.org/10.1787/842724383224

Figure E.3.2. **OECD portfolio assets by issuer – Major issuing countries**
1997-2007[1]



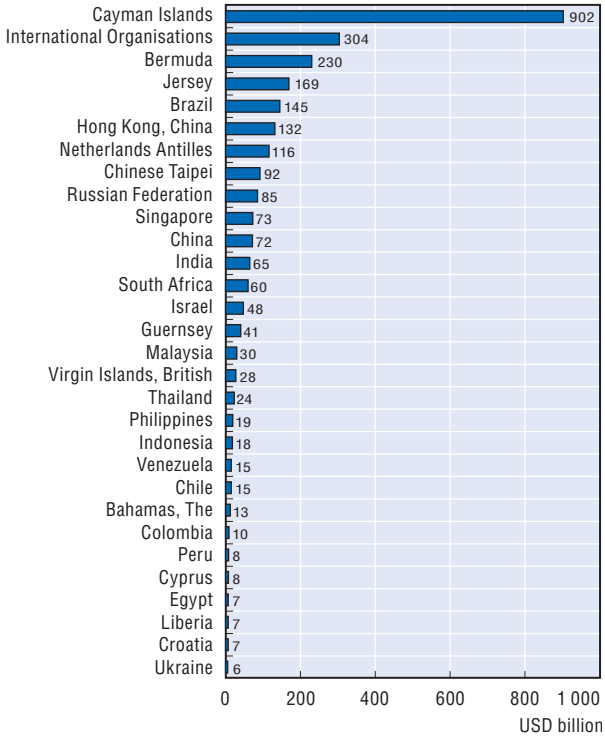
StatLink http://dx.doi.org/10.1787/842757234678

Figure E.3.3. **OECD holdings by issuer – OECD countries, average 2004-07**



StatLink http://dx.doi.org/10.1787/842763426723

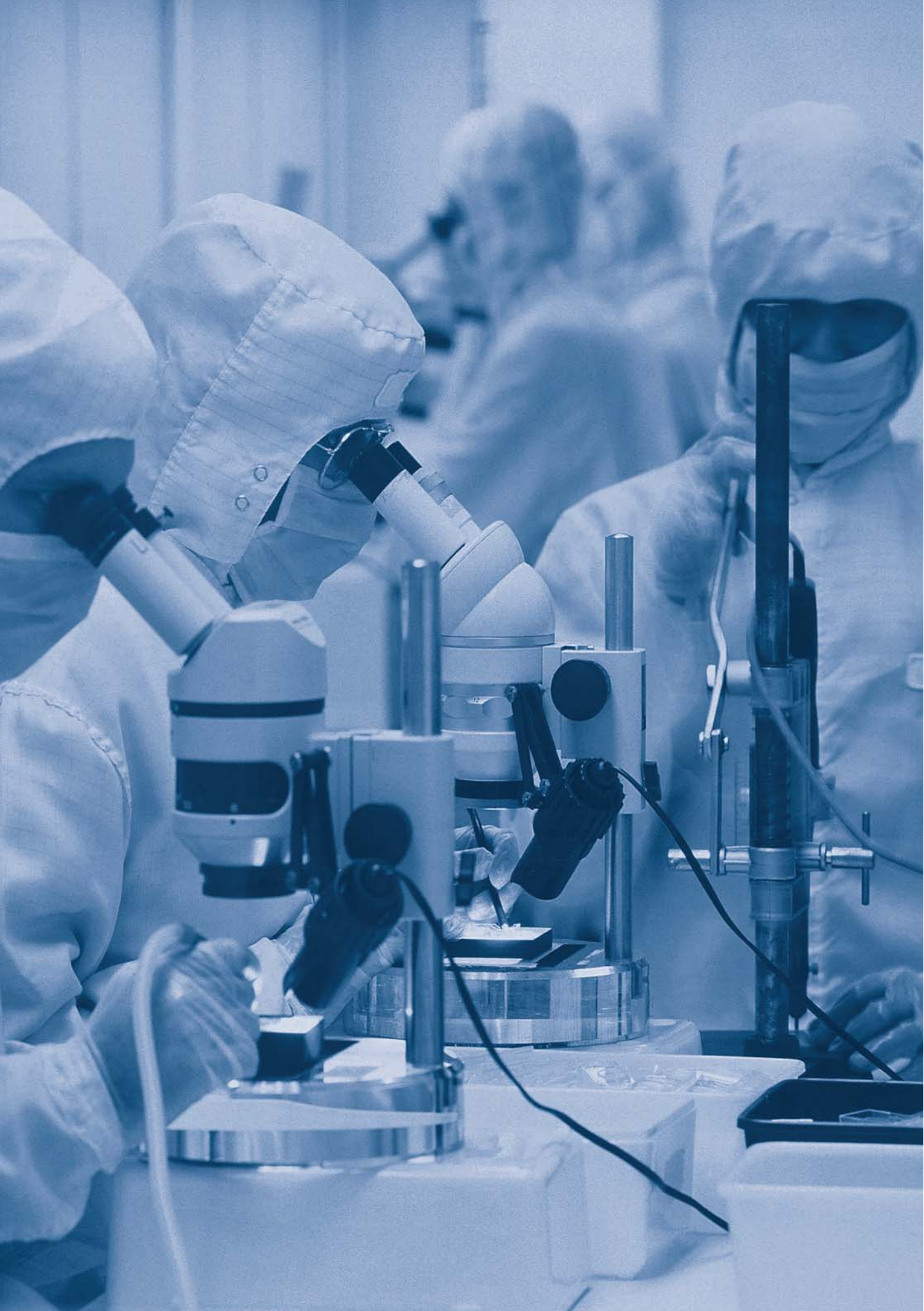
Figure E.3.4. **OECD holdings by issuer – Non-OECD countries, average 2004-07**



StatLink http://dx.doi.org/10.1787/842776400025

1. The survey does not cover 1998, 1999 and 2000.

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.



PART III

Globalisation of Technology and Knowledge

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F. INTERNATIONALISATION OF SCIENCE AND TECHNOLOGY

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F.1. R&D in OECD and non-OECD economies

The landscape for technology and knowledge has become increasingly global. While research and development (R&D) investments are still heavily concentrated in OECD countries, non-OECD economies account for a growing share of the world's R&D. In 2007, non-OECD countries for which data are available (see box) accounted for almost 16% of the business sector R&D expenditure (expressed in current USD purchasing power parity [PPP]) of OECD and non-OECD economies combined.

China made by far the largest contribution, accounting for 54% of the non-OECD share. It ranked third worldwide, behind the United States and Japan, but ahead of individual EU member states. Israel had the world's highest R&D intensity in the business sector, spending 3.7% of gross domestic product (GDP) on civil industrial R&D, twice the OECD average.

In most of the non-OECD economies covered, growth rates were well above the OECD average. R&D expenditures have grown particularly impressively in China, at an annual average rate of 22.1% for 2000-07, up from 20.9% over the preceding five years. China has set a target of raising its R&D intensity to 2% by 2010 and to 2.5% or above by 2020. This ambitious target implicitly means that R&D expenditure will need to continue to increase by at least 10-15% annually.

Sources

- OECD, *Main Science and Technology Indicators Database,* December 2009 and national sources.
- Eurostat, *New Cronos Database*.

For further reading

- OECD (2002), *Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development*, OECD, Paris, *www.oecd.org/sti/frascatimanual*.
- OECD (2010), *Main Science and Technology Indicators 2009/2*, OECD, Paris.

Measuring R&D in non-OECD economies

R&D data for Argentina, China, Israel, Romania, the Russian Federation, Singapore, South Africa, Slovenia and Chinese Taipei are included in the OECD's R&D database and are published in the OECD's *Main Science and Technology Indicators* (MSTI). Data for Brazil, Hong Kong (China) and India are from national S&T ministries (or equivalent) or the central statistical office.

The R&D data for non-OECD countries that are included in the *MSTI Database* largely comply with the recommended methodology of the *Frascati Manual*. Data for the other countries included here may not be completely in accordance with the *Frascati Manual* guidelines.

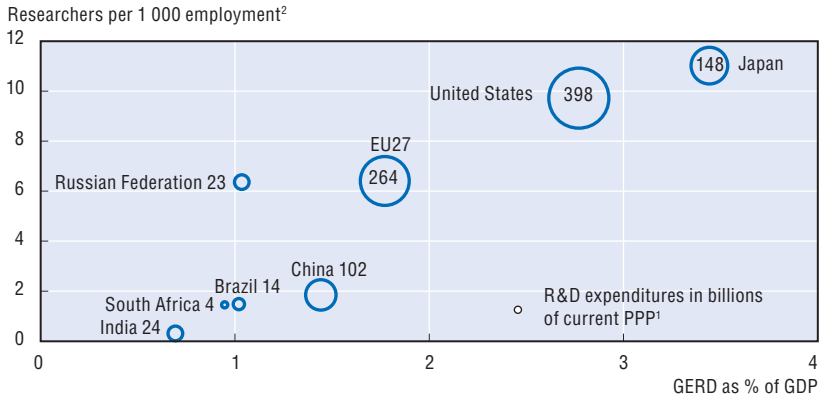
When examining the data, the following should be kept in mind.

- In Brazil, data for the business enterprise sector are collected through innovation surveys, which were held in 2000, 2003 and 2005. Data for other years are estimated. In 2000 and 2003, only mining and quarrying and manufacturing were covered. In 2005, in addition, telecommunications, computer activities and the R&D sector were covered. Therefore there is a break in series between 2004 and 2005.
- In India, the small-scale industry sector is only partially covered. Data for 2004-05 were estimated by applying sector-wise growth rates for the period 1998-99 to 2002-03.
- In Israel, defence R&D is not covered.
- In Romania and the Russian Federation, much R&D is traditionally performed by public enterprises, which are classified in the business enterprise sector.
- Owing to the lack of a comprehensive business register for South Africa, R&D expenditure may be underestimated by 10% to 15%.

F.1. R&D in OECD and non-OECD economies

Figure F.1.1. **Gross expenditure on R&D (GERD) in OECD and non-OECD areas, 2007**

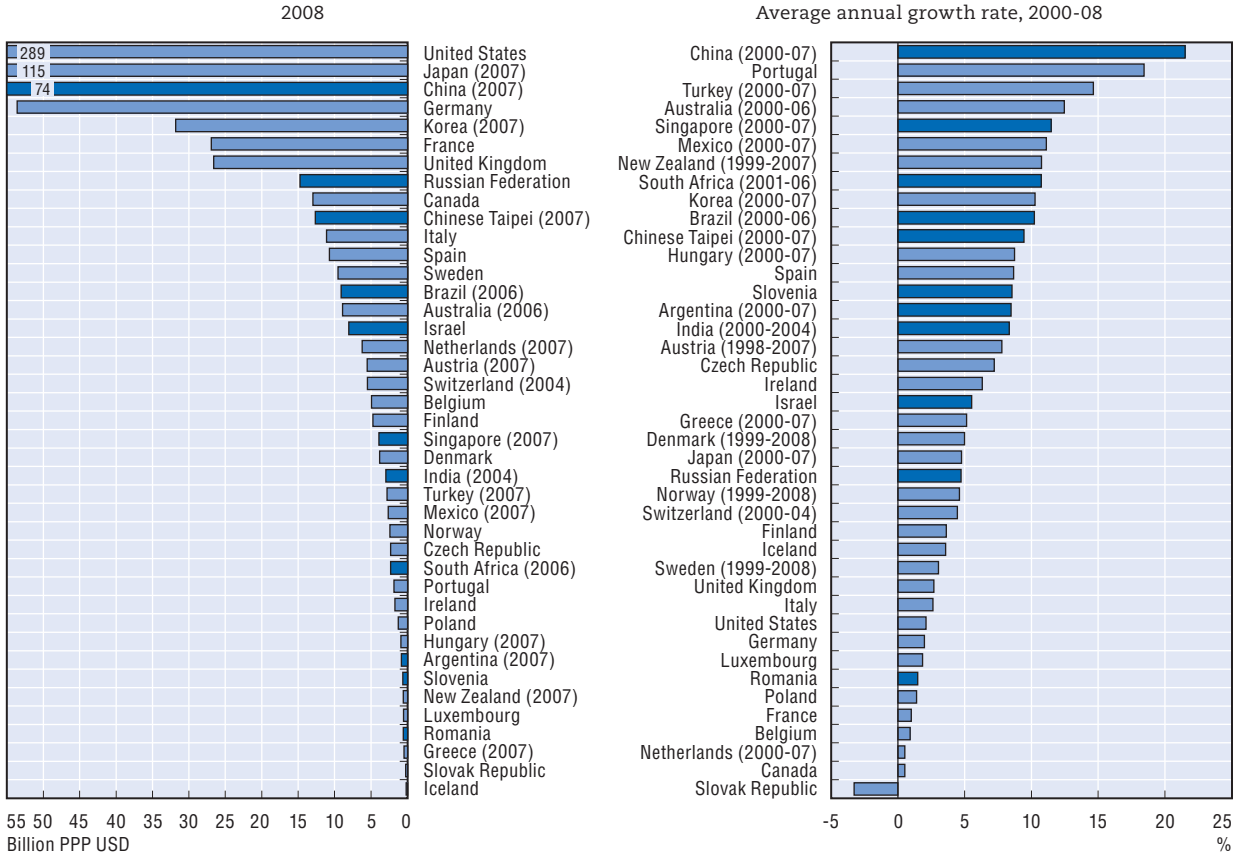
As a percentage of GDP, in billions of current USD PPP and researchers per 1 000 persons employed[2]



1. The size of the bubble represents R&D expenditure in billions of current USD in PPP; data for the Russian Federation and for the United States are for 2008, data for Brazil and South Africa are for 2006 and data for India are for 2004.
2. For researchers per 1 000 persons employed: data for the United States are for 2006, data for India are for 2004.

StatLink http://dx.doi.org/10.1787/842786737584

Figure F.1.2. **Business enterprise R&D (BERD) in OECD and non-OECD economies**



StatLink http://dx.doi.org/10.1787/842807561645

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

F.2. Sources of R&D funding from abroad

Business research and development (R&D) is financed by funds provided from within a country and from abroad. Foreign sources include other businesses, public institutions (government agencies or universities) or international organisations. According to the *Frascati Manual*, foreign-funded R&D includes, for example, R&D performed by foreign affiliates when funded by the parent company (located abroad), but it excludes R&D that is funded domestically.

Foreign sources play a substantial role in the funding of business-sector R&D. Funds from abroad accounted for at least 15% of aggregate business R&D funding in 2007 in Austria, the United Kingdom, the Slovak Republic, Hungary, Canada and the Netherlands. In Turkey, Chile, Japan, Korea and Israel, they accounted for less than 1% of the total.

In most countries, the main providers of foreign funding are other businesses. Among the 16 countries for which data were available, Greece and Portugal were the only ones reporting over 50% of foreign funding supplied by international organisations (in this case the European Union). Spain was the only country reporting almost 10% of finance originating from other governments and foreign higher education institutions

Again for the countries with available data, funding from other businesses comes largely from internal corporate transfers (from the parent company to its affiliates abroad). This form of funding accounted for over 85% of the total in Denmark, the Slovak Republic and Finland, and for over 50% in France, Austria and Norway.

Source

- OECD (2009), *OECD Science, Technology and Industry Scoreboard*, OECD, Paris.

For further reading

- OECD (2002), *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development*, OECD, Paris, *www.oecd.org/sti/frascatimanual*.

Measuring flows of R&D funds

R&D involves significant transfers of resources between units, organisations and sectors. In order to better measure and evaluate innovation policies and globalisation, it is important to trace the flow of R&D funds. According to the *Frascati Manual*, these transfers may be measured in two ways.

One is *performer-based reporting* of the sums which one unit, organisation or sector has received or will receive from another unit, organisation or sector for the performance of intramural R&D during a specific period.

The second is *source-based reporting* of extramural expenditures. These are the sums a unit, organisation or sector reports having paid or committed itself to pay to another unit, organisation or sector for the performance of R&D during a specific period. The first of these approaches is strongly recommended.

For such a flow of funds to be correctly identified, two criteria must be fulfilled:

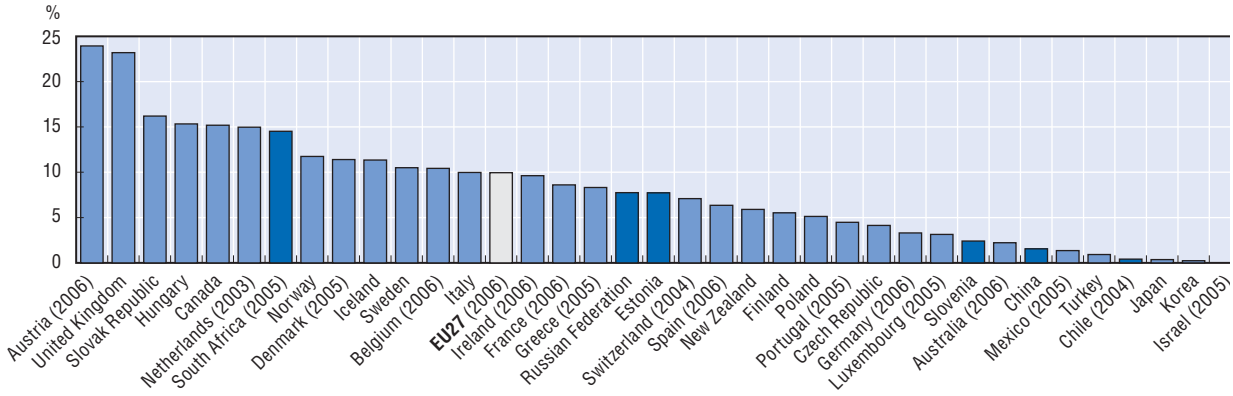
- There must be a direct transfer of resources.
- The transfer must be both intended and used for the performance of R&D.

For further details on the identification of these criteria, see the *Frascati Manual*.

F.2. Sources of R&D funding from abroad

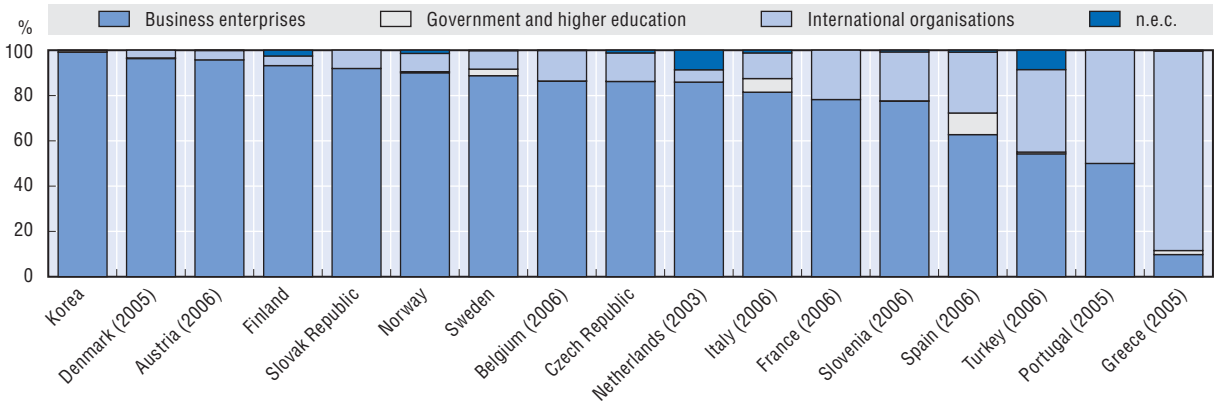
Figure F.2.1. **Funds from abroad, 2007**

As a percentage of business enterprise R&D



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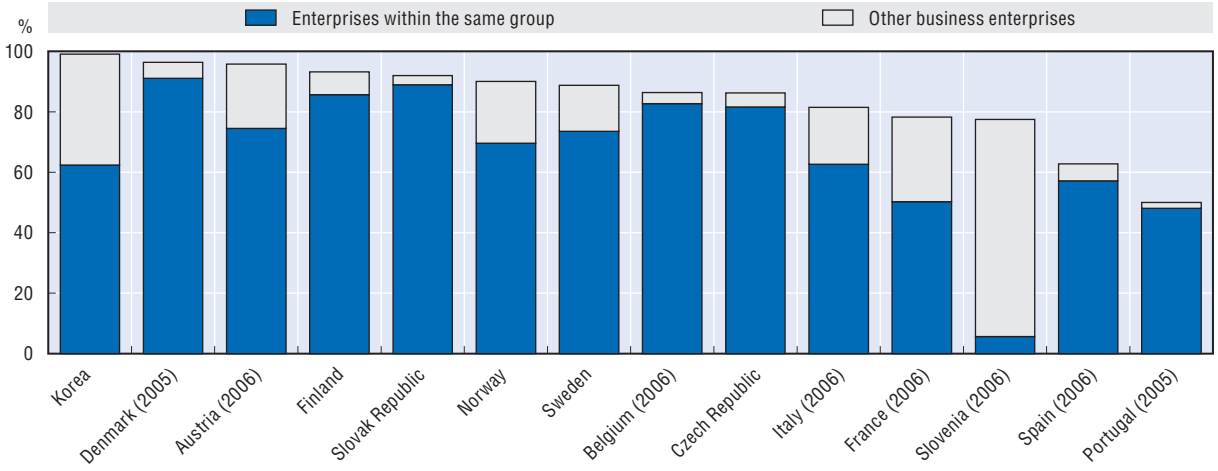
Figure F.2.2. **Business enterprise R&D funded from abroad by source, 2007**



StatLink http://dx.doi.org/10.1787/842855306071

Figure F.2.3. **Funding from foreign enterprises, 2007**

As a percentage of funds from abroad



StatLink http://dx.doi.org/10.1787/842856531164

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

F.3. R&D investments and multinationals

Multinational firms play an important role in investments in research and development (R&D) across the world. While they fund a large share of cross-border investments and are as such important vehicles for the international transfer of technology, they are themselves important investors in R&D.

R&D budgets of the largest multinational companies are larger than the R&D investments of several countries. The largest investor in R&D worldwide is the Japanese company Toyota with an R&D budget of USD 11 million, this places it among the top ten countries investing in R&D.

Aggregate spending by the world's top eight multinational groups in 2008 was larger than the R&D investments of all individual countries except the United States and Japan.

Sources

- *2009 EU R&D Scoreboard*.
- OECD, *Main Science and Technology Indicators Database* (MSTI), January 2010.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.
- OECD (2008), *Recent Trends in the Internationalisation of R&D in the Enterprise Sector*, OECD, Paris.
- OECD (2008), *The Internationalisation of Business R&D: Evidence, Impacts and Implications*, OECD, Paris.

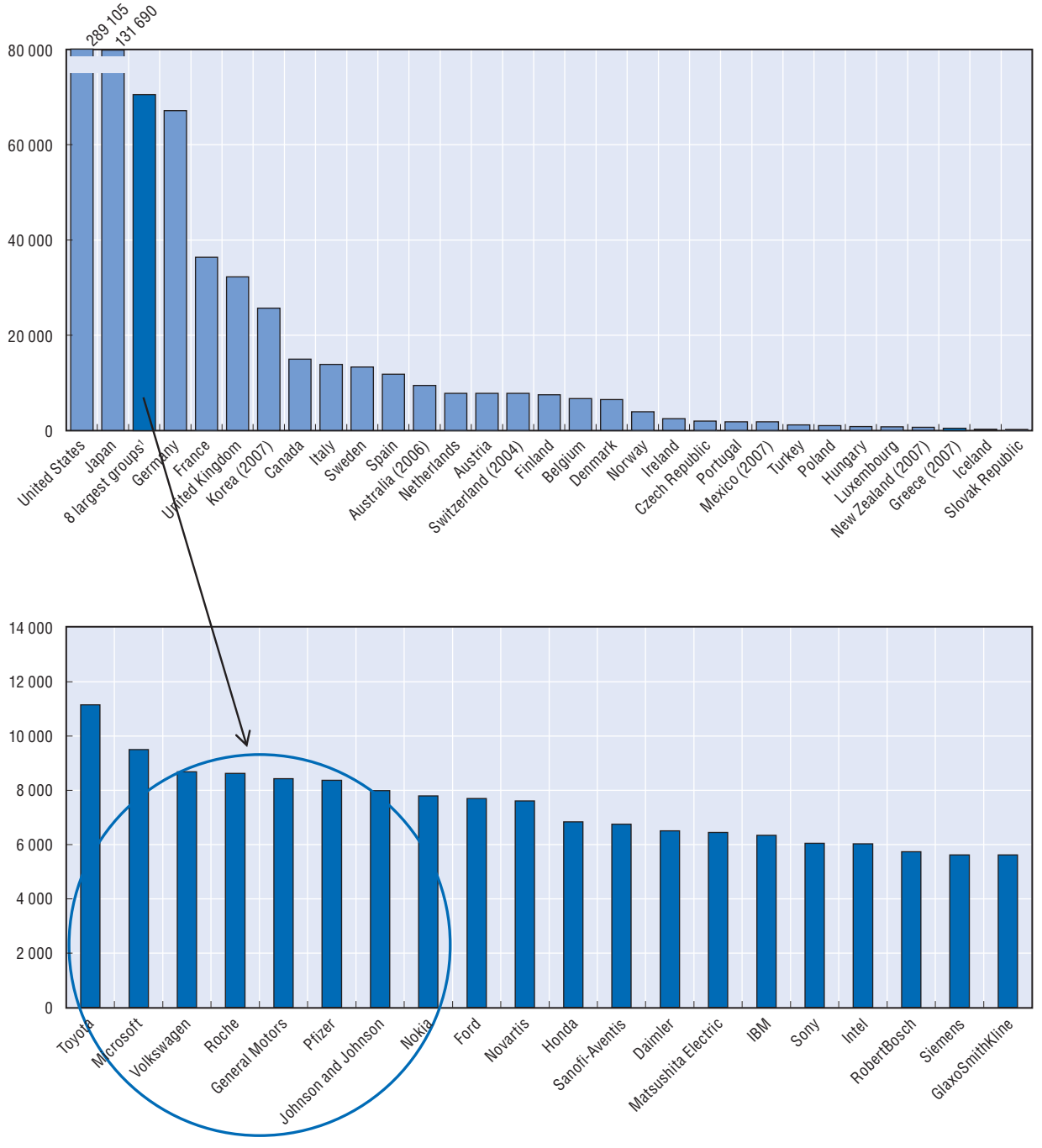
R&D data by enterprise group at the world level

This is R&D performed by a group of business enterprises located in different countries and over which majority control is exercised either directly or indirectly by a company that is controlled by no other firm (ultimate control). Such group data have three main limitations: they are consolidated at the global level and are not broken down by country; in some cases the main activity accounts for a low percentage of aggregate turnover; and R&D data are not exhaustive.

F.3. R&D investments and multinationals

Figure F.3.1. **Comparison between industrial R&D expenditures (BERD) of OECD countries and those of the eight largest multinational groups, 2008**

USD million



1. Toyota, Microsoft, Volkswagen, Roche, General Motors, Pfizer, Johnson and Johnson, Nokia.

StatLink http://dx.doi.org/10.1787/842871104357

F.4. Triadic patent families

■ The internationalisation of knowledge and technology is also reflected in the increasing number of triadic patent families. In 2007, about 52 000 were filed worldwide compared to something less than 42 000 ten years earlier.

■ The United States accounted for 31% of triadic patent families, with nearly 16 000. Japan and the European Union were the other two regions responsible for the majority of triadic patent families.

■ The surge in innovative activities in Asia is clearly reflected in growing country shares, although in absolute numbers the distance from the leaders remains considerable. Korea and China were among the top 12 countries in 2007, and India has also climbed up in the rankings. In absolute number, emerging countries like the Russian Federation and Brazil also have a considerable number of triadic patent families.

■ Relative to total population, however, the importance of emerging countries is less clear. China for example has less than 0.5 patent families per million population.

■ Switzerland, Japan, Sweden, Germany and Israel appear as the five most innovative countries in 2007, with the highest values recorded in Switzerland (118) and Japan (115). Ratios for the Netherlands, Finland, Denmark, the United States, Austria and Korea are also above the OECD average (42).

Source

- OECD, *Patent Database*, December 2009, *www.oecd.org/sti/ipr-statistics*.

For further reading

- Dernis, H. and M. Khan (2004), "Triadic Patent Families Methodology", *STI Working Paper 2004/2*, OECD, Paris.
- OECD (2009), *OECD Patent Statistics Manual*, OECD, Paris.

Triadic patent families

The globalisation of technological activities can be quantified with patent data. Patents have a distinctive feature which makes them very attractive as an indicator of global S&T activities.

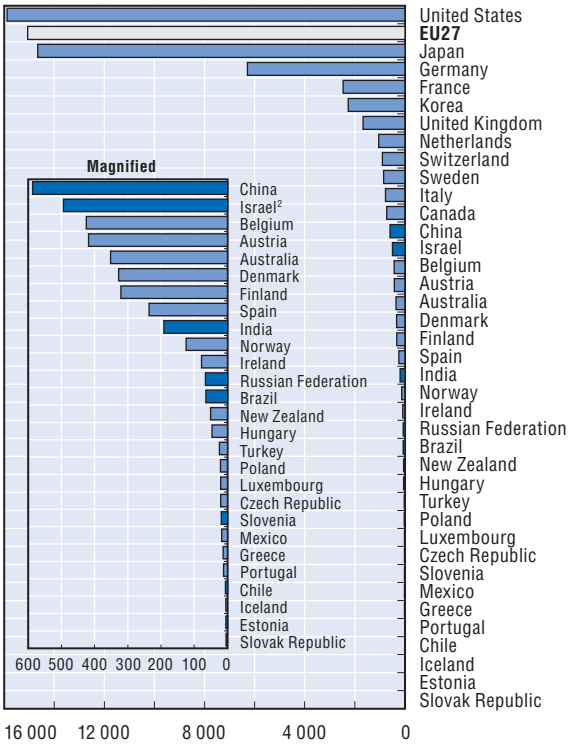
Patent statistics are commonly constructed on the basis of information from a single patent office. While patents filed at a given patent office represent a rich source of data, these data have certain weaknesses. The "home" advantage bias is one of them, since, proportionate to their inventive activity, domestic applicants tend to file more patents in their home country than non-resident applicants. Furthermore, indicators based on a single patent office are influenced by factors other than technology, such as patenting procedures, trade flows, proximity, etc. In addition, the value distribution of patents within a single patent office is skewed: many patents are of low value and few are of extremely high value. Simple patent counts would therefore give equal weight to all patent applications.

The OECD has developed the concept of triadic patent families in order to reduce the major weaknesses of the traditional patent indicators described above. Triadic patent families are defined at the OECD as a set of patents taken at the European Patent Office (EPO), the Japan Patent Office (JPO) and US Patent and Trademark Office (USPTO) that protect a same invention. In terms of statistical analysis, they improve the international comparability of patent-based indicators, as only patents applied for in the same set of countries are included in the family: home advantage and influence of geographical location are therefore eliminated. Second, patents included in the family are typically of higher value: patentees only take on the additional costs and delays of extending protection to other countries if they deem it worthwhile.

The criteria for counting triadic patent families are the earliest priority date (first application of the patent worldwide), the inventor's country of residence, and fractional counts. Owing to time lag between the priority date and the availability of information, 1999 is the latest year for which triadic patent family data are almost completely available. Data from 1999 onwards are OECD estimates based on more recent patent series ("nowcasting").

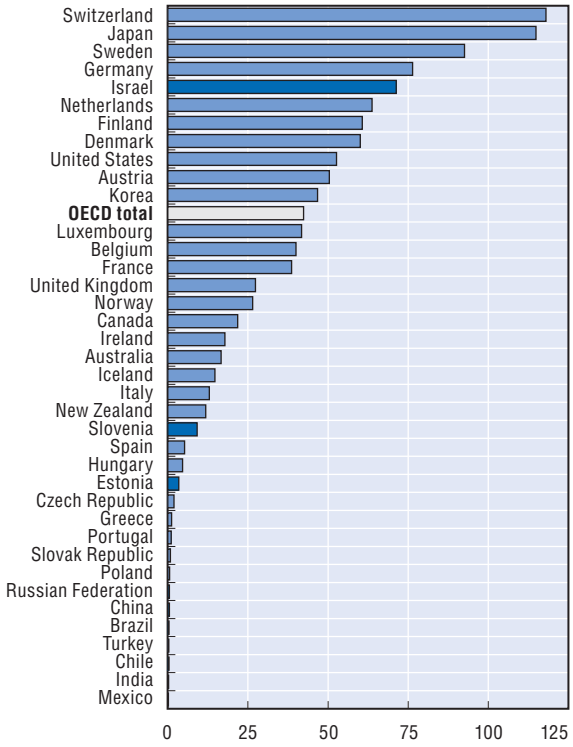
F.4. Triadic patent families

Figure F.4.1. **Triadic patents families,[1] absolute numbers, 2007**



StatLink http://dx.doi.org/10.1787/843033848386

Figure F.4.2. **Triadic patents, families,[1] per million population, 2007**



StatLink http://dx.doi.org/10.1787/843074661108

Note: Patent counts are based on the earliest priority date, the inventor's country of residence and fractional counts. The data mainly derive from the European Patent Office (EPO) *Worldwide Statistical Patent Database* (September 2009).

1. Patents filed at the EPO, the US Patent and Trademark Office (USPTO) and the Japan Patent Office (JPO) which protect the same invention. Data from 1999 onwards are OECD estimates.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

F.5. International co-operation in S&T

The technological activities of (multinational) firms have become increasingly internationalised. In the search for new technological competences, better adaptation to markets and lower research and development costs, companies are moving research activities overseas more intensively. The information contained in patents makes it possible to trace the internationalisation of technological activities and the circulation of knowledge among countries. In addition, collaboration with foreign partners increasingly plays an important role as firms gain access to a broader pool of resources and knowledge at lower cost and are able to share risks with partners.

Cross-border ownership of inventions/patents clearly reflects the internationalisation of science and technology activities. On average, 15% of all inventions were owned or co-owned by a foreign resident in 2005-07, but the differences are substantial across countries. In Argentina, nearly 89% of domestic inventions belong to foreign residents, while Korea and Japan report the lowest shares of foreign ownership in 2005-07 (3.9% and 4%, respectively). The United Kingdom is an exception among large countries, with around 37% of domestic inventions owned by foreign residents, compared to 30% in the mid-1990s.

Patents filed under the PCT (Patent Co-operation Treaty) show that domestic ownership of inventions made abroad is particularly high in small open economies. In Luxembourg more than 80% of inventions owned were made with inventors abroad and more than 30% in Switzerland, Chinese Taipei, Ireland, Belgium, the Netherlands, Sweden and Finland. Turkey, Japan, Korea, India, Brazil and South Africa report the lowest share of inventions made abroad (less than 6%).

Collaboration on innovation with foreign partners is another important source of knowledge inflows and can take a variety of forms with different levels of interaction ranging from simple one-way information flows to highly interactive and formal arrangements. Collaboration with foreign customers and/or suppliers helps firms develop new products, processes or other innovations.

The share of EU firms collaborating on innovation with partners across Europe ranges from less than 2% in Spain and Turkey to over 13% in Finland, Luxembourg and Slovenia. Collaboration with partners outside Europe is much less frequent and concerns between 1% and 5% of firms in most European countries. Overall, innovating firms from the Nordic countries and some small European economies (Belgium, Luxembourg and Slovenia) tend to collaborate more frequently with partners abroad.

Sources

- OECD, *Patent Database*, December 2009, *www.oecd.org/sti/ipr-statistics*.
- OECD (2009), *OECD Science, Technology and Industry Scoreboard 2009*, OECD, Paris.

For further reading

- Guellec, D. and B. Van Pottelsberghe de la Potterie (2001), "The internationalisation of technology analysed with patent data", *Research Policy*, 2001, Vol. 30, Issue 8, pp. 1253-1266.
- OECD and Eurostat (2005), *Oslo Manual: Guidelines for Collecting and Interpreting Innovation Data, 3rd edition*, OECD, Paris, *www.oecd.org/sti/oslomanual*.
- OECD (2009), *OECD Patent Statistics Manual*, OECD, Paris.

Cross-border ownership of inventions

Patent documents report the inventor(s) and the applicant(s) – the owner of the patent at the time of application – along with their addresses and countries of residence. A difference between the owners' and inventors' country of residence points to cross-border ownership of inventions. In most cases, cross-border ownership of inventions is mainly the result of activities of multinationals: the applicant is an international conglomerate and the inventors are employees of a foreign subsidiary.

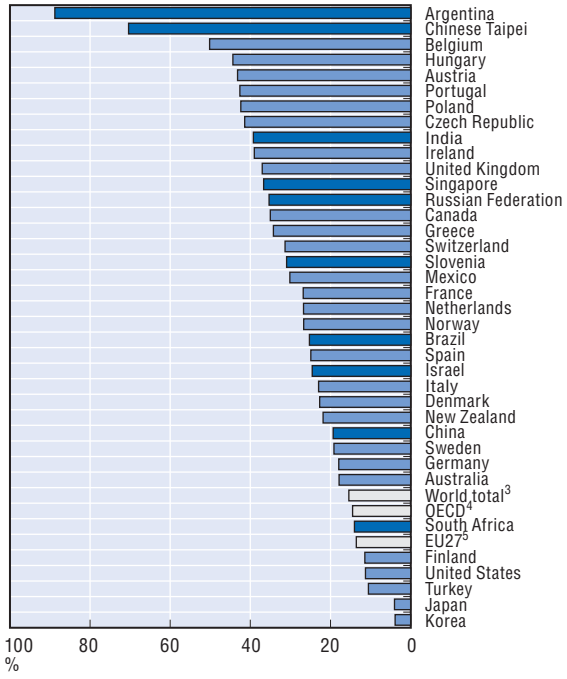
Foreign ownership of domestic inventions is one of the measures of globalisation of technological activities. It refers to the number of patents invented domestically and owned by non-residents in the total number of domestic inventions. It measures the extent to which foreign firms control domestic inventions. Obviously, what is considered foreign ownership in one inventor country implies a domestically owned invention abroad by firms in another country. Foreign ownership includes inventions in which the inventor country shares ownership (co-owned inventions), but this share is frequently a small part of the total of cross-border inventions.

Domestic ownership of inventions made abroad measures the extent to which domestic firms control inventions made by residents of other countries. It refers to patents that are the property of a country, but have at least one inventor located in a foreign country.

The use of patent indicators to measure globalisation of technology is not without shortcomings. Most of the caveats are related to the identification of companies' country of origin. The first concerns the financial context of the cross-border ownership. A patent invented abroad may mean an acquisition or merger rather than the setting up of a R&D laboratory. Patent databases do not register such changes in the ownership of patents. A second problem concerns the origin of subsidiaries. In some cases, the owner country reported may be not the country in which the company's headquarters are located but that of the subsidiary in charge of management of international intellectual property. In other cases, the company owing the invention may be the subsidiary and the address reported that of the host country (and not that of the headquarters).

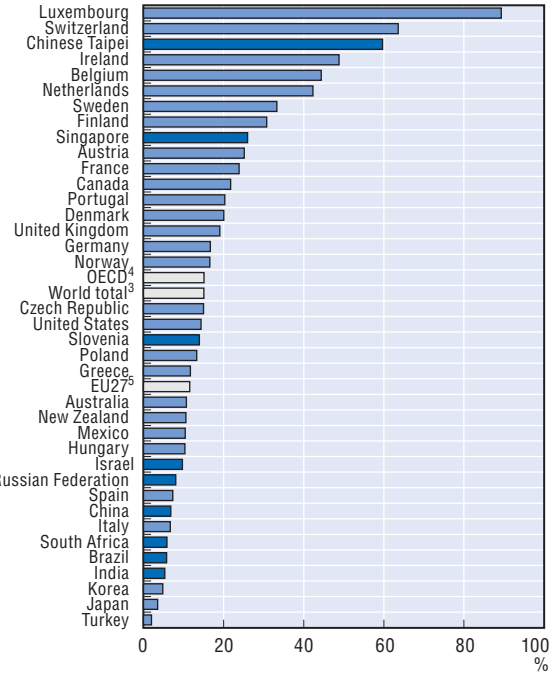
F.5. International co-operation in S&T

Figure F.5.1. **Foreign ownership of domestic inventions,[1] 2005-07**



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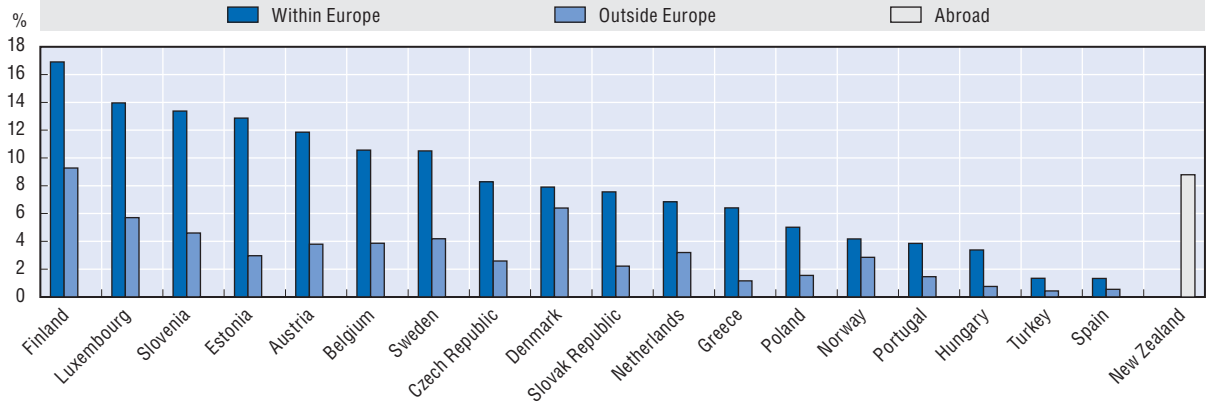
Figure F.5.2. **Domestic ownership of inventions made abroad,[2] 2005-07**



StatLink http://dx.doi.org/10.1787/843184628375

Figure F.5.3. **Firms in Europe with foreign collaboration on innovation, 2004-06**

As a percentage of all firms



StatLink http://dx.doi.org/10.1787/843215663712

Note: Patent counts are based on patent applications filed under the Patent Co-operation Treaty (PCT), at international phase, by the priority date and the inventor's (respectively applicant's) country of residence.

1. Share of PCT patent applications owned by foreign residents in total patents invented domestically. Coverage: countries/economies with more than 200 PCT filings over the period.
2. Share of PCT patent applications invented abroad in total patents owned by country residents. Coverage: countries/economies with more than 200 PCT filings over the period.
3. All patents that involve international co-operation.
4. Patents of OECD residents that involve international co-operation.
5. The EU is treated as one country; intra-EU co-operation is excluded.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

F.6. International co-operation in science

■ The co-authorship of research publications provides a direct measure of collaboration in science. Indicators of co-authorship help to understand how knowledge is created among researchers and how collaboration in science is changing. Co-authorship may involve researchers in the same institution, in the same country, or in two or more countries.

■ Co-authorship, both domestic and international, has grown in importance over the past decade. As a general trend, scientific knowledge production is shifting from individual to group, from single to multiple institutions, and from national to international. Researchers are increasingly networked across national and organisation borders.

■ Collaboration among researchers in a single institution was the major form of collaborative research until the end of the 1990s. However, the percentage of single-institution co-authorship has been decreasing over the last two decades.

■ Domestic co-authorship, *i.e.* collaboration by researchers of different institutions in the same country, has been increasing rapidly. It surpassed the share of single institution co-authorship in 1998 and has since been the most common form of scientific collaboration.

■ International co-authorship has been growing as fast as domestic co-authorship. In 2007, 21.9% of scientific articles involved international co-authorship, a figure three times higher than in 1985. Increases in domestic and international co-authorship point to the crucial role of interaction among researchers as a way to diversify their sources of knowledge.

■ The degree of international collaboration varies. Large countries tend to engage less in international collaboration. Large European countries (France, Germany and the United Kingdom) conduct more collaborative work than the United States and Asian countries.

Source

- OECD (2009), *OECD Science, Technology and Industry Scoreboard*, OECD, Paris.

For further reading

- Igami, M. and A. Saka (2007), "Capturing the Evolving Nature of Science, the Development of New Scientific Indicators and the Mapping of Science", *OECD Science, Technology and Industry Working Papers* 2007/1, OECD, Paris, *www.oecd.org/sti/working-papers*.

Measures of co-authorship

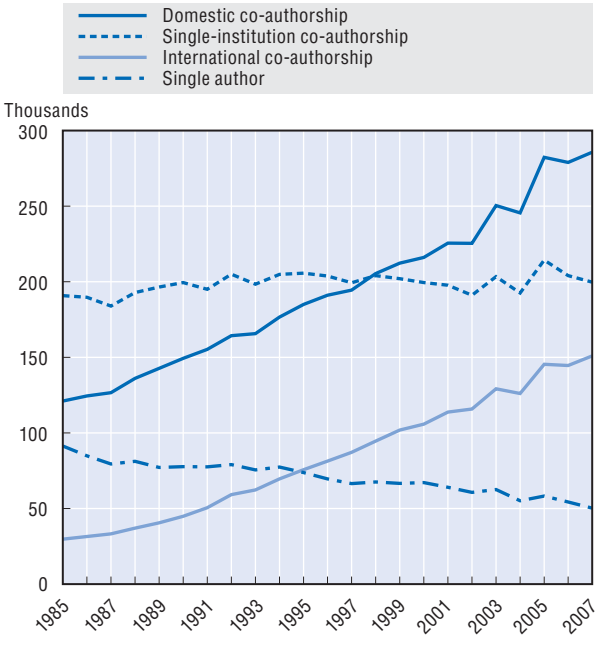
Four types of authorship of scientific articles are analysed: single authorship, single-institution co-authorship, domestic co-authorship and international co-authorship. The analysis is based on the Science Citation Index on CD-ROM (1981-2007) provided by Thomson Scientific and analysed by the National Institute of Science and Technology Policy in Japan.

Single authorship measures scientific papers with a single author. Single-institution co-authorship measures scientific papers with two or more authors of the same institution. Domestic co-authorship measures scientific articles with two or more authors from different institutions in the same country. International co-authorship measures scientific articles with two or more authors from different countries. The boundary between single-institution co-authorship and domestic co-authorship is not always clear, as for example, when co-authors belong to different departments of same university. Here, the classification is based upon the number of addresses listed in each article.

Indicators of co-authorship draw attention to language barriers and geographical factors. However, these obstacles have diminished as English has become the language most commonly used internationally among researchers. Furthermore physical distance between researchers is likely to have some correlation with the ratio of co-authorship, although the effect of information and communication technology on knowledge flows has undoubtedly facilitated distance collaboration.

F.6. International co-operation in science

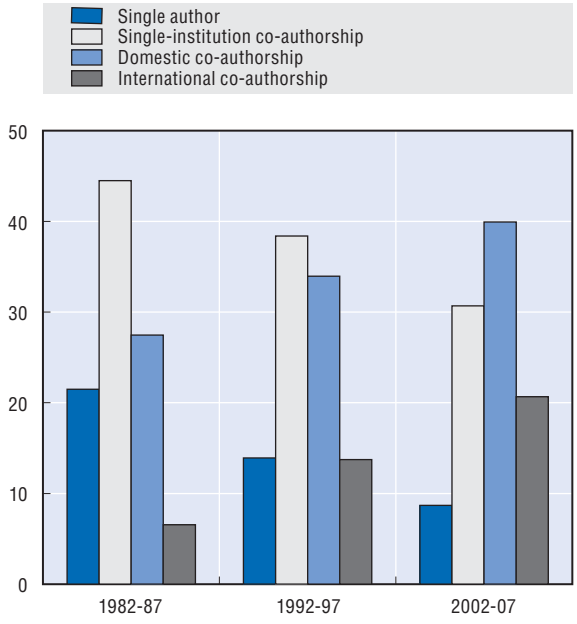
Figure F.6.1. **Trends in co-operation in science, 1985-2007**



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Figure F.6.2. **Share of co-authored scientific articles, 1982-87, 1992-97, 2002-07**

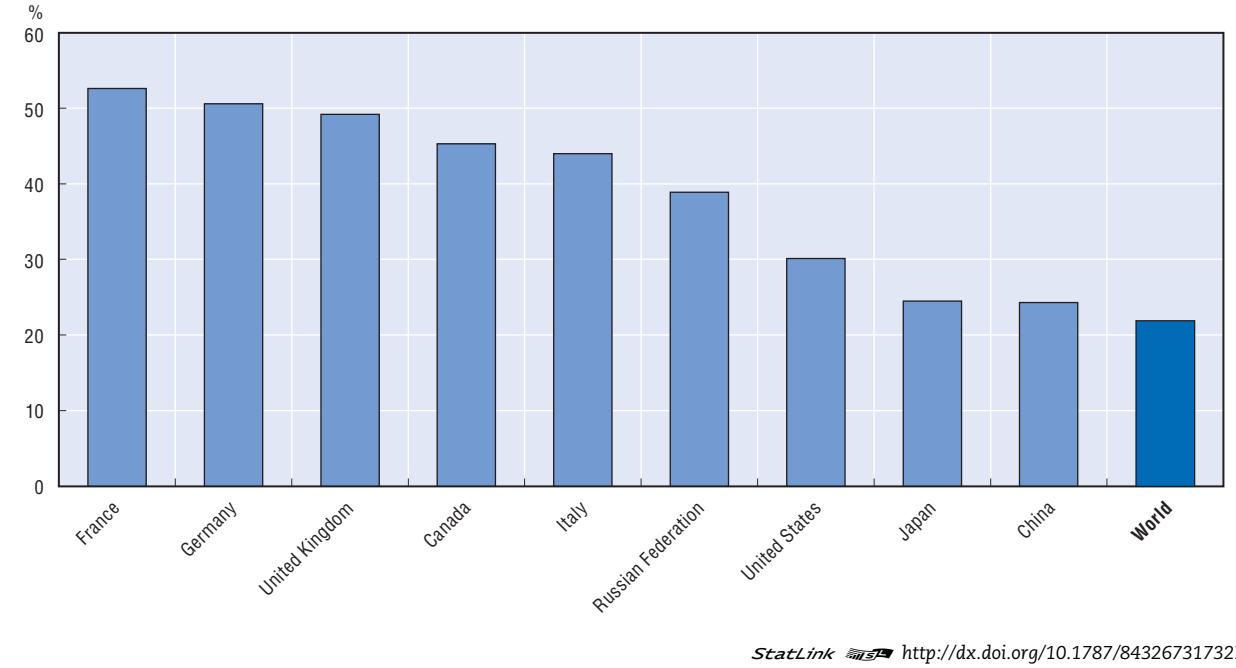
As a percentage of total



StatLink http://dx.doi.org/10.1787/843228526812

Figure F.6.3. **Share of internationally co-authored scientific articles, 2007**

As a percentage of total articles



StatLink http://dx.doi.org/10.1787/843267317327

Note: Data are based on research articles in natural and medical sciences and engineering.

F.7. Technology balance of payments

The internationalisation of technology is also reflected in the technology balance of payments, since payments and receipts reflect to some extent cross-border trade in research and development (R&D) outcomes. The technology balance of payments measures disembodied international technology transfers: licence fees, patents, purchases and royalties paid, know-how, research and technical assistance. Unlike R&D expenditures, these are payments for production-ready technologies.

In most OECD countries, technology receipts and payments increased strongly between 2000 and 2008. Overall, the OECD area maintained its position as a net technology exporter *vis-à-vis* the rest of the world.

The European Union, which recorded a deficit in the technology balance of payments until 2001, became a net exporter of technology in 2008. Results, along with the volume of transactions, must however be interpreted with care insofar as intra-EU flows cannot be set apart on the basis of available data.

The most spectacular change in the technology balance of payments occurred in Japan. During the 1980s and 1990s, only new contracts for technology transactions showed a positive trade balance, while total technology transactions were in deficit. In 2008, these transactions showed a very large surplus, even if the latter decreased from 2007.

In 2008, countries displaying a large surplus on their technology balance of payments as a percentage of gross domestic product (GDP) were Sweden, Austria, Norway, the United Kingdom, Finland, the United States, Denmark, the Netherlands and Japan. On the other hand, Hungary Switzerland, Belgium and Luxembourg imported the most technology.

The magnitude of Ireland's technology flows is mainly due to the strong presence of foreign affiliates (particularly US and UK firms). The figures may also be affected by intra-firm transactions and transfer pricing.

Source

- OECD, *Technology Balance of Payments Database* and OECD estimates, December 2009.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

Technology balance of payments

Technology receipts and payments constitute the main form of disembodied technology diffusion. Trade in technology comprises four main categories:

- transfer of techniques (through patents and licences, disclosure of know-how);
- transfer (sale, licensing, franchising) of designs, trademarks and patterns;
- services with a technical content, including technical and engineering studies, as well as technical assistance,
- industrial R&D.

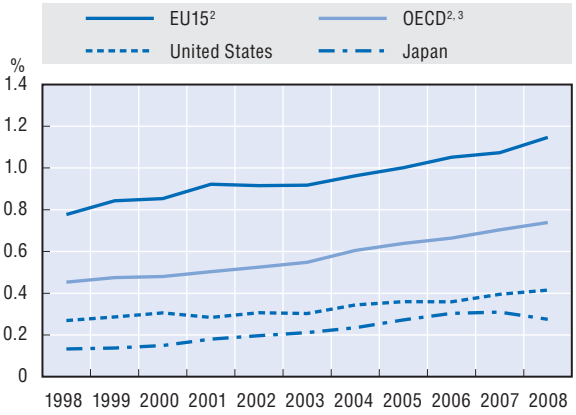
Although the balance reflects a country's ability to sell its technology abroad and its use of foreign technologies, a deficit does not necessarily indicate low competitiveness. In some cases, it results from increased imports of foreign technology; in others, it is due to declining receipts.

Likewise, if the balance is in surplus, this may be due to a high degree of technological autonomy, a low level of technology imports or a lack of capacity to assimilate foreign technologies. Most transactions also correspond to operations between parent companies and affiliates. Thus, it is important to have additional qualitative and quantitative information to analyse correctly a country's deficit or surplus position in a given year.

There is also the difficulty of dissociating the technological from the non-technological content of trade in services, which falls under the heading of pure industrial property. Thus, trade in services may be underestimated when a significant portion does not give rise to financial payments or when payments are not in the form of technology payments.

F.7. Technology balance of payments

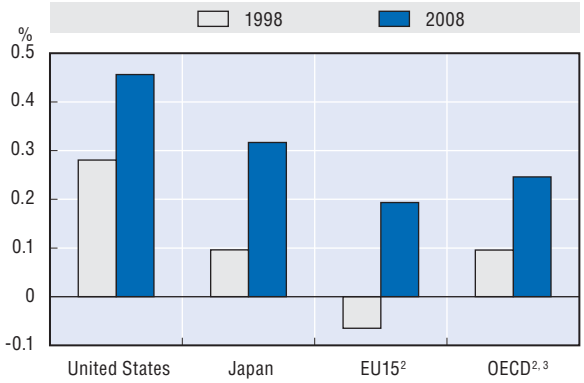
Figure F.7.1. **Trends in technology flows[1] as a percentage of GDP by geographical area**



1. Average of technological payments and receipts.
2. Including intra-area flows. Excluding Denmark. Data partially estimated.
3. Excluding Iceland and Turkey.

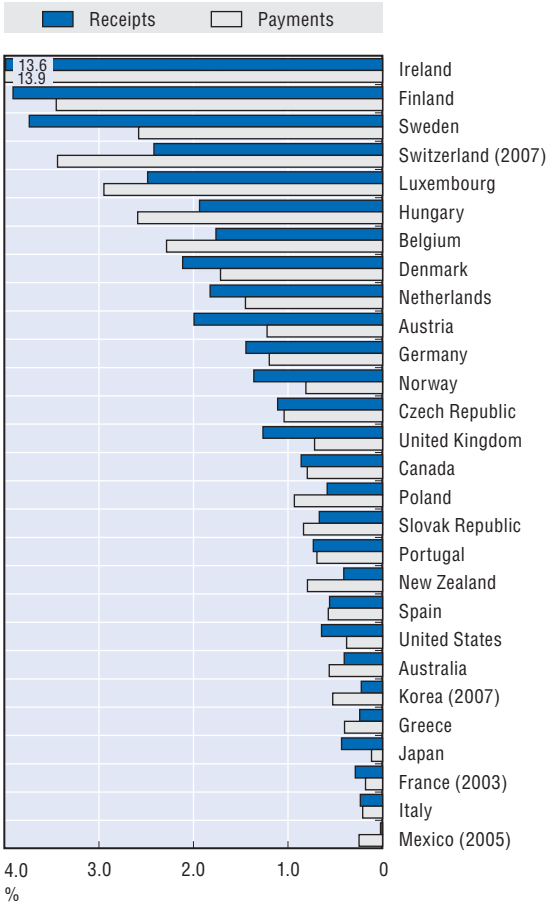
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Figure F.7.2. **Changes in the technology balance of payments as a percentage of GDP**



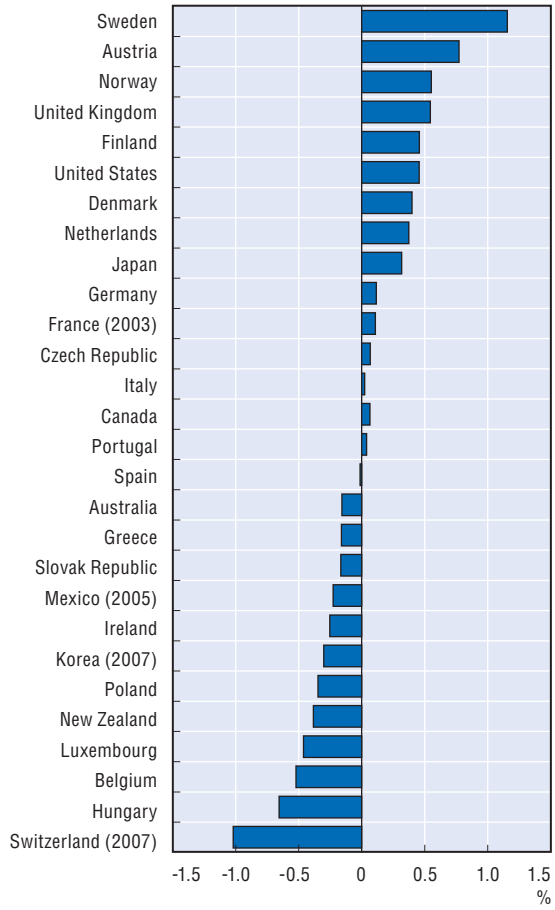
StatLink http://dx.doi.org/10.1787/843281100104

Figure F.7.3. **Technology flows (average of receipts and payments) as a percentage of GDP, 2008**



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Figure F.7.4. **Technology balance of payments (receipts – payments) as a percentage of GDP, 2008**



StatLink http://dx.doi.org/10.1787/843332174708

F.8. Technology balance of payments and domestic R&D activity

A country's technological development can reflect the choice between domestic production of technology/inventions [*via* a high national research and development (R&D) effort] or absorption of foreign technology (*via* the acquisition of foreign technologies and the payment of licensing fees and royalties).

Even though the R&D effort and the purchase of foreign technology are not linked, in some countries – particularly Ireland, Poland, Hungary, the Netherlands, Switzerland, Belgium and Luxembourg – expenditure for foreign technology (technological payments) is greater than expenditure for domestic business enterprise R&D. This is clearly related to the major activities of (domestic and foreign) multinationals in these countries.

Conclusions directly drawn from the comparison of "national" R&D investments and the technology balance of payments need to be interpreted with care. Major difficulties arise when collecting data on the technology balance of payments (see box).

Sources

- OECD, *Technology Balance of Payments Database*.
- OECD, *Main Science and Technology Indicators Database*, December 2009.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

Technology balance of payments: limitations

First, some technological transfers that do not imply a financial counterpart are not included logically in the technology balance of payments (TBP). Certain technology transfers by multinational firms to affiliates do not explicitly take the form of licence or know-how transmission contracts. In this situation, part of the profits remitted to the parent company can be regarded as representing remuneration for the technology made available but they are not incorporated in the TBP statistics.

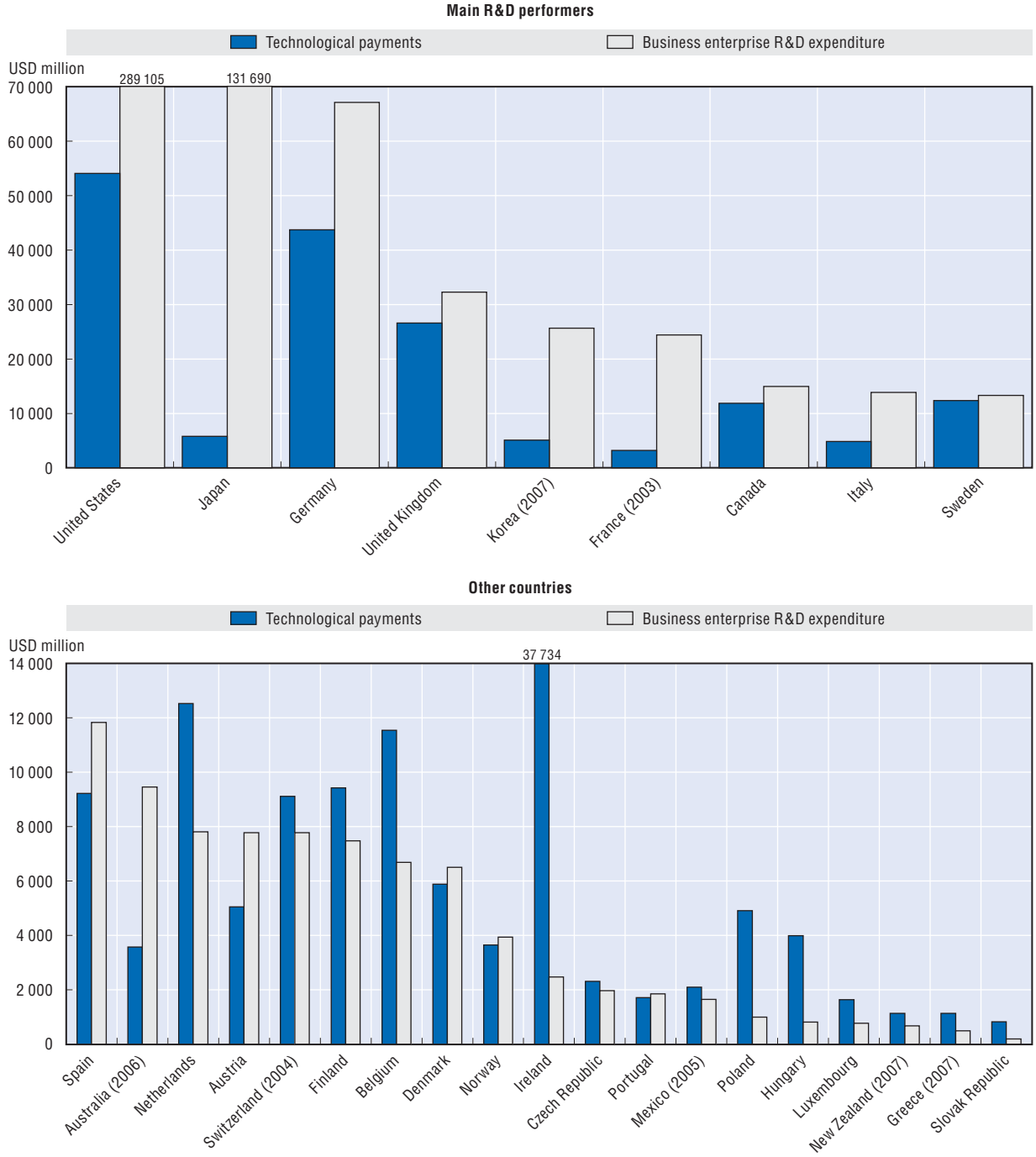
Second, TBP statistics include both unaffiliated and affiliated transfers of disembodied technology, but these two categories of transfers are not disaggregated.

Third, TBP data include transactions in which ownership of the technology is transferred, as well as other transactions in which ownership is retained by the licensor. While the former typically involve lump-sum payments, the latter typically generate variable payments over several periods. Since the proportion of each type of transaction is unknown, the stock of acquired technology variable is expected to be a better measure for the imported technology available to a given country in a specific period than the flow variable.

Fourth, measurement errors may result in both the underestimation and overestimation of technology transfers. Licensing contracts provide many payment channels other than technology payments, and payment/receipt flows recorded as such may be only part of the total price paid and received. Alternatively, national tax and control regulations on technology payments and receipts may bias TBP data, particularly the international transfers of multinational enterprises. If royalties are less taxable than profits, royalties may be preferred to other profit transfer channels and therefore exceed the value of technology transferred. On the contrary if control limitations are imposed on the royalty remittances, some part of repatriated profits will represent remuneration of technology transfer.

F.8. Technology balance of payments and domestic R&D activity

Figure F.8.1. **Technological payments and business enterprise R&D expenditure, 2008**



StatLink http://dx.doi.org/10.1787/843338225060

F.9. Trade in knowledge-intensive goods

■ Knowledge-intensive goods have been among the most dynamic components of international trade over the last decade. A country's ability to compete in high-technology markets is therefore important to its overall competitiveness in the world economy.

■ OECD trade in manufacturing has been mostly driven by high-technology industries over the second half of the 1990s and up to the beginning of 2005. The value of trade in high-technology manufactures then started to slow and in 2007 it stood at broadly the same level as medium-high-technology manufactures. Over the same period, trade in medium-low-technology manufactures rose sharply. The notable increase in the value of trade in medium-low-technology manufactures was due in part to the recent significant increases in commodity prices for oil, petroleum products and basic metals, particularly the metals required for the manufacture of ICT goods.

■ In individual OECD countries, high-technology exports generally grew substantially faster than medium-high-technology exports between 1997 and 2007; in the Slovak Republic, Iceland and the Czech Republic they represented about 1.5 times the value of medium-high-technology exports. They grew at somewhat under 30% in China and by about 15% in Brazil. Export growth of high-technology goods outstripped growth in total manufacturing except in most OECD accession countries (Chile, Estonia, Israel, Russian Federation, Slovenia), Sweden and Japan.

■ Trade in medium-low-technology manufactures accounted for 20% of total manufacturing trade in 2007 in the OECD area. Trade in high-technology manufactures and medium-high-technology manufactures accounted for 23% and 39%, respectively.

■ In 2007, exports were particularly oriented towards high- and medium-high-technology manufactures in Ireland, Japan, Hungary, Switzerland, Mexico and the United States. China's exports were significantly higher than the OECD average, with high- and medium-high-technology exports accounting for about 60% of its total manufacturing exports.

Source

- OECD (2009), *OECD Science, Technology and Industry Scoreboard 2009*, OECD, Paris.

For further reading

- Hatzichronoglou, T. (1997), "Revision of the High Technology Sector and Product Classification", *OECD Science, Technology and Industry Working Papers* 1997/2, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris.
- Pilat, D. *et al.* (2006), "The Changing Nature of Manufacturing in OECD Countries", *OECD Science, Technology and Industry Working Papers* 2006/9, OECD, Paris.
- OECD (2007), *Staying Competitive in the Global Economy: Moving Up the Value Chain*, OECD, Paris.

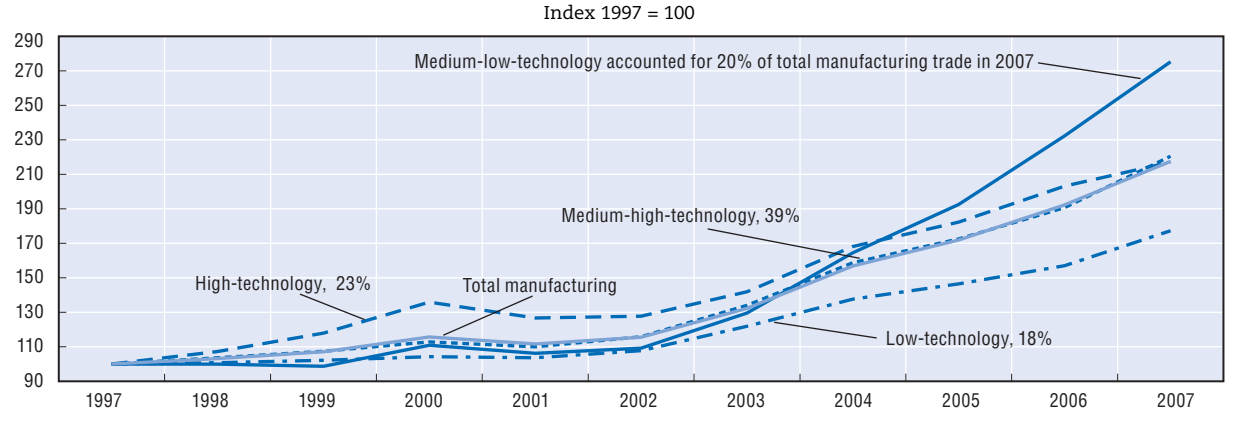
Trade by technology intensity

OECD methodological work classifies manufacturing industries in four categories of technological intensity: high, medium-high, medium-low and low technology. This classification is based on indicators of (direct as well as indirect) technological intensity which reflect to some degree "technology-producer" or "technology-user" aspects.

To analyse international trade flows by technological intensity requires attributing each product to a specific industry. However, products which belong to a high-technology industry do not necessarily have only high-technology content. Likewise, some products in industries of lower technological intensity may incorporate a high degree of technological sophistication. No detailed data are available for services at present. Therefore the indicators presented here only relate to manufacturing industries.

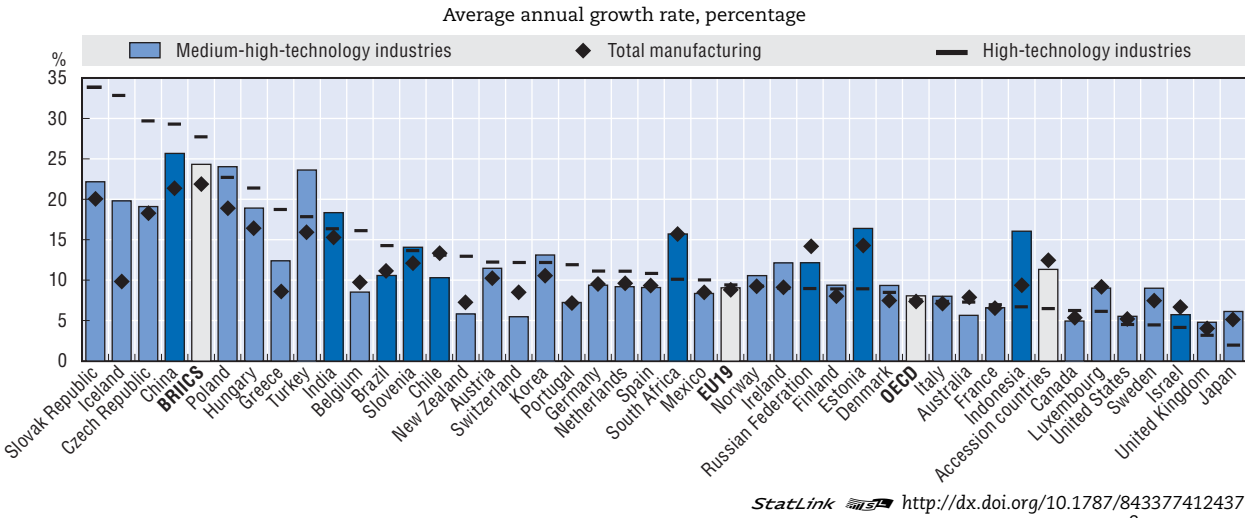
F.9. Trade in knowledge-intensive goods

Figure F.9.1. **OECD manufacturing trade[1] by technology intensity[2]**



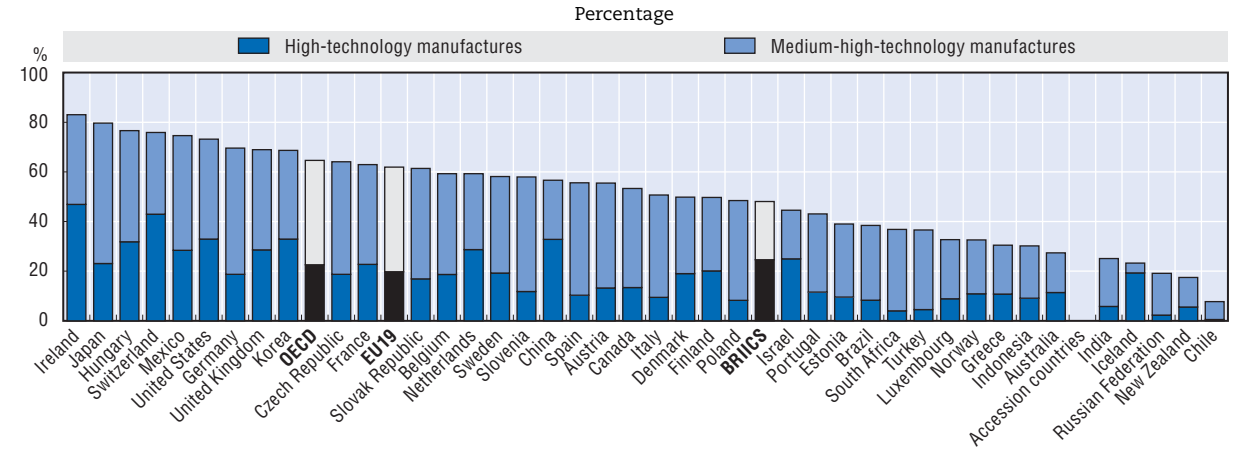
StatLink http://dx.doi.org/10.1787/843365734077

Figure F.9.2. **Growth of high- and medium-high-technology exports, 1997-2007[2]**



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Figure F.9.3. **Share of high- and medium-high-technology in manufacturing exports, 2007[2]**



StatLink http://dx.doi.org/10.1787/843441506560

1. Average value of total OECD exports and imports of goods.
2. The OECD and EU aggregates exclude Luxembourg for which data are only available from 1999.

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

G. INTERNATIONALISATION OF HIGHLY SKILLED HUMAN CAPITAL

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G.1. Internationalisation of higher education

■ Various forms of cross-border education have been developed in recent decades (*e.g.* mobility of educational programmes and institutions across borders) and contribute to the internationalisation of the higher education system. Student mobility in tertiary education is an important illustration of this.

■ The number of students enrolled outside their country of citizenship has risen dramatically since 1975 from 0.8 million worldwide to 3 million in 2007, a nearly four-fold increase. In 2007, 2.5 million tertiary-level students were enrolled outside their country of citizenship in the OECD area, an increase of 59.3% since 2000 for an average annual growth rate of 6.9%.

■ In 2007, one out of two foreign students went to the four countries that host the majority of foreign students enrolled outside their country of citizenship: the United States received 19.7% of all foreign students worldwide, followed by the United Kingdom (11.6%), Germany (8.6%) and France (8.2%). The market share of the United States has decreased by 5 percentage points since 2000 while those of Australia, France, Japan, New Zealand and South Africa have been growing.

■ As a proportion of total tertiary-level enrolments, Australia (19.5%), the United Kingdom (14.9%), Switzerland (14.0%), New Zealand (13.6%) and Austria (12.4%) have attracted the highest percentages of international students. Women represent the majority of international students in 9 of the 20 countries for which data are available and at least 45% in the others.

Source

- OECD, *Education Database*, January 2010.

For further reading

- OECD (2004), *Internationalisation and Trade in Higher Education: Challenges and Opportunities*, OECD, Paris.
- OECD (2009), *Education at a Glance 2009: OECD Indicators*, OECD, Paris, *www.oecd.org/edu/eag2009*.

Foreign and international students

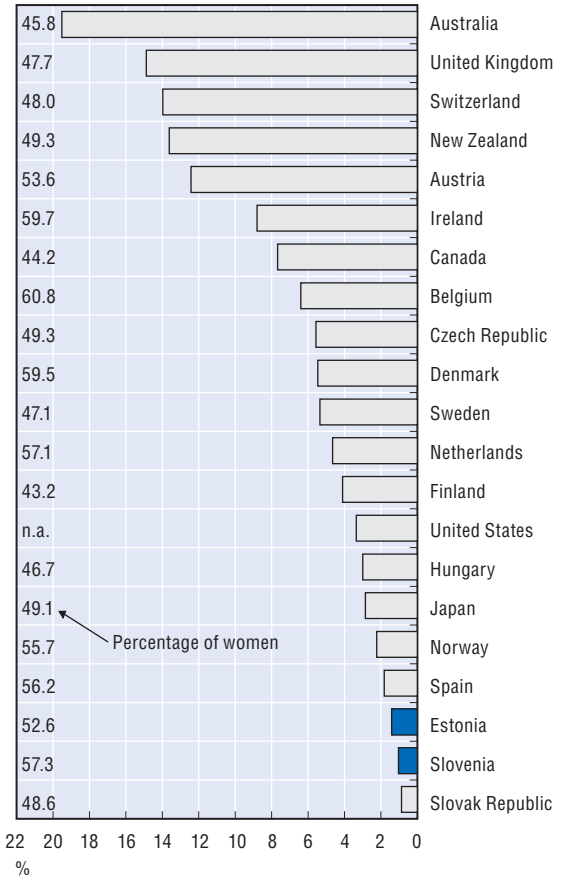
The data are from the UNESCO/OECD/Eurostat data collection and the OECD Education Database. Additional data from the UNESCO Institute for Statistics are also used. Tertiary-level students are defined as those enrolled in programmes at levels 5 and 6 of the 1997 International Standard Classification of Education (ISCED 1997). ISCED level 5 corresponds to programmes at the first stage of tertiary education and are subdivided into programmes which are theoretically based, preparatory to research or give access to professions with high skills requirements (ISCED 5A) and programmes which are practical/technical/occupation-specific (ISCED 5B). ISCED level 6 corresponds to programmes at the second stage of tertiary education which lead to an advanced research qualification equivalent to a doctorate.

Data on international and foreign students are obtained from tertiary enrolments in their country of destination. The data therefore relate to incoming students rather than to students going abroad. Students are classified as international students if they left their country of origin and moved to another country for the purpose of study. International students may be defined as students who are not permanent or usual residents of their country of study or alternatively as students who obtained their prior education in a different country. Students are classified as foreign students if they are not citizens of the country in which the data are collected. While pragmatic and operational, this classification is inappropriate for capturing student mobility because of differing national policies regarding naturalisation of immigrants. It is used as a proxy when data on international students are not available.

G.1. Internationalisation of higher education

Figure G.1.1. **Student mobility in tertiary education, 2007**

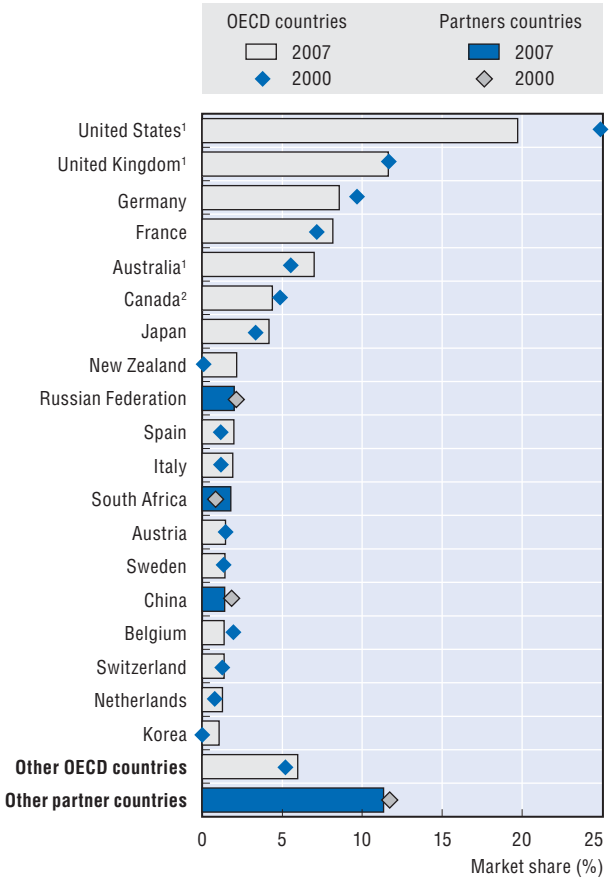
Percentage of international students in tertiary enrolments



StatLink http://dx.doi.org/10.1787/843460465321

Figure G.1.2. **International education market shares, 2000 and 2007**

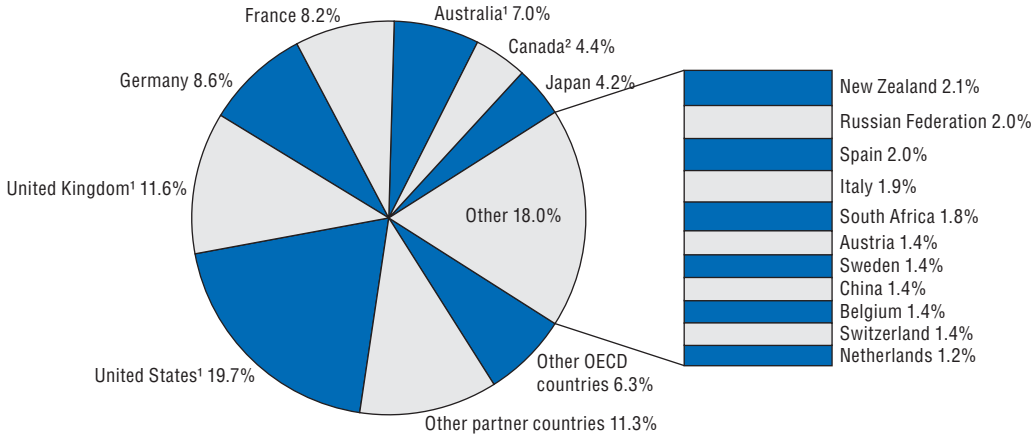
Percentage of all foreign tertiary students enrolled, by destination



StatLink http://dx.doi.org/10.1787/843470328321

Figure G.1.3. **Distribution of foreign students in tertiary education, by country of destination, 2007**

Percentage of foreign tertiary students enrolled in each country of destination as reported to the OECD



1. Data relate to international students defined on the basis of their country of residence.
2. Reference year 2006.

StatLink http://dx.doi.org/10.1787/843483553853

G.2. International mobility of doctoral students

International mobility of doctoral students can be used as an indicator of the internationalisation of the higher education sector as well as of the research system. It also highlights the attractiveness of advanced research programmes and in some cases the existence of career opportunities for junior researchers in the host country. Previous research has shown that doctoral students contribute to the advancement of research in the host country during their studies and afterwards. When returning home, they bring back new competences and connections with international research networks.

The share of foreign doctoral students in total enrolments differs widely across countries. Non-citizens represent more than 40% of the doctoral population in Switzerland, New Zealand and the United Kingdom, but less than 6% in Italy and Korea. Shares of foreign and international doctoral students range between 25% and 40% in Canada, France, Belgium, Australia and the United States.

In absolute numbers, the United States hosted the largest foreign doctoral population, with more than 93 000 students in 2007 from abroad, followed by the United Kingdom (41 000) and France (28 000).

Language plays a role in the choice of destination, notably for English-speaking countries or for Spain (students from Central and South America). However, other factors also matter: geographical proximity, cultural and historical links, the existence of exchange programs (*e.g.* Erasmus) or scholarships, as well as immigration policies. Asian students (particularly from China, India, Korea and Chinese Taipei) represent the bulk of foreign doctoral students in the United States, whereas European universities enrol large shares of doctoral students from other European countries.

International mobility of doctoral students has increased over the past nine years, most notably in Canada and New Zealand, as well as in Norway and in Spain. The share of foreign students enrolled in advanced research programmes rose in most countries between 1998 and 2007. Belgium, one of the main European host countries, is an exception.

Men still account for the majority of foreign doctoral students, but women are catching up. They represent at least 43% of international students in half of the countries for which data are available.

Source

- OECD, *Education Database,* January 2010.

For further reading

- OECD (2004), *Internationalisation and Trade in Higher Education, Challenges and Opportunities*, OECD, Paris.
- OECD (2008), *Education at a Glance 2009: OECD Indicators*, OECD, Paris, *www.oecd.org/edu/eag2009*.

Foreign and international doctoral students

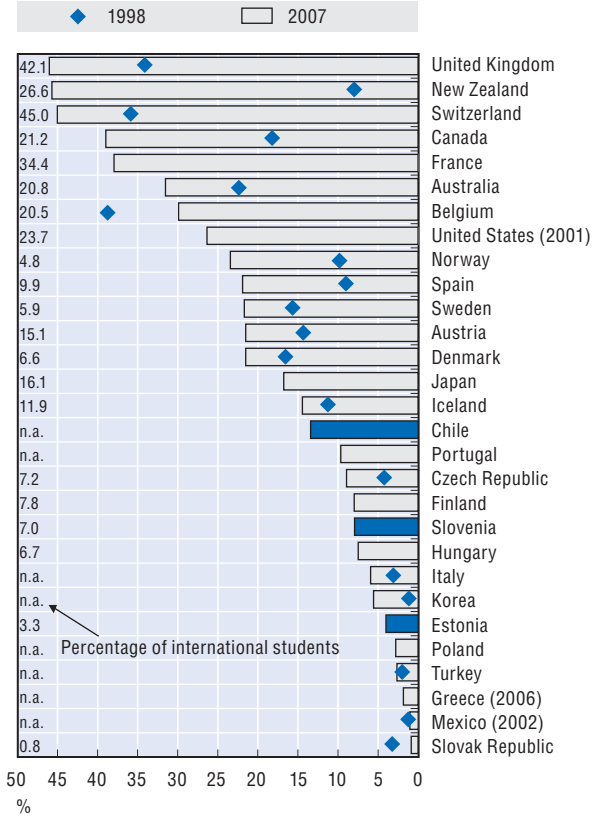
The data are from the Indicators for Education Systems (INES) project conducted jointly by the OECD, the UNESCO Institute for Statistics (UIS) and Eurostat. Doctoral students are defined according to the International Classification of Education developed by UNESCO (ISCED 1997). ISCED level 6 corresponds to programmes that lead to an advanced research qualification, equivalent to a doctorate.

The term "international students" refers to students who have crossed borders expressly with the intention to study. The UNESCO Institute for Statistics, OECD and Eurostat define as international students those who are not residents of their country of study or those who received their prior education in another country. Overall, the country of prior education is considered a better criterion for EU countries in order to take account of intra-EU student mobility. The residence criterion is usually a good proxy in countries that require a student visa to enter the country. Since not all countries are yet able to report data on international students, data for "foreign students" are presented here. However, it should be borne in mind that not all "foreign students" have come to the country with the intention to study.

G.2. International mobility of doctoral students

Figure G.2.1. **Share of foreign doctoral students,[1] 1998 and 2007[2]**

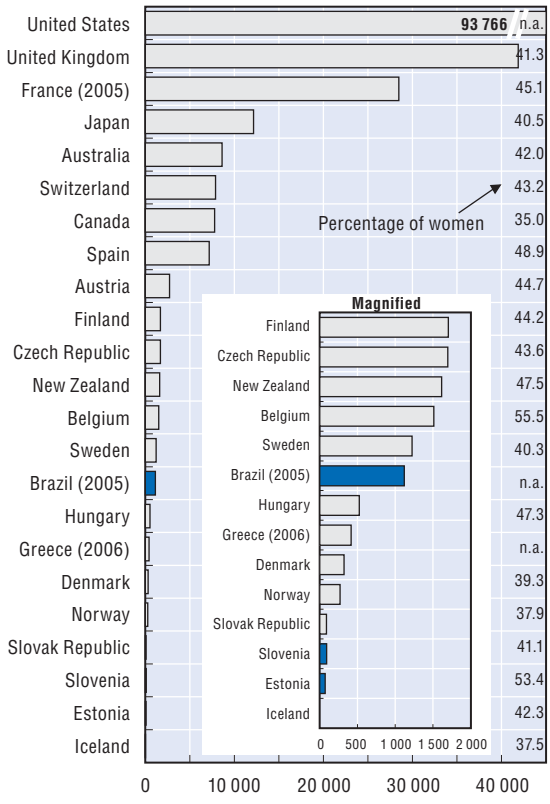
As a percentage of total doctoral enrolments in host country



StatLink http://dx.doi.org/10.1787/843566368032

Figure G.2.2. **Number of international doctoral students,[3] 2007**

By host country



StatLink http://dx.doi.org/10.1787/843570404564

1. Including foreign students from non-OECD countries.
2. 1999 instead of 1998 for Belgium, Mexico, the Slovak Republic and Turkey; 2000 for Iceland and Portugal. In the United States, data refer to 2001 for foreign students and to 2007 for international students. In France, data for international students refer to 2005.
3. International students are defined as non-resident students of reporting countries for all countries except Finland, Iceland and Switzerland which define them as students with prior education outside the reporting country.

G.3. S&E doctorates awarded and postdoctoral appointments to foreign citizens in the United States

■ The United States, like France and the United Kingdom, educates large numbers of foreign students. Of the 45 600 doctorates awarded in 2006, two-thirds were in science and engineering (S&E) and 38% of new graduates in these fields were foreign citizens with temporary visas. Over the past decade, the US higher education system has granted an average of 9 500 new S&E doctorates to foreign citizens each year; the number exceeded 12 700 in 2006.

■ Asians accounted for more than 70% of new non-US doctorates. Chinese students accounted for 26%, Koreans for 10% and students from Chinese Taipei for almost 5%. Other foreign students came from a wide diversity of countries. European students were more numerous than in the past.

■ For students from Korea and Chinese Taipei, as well as from Argentina, Chile, Greece and Turkey, US universities award about one S&E doctorate for every three or four granted in their home country. US-earned doctorates by Chinese citizens represent almost one-fifth of those granted in China. The proportion of doctorates granted to Europeans in the United States remains very small.

■ In 2006, the number of S&E doctorates awarded by US universities peaked at 29 850 surpassing for the second year in a row the previous high of 1998. This is the result of a four-year increase in S&E doctorate awards (academic years 2002-06), following a four-year decrease (1998-2002). This suggests that there has in fact been no decline in the number of S&E doctorates granted to non-US citizens. Indeed, most of the recent growth is due to non-US citizens.

■ Several fields reached new peaks in 2006: engineering (7 191), biological sciences (6 631), physical sciences (3 925), computer sciences (1 452) and mathematics (1 327).

■ Foreign doctoral graduates often stay in the United States after completing their studies. In 2006, US universities awarded around 28 000 S&E postdoctoral positions to temporary visa holders, compared to 21 000 to US-born or resident graduates. The number of appointments for foreigners grew markedly over the decade but changed little for citizens and residents.

■ The propensity of new doctorate recipients to remain in the United States varies according to country of origin but has increased for all citizenships since the beginning of the 1990s. Over 60% of Indian and Chinese recipients of S&E doctorates and over half of European recipients receive a postdoctoral appointment or job in the United States after graduation. The number of those from Japan, Korea or Chinese Taipei, who were traditionally less likely to stay, has also increased. Leaving the issue of length of stay aside, the ability of the United States to retain researchers in relevant S&E fields following completion of their studies is evident.

Source

- National Science Foundation (2008), *Science and Engineering Indicators 2008*, Arlington, Virginia, *www.nsf.gov/sbe/srs/seind08/start.htm*.
- National Science Foundation (2009), *Science and Engineering Doctorate Awards: 2006*, Arlington, Virginia, *www.nsf.gov/statistics/survey.cfm* and *www.nsf.gov/statistics/survey.cfm*.

National Science Foundation (NSF) data on US doctorates and postdoctorates

The Survey of Earned Doctorates (SED) is a census of all individuals receiving a research doctorate from a US institution in the academic year. The results are used to assess characteristics and trends in doctoral education and degrees. The data are published annually since 1958.

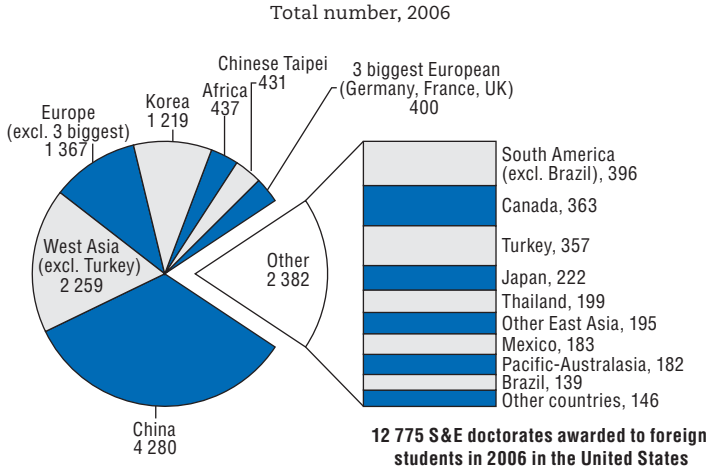
The definition of postdoctorates differs among academic disciplines, universities and sectors. For the US NSF, postdoctorates include "individuals with science and engineering Ph.D.'s, M.D.'s, D.D.S.'s, or D.V.M.'s (including foreign degrees equivalent to US doctorates) who devote their primary effort to their own research training through research activities or study in the department under temporary appointments carrying no academic rank". Postdoctorates may contribute to the academic programme through seminars, lectures or working with graduate students. They may have different titles at different institutions, *e.g.* Postdoctoral Scholar, Research Associate, Postdoctoral Fellow, or Postgraduate Researcher.

S&E fields include the natural sciences (*e.g.* physical, biological, Earth, atmospheric and ocean sciences), mathematics/computer sciences, agricultural sciences, social/behavioural sciences, engineering, medical/other life sciences.

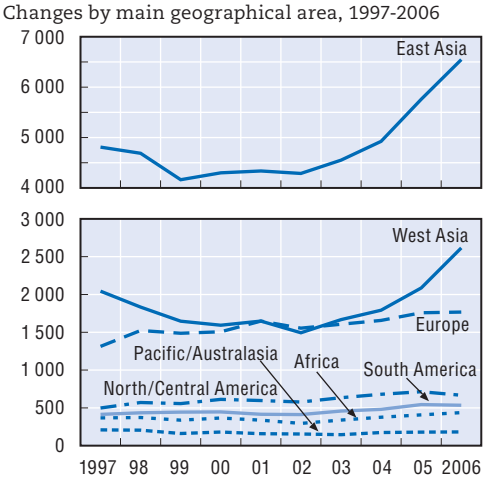
New graduates who intend to stay are measured by those who accept a postdoctoral research appointment or academic, industrial or other firm employment in the United States following receipt of the doctorate. This gives an indicator of how much the United States relies on inflows of doctorate holders and of whether working in the United States is an attractive option for foreign students who obtain US doctorates.

G.3. S&E doctorates awarded and postdoctoral appointments to foreign citizens in the United States

Figure G.3.1. **S&E doctorates awarded to foreign citizens in the United States, by citizenship or origin**

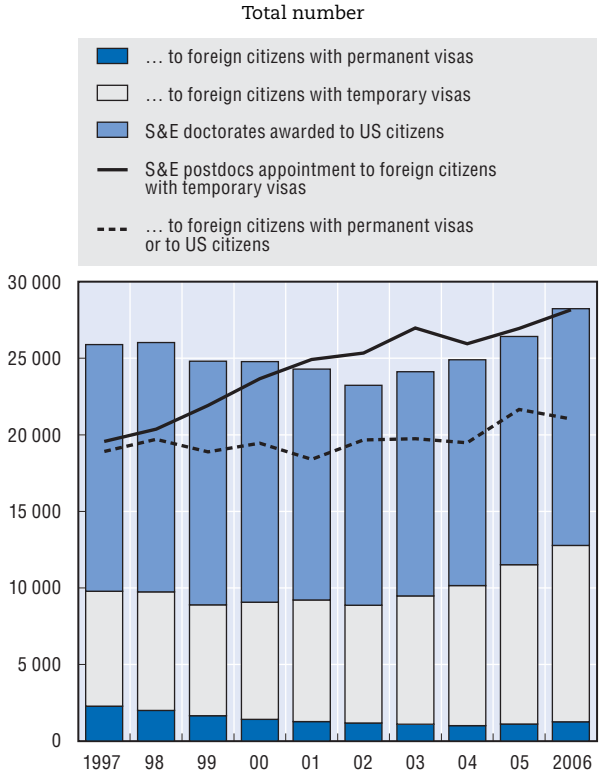


StatLink http://dx.doi.org/10.1787/843628800380



StatLink http://dx.doi.org/10.1787/843630364224

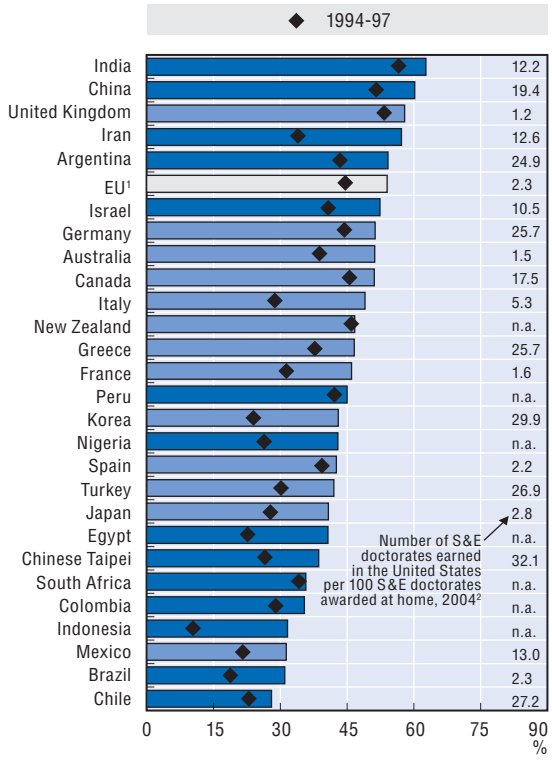
Figure G.3.2. **S&E doctorates and postdoctoral appointments in the United States, by citizenship and type of visa, 1997-2006**



StatLink http://dx.doi.org/10.1787/843634263318

Figure G.3.3. **Foreign S&E doctorate recipients who intend to stay in the United States, 2002-05**

As a percentage of total foreign S&E doctorate recipients



StatLink http://dx.doi.org/10.1787/843634263318

1. Includes all European countries.
2. OECD estimates based on National Science Foundation data. The ratio compares the number of new foreign citizens graduating at doctoral level in S&E fields in the United States to the number of earned S&E doctoral degrees in the country of origin. New S&E doctorates refer to 2005 for Germany, Japan and Chinese Taipei, 2003 for Argentina and Brazil, 2001 for Greece, Italy and Spain.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

G.4. Foreign scholars in the United States

■ The presence of foreign scholars in US higher education institutions is an indicator of the international attractiveness of the country's universities and of opportunities for researchers in the United States.

■ In 2007-08, US higher education institutions hosted 106 000 foreign scholars. They conducted research or teaching activities. Most were engaged in research and two-thirds were in the life, biological, health or physical sciences and in engineering.

■ Just 20 countries account for 80% of foreign scholars in the United States. China is the leading country of origin and Asia the most important region. More than 22% were Chinese, around 9% were Korean or Indian, and 5% Japanese. France, Germany, Italy, Spain and the United Kingdom each provided between 2% and 5% of foreign academic staff. Canada accounted for 4.5% of the total.

■ Mobility of scholars, compared to the size of the local academic population, varies across countries. For most OECD countries, one to three scholars have positions in US universities per 100 working at home. Academic mobility is most significant from Korea (14 per 100), the Netherlands (8), the Russian Federation (6) and from Canada, Iceland, Ireland, Italy and Mexico (4 each).

■ The population of foreign scholars working in the United States has steadily increased over the past 14 years compared to the 60 000 hosted in 1993-94. After a decline during the two academic years following the post-September 11 security-related change in visa policy, the numbers have grown again since 2004 and in 2007-08 they increased by 8% from the previous year.

■ Expansion of the population of foreign scholars has been driven by a massive and sustained arrival of Asian academics. Although many Asian academics worked in US universities in the mid-1990s, the number of scholars from Korea, India and China has kept growing at average annual rates of 8% to 9%. Growth in academic mobility from Turkey (7%), Chinese Taipei (6%) and Italy (6%) has also been rapid. The increase in mobility from most European countries has been moderate (around 2% a year on average).

■ Although most foreign scholars are still men, women are more numerous than in the past; in 2007-08 female academics accounted for 34% of all foreign scholars in the United States.

Source

- OECD, based on data from the Institute of International Education (IIE), June 2008.

For further reading

- Institute of International Education (2008), *Open Doors 2008: Report on International Educational Exchange*, New York, *http://opendoors.iienetwork.org/page/OpendDoors2008*.

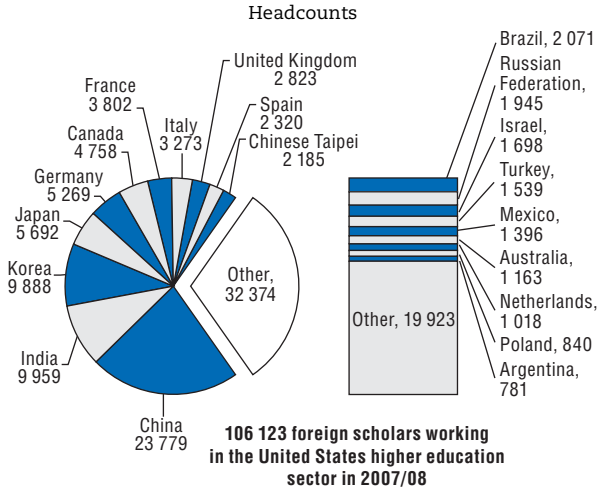
Open Doors data

The Institute of International Education (IIE) is a non-profit international organisation for educational and cultural exchange. The IIE conducts an annual statistical survey of the internationally mobile student population in the United States. Open Doors is a long-standing, comprehensive information resource on international students in the United States and on US students studying abroad. It highlights key facts and trends in international flows of scholars to the United States.

International scholars are defined as non-immigrant, non-student academics (teachers and/or researchers, and administrators). Scholars may also be affiliated with US institutions for activities such as conferences, colloquia, observation, consultations or other short-term professional development activities. The survey is limited to doctoral degree-granting institutions.

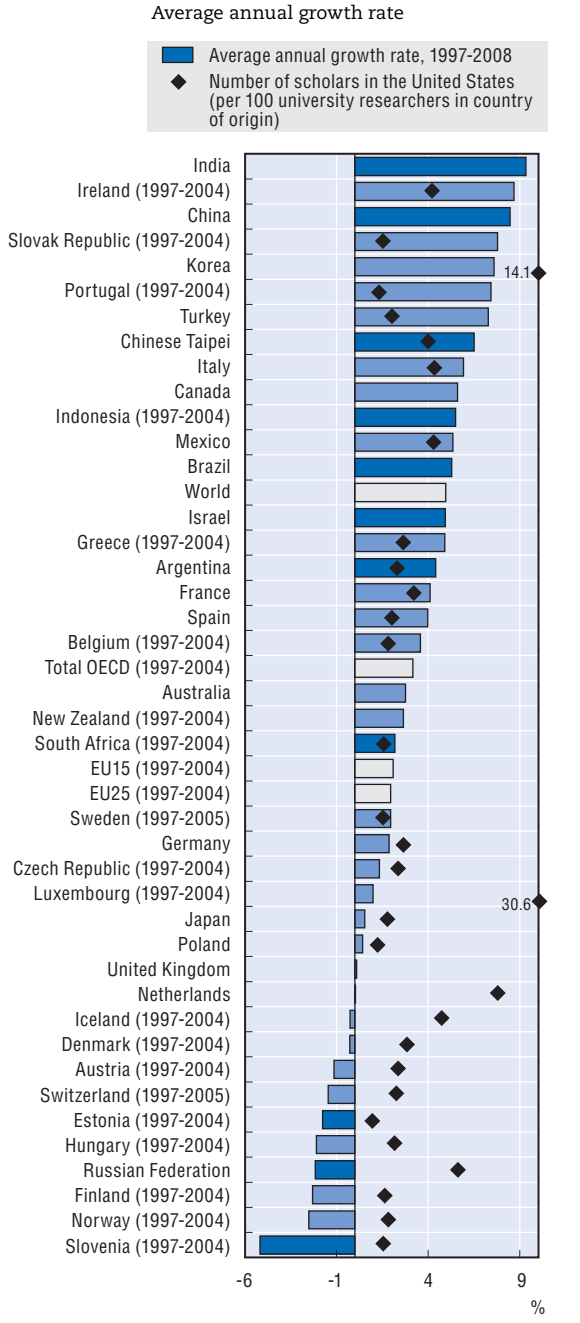
G.4. Foreign scholars in the United States

Figure G.4.1. **Top 20 places of origin of foreign scholars in the United States, 2007/08**



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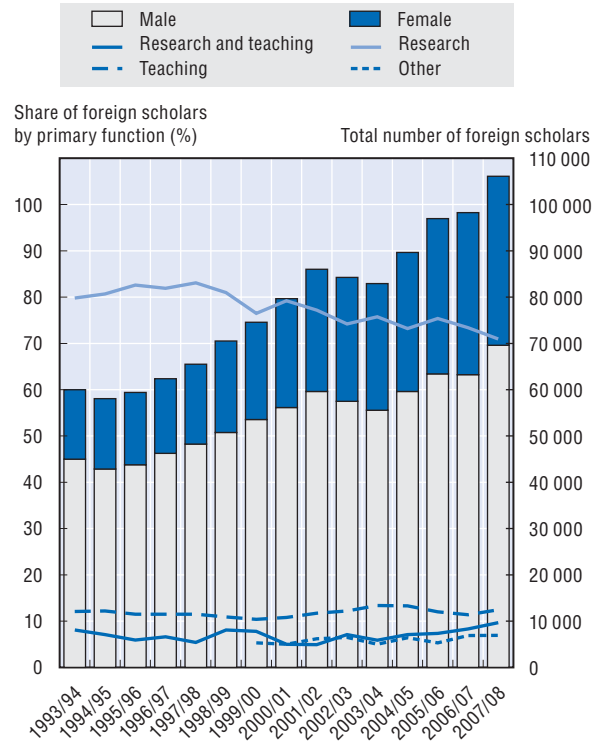
Figure G.4.2. **Growth in foreign scholars, by country of origin, 1997-2008**



StatLink http://dx.doi.org/10.1787/843688416710

Figure G.4.3. **Growth of foreign scholars in the United States, by gender and activity, 1993/94-2007/08**

Headcounts and as a percentage of total foreign US scholars



StatLink http://dx.doi.org/10.1787/843730725354

1. 2007 for Argentina and the Russian Federation; 2006 for France, Germany, Italy, Japan, Korea, Poland, Spain, Chinese Taipei and Turkey; 2002 for Austria, Finland and Switzerland; 2003 for other countries.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

H. INTERNATIONALISATION OF ENVIRONMENTAL TECHNOLOGY

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H.1. The changing geography of environmental innovation

Most innovation in "environmental" technologies takes place in OECD economies. From 1978 to 2006, almost 98% of all patents pertaining to air and water pollution control technologies were deposited by inventors from OECD countries. Japan, Germany, the United States, France and the United Kingdom were the most active. Korea has also become remarkably active in recent years.

In recent years some non-OECD countries have started to become more important innovators. Comparing inventive activity in general environmental technologies (air, water, waste) in OECD countries with those of enhanced engagement and accession countries clearly shows that the latter have become very active in this area.

The same observation applies for patent applications deposited for technologies for electric and hybrid vehicles from 2001 to 2004. While the G7 countries (and Korea) are the most important sources of innovation, Chinese Taipei, China, the Russian Federation and Israel figure among the top 20 innovating countries. Moreover, in terms of specialisation, non-OECD countries such as Belarus, Ukraine and Venezuela are particularly intensive generators of environmental technologies.

Source

- OECD, *Patent Database*, April 2009.

For further reading

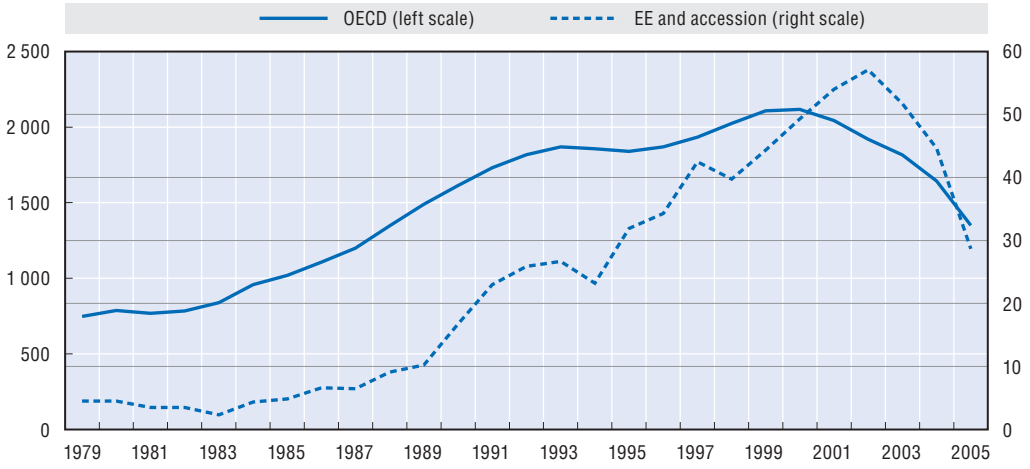
- OECD Project on Environmental Policy and Technological Innovation, *www.oecd.org/environment/innovation*.
- OECD (2010), *The Invention and Transfer of Environmental Technologies*, OECD, Paris.
- OECD (2008), *Environmental Policy, Technological Innovation and Patents*, OECD, Paris.

Measuring the generation of "environmental" technology

Patent data are used as a measure of technological innovation because they focus on outputs of the inventive process. Moreover, the application-based nature of the patent classification system allows for a rich characterisation of relevant technologies for environmental concerns. Consequently, this section uses patent classifications rather than industrial or sectoral classifications. Relevant patents were identified using the International Patent Classification (IPC) system. Because IPC classes may be too broad for many areas of "environmental" technology, two possible types of error may arise when searching for relevant patents: inclusion of irrelevant patents within the classes selected, and exclusion of relevant patents from the classes not selected. Therefore, combinations of classes were used in some cases to identify relevant patents. On this basis, measures of innovative activity in different fields are developed, based upon a "count" of patent applications. The fields covered include a wide variety of technologies related to abatement of air and water pollution, solid waste management and recycling, climate change mitigation, renewable energy, alternative-fuelled vehicles, etc. The list of relevant classes can be found at *www.oecd.org/environment/innovation*.

Figure H.1.1. **Environmental innovation in enhanced engagement and accession countries**

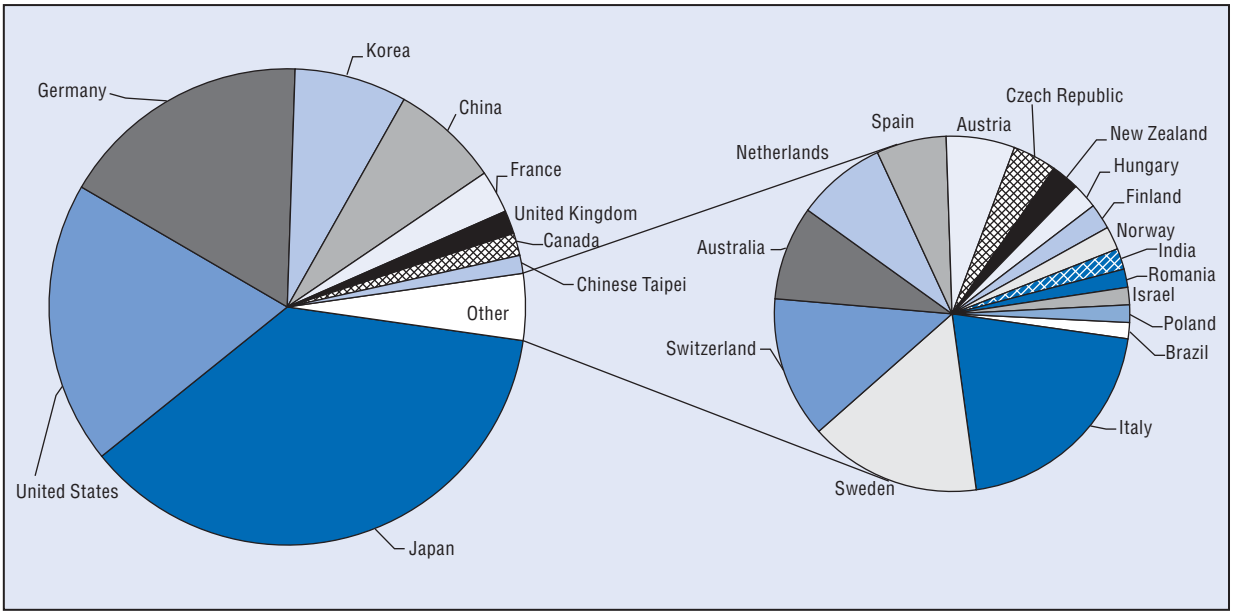
Number of patent applications, claimed priorities, worldwide, 3-year moving average



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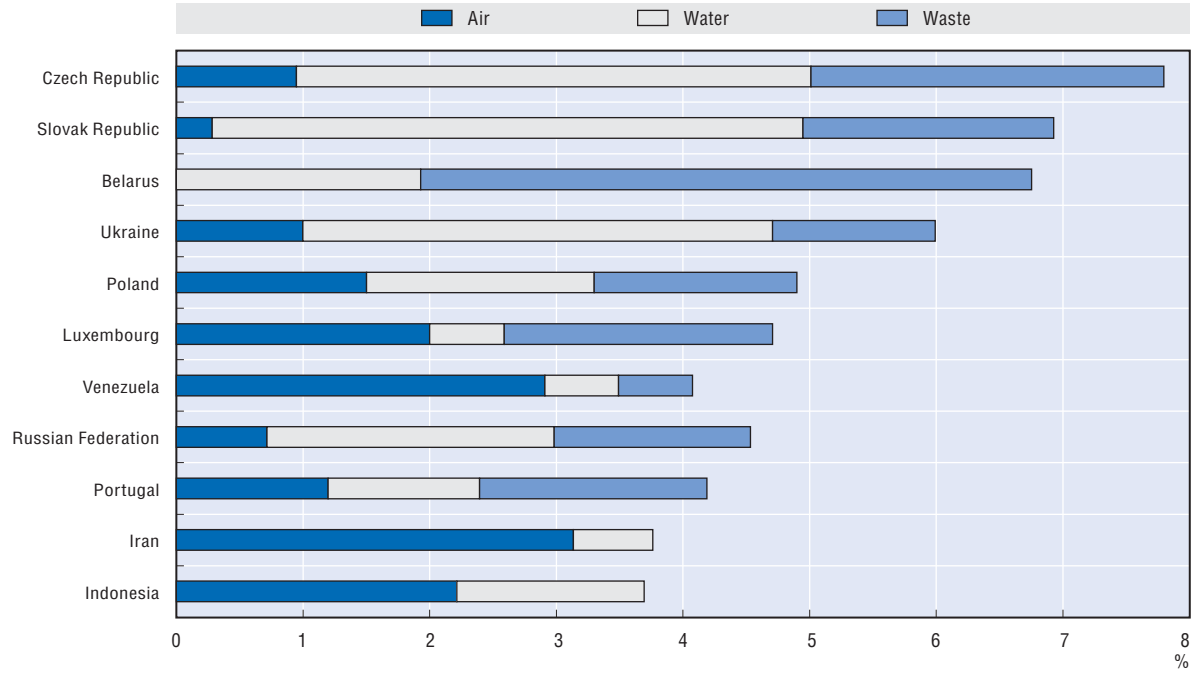
H.1. The changing geography of environmental innovation

Figure H.1.2. **Innovation in hybrid and electric vehicle technologies, 2001-04**
Number of patent applications, claimed priorities, worldwid



StatLink http://dx.doi.org/10.1787/843801811015

Figure H.1.3. **Proportion of patenting in general "environmental" technologies in overall patenting**
Percentage of air + water + waste in total patenting, 1990-2005



StatLink http://dx.doi.org/10.1787/843813626085

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

H.2. Transfer of environmental technologies

■ Environmental technologies that mitigate cross-border (*i.e.* SO_2) or global pollutants (*i.e.* CO_2) benefit all countries. However, since much relevant innovation occurs in OECD countries, some transfer from developed to developing countries will be required to address environmental problems worldwide.

■ This is particularly true for climate change mitigation, and technology transfer will certainly be a key element of any post-Kyoto agreement. Knowledge transfer (measured in terms of duplicate patent applications) takes place from Annex 1 to non-Annex 1 countries for two key technologies: wind power and solar photovoltaics. Detailed data show the growing importance of this knowledge transfer to China for some technology-exporting countries.

■ Close economic ties between pairs of countries positively influence the transfer of environmental technologies. International environmental co-operation, *e.g.* the Clean Development Mechanism, also plays an important role. Flexible domestic policy regimes also encourage technology transfer, since they encourage "exporters" to develop technologies with wide market appeal and allow "importers" to adopt the most appropriate technologies on the market.

■ Nevertheless, the biggest role seems to be played by domestic absorptive capacity, since countries with high domestic technological capability import more environmental technologies from overseas. Analysis of the most important non-OECD wind power innovators shows that imports of foreign technologies and domestic knowledge stocks relating to wind power are highly correlated.

Source

- OECD, *Patent Database*, April 2009.

For further reading

- OECD Project on Environmental Policy and Technological Innovation, *www.oecd.org/environment/innovation*.
- OECD (2010), *The Invention and Transfer of Environmental Technologies*, OECD, Paris.
- OECD (2008), *Environmental Policy, Technological Innovation and Patents*, OECD, Paris

Measuring "environmental" technology transfer

The idea of using patent data to measure international technology transfers arises from the fact that patterns of patenting will carry a partial trace of the three principal channels of market transfer (international trade, foreign direct investment and licensing) since a single invention may be patented in a number of countries.

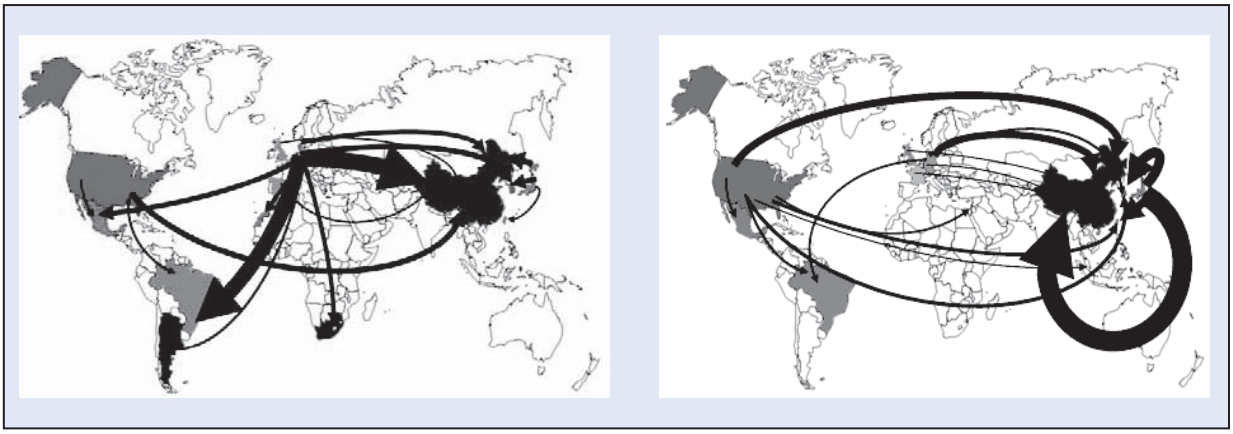
If there is any potential for reverse engineering, exporters, investors and licensors will each have an incentive to protect their intellectual property when it goes overseas. Although patent data cannot capture the full extent of the transfers which eventually take place, they can provide robust indicators of trends in the direction and the extent of international transfer.

A patent only gives the applicant protection from potential imitators. It does not reflect actual transfer of technologies. If applying for protection did not cost anything, inventors might patent widely and indiscriminately. However, patenting is costly in terms both of the costs of preparing the application and the administrative costs and fees associated with the approval procedure. As such, inventors are unlikely to apply for patent protection in a second (or duplicate) country unless they are relatively certain of the potential market in that country for the technology involved. On this basis it is possible to assess how widely innovations are diffused in the global economy and see which countries are the sources and recipients of such innovations.

H.2. Transfer of environmental technologies

Figure H.2.1. **Transfer of wind (left) and solar photovoltaic (right) technologies, 1990-2006**

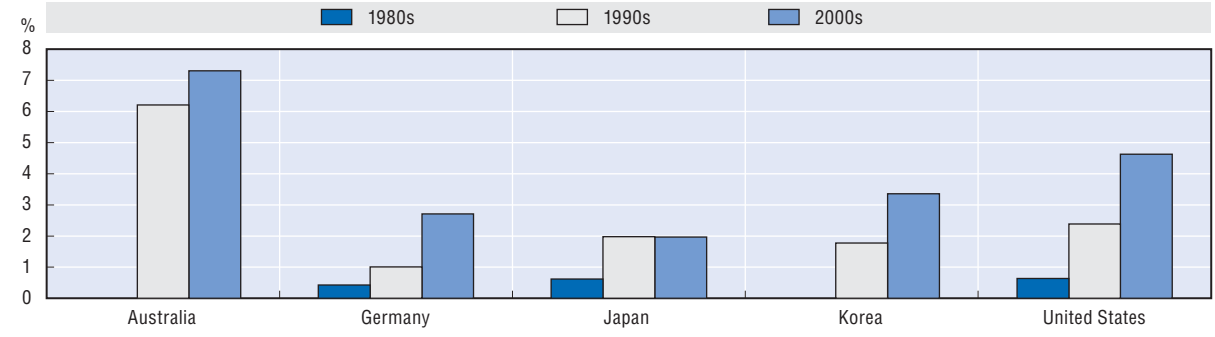
Transfers from Annex I to non-Annex I countries, measured using duplicate patent applications



Note: Parties to the United Nations Framework Convention on Climate Change are classified as Annex I countries if they are industrialized countries or economies in transition. Annex I countries which have ratified the Protocol have committed to reduce their emission levels of greenhouse gases to targets that are mainly set below their 1990 levels.

Figure H.2.2. **Transfer of solar power technologies to China**

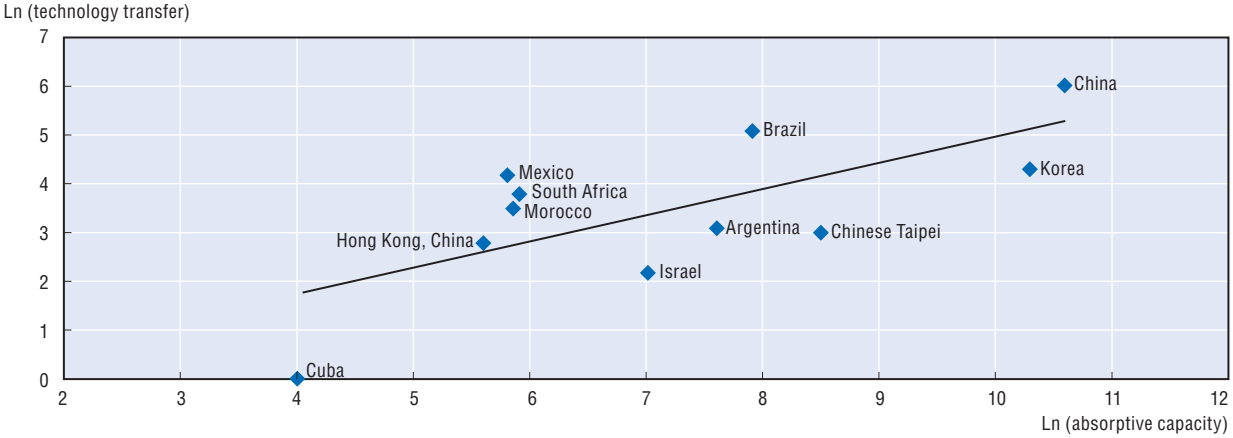
Proportion of transfer to China in total transfers



StatLink http://dx.doi.org/10.1787/843847880832

Figure H.2.3. **Relation between absorptive capacity and wind power technology transfers, 1998-2007**

Absorptive capacity measured as domestic knowledge stock, at log scale



StatLink http://dx.doi.org/10.1787/843876376221

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

H.3. Trade in environmental goods

Exports of environmental goods in the OECD area reached USD 370 billion in 2006, or 1% of its gross domestic product (GDP) and nearly 6% of its merchandise exports. In the same year, the BRICS (Brazil, the Russian Federation, India, China and South Africa) exported USD 43 billion, which accounted for almost 1% of their GDP and 2.7% of their total merchandise exports. Over the last four years, trade in environmental goods has grown dynamically, increasing faster than total merchandise trade, particularly in the BRICS, where exports have grown at an annual average rate of 35%.

The leading world exporters of environmental goods are Germany, the United States, Japan and China which together account for more than half of the total exports of environmental goods from OECD countries and the BRICS. These countries also benefit from the highest levels of public R&D budgets for environmental protection.

Nearly 60% of Germany's exports of environmental goods go to the EU27. Other countries have more diverse export profiles and cover a wider spectrum of recipients. The United States exports mainly to Canada and Mexico (36%), to Asia (Japan, China, and Korea) and Europe (Germany, the United Kingdom and France). Most Japanese exports of environmental goods are directed to Asia (50% to China, Korea, Thailand and Singapore), then to the United States (almost 20%), followed by Germany, the United Kingdom and the Netherlands. The main recipients of China's exports are the United States, Japan (and other Asian countries such as Korea, India and Indonesia), and Germany (followed in Europe by the United Kingdom, Spain and Italy).

The environmental goods exported vary from country to country, but in general more than one-quarter are equipment for wastewater treatment. This is also the fastest growing market segment, followed by air pollution control, waste management and environmental monitoring equipment.

Source

- OECD, *International Trade by Commodity Statistics Database*, April 2008.

For further reading

- OECD (1999), *The Environmental Goods and Services Industry: Manual for Data Collection and Analysis*, OECD, Paris.
- OECD (2001), *Environmental Goods and Services: The Benefits of Further Global Trade Liberalisation*, OECD, Paris.
- OECD (2005), *Trade that Benefits Environment and Development. Opening Markets for Environmental Goods and Services*. OECD, Paris.
- OECD (2006), *Environmental and Energy Products: The Benefits of Liberalising Trade*, OECD, Paris.

OECD classification of environmental goods

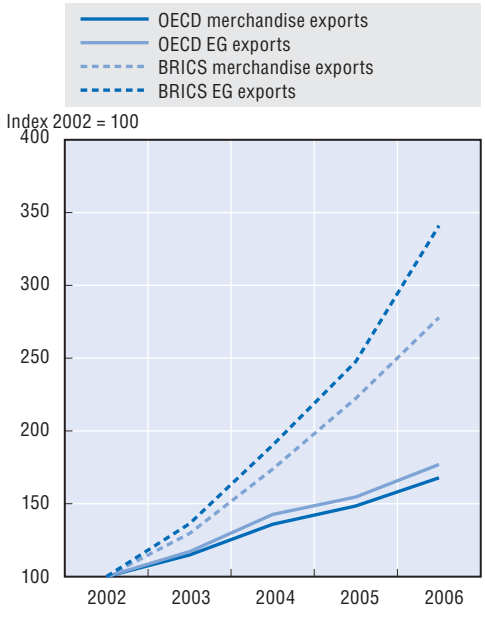
The notion of "environmental goods and services" was introduced at international level in the context of the joint work of the OECD/Eurostat Informal Working Group on the Environment Industry, which developed a manual (*OECD, 1999*) providing a common framework for the definition and classification of environmental industry activities. The manual identified three broad "environmental segments", each of which includes a large range of business activities:

- **Pollution management,** including goods that help control air pollution; manage wastewater and solid waste; clean up soil, surface water and groundwater; reduce noise and vibrations; and facilitate environmental monitoring, analysis and assessment.
- **Cleaner technologies and products** including goods that are intrinsically cleaner or more resource-efficient than available alternatives. For example, a solar photovoltaic power plant is cleaner than a coal-fired one.
- **Resource management**, including goods used to control indoor pollution, supply water, or to help manage farms, forests or fisheries sustainably. Included are also goods used to conserve energy and goods that help prevent or reduce the environmental impact of natural disasters, such as fire-fighting equipment.

At about the same time, the OECD developed an illustrative list of environmental goods (OECD, 2001). This list, which was used here as a basis for estimating trade in environmental goods, was the first attempt to match the industrial classification of the environment industry – according to the groups established in the manual – with the Harmonised Commodity Description and Coding Systems (HS) of the World Customs Organization. The OECD illustrative list has since informed discussions on environmental goods and services at the World Trade Organization (WTO), in the context of the Doha Round of multilateral trade negotiations. The Doha Ministerial Declaration calls for the liberalisation of environmental goods (and services) and there have been lengthy but inconclusive discussions on how to define those goods. Reaching a broad, international agreement on the definition of environmental goods is difficult because many candidate goods have a range of uses besides environmental protection. Moreover, environmental goods are constantly evolving. It has been estimated that half of the current environmental technologies will be replaced with new and different ones within 15 years. That suggests, at the very least, that any selection of goods targeted for accelerated tariff reduction has to be a "living list" which is updated frequently.

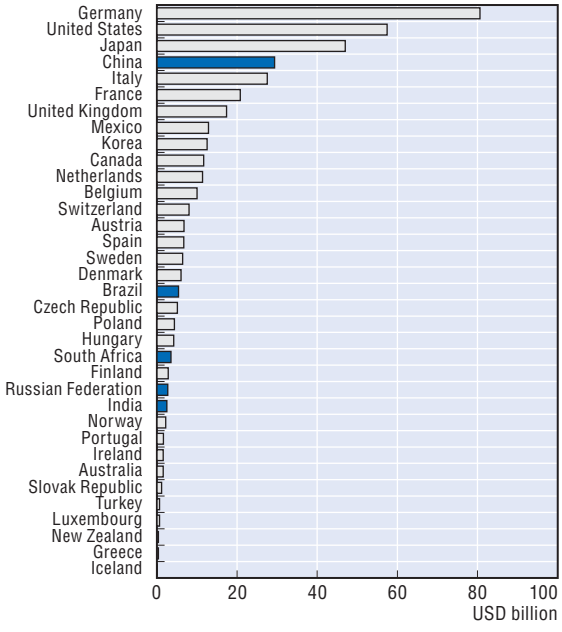
H.3. Trade in environmental goods

Figure H.3.1. **Trends in export market shares of environmental goods**[1]



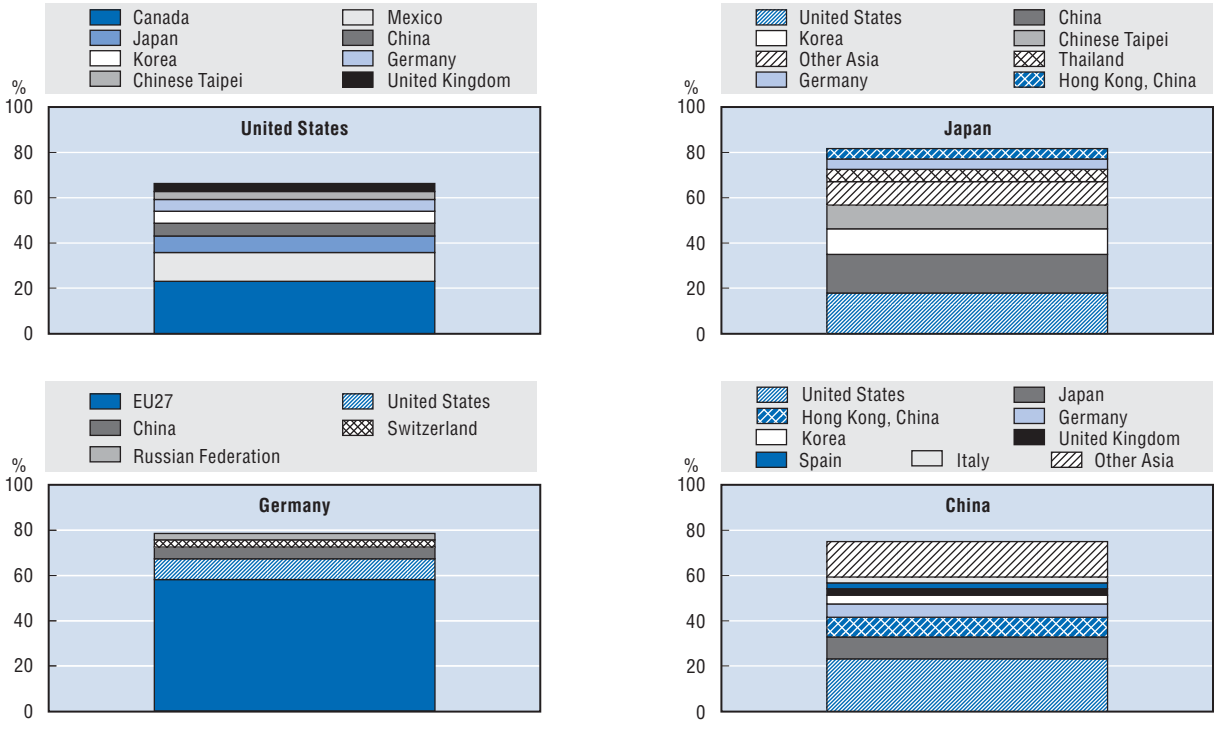
StatLink http://dx.doi.org/10.1787/843887343128

Figure H.3.2. **Exports of environmental goods,**[1] **2006**



StatLink http://dx.doi.org/10.1787/844035312320

Figure H.3.3. **Top four exporters of environmental goods, percentage share of main destinations,**[1] **2006**



StatLink http://dx.doi.org/10.1787/844052288601

1. The six-digit HS codes used to measure trade in "environmental goods" is based on previous OECD analytical work (OECD, 2001); its scope is in no way intended to reflect national or group positions in the WTO negotiations on the coverage of such a category. Definitions of "environmental goods" vary across countries, and will give different volumes of trade. Trends in traded environmental goods may not diverge so much.



PART IV

Multinational Enterprises and Globalisation

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K. Multinational Enterprises and R&D 189

I. THE IMPORTANCE OF MULTINATIONAL ENTERPRISES

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I.1. Inward activity: share of foreign affiliates in employment, turnover and value added

In 2007, the share of foreign-controlled affiliates in total manufacturing turnover ranged from nearly 80% in Ireland to 3% in Japan. Among G7 countries, foreign presence in manufacturing was strongest in Canada and the United Kingdom, followed by France, Germany, the United States and Italy. The percentage in Japan was the lowest of any OECD country for which data were available.

Employment in foreign-controlled affiliates tends to follow the same trend as turnover, but the foreign-controlled share of employment is smaller than that of turnover in all countries except Finland. This is probably because turnover overestimates the relative share of foreign affiliates in host countries (see box), because a majority of foreign-controlled affiliates operate in industries that are more capital- than labour-intensive.

In most countries, the share of foreign-controlled affiliates in manufacturing value added corresponds to their share of the sector's turnover. Foreign shares in value added are however higher in Israel, Finland, France and Ireland. The difference between shares in turnover and value added reflects the fact that some foreign-controlled affiliates import goods from their parent companies, or from other firms in the same group, to sell them untransformed in the domestic market.

In the services sector, the share of turnover of affiliates under foreign control is over 45% in Ireland and 35% in the Czech Republic. These affiliates are less important in terms of employment than in terms of their share of turnover in all countries. In 2006, the share ranged from 25% in Ireland to less than 5% in the United States.

Overall, foreign presence in services is smaller than in manufacturing although in a few countries, the turnover and number of employees of the affiliates under foreign control are of the same magnitude.

Source

- OECD, *AFA Database* and *FATS Database*, January 2010.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

Share of foreign affiliates in turnover

Output differs from turnover because it includes changes in stocks of finished goods and work in progress, and because of differences in the measurement of activities involving trade or financial intermediation. Turnover covers gross operating revenues less rebates, discounts and returns. It should be measured exclusive of consumption and turnover (sales) taxes on consumers and value-added taxes. The turnover variable generally presents fewer collection difficulties and thus is likely to be more widely available than value added. However, in contrast to value added, sales and turnover are variables that can overestimate the share of foreign-controlled affiliates in host country activity. First, until now local sales have in most countries not been separated from sales abroad, which are included in the export variable. Second, local sales also encompass sales to other foreign-controlled affiliates, while a significant share of sales abroad are to the parent company or to other affiliates belonging to the same group.

Share of foreign affiliates in employment

Employment in foreign affiliates should normally be measured as the number of persons on the payrolls of affiliates under foreign control. Employment data are sometimes converted to a full-time equivalent (FTE), with part-time workers counted according to time worked. Employment data can be used to determine the share of affiliates under foreign control in host country employment or to help determine the extent to which employment by affiliates under foreign control complements or substitutes for domestic (home country) employment by parent companies or other domestic firms. The share of affiliates under foreign control in host country employment may reflect the importance of foreign direct investment in maintaining or creating employment in a compiling country. However, this information does not allow for evaluating net job creation due to foreign investment in the compiling countries.

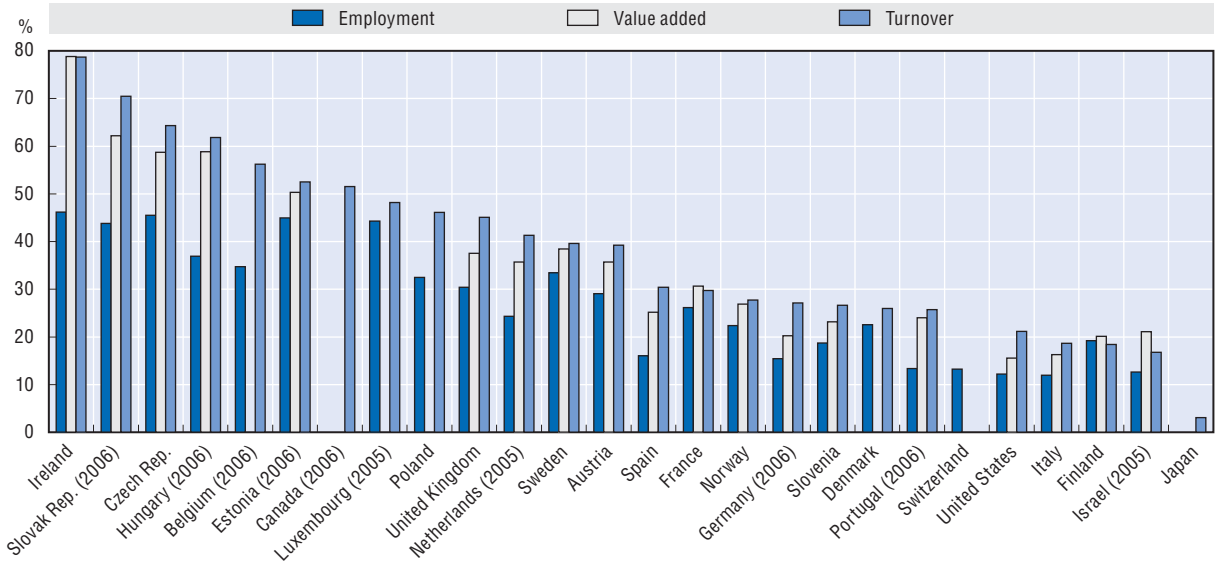
Share of foreign-controlled affiliates in value added

Value added – the portion of an enterprise's output that originates within the enterprise itself – is perhaps the most comprehensive measure of economic activity to be derived from data on the activities of multinationals. It is particularly useful for analysing globalisation. The System of National Accounts (SNA) defines the gross value added of an establishment, enterprise, industry or sector as the amount by which the value of the outputs produced exceeds that of the intermediate inputs consumed. Gross value added can provide information about the contribution of affiliates under foreign control to host country gross domestic product (GDP), both in the aggregate and in specific industries.

Value added, when it concerns all the components of a country's economy, is equal to the sum of its GDP, the most widely available aggregate measure of the size of an economy and its growth. Thus, the shares of foreign-controlled affiliates in total GDP and in the relevant industrial sector are a useful measure of the extent to which an economy has become globalised.

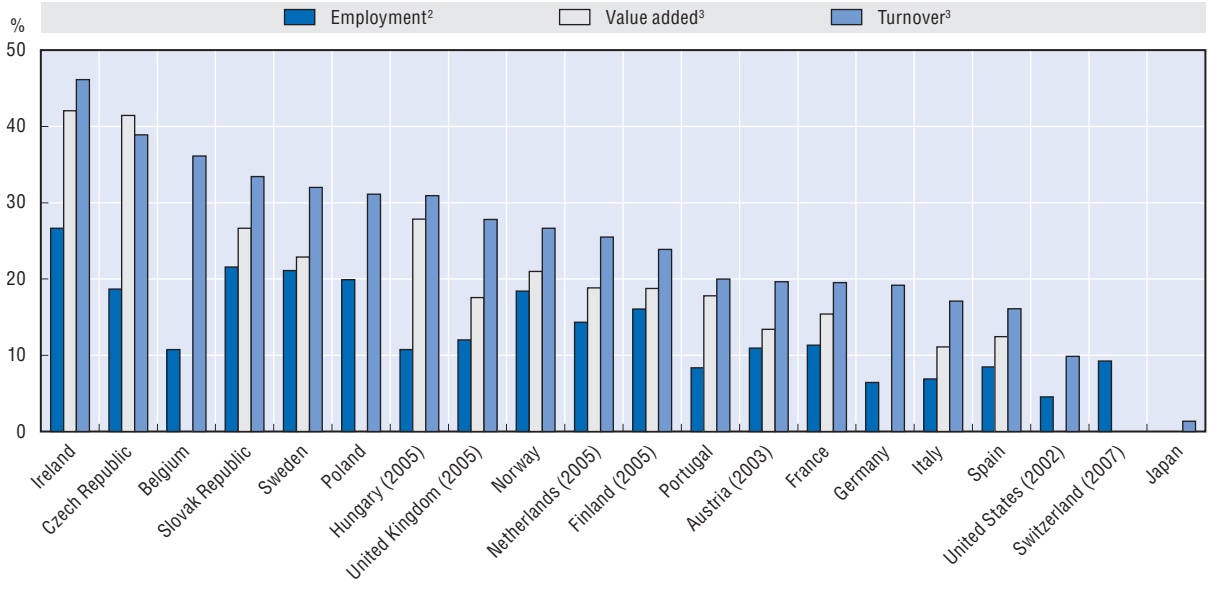
I.1. Inward activity: share of foreign affiliates in employment, turnover and value added

Figure I.1.1. **Share of foreign-controlled affiliates in manufacturing employment, turnover[1] and value added, 2007**



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Figure I.1.2. **Share of foreign-controlled affiliates in services employment, turnover and value added, 2006**



StatLink http://dx.doi.org/10.1787/844078426735

1. Production instead of turnover for Israel.
2. Financial intermediation (ISIC 65 to 67) excluded completely or in part for all countries except Belgium, the Czech Republic, France, Italy, Poland, the Slovak Republic and Switzerland. Community, social and personal services (ISIC 80 to 93) excluded for Austria, France, Germany, Hungary, the Netherlands, Norway, Portugal, Spain and Switzerland.
3. Financial intermediation (ISIC 65 to 67) excluded completely or in part for all countries except the Czech Republic, France, Poland and the Slovak Republic; Community, social and personal services (ISIC 80 to 93) excluded for Austria, Finland, France, Germany, the Netherlands, Norway, Portugal, Spain and the United Kingdom.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

I.2. Inward activity: employment growth of foreign affiliates in manufacturing

■ Between 1999 and 2007, aggregate employment in the manufacturing sector dropped sharply in most countries. This trend significantly changes the business sector, with services gaining in importance compared to manufacturing.

■ The de-industrialisation that is characteristic of most OECD countries has several sources. First, productivity growth is typically greater in manufacturing than in services, which directly results in lowering employment in manufacturing. Second, the outsourcing of many service activities (originally done in-house) in manufacturing to external service providers (*e.g.* cleaning, IT support, etc.) is increasing. Third, offshoring of manufacturing activities to (lower-wage) countries has also increased in the last decade, although service activities have also increasingly been offshored.

■ When distinguishing between foreign affiliates and domestic firms, the picture is less clear. The number of employees increased at foreign-controlled affiliates over the period but not at firms under national control in several countries. However in the United States, Ireland, Italy and Norway, employment decreased in both categories of firms.

■ With regard to the geographic origin of employment by foreign-controlled affiliates, in the European Union, the proportion of jobs at US and Japanese affiliates declined, while the share of employment by affiliates controlled by other European companies expanded. In the United States, the overall decrease in persons employed by foreign-controlled affiliates was attributable mainly to European affiliates, while in Japan it was essentially affiliates of European companies that increased their workforces.

Source

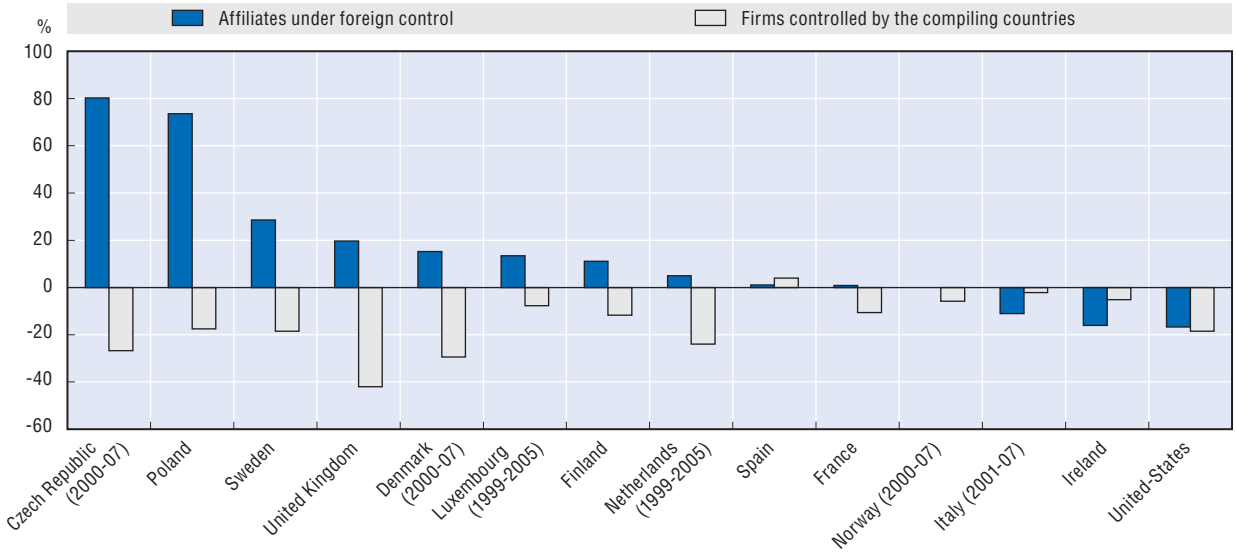
- OECD, *AFA Database* and *FATS Database*, January 2010.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

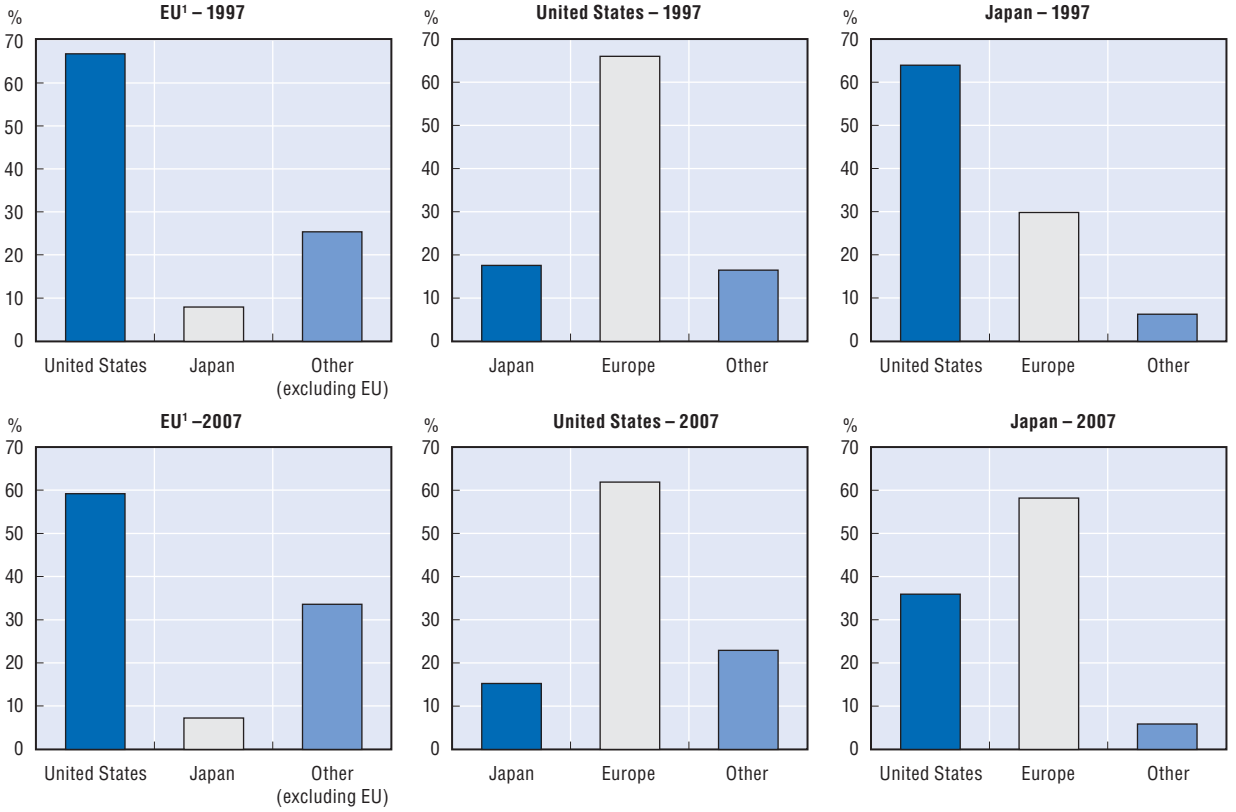
I.2. Inward activity: employment growth of foreign affiliates in manufacturing

Figure I.2.1. **Trends in employment by foreign-controlled affiliates and national firms in the manufacturing sector between 1999 and 2007**



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Figure I.2.2. **Geographic origin of employment by foreign-controlled affiliates in the manufacturing sector, 1997 and 2007**



1. EU: Finland, France, Germany, Ireland, Italy, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. Data partially estimated.

StatLink http://dx.doi.org/10.1787/844227627407

I.3. Inward activity: employment growth of foreign affiliates in services

■ In contrast to the manufacturing sector, employment has grown strongly in the services sector during 2000-06. In all countries except Finland and the Netherlands, employment grew significantly in foreign affiliates as well as in national firms. Remarkably, employment grew more for foreign affiliates than for national firms.

■ Employment in foreign affiliates in services is found essentially in business services, wholesale trade and transport. However, there is also a large foreign presence in financial intermediation, especially in the United States.

■ Between 1997 and 2006, the importance of foreign-controlled affiliates of European origin in Europe rose from 59% to approximately 65%. This suggests that in Europe, other European countries created affiliates or acquired existing enterprises. The presence of US and Japanese affiliates decreased.

■ In the United States, European affiliates have grown strongly at the expense of Japan and Canada.

■ In the domestic Japanese market, the weight of US affiliates fell significantly between 1997 and 2006 to the benefit of European and Asian, in particular Korean, affiliates. However, these changes are not very significant as they reflect a low level of foreign investment.

Sources

- OECD, *FATS Database*, December 2009.
- Eurostat, *NewCronos Database*.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

Number of foreign affiliate employees in the services sector

The number of employees in foreign-controlled enterprises is defined as the total number of persons working in these enterprises. Included in this category are workers on short leave but not workers on leave for an unlimited period. Also included are part-time workers together with seasonal workers, apprentices and family workers. Employees seconded to other firms are excluded. Employment data are usually converted to a full-time equivalent (FTE) basis. Part-time workers are counted according to the time worked: thus, two workers on half-time schedules count the same as one full-time worker. Used in combination with data on compensation of employees, the employment variable may be used to examine the compensation practices of foreign affiliates relative to those of domestically owned enterprises.

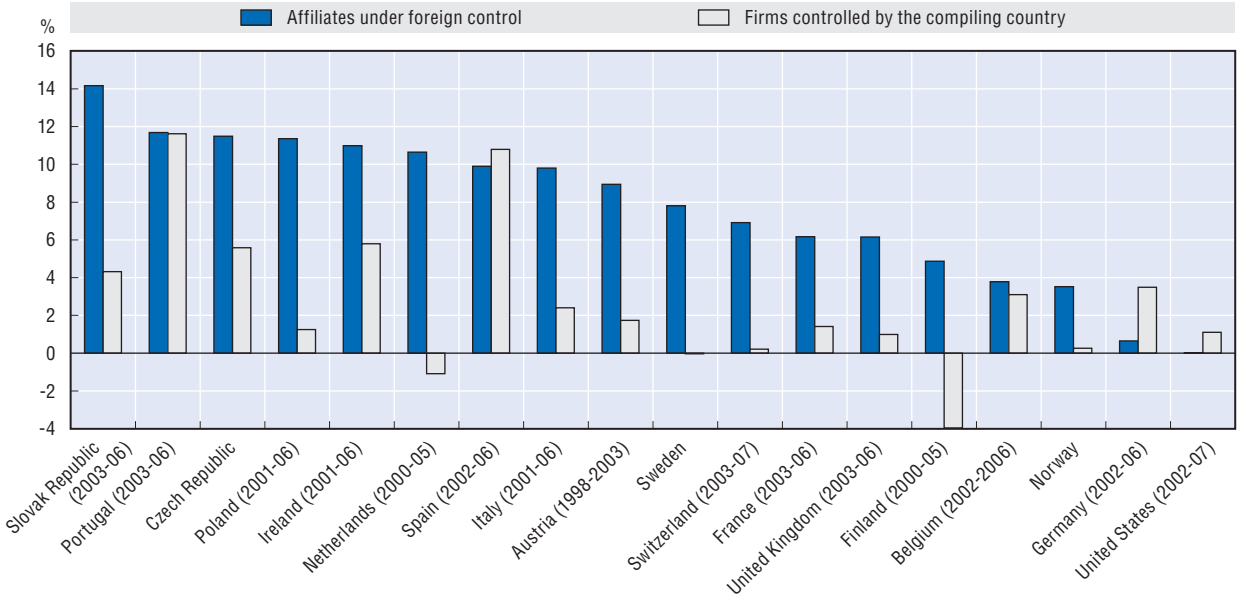
Identifying the foreign controlling country

For services as for manufacturing, the country controlling a foreign affiliate in a host country is the country in which the enterprise or unit of ultimate control is located. The enterprise of unit of ultimate control is the element of a chain of companies which directly or indirectly controls all the other companies and is not controlled by another enterprise or institution.

In cases where the control over other companies is indirect, the company of ultimate control may not hold the majority of shares giving the right to vote on the governing board. The problems of identifying the unit of ultimate control of a foreign affiliate are discussed in OECD (2005), Chapter 3, Section 3.3.3.

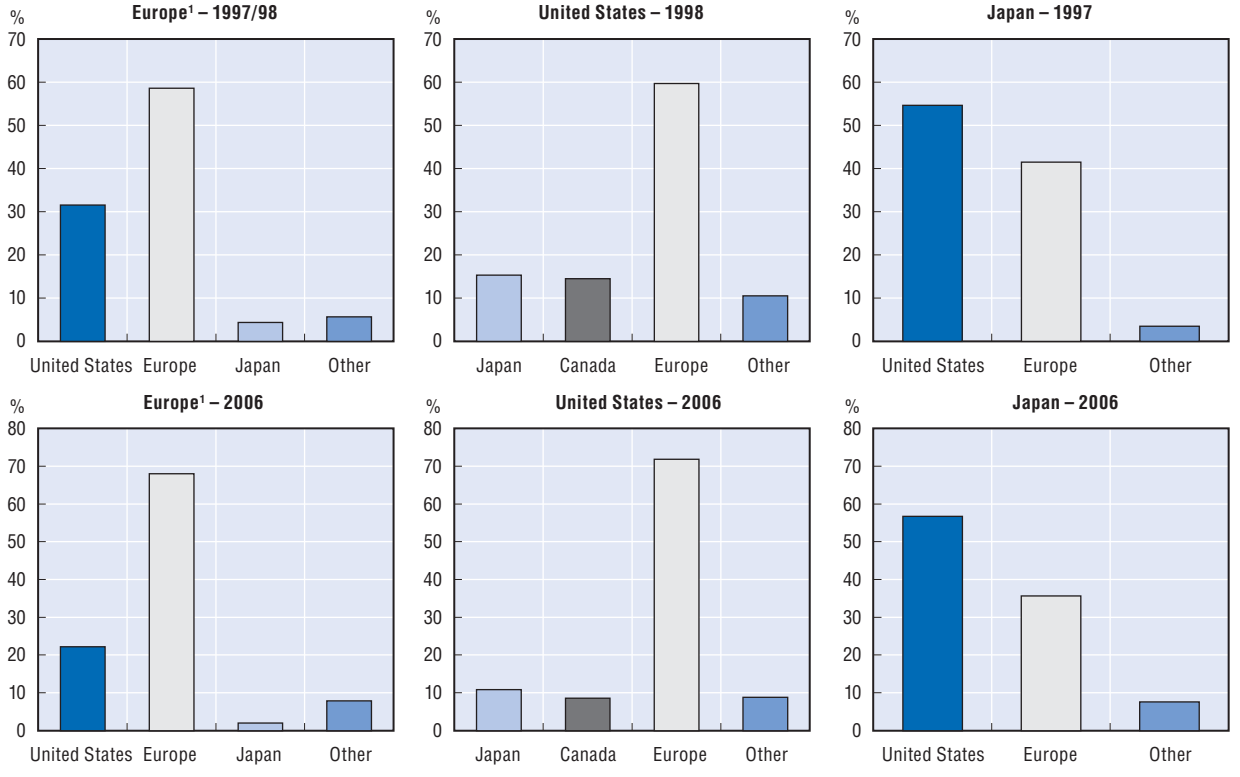
I.3. Inward activity: employment growth of foreign affiliates in services

Figure I.3.1. **Trends in employment by foreign-controlled affiliates and national firms in the services sector, average annual growth rate 2000-06**



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Figure I.3.2. **Geographic origin of employment by foreign-controlled affiliates in the services sector**



1. Data based on available countries.

StatLink http://dx.doi.org/10.1787/844301875515

I.4. Inward activity: share of turnover of foreign affiliates in selected manufacturing industries

■ Foreign presence on the industry level illustrates some major differences across industries (high, medium and low technology) and countries.

■ Foreign presence seems to be more important in higher-technology industries, thus reflecting the importance of proprietary knowledge and technology for the competitiveness of companies in these industries. The foreign share in turnover is higher in medium- and high-technology industries than in lower-technology industries.

■ In the food and beverages industry, classified as low-technology, the share of turnover ranges from 40% to 50%. The foreign share is somewhat smaller in Italy, Spain and France, countries with strong indigenous companies in this industry.

■ The automobile industry is characterised by a very large presence of foreign affiliates. This global industry is dominated by a limited number of large assemblers which have located affiliates across a large number of countries. As such, these companies are able to source foreign production factors and are also near large and growing markets for automobiles.

■ The pharmaceutical industry is also characterised by a large foreign presence in most countries. In Ireland and Sweden turnover in this industry is almost completely realised by foreign affiliates. In Ireland this is especially due to US multinationals which located in Ireland to serve the European market.

Source

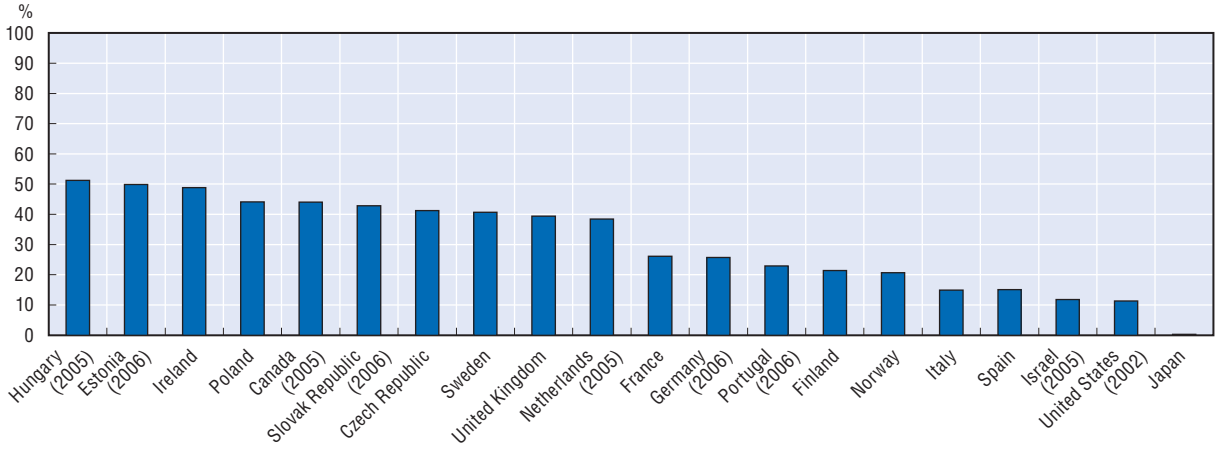
- OECD, *AFA Database*, January 2010.

For further reading

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- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

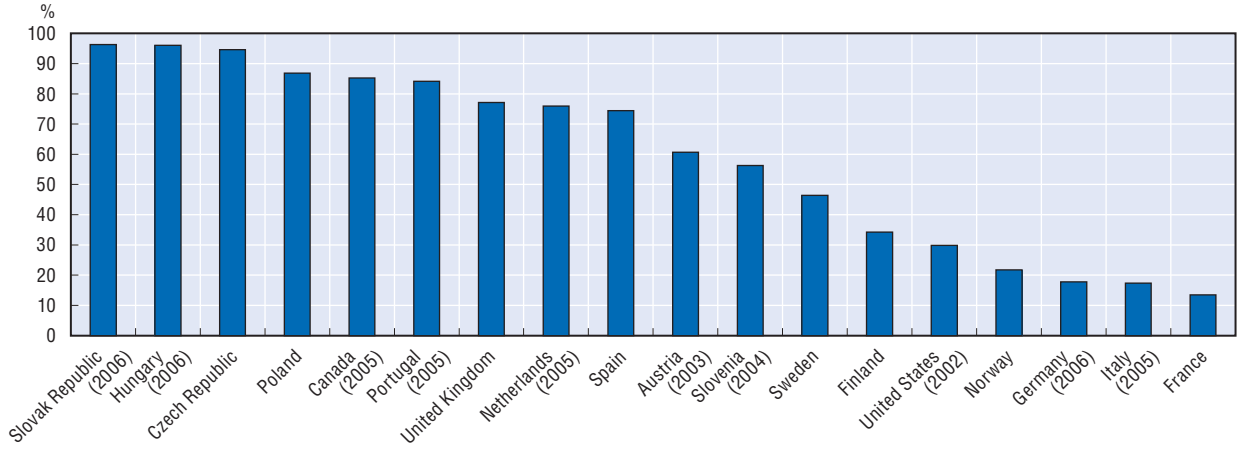
I.4. Inward activity: share of turnover of foreign affiliates in selected manufacturing industries

Figure I.4.1. **Food, beverages and tobacco (ISIC 15 to 16), 2007**



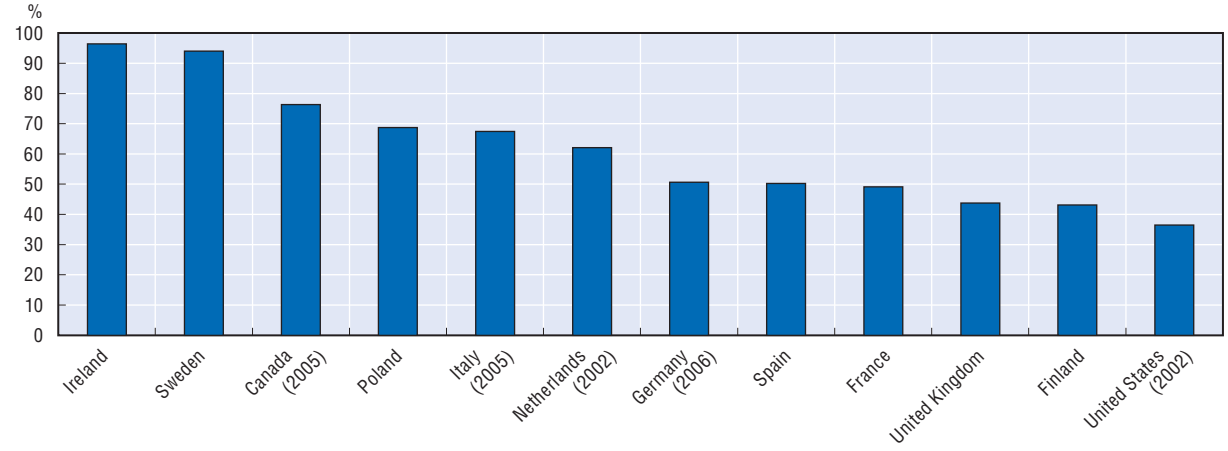
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Figure I.4.2. **Motor vehicles (ISIC 34), 2007**



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Figure I.4.3. **Pharmaceuticals (ISIC 2423), 2007**



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Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

I.5. Inward activity: share of turnover of foreign affiliates in selected service industries

■ Foreign presence is somewhat less strong in the services sector than in manufacturing. Again, there are important differences between individual industries and countries.

■ The financial sector has the largest foreign presence. In some eastern European countries, a large share of turnover is realised by foreign affiliates of the many western European banks which built their positions after these countries joined the European Union.

■ In the wholesale and retail sector, differences across countries seem to be smaller. However, this industry is undergoing a rapid process of internationalisation with large groups developing positions in different countries. International takeovers of local, typically smaller companies are a crucial aspect of the internationalisation strategies of companies in this sector.

■ The business activities service sector is characterised by a lower level of foreign presence. This is due to the presence of a large number of smaller domestic companies active in this sector.

Source

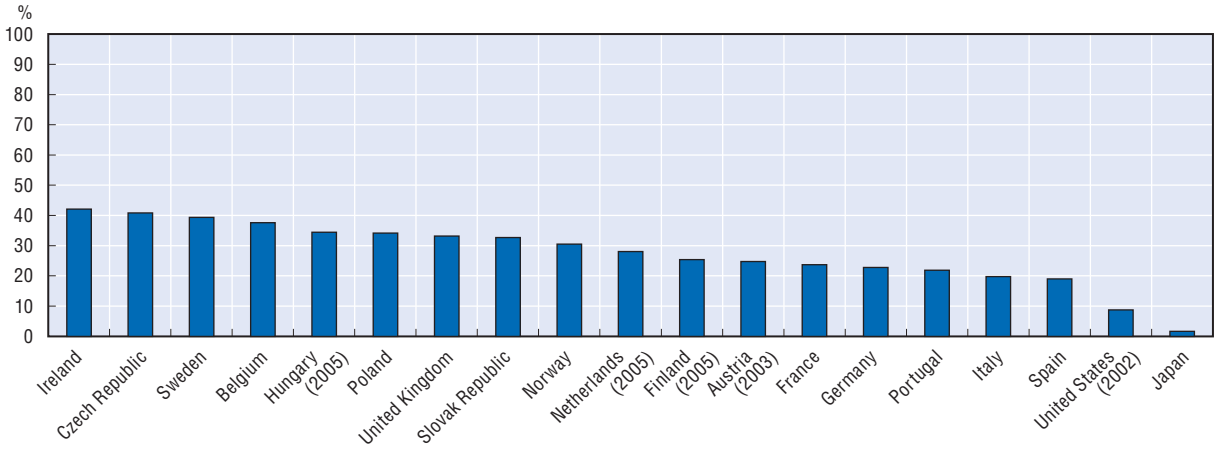
- OECD, *FATS Database*, December 2009.

For further reading

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- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

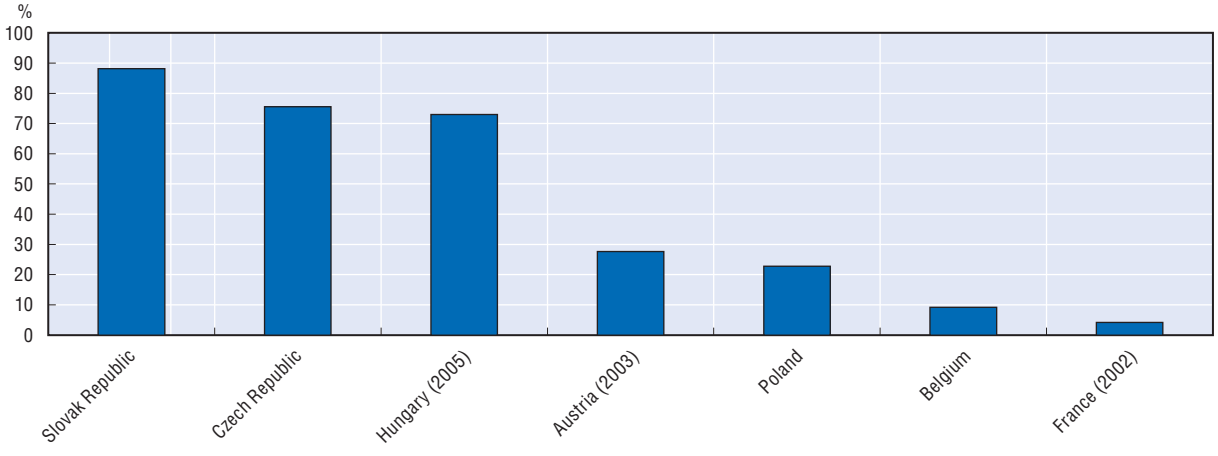
I.5. Inward activity: share of turnover of foreign affiliates in selected service industries

Figure I.5.1. **Wholesale and retail trade (ISIC 50 to 52), 2006**



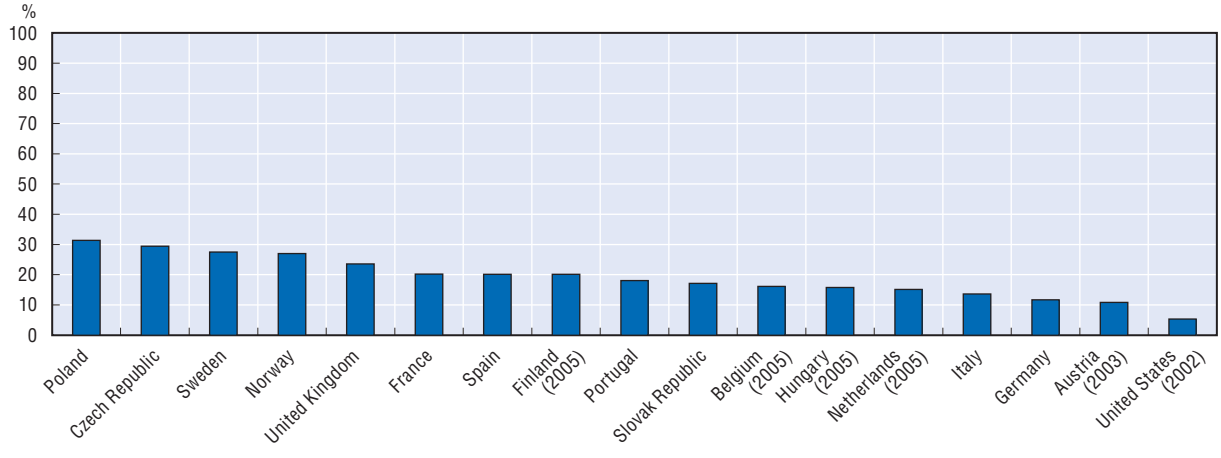
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Figure I.5.2. **Financial intermediation and insurance (ISIC 65 to 67), 2006**



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Figure I.5.3. **Business activities (ISIC 72 to 74), 2006**



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I.6. Headquarters: share of parent companies in turnover and employment

■ Data on the activity of parent companies have only recently been requested as part of OECD surveys, and few member countries have been able to provide the information so far. One reason for the differences observed between countries may be the method used to consolidate data for enterprise groups.

■ The shares of parent companies in countries' manufacturing turnover and employment are extremely large in the United States and Finland but may be significantly lower elsewhere (*e.g.* Luxembourg). The high shares of parent companies in manufacturing turnover and employment in some countries may be due the fact that many medium-sized firms are included in the data since they are under the direct or indirect control of the domestic parent group.

■ The share of parent companies in manufacturing turnover seems to be higher than their share in manufacturing employment. The scale and capital-intensive character of multinational enterprises partially explains this.

■ Parent companies appear to play a lesser role in services than in manufacturing. Available data for a couple of countries show a share of turnover below 30%. As in manufacturing, the share of employment of parent companies in the services sector is smaller than the share of turnover. In addition to the larger size and capital intensity of multinational companies, this is also related to the headquarters and support activities of parent companies.

Sources

- OECD, *AFA Database*, December 2009.
- OECD, *FATS Database,* December 2009.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

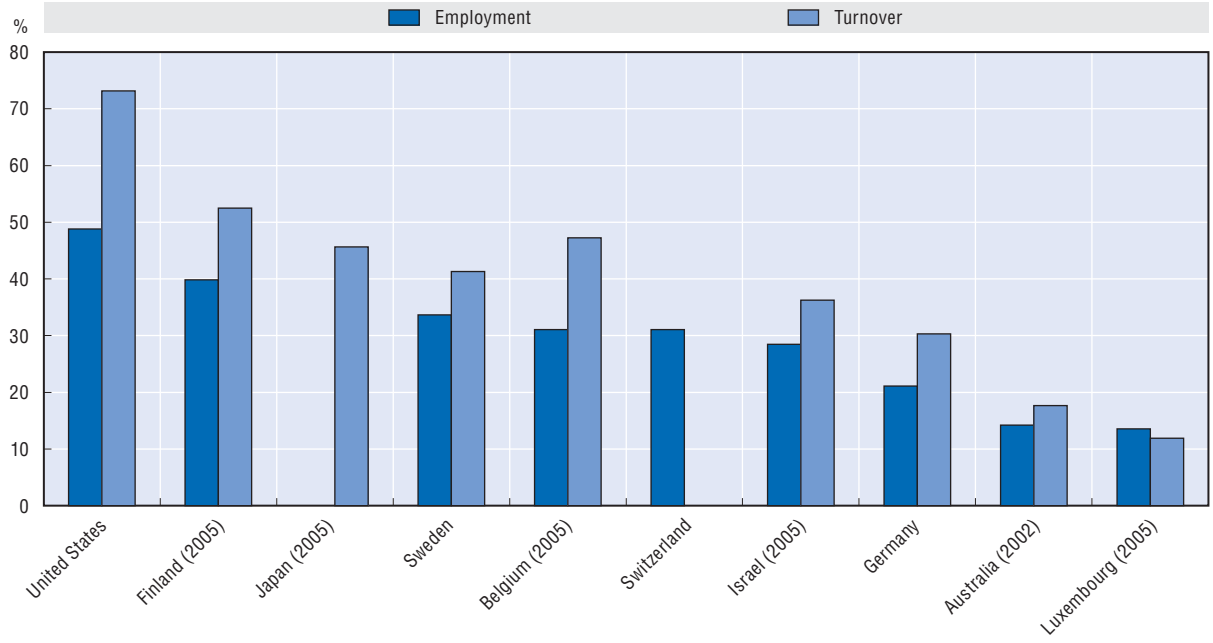
Parent company of a compiling country

"Parent company", in the context of a compiling country, refers to the parent consolidated enterprise or parent enterprise group in the compiling country. This includes the headquarters of the group (which in many cases is not controlled by any other company or individual) plus the domestic firms which the headquarters controls directly or indirectly (see OECD, 2005, Box 3.7 and § 319-331 for the definition of parent company and § 306-310 for the definition of direct and indirect control). By definition, all parent companies have affiliates abroad.

With respect to the compiling country, the parent company is in principle located in the country. There are two possible situations: *i*) when the parent company is located in the compiling country and is controlled by the residents of the compiling country; and *ii*) when the parent company located in the compiling country is under foreign control. In the first case, the headquarters of the company is also the unit of ultimate control while, in the second case, the headquarters and the unit of ultimate control are different entities and located in different countries. Since the parent company under foreign control is also an affiliate under foreign control, OECD (2005) recommends, in order to avoid possible double counting, taking separately into account (at least as far as the total is concerned) parent companies under foreign control and other foreign affiliates.

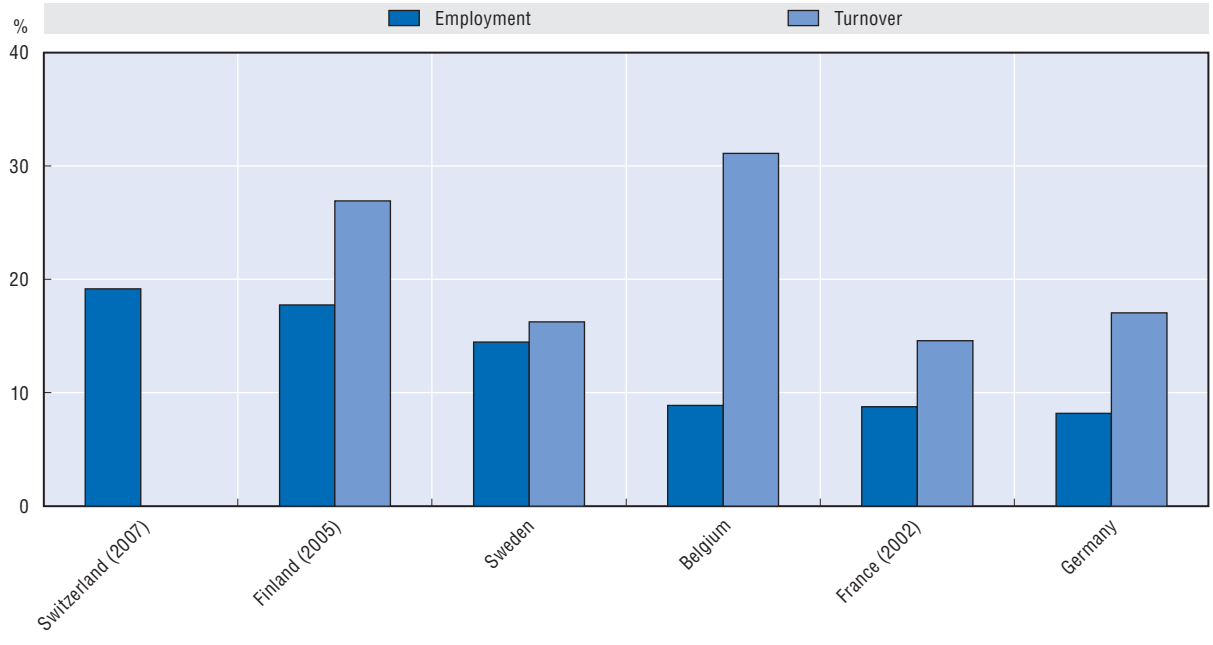
I.6. Headquarters: share of parent companies in turnover and employment

Figure I.6.1. **Parent companies' share of manufacturing turnover and employment, 2007**



StatLink http://dx.doi.org/10.1787/844433667551

Figure I.6.2. **Parent companies' share of services turnover and employment, 2006**



StatLink http://dx.doi.org/10.1787/844442216717

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

I.7. Outward activity: employment and turnover of affiliates abroad

The ratio of the turnover of affiliates abroad to the turnover of parent companies at home can be used as an indicator of globalisation. This indicator should however be interpreted with care, since employment and turnover created abroad does not come at the expense of the home country. On the contrary, foreign activities often benefit home country activities and reinforce the global competitiveness of the multinational company.

Smaller countries with a large presence of own multinationals such as Switzerland, Sweden and Finland show higher values on this indicator. In these countries, affiliates abroad generate significantly more sales and create large employment. For example, Swiss affiliates abroad employ over a million people, whereas foreign-controlled affiliates in Switzerland provide fewer than 150 000 jobs.

German manufacturing multinationals are also highly internationalised, since the sales of German offshore affiliates are equivalent to 80% of their parent companies' sales in Germany. Half of their affiliates' sales are derived in the European Union, 30% in the United States, and the rest in Asia and in other European countries.

In the services sector also, the importance of foreign affiliates relative to the parent company is especially significant in smaller countries. Among countries for which data are available, German service-sector affiliates abroad generate more turnover than their parent companies. In other countries, including the United States, the parent companies accounts for more turnover than their affiliates abroad.

Sources

- OECD, *AFA Database*, December 2009.
- OECD, *FATS Database*, December 2009.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

The activities of multinationals abroad

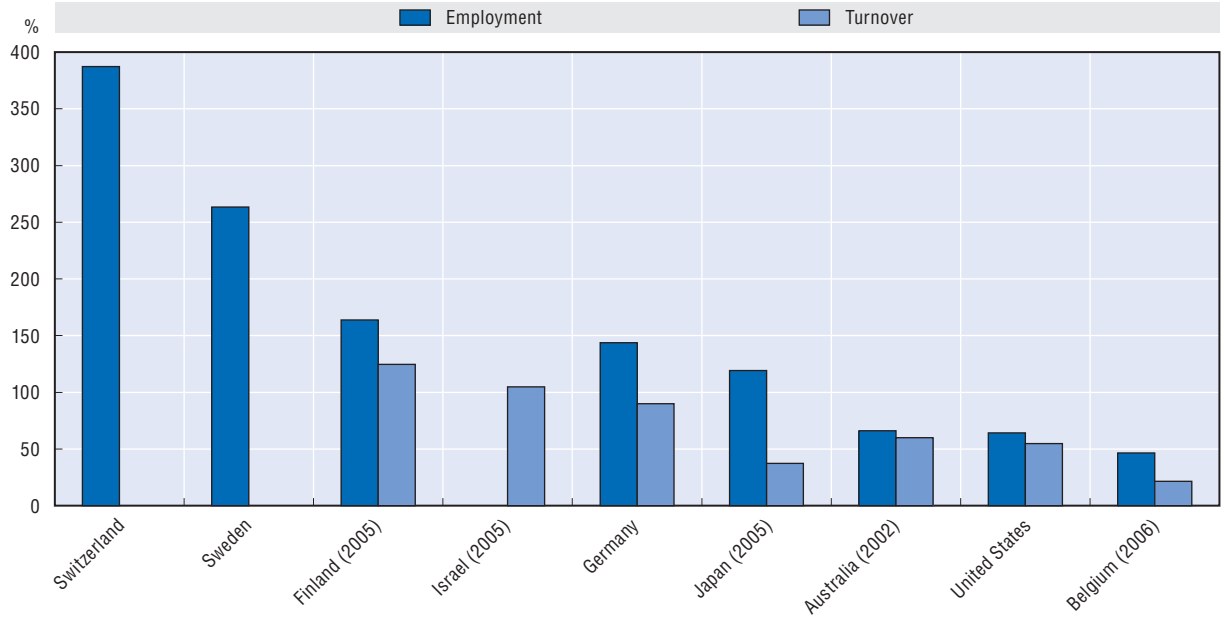
The activities of multinationals abroad involve affiliates of parent companies in the compiling countries that are, first, under the direct control of their parent companies. Data on the activities of these affiliates are broken down by industry and by country in which they are located.

OECD (2005) recommends that offshore affiliates over which parent companies exercise indirect control should be included as well, insofar as these firms theoretically belong to the same group. Consequently, the data provided by a country on the turnover or workforce of its affiliates abroad theoretically include all affiliates that are controlled either directly or indirectly by their parent companies.

Data from the United States depart from this rule, inasmuch as the only affiliates included are those in which US parent companies hold a majority interest. From this standpoint, US data, as compared with those of other countries, underestimate the scope of activity of their affiliates abroad.

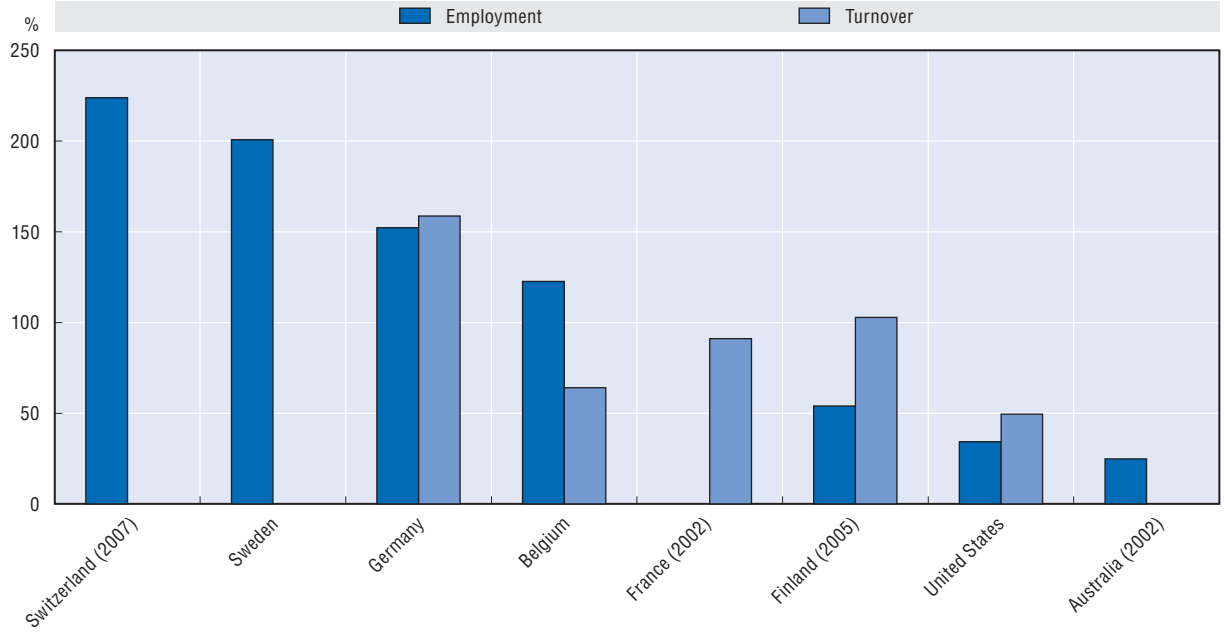
I.7. Outward activity: employment and turnover of affiliates abroad

Figure I.7.1. **Share of affiliates abroad in the manufacturing turnover and employment of parent companies located in the domestic economy, 2007**



StatLink http://dx.doi.org/10.1787/844573824580

Figure I.7.2. **Share of affiliates abroad in the turnover and employment of parent companies located in the domestic economy, in the services sector, 2006**



StatLink http://dx.doi.org/10.1787/844625104074

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

J. THE CHARACTERISTICS OF MULTINATIONAL ENTERPRISES

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J.1. Firm size: employment per enterprise

■ A comparison of the average employment of foreign affiliates and firms under national control shows that foreign affiliates are significantly larger than national firms. This is true for all countries.

■ The difference is especially large in manufacturing. The average employment of foreign affiliates is a multiple of that of firms under national control, even in large countries such as Germany and the United States which have large domestic firms. A large group of small and medium-sized enterprises (SMEs) likely decreases the average size of the group of firms under national control.

■ In services, foreign affiliates are also larger than national firms, although the differences seem smaller than in manufacturing in certain countries.

■ The larger average size of foreign affiliates is explained in the first place by a sector composition effect. Foreign affiliates are typically more often in scale industries in which scale and thus size are important drivers of competitiveness.

■ Even abstracting from differences in the sector mix between foreign affiliates and firms under national control, foreign affiliates still have on average a larger size within industries. Previous research has demonstrated that the production technology of multinational companies is typically characterised by a high degree of scale economies.

Sources

- OECD, *AFA Database*, January 2010.
- OECD, *FATS Database*, January 2010.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

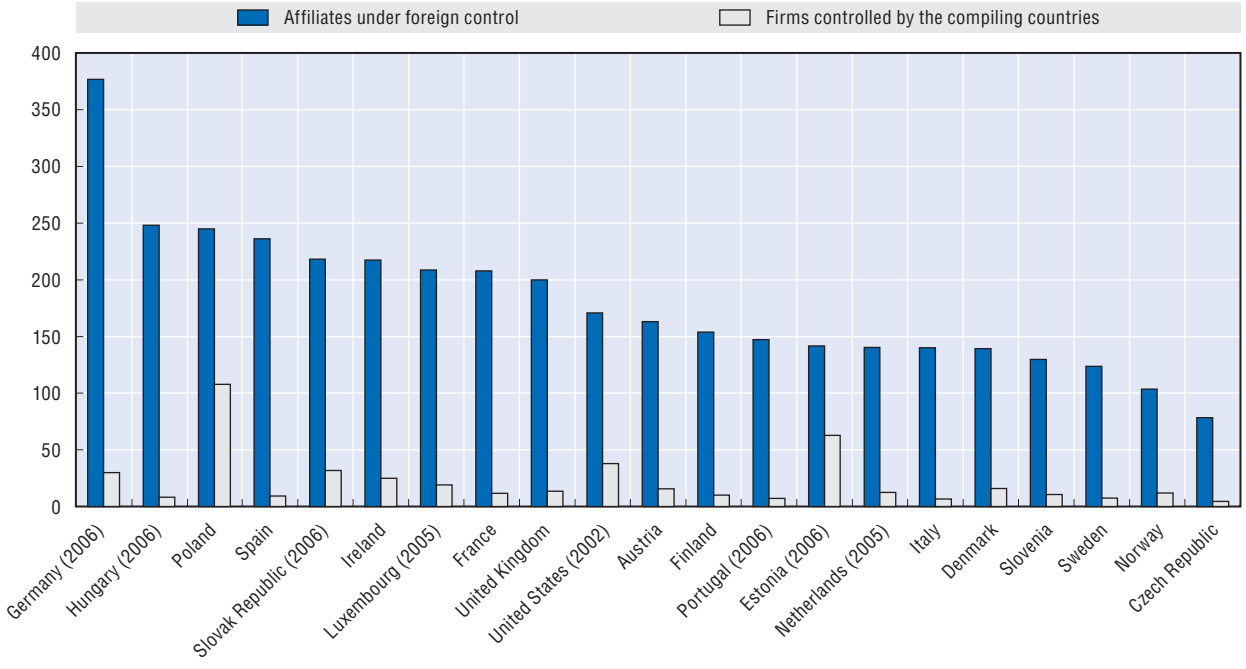
Measuring the average size of foreign-controlled affiliates

The size of foreign-controlled affiliates should normally be factored into analytical work on the basis of survey results. Even though this information should theoretically be available for a great many countries, the OECD has not yet requested it as part of its international surveys on the activity of multinational firms, so as not to raise the administrative cost of member country responses and, above all, to avoid the numerous cases of statistical confidentiality to which such data could give rise. Nevertheless, it is acknowledged that firm size has a significant influence on certain economic variables, such as wages, R&D expenditure, exports and profit. Moreover, a breakdown by size of all firms located within a given compiling country would facilitate identification of the degree of internationalisation of small and medium-sized enterprises in terms of exports and outward foreign direct investment. As proxies for actual survey data on firm size, the following approximate average metrics are used:

- average turnover by firm;
- average employees by firm.

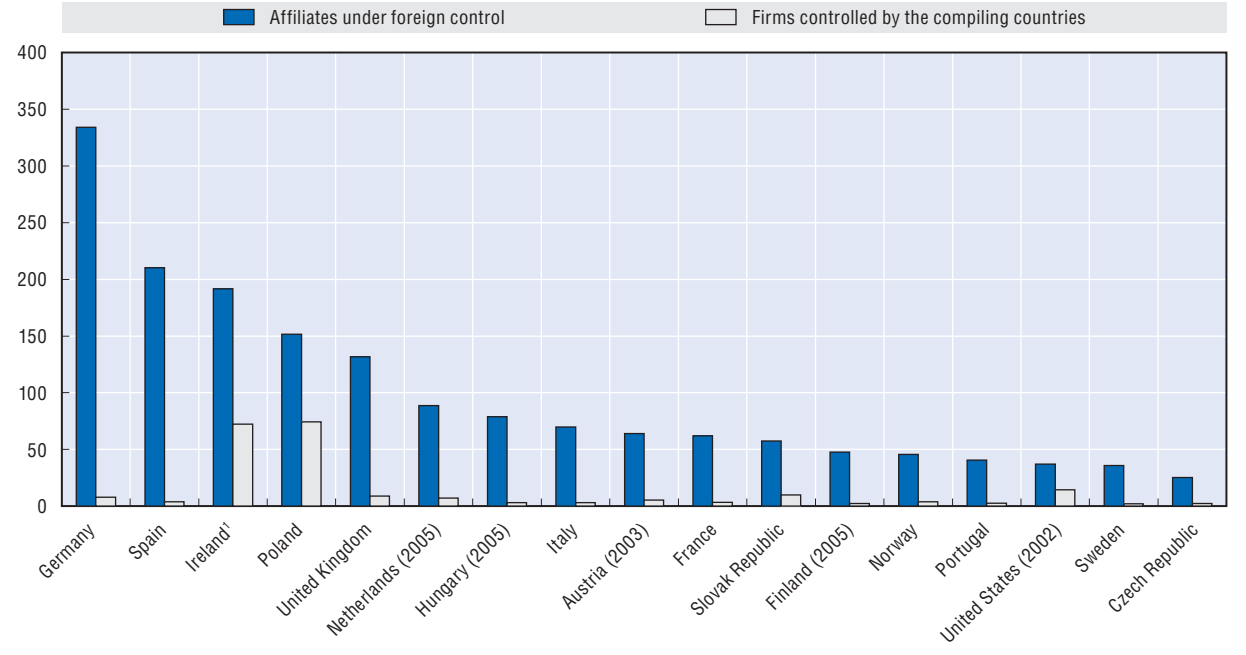
J.1. Firm size: employment per enterprise

Figure J.1.1. **Number of employees by enterprise of foreign affiliates and national firms in manufacturing, 2007**



StatLink http://dx.doi.org/10.1787/844637758325

Figure J.1.2. **Number of employees by enterprise of foreign affiliates and national firms in services, 2006**



1. Enterprises with 20 employees or more.

StatLink http://dx.doi.org/10.1787/844644005212

J.2. Average labour productivity: value added per employee

■ In addition to being larger on average than firms under national control, foreign affiliates also display higher levels of (apparent) labour productivity. Without exception, foreign affiliates have higher productivity than firms under national control. The differences between the two types of firms are especially large in Ireland and Hungary.

■ In manufacturing as well as in the services sector, value added per employee in foreign affiliates is higher than in firms under national control. On average, apparent labour productivity is higher in manufacturing industries than in services, owing to the higher capital intensity of manufacturing.

■ Differences in the sector composition of foreign affiliates and of firms under national control are an important reason for this. The fact that foreign affiliates are more often active in scale and in capital-intensive industries partially explains the difference in aggregate labour productivity.

■ Within industries as well, foreign affiliates display higher labour productivity levels than firms under national control. The fact that foreign affiliates are on average more capital-intensive contributes directly to their higher labour productivity.

Sources

- OECD, *AFA Database*, January 2010.
- OECD, *FATS Database*, January 2010.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
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Measuring apparent labour productivity

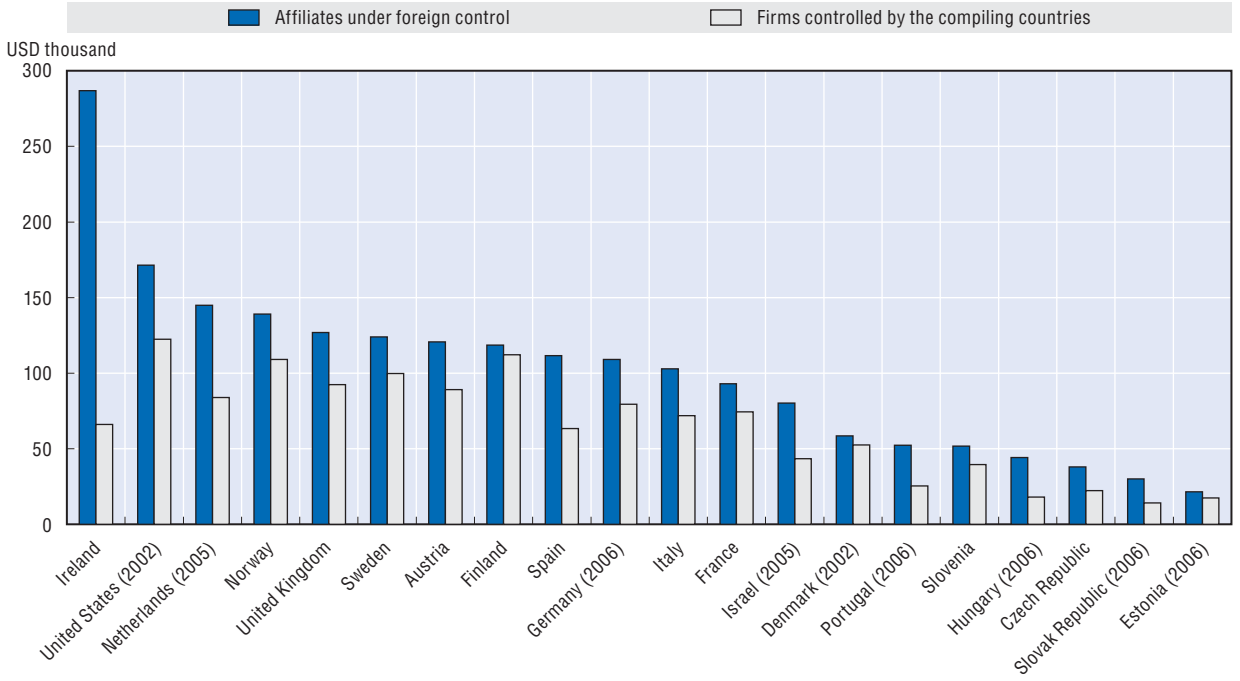
Productivity is commonly defined as the ratio between output volume and volume of inputs and measures how efficiently production inputs, such as labour and capital, are used to produce a given level of output. Productivity is considered a key source of economic growth and competitiveness and, as such, is basic statistical information for many international comparisons and for assessments of country, industry and company performance.

Apparent labour productivity is defined as the ratio of value added to number of employees and gives an idea of the productivity of the production factor labour.

Despite the progress made, the measurement of productivity still suffers from a number of statistical problems. Countries use different concepts and basic statistical sources, and this can hinder international comparability. Differences may exist in the measurement of value added (factor prices, market prices, etc.). In terms of labour input, differences in workers' educational attainment, skills and experience can also bias results. Productivity indicators in general and the indicator of apparent labour productivity should therefore be interpreted with care.

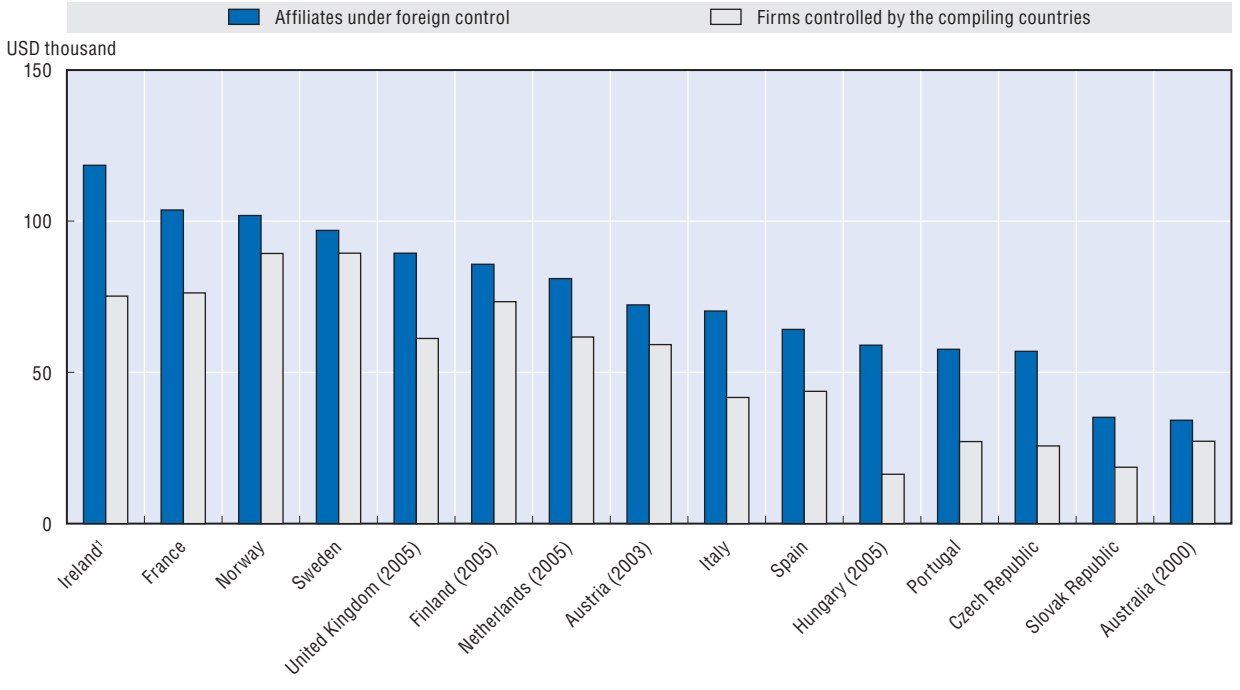
J.2. Average labour productivity: value added per employee

Figure J.2.1. **Value added per employee of foreign affiliates and national firms in manufacturing, 2007**



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Figure J.2.2. **Value added per employee of foreign affiliates and national firms in services, 2006**



StatLink http://dx.doi.org/10.1787/844718541773

1. Enterprises with 20 employees or more.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

J.3. Average wage: employee compensation per employee

■ In all countries for which data are available, average compensation per employee is higher for foreign-controlled affiliates than for national firms both in manufacturing and services industries. Average wages are higher in the manufacturing sector than in the services sector.

■ Differences in average wage between industries and types of companies are directly related to differences in (apparent) labour productivity. Value added per employee is higher in manufacturing than in services; this partially explains the higher average compensation per employee in manufacturing.

■ Along the same lines, apparent labour productivity is higher in foreign affiliates than in firms under national control. This results in higher average wages because foreign affiliates are largely in more labour-productive and higher capital-intensive industries and typically use more capital-intensive technologies.

■ The differences may also be due to other factors as well, such as differences in skills between the two types of firms. Other reasons might be differences in the number of hours worked, the organisation of the labour market and average firm size.

Sources

- OECD, *AFA Database*, January 2010.
- OECD, *FATS Database*, January 2010.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

Employee compensation

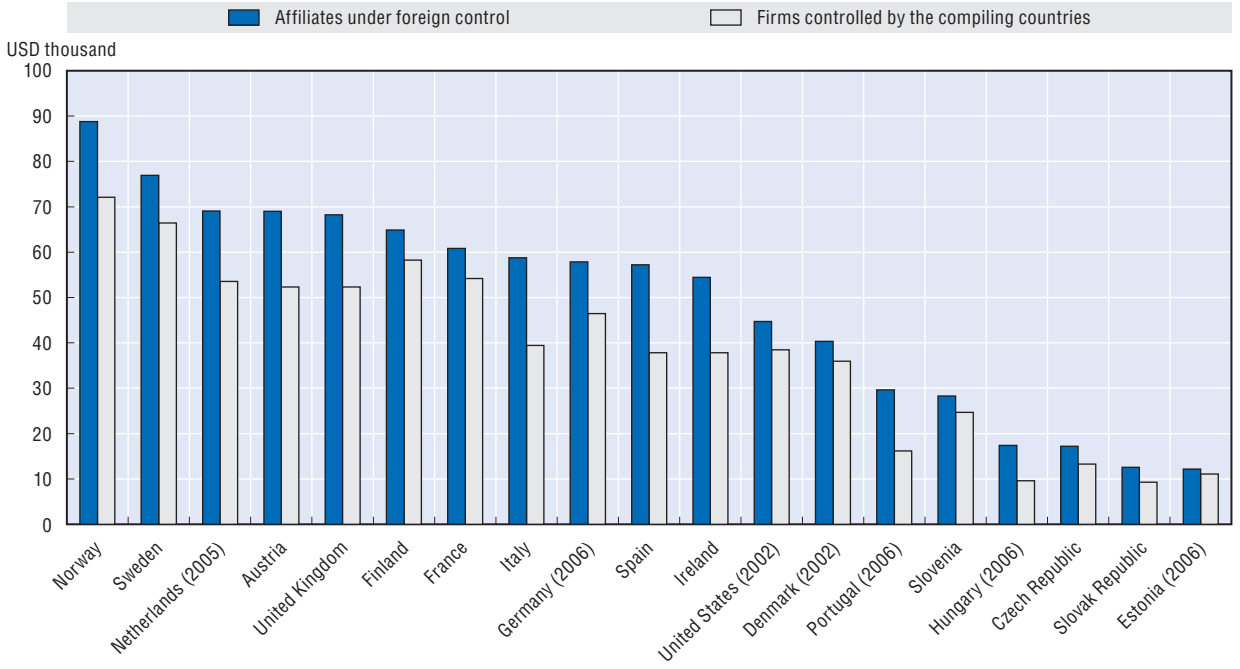
Employee compensation is defined as the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period. Compensation of employees has two main components:

- Wages and salaries payable in cash or in kind.
- The value of the social contributions payable by employers; these may be actual social contributions payable by employers to social security schemes or to privately funded social insurance schemes to secure social benefits for their employees; or imputed social contributions by employers providing unfunded social benefits. (SNA 1993, § 7.21 and 7.31)

"Social security costs for the employer include the employer's social security contributions to schemes for retirement pensions, sickness, maternity, disability, unemployment, occupational accidents and diseases, and family allowances as well other schemes. Optional social benefits are also a cost for the employer." (*Definition of Economic Variables*, Code 13330, Eurostat.)

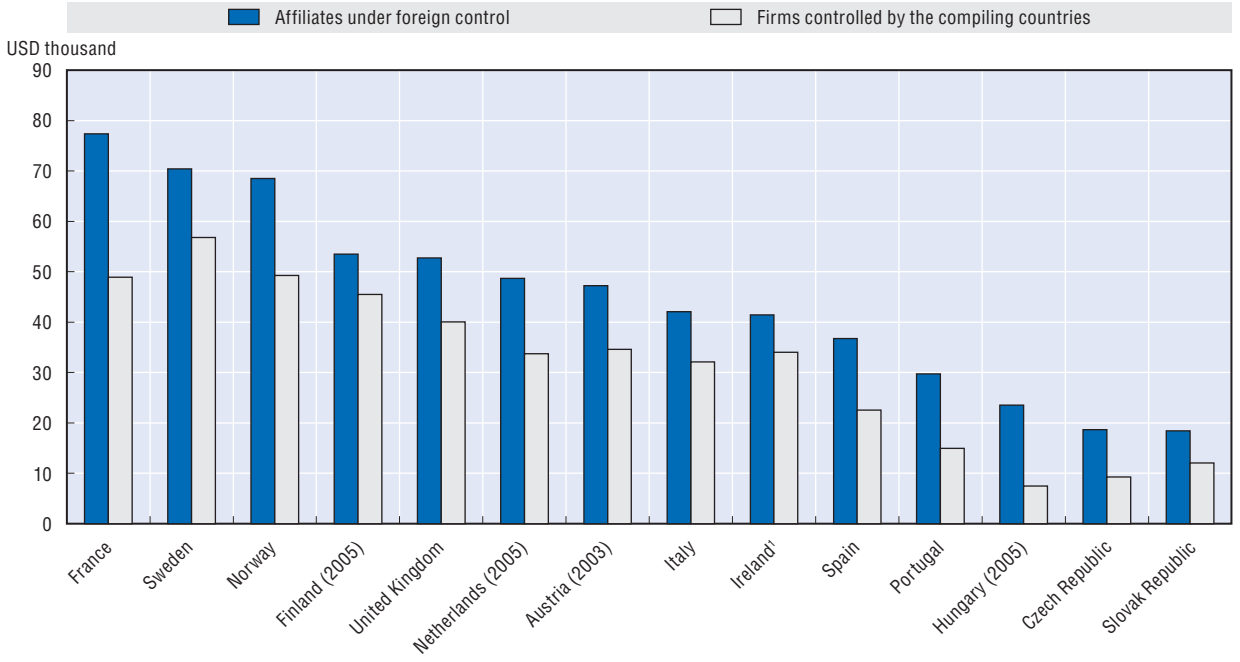
J.3. Average wage: employee compensation per employee

Figure J.3.1. **Compensation per employee of foreign affiliates and national firms in manufacturing, 2007**



StatLink http://dx.doi.org/10.1787/844728521770

Figure J.3.2. **Compensation per employee of foreign affiliates and national firms in services, 2006**



1. Enterprises with 20 employees or more.

StatLink http://dx.doi.org/10.1787/844758182662

J.4. Profitability: gross operating surplus as a share of turnover

■ The share of gross operating surplus (profit) in the turnover of foreign-controlled affiliates could be used as one indicator of the profitability of foreign-owned investments in host countries. However, comparisons of the profitability of foreign affiliates should be interpreted with care, given differences in regulatory environments, tax rules, etc., in different countries. Previous research has shown the importance of transfer pricing in the observed profitability of affiliates of multinational companies in different countries.

■ In some countries, foreign affiliates are more "profitable" than firms under national control, but this observation is not valid for all countries.

■ Investments in Slovenia, Hungary and the Czech Republic yield profits that are higher in relation to turnover than investments in other countries. This outcome may suggest that offshoring in central Europe is motivated not only by low labour costs, but by expectations of high profitability as well. However, interpretations of differences based on this rather simple indicator should be drawn carefully.

Source

- OECD, *AFA Database*, January 2010.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

Gross operating surplus

Gross operating surplus (GOS) is defined as:

– gross value added (VA);

- *minus* compensation payable to employees (W);
- *minus* taxes on production payable (T);
- *plus* subsidies receivable (S) (SNA 1993, §7.80).

Value added corresponds to the value of the output that a firm produces for itself, reduced by the value of intermediate consumption. Employee compensation encompasses wages and salaries plus social security contributions payable by employers. Taxes on production include taxes payable by foreign affiliates in the affiliates' host countries but not those paid by the parent company in the country of origin in respect of income received or distributed by the affiliate. Subsidies are payments without consideration that general government makes to business enterprises on the basis of the level of their production activities.

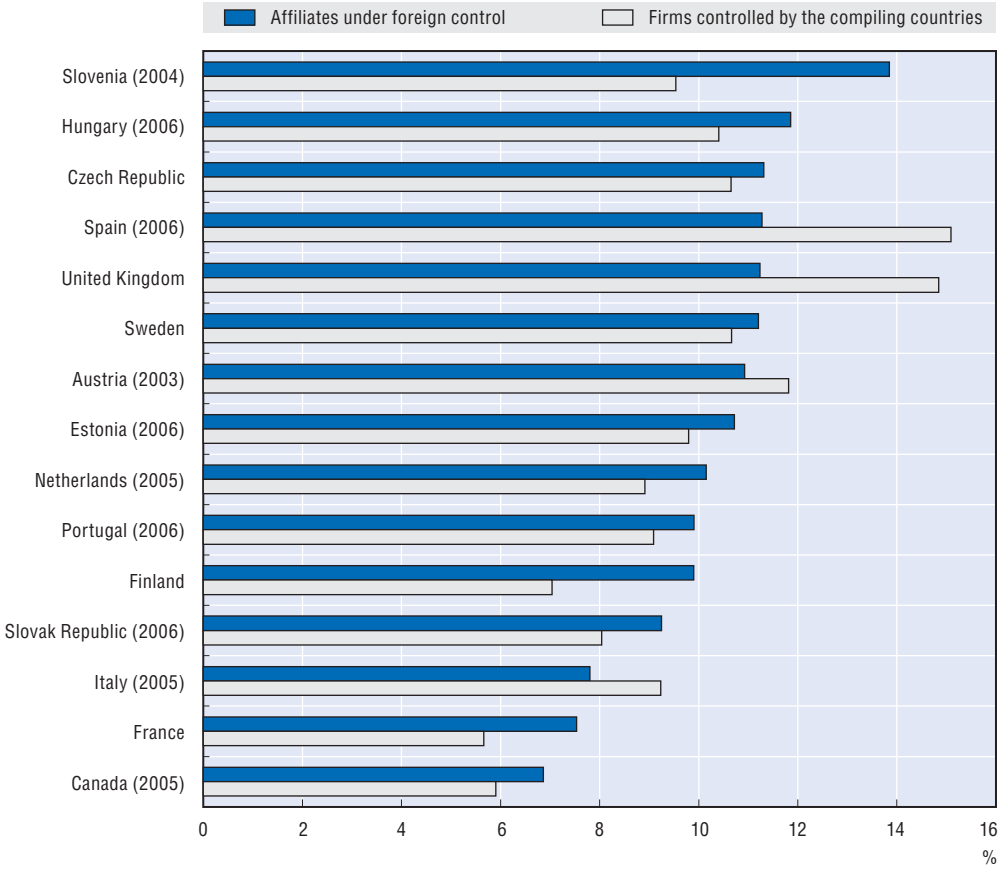
Thus, GOS = VA – W – T + S.

Gross operating surplus can take on negative values if VA < W + T – S.

In addition, the ratio (GOS + W + T – S) / VA = 1.

J.4. Profitability: gross operating surplus as a share of turnover

Figure J.4.1. **Gross operating surplus as a share of turnover of foreign affiliates and national firms in manufacturing, 2007**



StatLink http://dx.doi.org/10.1787/844765218547

J.5. Export and import propensity of foreign affiliates

Affiliates under foreign control engage not only in serving local markets in the host country but often also serve other (neighbouring) markets. In addition, they produce inputs for other affiliates in the multinational network. This intra-firm trade involves the export and import of nearly finished goods destined for affiliate firms that are mainly involved in marketing and distribution but engage in little additional manufacturing processing.

Another and growing part of intra-firm trade concerns exports and imports by foreign affiliates that manufacture intermediate products destined for other affiliates. This is directly related to the globalisation of value chains.

As a result, the export and import propensities of foreign affiliates are in many cases greater 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 Estonia, Israel, Finland, Sweden and Poland, the proportion is over 50%.

In the majority of countries, the import propensity of affiliates under foreign control in manufacturing is lower than their export propensity. However, in the services sector, all affiliates under foreign control have significantly greater propensities to import than to export.

Export propensities in services are significantly smaller than in manufacturing industries. This seems to suggest that the local market is more important for services activities. Services are typically more difficult to export than goods, although the international transferability of services has increased lasting recent years.

Sources

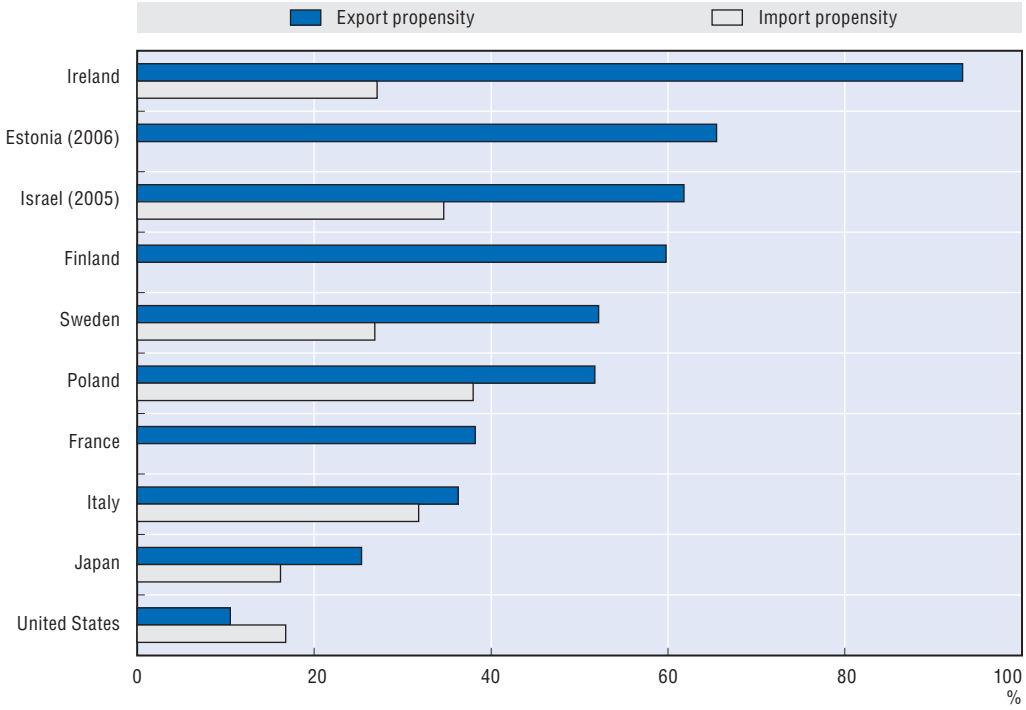
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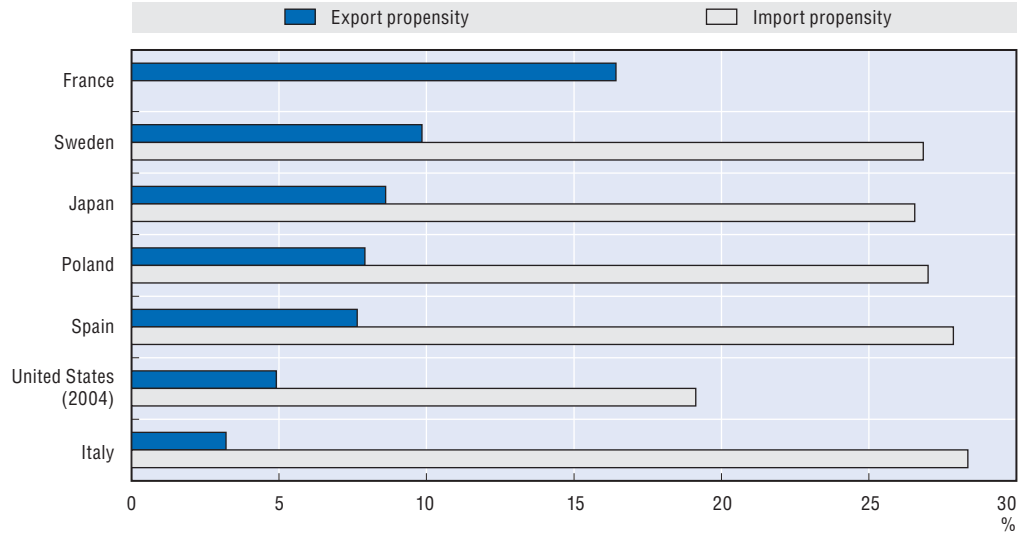
J.5. Export and import propensity of foreign affiliates

Figure J.5.1. **Export and import propensity[1] of foreign affiliates in manufacturing, 2007**



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Figure J.5.2. **Export and import propensity[1] of foreign affiliates in services, 2006**



StatLink http://dx.doi.org/10.1787/844845211314

1. Exports and imports as a percentage of turnover. For the United States, Japan, Italy, Sweden, Israel and Italy, trade in goods only.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

J.6. Intra-firm trade in selected OECD countries

■ Since part of foreign affiliates' production is used as intermediate inputs by parent firms and other affiliates within the multinational network, intra-firm trade has taken on greater importance. Over 2000-07, the share of intra-firm exports in total exports of manufacturing affiliates under foreign control ranged between 15% and 50% in several of the countries for which relevant data are available.

■ Throughout the present decade, the proportion of exports has held steady at around 50% in the United States and 20% in Japan. In other words, half of the exports of affiliates under foreign control in the United States were destined to non-affiliates; in Japan the proportion was 80%.

■ Between 2004 and 2007 intra-firm exports of manufacturing affiliates under foreign control in Poland increased from 20% to 47%, in line with the increase in the activities of foreign affiliates in that country.

■ During the 2000s, the share of intra-firm imports in total imports of affiliates under foreign control in the United States and in Japan was significantly higher than the share of intra-firm exports in total exports. The share remained stable in the United States (almost 80%) but declined in Japan (from 70% to less than 50%).

Source

- OECD, *AFA Database,* December 2009.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

Measuring intra-firm trade

Intra-firm trade refers to trade between enterprises belonging to the same group that are located in different countries. The ratio of intra-firm trade to the total trade of countries publishing the relevant data is quite high. Once foreign investments have been made, these transactions reflect centralised decisions that are part of a group's global strategy.

A significant portion of intra-firm trade may reflect affiliates' better understanding of local market demand. Parent corporations and other firms in the group often prefer to export to their own affiliates, which then sell the goods they receive to local consumers. In fact, parent corporations could sell these products directly to local distributors, without involving affiliates. It is difficult to determine whether there would be fewer transactions if they did not pass through affiliates.

Four basic indicators are proposed: two for inward investment and two for outward investment.

Inward investment: Exports (X_F^{intra}) and imports (M_F^{intra}) by the foreign-controlled affiliates in compiling countries with parent companies and other affiliates located abroad to total exports (X) and imports (M) of the compiling countries:

X_F^{intra}/X, M_F^{intra}/M

Outward investment: Exports (X_{out}^{intra}) and imports (M_{out}^{intra}) by parent companies in the compiling country with their affiliates abroad to total exports and imports:

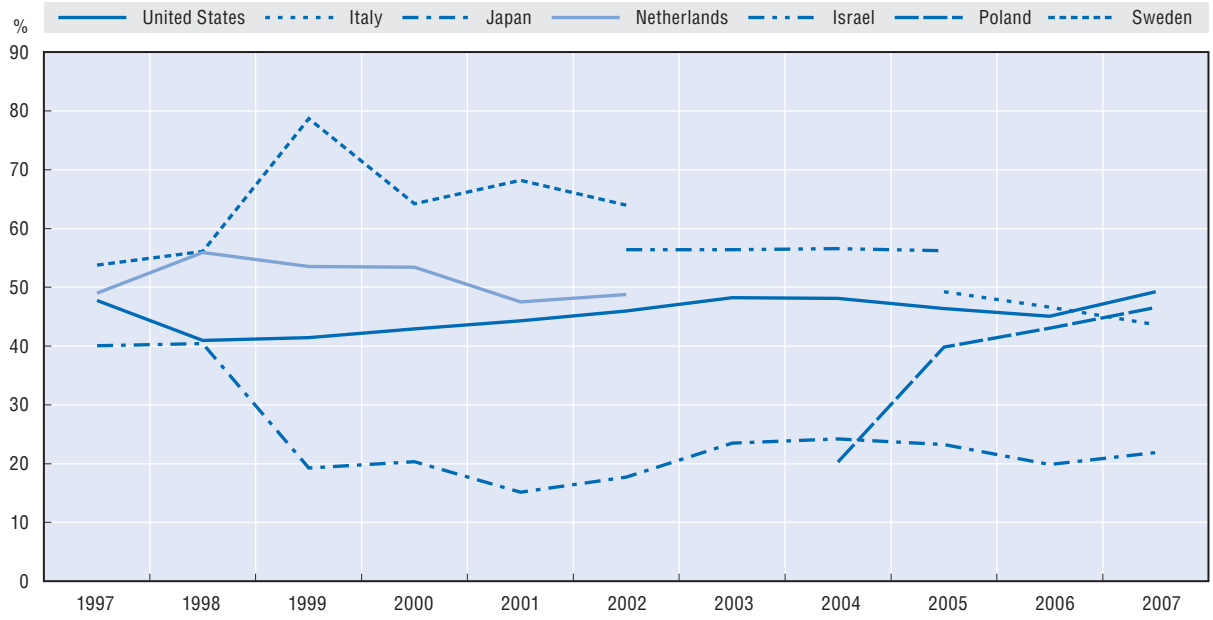
X_{out}^{intra}/X, M_{out}^{intra}/M

These indicators might also be calculated in terms of total exports and imports by these firms, and by industrial sector and by country of origin and destination.

In the case of imports by affiliates under foreign control in host countries and by parent companies controlled by residents of compiling countries, it would also be very useful to distinguish between imports destined for use in their own production, those resold as same-state goods on the domestic market, and those re-exported, either in the same state or after further processing.

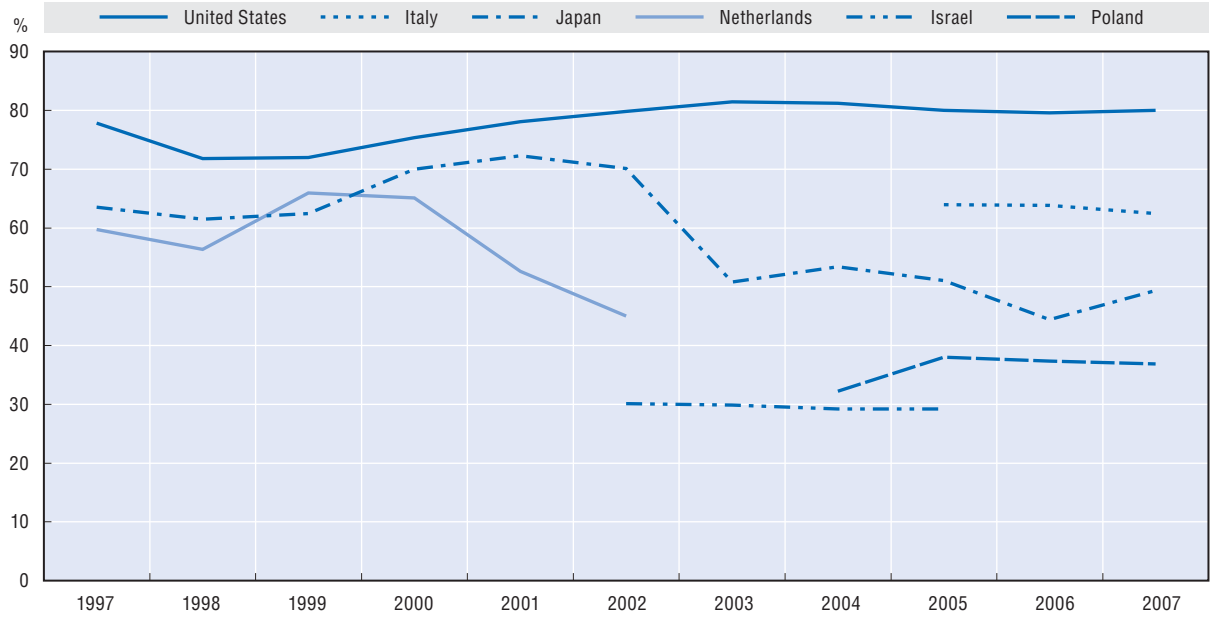
J.6. Intra-firm trade in selected OECD countries

Figure J.6.1. **Share of intra-firm exports in total exports of affiliates under foreign control, 1997-2007**



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Figure J.6.2. **Share of intra-firm imports in total imports of affiliates under foreign control, 1997-2007**



StatLink http://dx.doi.org/10.1787/845020621284

Note: Data for Poland and Israel refer to the manufacturing sector only.

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602.*

J.7. Intra-firm trade and impact on the trade balance: United States manufacturing sector

Data for 2007 show that the deficit on the US trade balance was mainly the result of the activities of firms under national control. Affiliates under foreign control in the manufacturing sector only contributed 13% to the global trade deficit of the United States compared to 87% for firms under US control.

Generally the most important intra-firm trade of US parent companies was with its NAFTA trade partners, Canada and Mexico. In 2007, intra-firm trade with Canada was even greater than intra-firm trade with the countries of Europe.

About 48% of US imports from American affiliates in Canada and 60% from Mexico were from the automobile industry. From their affiliates in the European Union (EU27), 31.4% involved wholesale trade, 12.8% chemicals and 12.3% transport equipment.

In 2007, US imports from affiliates in China represented USD 6 billion, which corresponded to 1.8% of total imports from China. Over 59% of imports from US affiliates in China concerned computers and electronic products. In other words, the majority of the US high-technology imports from China come from Chinese firms or from other foreign affiliates.

Sources

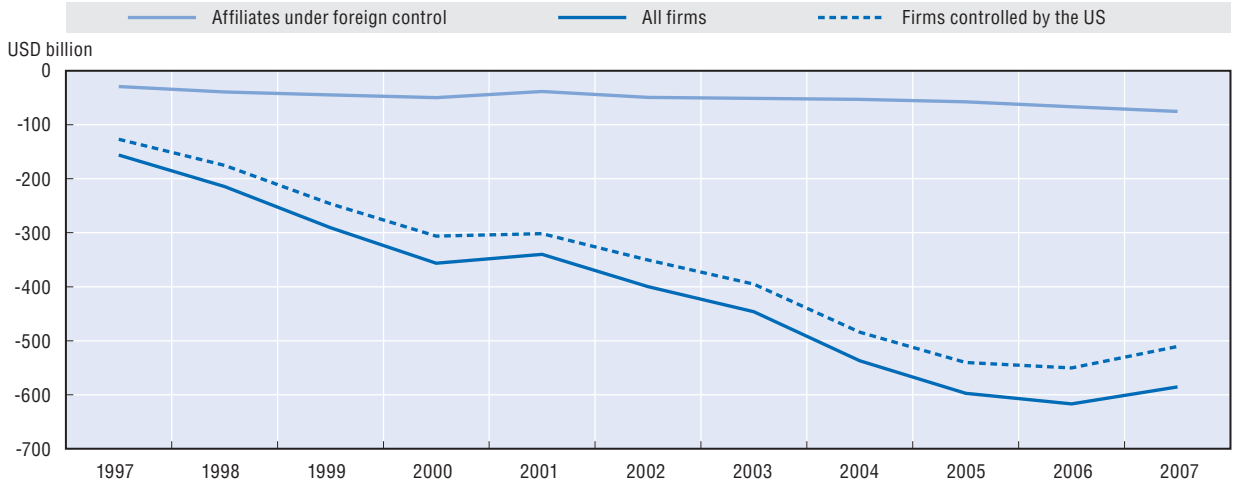
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- OECD, *AFA Database* and *International Trade in Commodities Statistics Database*, December 2009.

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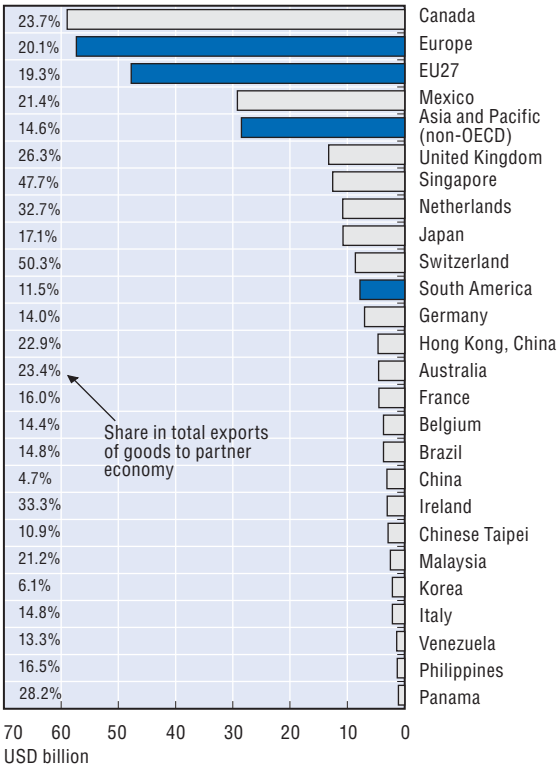
J.7. Intra-firm trade and impact on the trade balance: United States manufacturing sector

Figure J.7.1. **Trade balance of the US manufacturing sector**



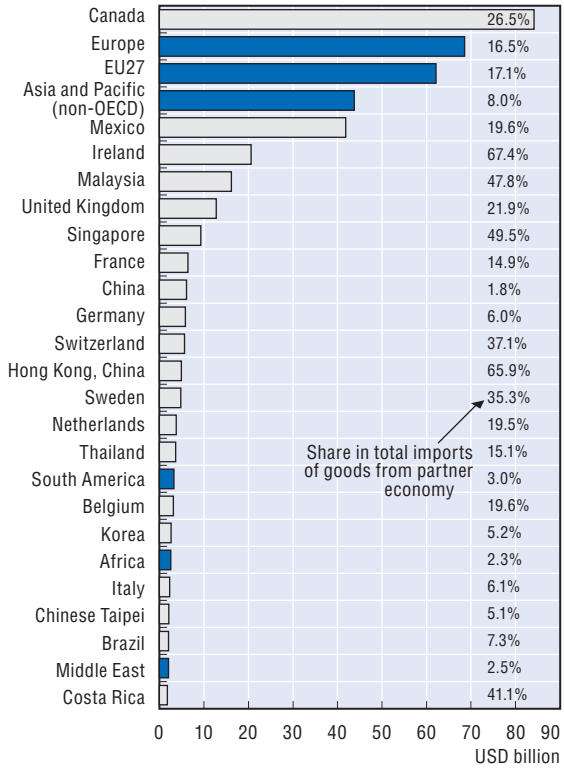
StatLink http://dx.doi.org/10.1787/845038140152

Figure J.7.2. **Intra-firm exports of goods from US parent companies to affiliates abroad by partner economy, 2007**



StatLink http://dx.doi.org/10.1787/845061588268

Figure J.7.3. **Intra-firm imports of goods to US parent companies from affiliates abroad by partner economy, 2007**



StatLink http://dx.doi.org/10.1787/845067870153

J.8. Intra-firm trade and impact on the trade balance: Japan manufacturing sector

■ The share of foreign affiliates amounted to about 7% of exports from Japan and 13% of imports to Japan. Thus, trade of foreign affiliates in Japan seemed to play a rather limited role in Japan's international trade.

■ The trade balance of foreign affiliates in the manufacturing sector was in deficit until 1998, but has since recorded a surplus.

■ In 2007, more than 80% of the intra-firm exports of foreign affiliates in the manufacturing sector were destined to the United States, which was also the origin of 60% of their imports. Among US affiliates in Japan, more than 80% of exports were destined to their parent group abroad, while the share of European affiliates' exports to their parent group was less than 10% and their imports were more than 18%. The main countries involved were Germany and Switzerland.

■ The sectoral distribution of intra-firm trade of foreign affiliates shows that the electrical machinery industry represented 76% of exports in 2007. In the case of imports, electrical machinery and basic metals played an important role.

Sources

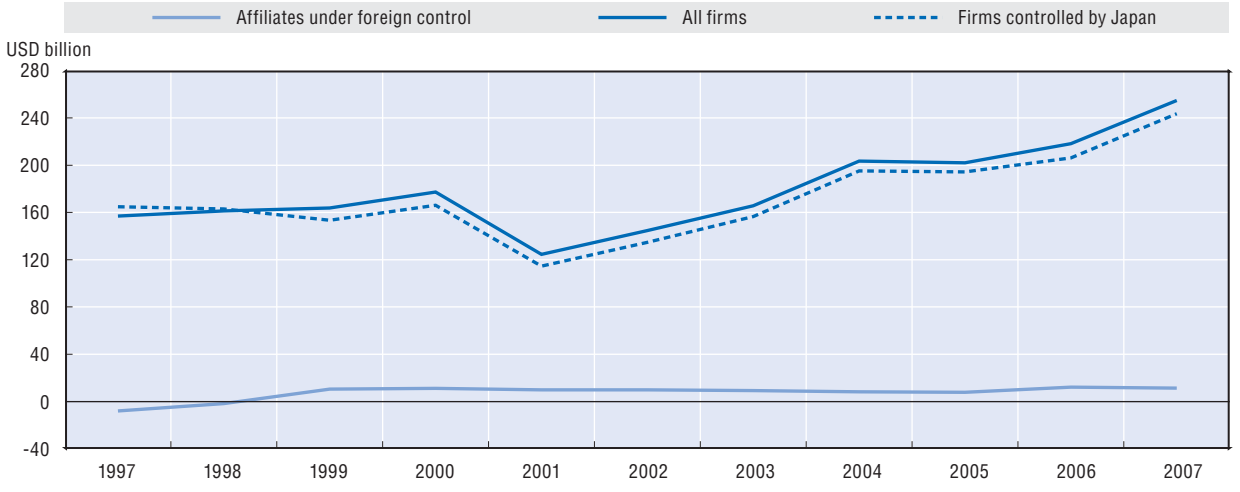
- OECD, *AFA Database* and *Bilateral Trade Database*, January 2010.

For further reading

- OECD (1994), *The Performance of Foreign Affiliates in OECD Countries*, OECD, Paris.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

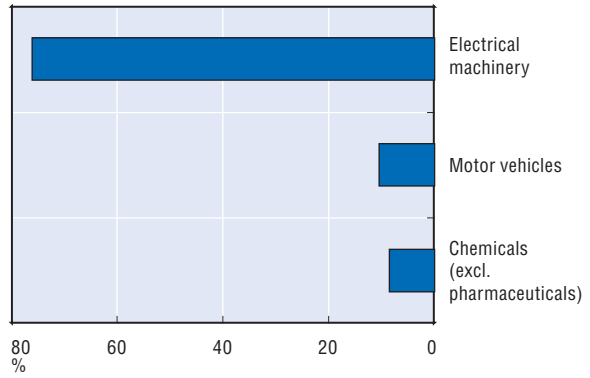
J.8. Intra-firm trade and impact on the trade balance: Japan manufacturing sector

Figure J.8.1. **Trade balance of the Japanese manufacturing sector**



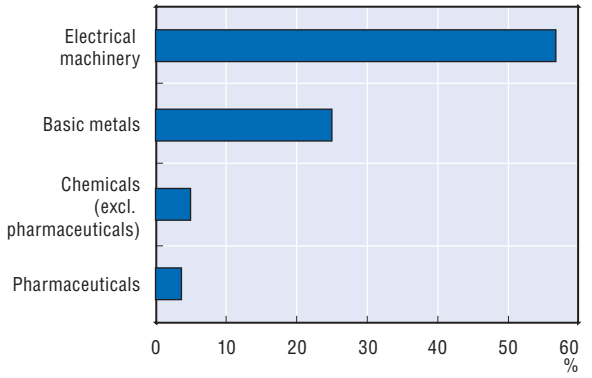
StatLink http://dx.doi.org/10.1787/845122065082

Figure J.8.2. **Intra-firm exports of affiliates under foreign control in Japan by industry, 2007**



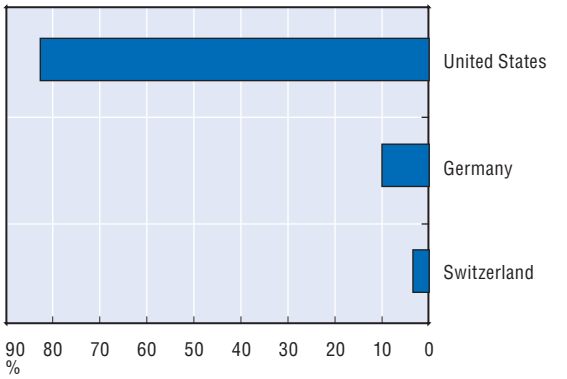
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Figure J.8.3. **Intra-firm imports of affiliates under foreign control in Japan by industry, 2007**



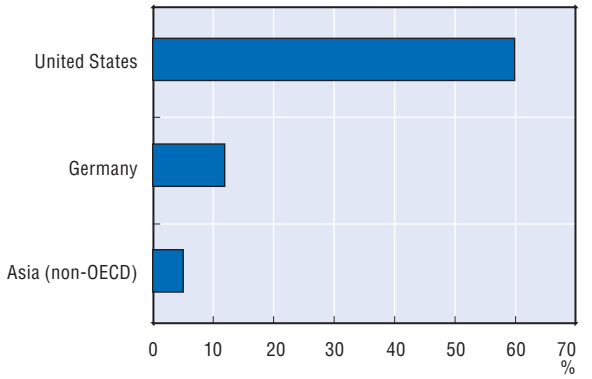
StatLink http://dx.doi.org/10.1787/845218082764

Figure J.8.4. **Intra-firm exports of affiliates under foreign control in Japan by country of origin in the manufacturing sector, 2007**



StatLink http://dx.doi.org/10.1787/845228705432

Figure J.8.5. **Intra-firm imports of affiliates under foreign control in Japan by country of origin in the manufacturing sector, 2007**



StatLink http://dx.doi.org/10.1787/845238446444

K. MULTINATIONAL ENTERPRISES AND R&D

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K.1. Inward investments in R&D

■ Between 1997 and 2007, research and development (R&D) investments by foreign affiliates in the OECD area increased in value by USD 53 billion in purchasing power parity (PPP). Increases were observed in all major countries: the United States attracted USD 22.6 billion, Germany USD 8.9 billion, the United Kingdom USD 3.7 billion, Japan USD 5.1 billion, France USD 2.3 billion and Canada USD 1.9 billion.

■ Countries' relative shares in aggregate R&D expenditure by foreign affiliates have significantly changed in the OECD area. Germany and Japan increased their share at the expense of the United States, the United Kingdom, France and Canada.

■ Despite the relative decline in the US share, the United States continued to attract almost 45% of the area's foreign R&D investment in 2007.

■ The growth of foreign R&D investment in Japan was attributable essentially to the motor vehicle industry and stemmed mainly from the alliance between Renault and Nissan.

■ Except in Canada, increases in R&D investments by foreign affiliates were larger than the increases recorded by firms under national control.

■ However, in order to assess the real trend in foreign affiliates' contribution to the aggregate R&D effort of a country's business sector, it is necessary to distinguish between new R&D outlays of foreign affiliates and the spending by laboratories of national firms that have become foreign-controlled. However the data available do not allow for such a distinction.

Source

- OECD, *AFA Database* and OECD estimates, January 2010.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.
- OECD (2008), *Recent Trends in the Internationalisation of R&D in the Enterprise Sector*, OECD, Paris.
- OECD (2008), *The Internationalisation of Business R&D: Evidence, Impacts and Implications*, OECD, Paris.

Defining R&D expenditure

R&D expenditure covers all expenditures for activities undertaken for the purpose of discovering or developing new products (goods and services), including improved versions of existing products, or discovering or developing new or more efficient production processes. Here, these expenditures relate exclusively to the enterprise sector, in which are included "all firms, organisations and institutions whose primary activity is the market production of goods and services for sale to the general public at an economically significant price…" (*Frascati Manual*, § 163).

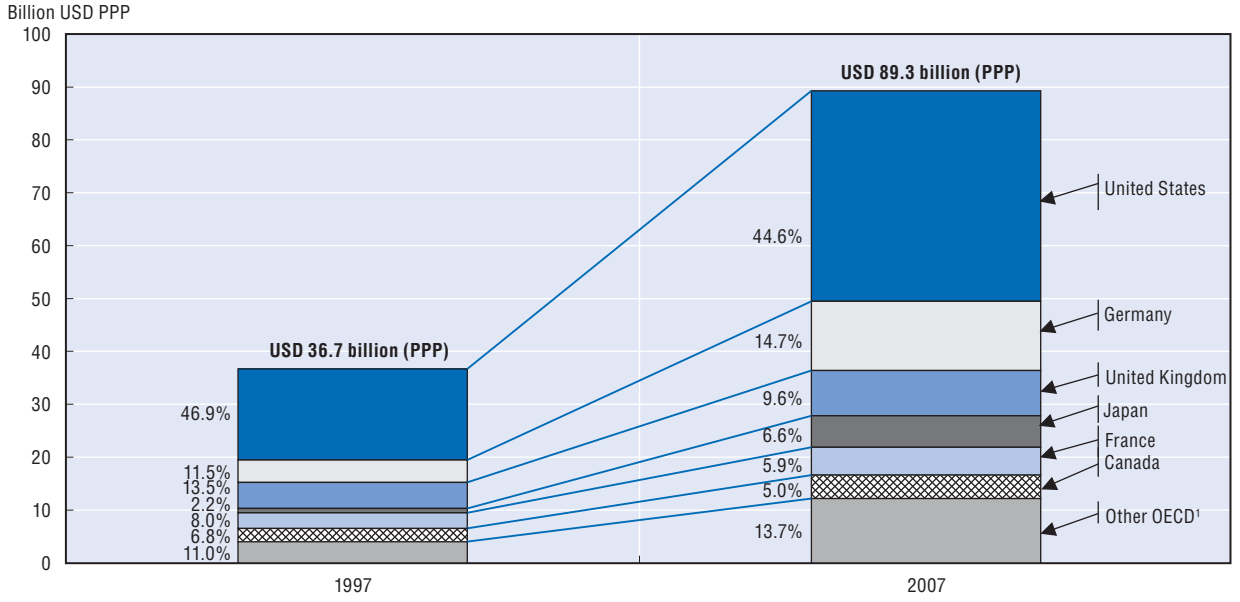
R&D expenditure comprises current costs and capital expenditure. Current costs are composed of labour costs, which are the largest component of current costs, and other current costs, which comprise non-capital purchases of materials, supplies and equipment to support R&D in a given year. Capital expenditure is the annual gross expenditure on fixed assets used in R&D programmes. It should be reported in full for the period when it took place and should not be registered as an element of depreciation (*Frascati Manual*, § 359, 360, 374). Capital expenditure is composed of expenditure on:

- land and building;
- investment and equipment;
- computer software.

The role of R&D in the activity of multinationals (parent companies and their affiliates), the main reference indicators and a description of all the associated variables are presented in OECD (2005), Chapter 4, "Internationalisation of Technology".

K.1. Inward investments in R&D

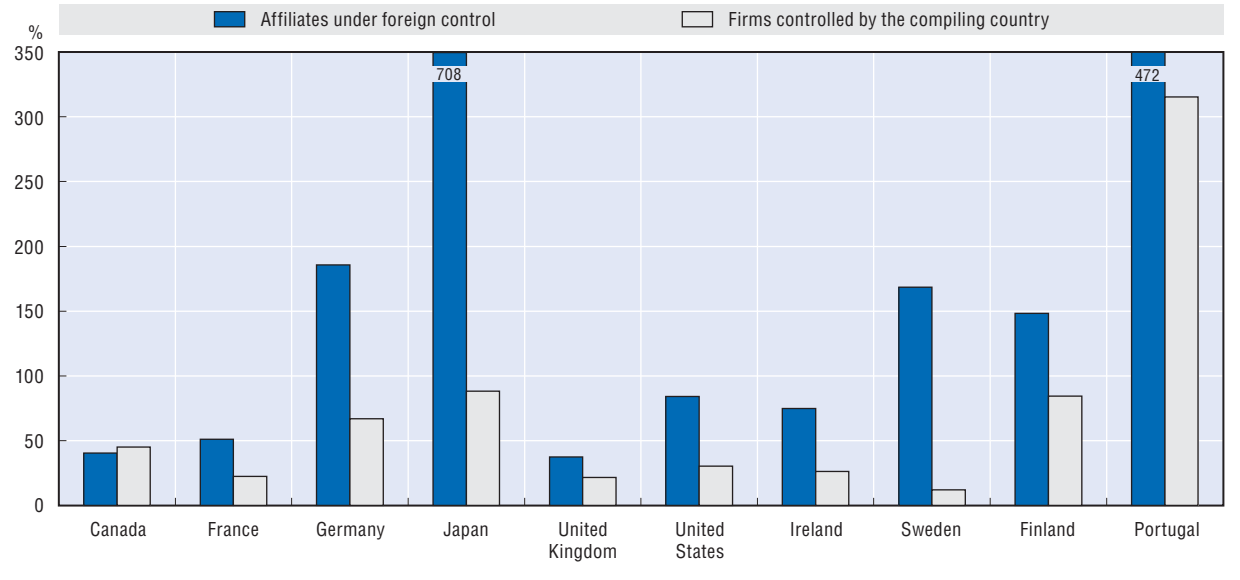
Figure K.1.1. **Trends in the share of R&D expenditure under foreign control Selected OECD countries between 1997 and 2007**



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Figure K.1.2. **Growth of R&D expenditure of affiliates under foreign control and firms under domestic control Selected OECD countries between 1997 and 2007**[2]

In constant PPP dollars (2000)



StatLink http://dx.doi.org/10.1787/845247086625

1. Consists of the Czech Republic, Finland, Hungary, Ireland, the Netherlands, Poland, Spain and Sweden.
2. Finland: 1997-2006; Portugal: 1999-2007.

K.2. Inward activity: importance of foreign affiliates in host countries' R&D

The importance of foreign affiliates in national research and development (R&D) investments differs considerably across countries. In 2007, the share of foreign affiliates in business-sector R&D expenditure ranged from 5% in Japan to over 70% in Ireland. In Hungary, Belgium, the Czech Republic and Austria, which have many foreign multinationals, foreign affiliates were responsible for over half of the R&D investments.

In other countries, the contribution of foreign affiliates was more limited. This is due first to the lesser importance of foreign affiliates in such countries, but the presence of strong "indigenous" multinationals (as in Sweden) also helps explain this, since R&D activities are still often located close to the company headquarters.

In the majority of countries, foreign affiliates are characterised by higher R&D intensities than firms under national control, *i.e.* foreign affiliates devote a larger share of their turnover to R&D. This is because the activity of foreign affiliates in higher-technology industries is typically directly related to their proprietary knowledge. Often, foreign affiliates are concentrated in a few higher-technology sectors (*e.g.* motor vehicles in Japan and Sweden, chemicals and aerospace in France). These sectors have considerably increased their R&D spending, in contrast to firms under national control, which operate in all sectors of activity.

While differences in R&D intensities between foreign affiliates and firms under national control are considerable in some countries, they are much more limited in others.

Source

- OECD, *AFA Database* and OECD estimates, January 2010.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.
- OECD (2008), *Recent Trends in the Internationalisation of R&D in the Enterprise Sector*, OECD, Paris.
- OECD (2008), *The Internationalisation of Business R&D: Evidence, Impacts and Implications*, OECD, Paris.

Measuring the R&D intensity of foreign affiliates

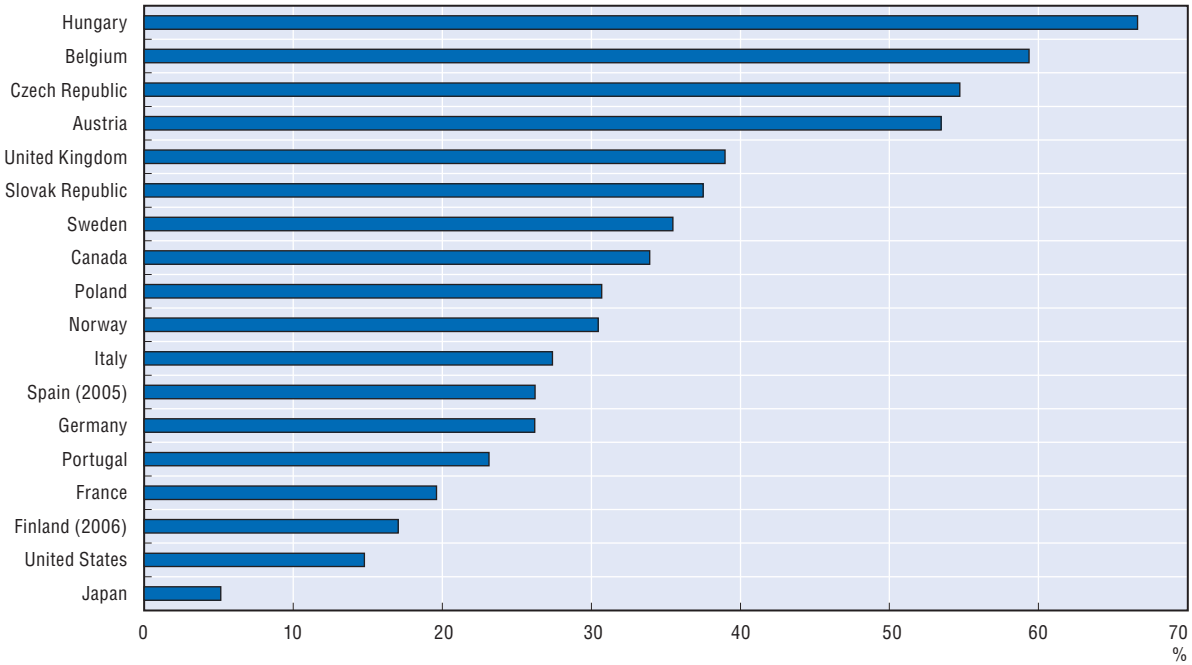
In order to assess the R&D effort of foreign affiliates as compared with that of firms under national control, or to make comparisons between countries, so-called "R&D intensities" are generally calculated. These correspond to the following ratios:

- R&D expenditure of foreign affiliates/Turnover of those affiliates;
- R&D expenditure of foreign affiliates/Value added of those affiliates;
- Number of researchers at foreign affiliates/Total staff of those affiliates;
- R&D staff at foreign affiliates/Total staff of those affiliates.

In most cases, the first ratio, which uses turnover, is used as turnover is available for more countries than the other variables. However, all ratios that measure R&D intensities have the same limitations as the ratio that is widely used on the national level, which corresponds to a country's R&D expenditures as a percentage of its GDP. Among the main limitations is the fact that, in a majority of cases, data for the numerators of these fractions correspond only to firms that perform R&D, whereas the denominators encompass all firms. Consequently, these ratios are fairly sensitive to the structure of a country's industry (*e.g.* presence of a large number of multinationals or of SMEs, establishment of affiliates in a limited number of innovative sectors and high sectoral dispersion of the R&D of national firms, greater or lesser offshoring of production with no equivalent offshoring of R&D centres, etc.).

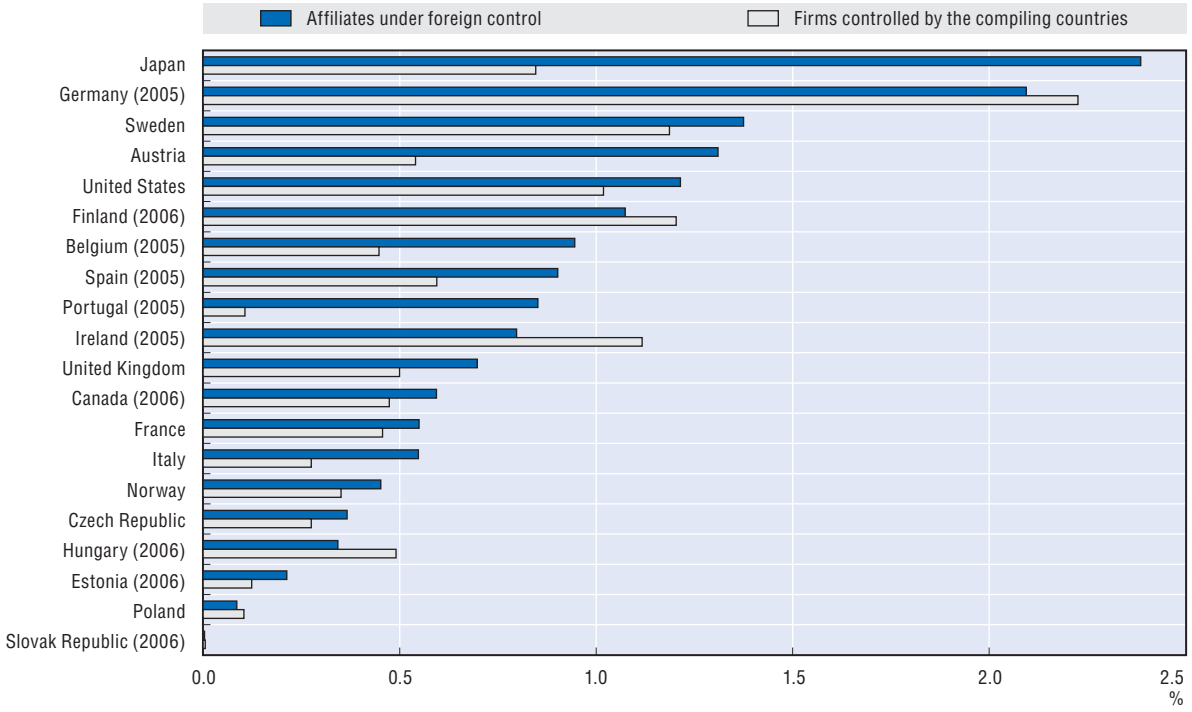
K.2. Inward activity: importance of foreign affiliates in host countries' R&D

Figure K.2.1. **The share of foreign-controlled affiliates in total business sector R&D expenditure, 2007**



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Figure K.2.2. **R&D intensities[1] of foreign affiliates and national firms in the business sector,[2] 2007**



1. R&D intensity = R&D expenditures as a percentage of turnover.
2. Manufacturing sector only for Germany, Hungary, Ireland, Portugal, Spain and the Slovak Republic.

StatLink http://dx.doi.org/10.1787/845367713136

K.3. Inward activity: importance of foreign affiliates in host countries' researchers

■ The share of foreign-controlled affiliates in the total number of manufacturing-sector researchers tends to be slightly smaller than the corresponding ratio for research and development (R&D) expenditures. Information on the number of researchers working for foreign affiliates in the services sector has not so far been available.

■ In Austria, the Slovak Republic, the Czech Republic, Portugal and Hungary, more than half of all researchers worked for foreign-controlled affiliates. In Sweden and Estonia, researchers at foreign affiliates accounted for over 40% of all researchers in the manufacturing industry.

■ The number of researchers per thousand employees in 2007 was significantly higher in foreign affiliates in the manufacturing sector than in firms under national control in all countries except Finland, France, Estonia and Poland. In Finland, this outcome is compatible with the R&D intensity of foreign affiliates, which is lower than that of national firms. In Poland, both foreign affiliates and national firms devote only a small percentage of their turnover to R&D.

■ In Germany, the number of R&D staff (and not just researchers) per thousand employees is twice as large in foreign affiliates as in national firms. In the United States, this comparison is more difficult to make insofar as data on foreign affiliates cover all R&D staff, whereas the figures for national firms cover researchers alone.

Source

- OECD, *AFA Database*, January 2010.

For further reading

- OECD (2002), *Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development*, OECD, Paris, *www.oecd.org/sti/frascatimanual*.
- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.

Number of researchers

According to *Frascati Manual* definitions, "researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned" (*Frascati Manual*, 2002 edition, § 301). "Managers and administrators engaged in the planning and management of the scientific and technical aspects of a researcher's work also fall into this category" (§ 303). "Postgraduate students at the PhD level engaged in R&D should be considered as researchers" (§ 305). "As for the other categories of data on the number of persons in employment, the number of researchers should be calculated in 'full-time equivalents'".

Other R&D personnel

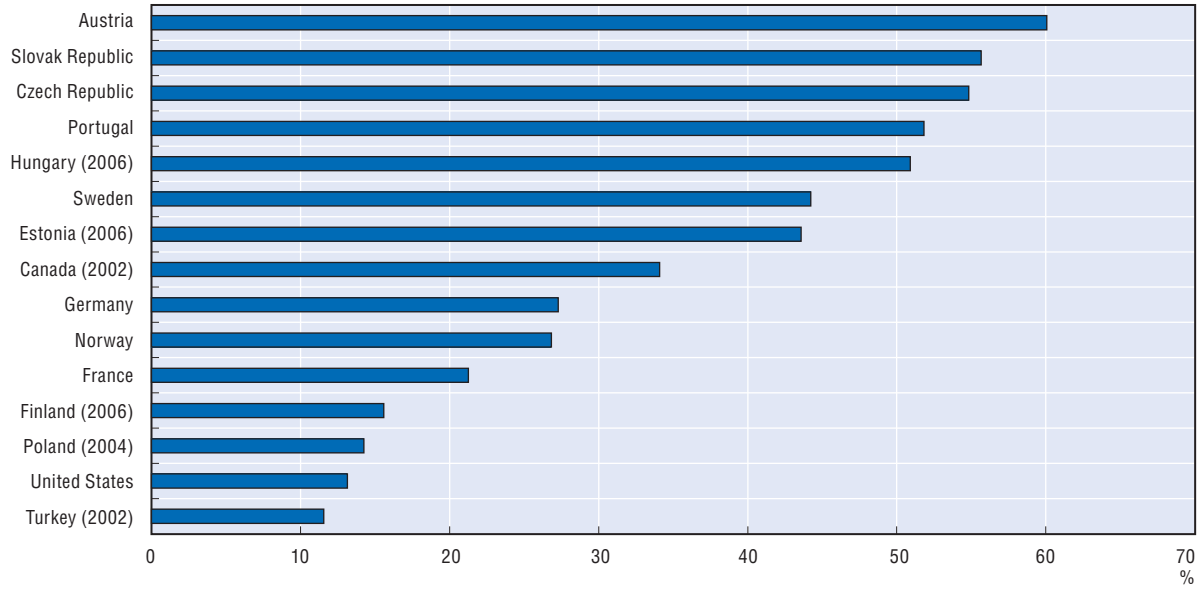
The other categories of R&D personnel according to the *Frascati Manual* are "Technicians and equivalent staff" and "Other supporting staff".

Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences or social sciences and humanities. They participate in R&D by performing scientific and technical tasks involving the application of concepts and operational methods, normally under the supervision of researchers. Equivalent staff performs the corresponding R&D tasks under the supervision of researchers in the social sciences and humanities.

Other supporting staff includes skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

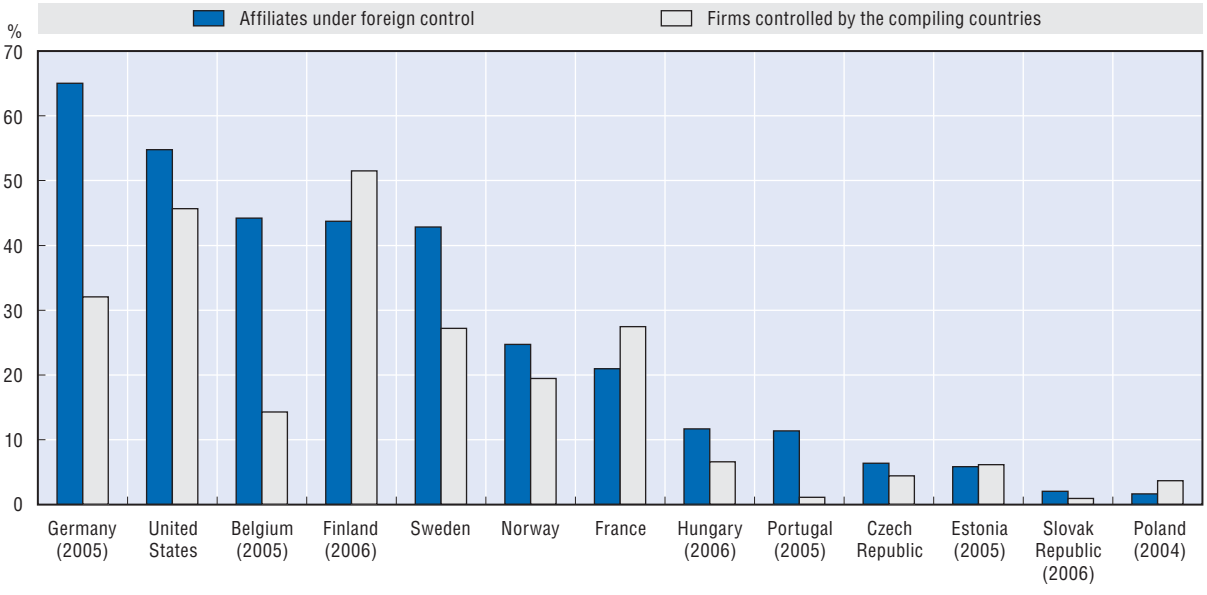
K.3. Inward activity: importance of foreign affiliates in host countries' researchers

Figure K.3.1. **Share of the number of researchers[1] in foreign-controlled affiliates in the manufacturing sector, 2007**



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Figure K.3.2. **Researchers[1] per thousand employees in foreign affiliates and national firms in the manufacturing sector, 2007**



StatLink http://dx.doi.org/10.1787/845431088033

1. United States, Germany, Hungary and Estonia: total R&D personnel rather than researchers.

K.4. Inward activity: sectoral dimension of R&D expenditure of foreign affiliates

The sectoral breakdown of the research and development (R&D) expenditure of foreign affiliates shows that in most countries the bulk of research is performed in the manufacturing sector. This is directly related to the fact that foreign affiliates are more active in manufacturing industries.

Even in countries where foreign affiliates' R&D in services is more substantial (Italy, Poland, Finland, Canada), it still accounted for only 30% to 40% of aggregate business-sector R&D. In Norway and Portugal, however, half of the R&D expenditure of foreign affiliates is performed in the services sector.

Foreign affiliates in the pharmaceutical industry seem to make the largest contribution to national R&D investments. Other sectors characterised by a high share of foreign affiliates are motor vehicles and the electronics and communication equipment sector. This last sector is one of those whose share in aggregate OECD-area R&D declined between 1997 and 2007, probably because some R&D activities moved outside the OECD area. The trend might be different if services relating to this sector, such as software creation, were included.

Source

- OECD, *AFA Database* and OECD estimates, January 2010.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.
- OECD (2008), *Recent Trends in the Internationalisation of R&D in the Enterprise Sector*, OECD, Paris.
- OECD (2008), *The Internationalisation of Business R&D: Evidence, Impacts and Implications*, OECD, Paris.

Measuring the internationalisation of a sector's R&D

The most relevant indicator for measuring the internationalisation of a sector's R&D would be the ratio of R&D performed abroad to aggregate R&D performed within the reference country.

The major stumbling block for compiling such an indicator is that data on R&D activity by affiliates abroad are not available. An alternative measure would be to compute the share of each sector's R&D that is under foreign control throughout the entire OECD area. The main drawback to that option is that it would limit the notion of internationalisation to the OECD area.

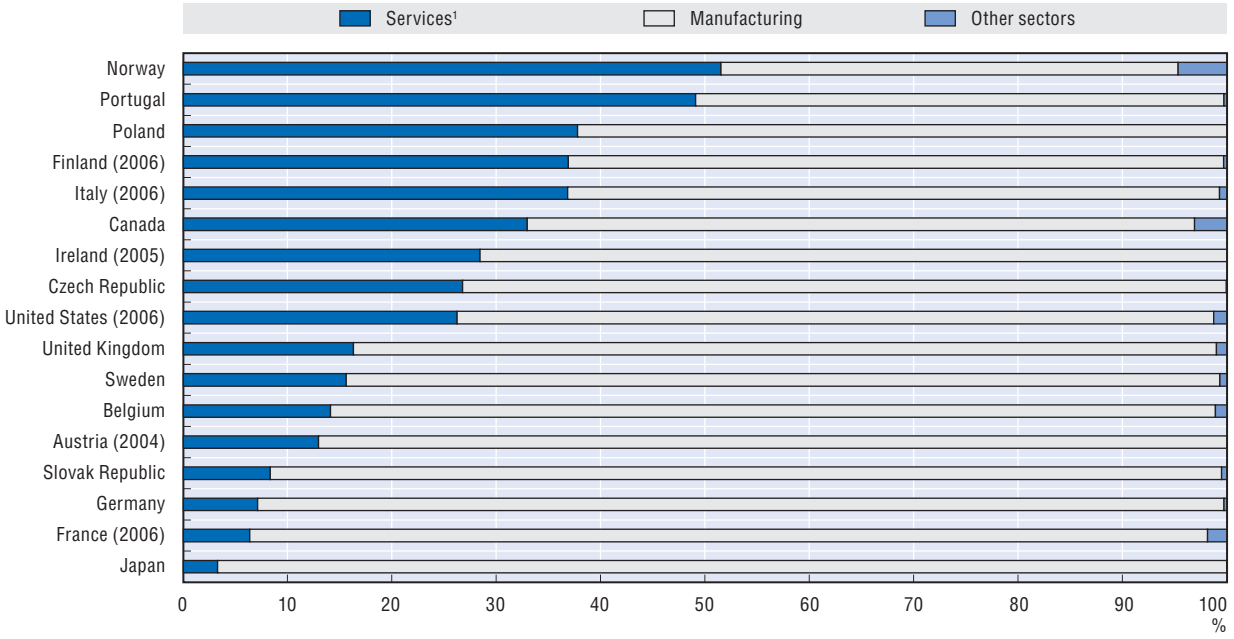
To better understand what is meant by the internationalisation of a sector's R&D, it is necessary to ascertain the extent of the geographic decentralisation of the R&D laboratories of multinational firms throughout the world and their geographic concentration. For a compiling country, decentralisation within the OECD area could be based on reporting by the host countries.

The choice of the exchange rate to be used to divide R&D expenditures among countries is another point that ought to be raised. Inasmuch as R&D expenditures consist essentially of salaries and the value of capital equipment, the major factor is their purchasing power. As these are not transactions involving repatriation of profits, the proper exchange rate should be based on purchasing power parities.

A distinction should also be made between research activity and the marketing of its results. This takes on even greater importance in reference to firms. For instance, Microsoft's R&D is split up between a small number of countries, while the company's products are among the most highly internationalised.

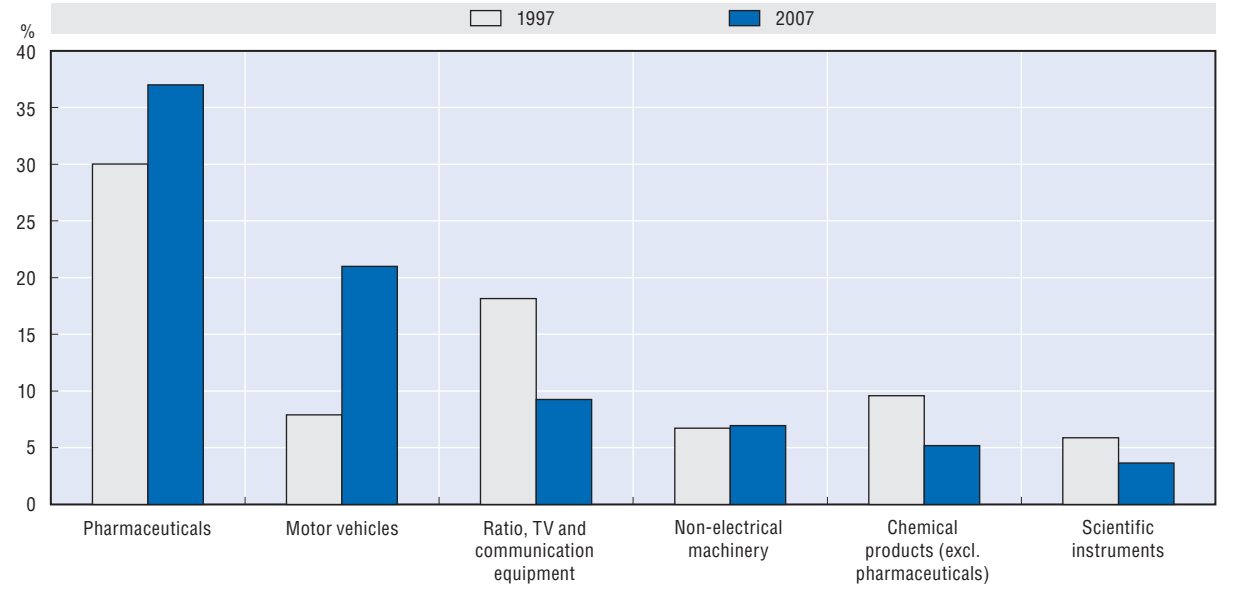
K.4. Inward activity: sectoral dimension of R&D expenditure of foreign affiliates

Figure K.4.1. **Sectoral distribution of R&D expenditures of foreign affiliates, 2007**



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Figure K.4.2. **Share of R&D under foreign control by main manufacturing sectors, total OECD[2]**



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1. Austria and Finland: Mining included.
2. Countries included: Canada, Czech Republic, Ireland, United States, France, Japan, Netherlands, Spain, Sweden and the United Kingdom. Canada and Netherlands: 2004 data, Ireland and Spain: 2005 data.

K.5. Inward activity: sectoral dimension of R&D expenditure of foreign affiliates (cont.)

■ A closer look at the sectoral dimension of research and development (R&D) investments by foreign affiliates shows a particularly high share of foreign affiliates in R&D investments in smaller host countries.

■ In pharmaceuticals, foreign affiliates were responsible for over 75% of national R&D investments in Sweden, Ireland, the Slovak Republic, the Czech Republic, Belgium and Austria. In larger countries, foreign affiliates' share is smaller and ranges between 20% and 30%.

■ In the motor vehicles sector, foreign affiliates account for almost all R&D investments in some smaller countries (Hungary, the Czech Republic, Ireland and Belgium). But because of the dominance of a small number of large auto assemblers, foreign affiliates in larger countries like Poland and the United Kingdom also account for a large share of R&D. Larger countries with national companies among these dominant car assembly companies have a much smaller share of R&D abroad, as their major R&D investments are still often located close to headquarters.

■ The foreign share of R&D seems somewhat smaller in the information and communication technology (ICT) industry. The presence of a large number of smaller firms (under national control) limits somewhat the importance of foreign affiliates. Data concern the ICT manufacturing industry only in some countries and need to be interpreted and compared with care.

Source

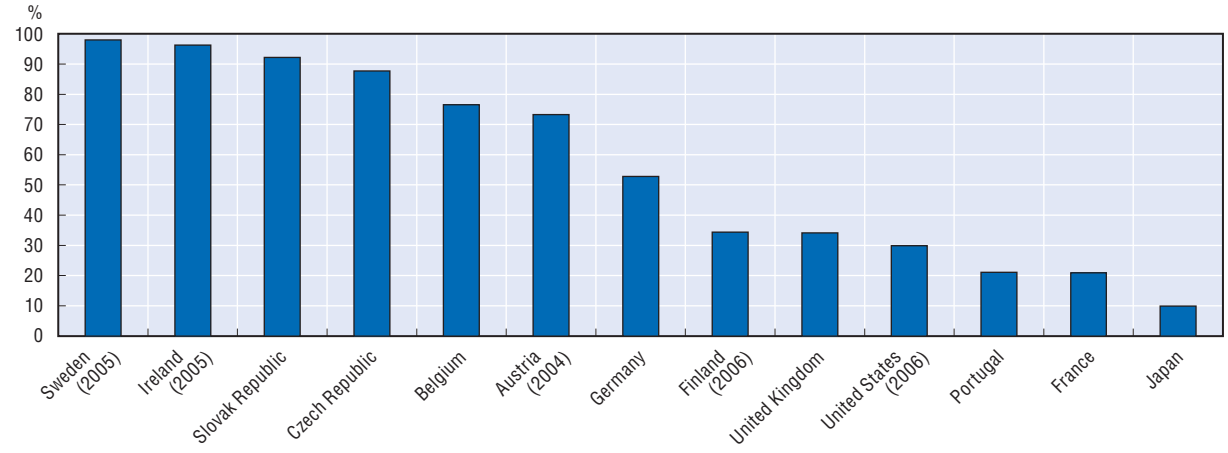
- OECD, *AFA Database* and OECD estimates, January 2010.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.
- OECD (2008), *Recent Trends in the Internationalisation of R&D in the Enterprise Sector*, OECD, Paris.
- OECD (2008), *The Internationalisation of Business R&D: Evidence, Impacts and Implications*, OECD, Paris.

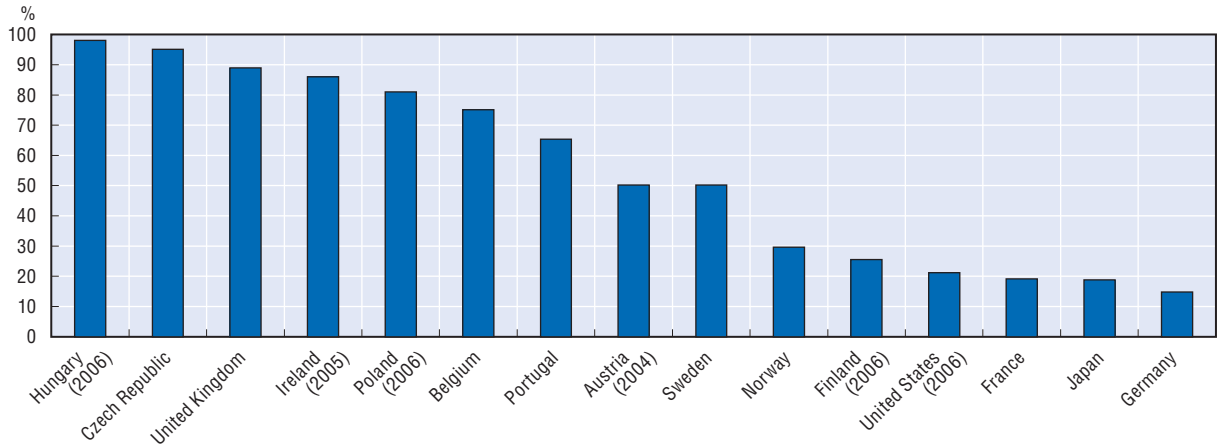
K.5. Inward activity: sectoral dimension of R&D expenditure of foreign affiliates (cont.)

Figure K.5.1. **Pharmaceuticals (ISIC 2423), 2007**



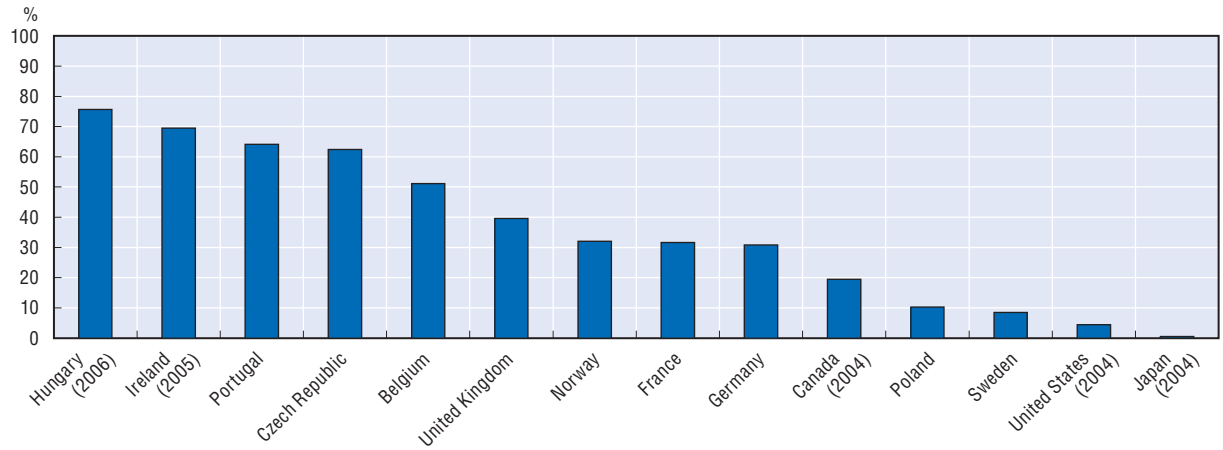
StatLink http://dx.doi.org/10.1787/845474323526

Figure K.5.2. **Motor vehicles (ISIC 34), 2007**



StatLink http://dx.doi.org/10.1787/845476674335

Figure K.5.3. **ICT[1] sector, 2007**



1. Manufacturing ICT only for Belgium, Germany, Hungary, Norway, Poland, Portugal and Sweden.

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K.6. Inward activity: geographical dimension of R&D expenditure by foreign affiliates

European investment in the United States in 2007 accounted for over three-quarters of aggregate foreign research and development (R&D) investment. The leading R&D investing country in the United States was the United Kingdom, with 26% of the R&D investment of foreign-controlled affiliates, followed by Switzerland (15%), Germany (14%), France (13%) and Japan (10%).

Between 1997 and 2007, the share of US-controlled affiliates in industrial R&D in the European Union declined from 75% to 71%. However, the United States continued to be the leading R&D investor in the major European countries, including the United Kingdom (50%), Sweden (38%), Germany (36%) and France (34%).

During the last decade, Japan has attracted a large number of R&D investments. The European Union's share in Japan nearly tripled between 1997 and 2006, essentially at the expense of the United States. To a great extent, however, this trend reflects the bolstering of foreign R&D as a result of the association between Renault and Nissan.

At the sectoral level, it can be seen that in the United States and the European Union, the largest share of foreign R&D investment was in pharmaceuticals, followed by the motor vehicle industry.

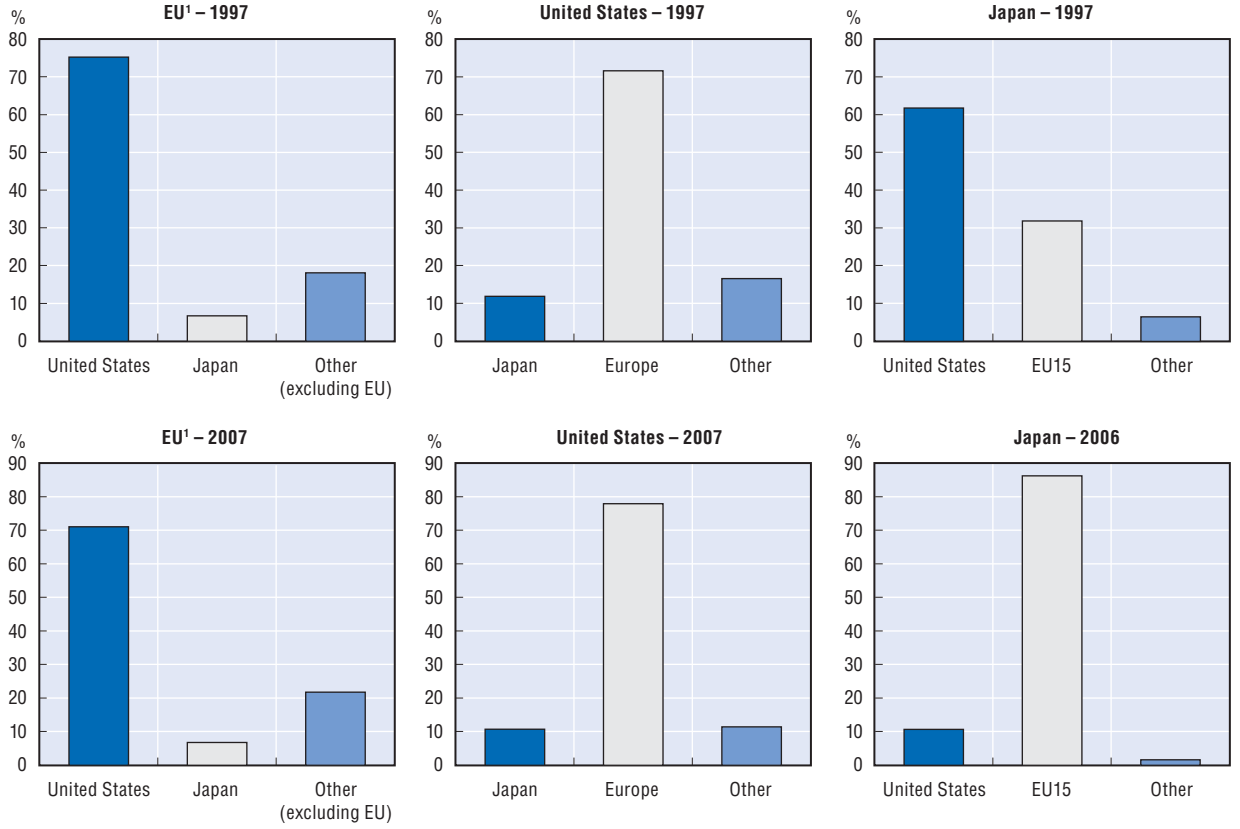
Source

- OECD, *AFA Database* and OECD estimates, January 2010.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.
- OECD (2008), *Recent Trends in the Internationalisation of R&D in the Enterprise Sector*, OECD, Paris.
- OECD (2008), *The Internationalisation of Business R&D: Evidence, Impacts and Implications*, OECD, Paris.

Figure K.6.1. **Geographic origin of R&D expenditure by foreign-controlled affiliates, 1997 and 2007**



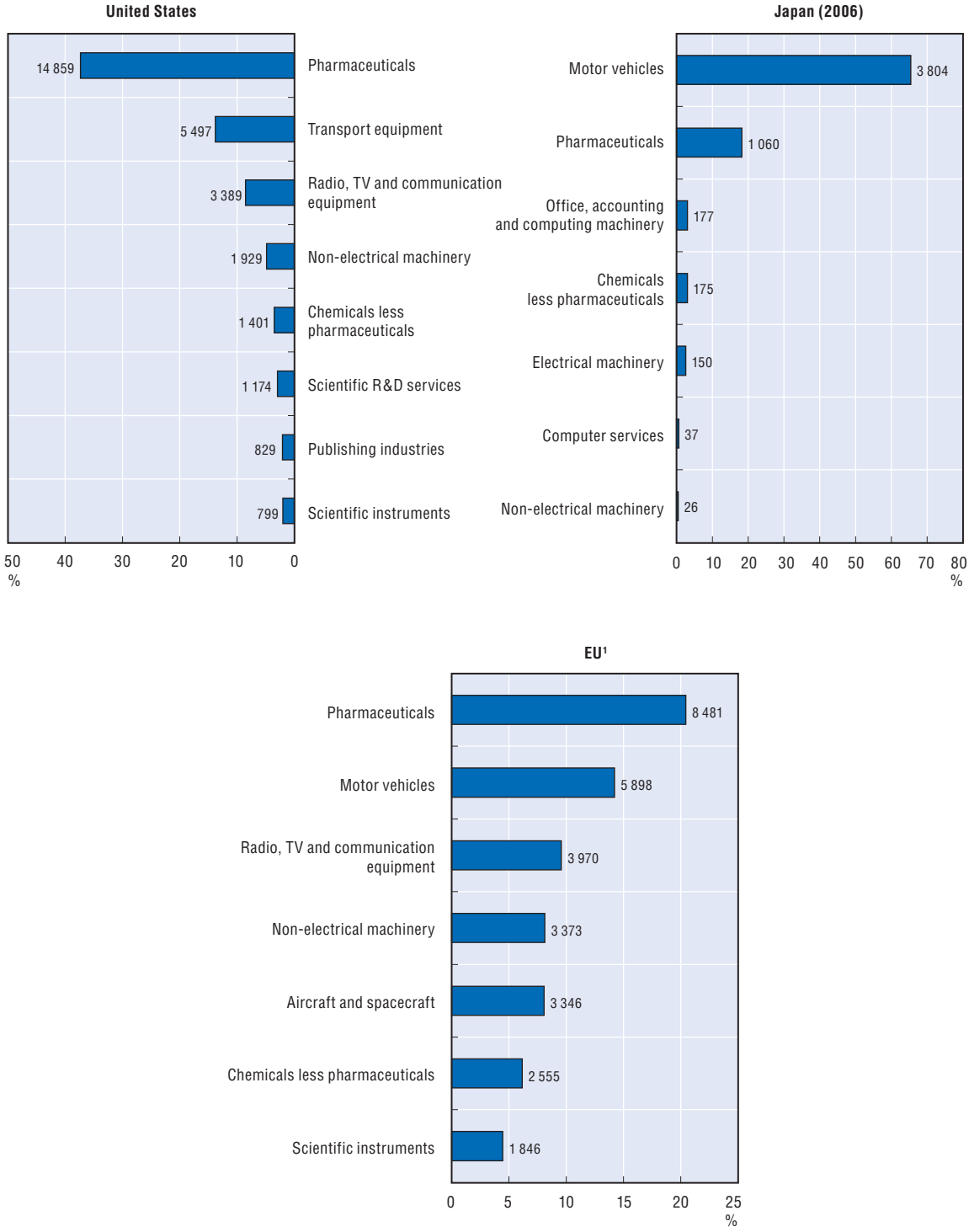
1. EU: Finland, France, Germany, the Netherlands, Portugal, Spain, Sweden and the United Kingdom. Data partially estimated.

StatLink http://dx.doi.org/10.1787/845525248547

K.6. Inward activity: geographical dimension of R&D expenditure by foreign affiliates

Figure K.6.2. **R&D expenditures of affiliates under foreign control by main industrial sectors, 2007**

Million PPP USD and percentages of total



1. Austria, Belgium, France, Germany, Ireland, Netherlands, Spain, Sweden and the United Kingdom. Data partially estimated.

StatLink http://dx.doi.org/10.1787/845534651225

K.7. Outward activity: R&D by affiliates abroad

Comparing the research and development (R&D) investments of a country's affiliates abroad with those of foreign-controlled affiliates in that country gives a first, albeit incomplete, picture of R&D flows across countries. The contribution of multinational enterprises' affiliates to R&D investments in home and host countries is very complex and cannot be grasped in simple comparisons.

For countries for which information is available, and with the exception of Sweden and Belgium, foreign-controlled affiliates spent more on R&D than the host countries' affiliates spent abroad. In the United States, given the method for measuring activities that are controlled indirectly (see box), it is likely that the R&D expenditure of US affiliates abroad and that of foreign-controlled affiliates in the United States were more evenly balanced than the statistics indicate.

The United States is still the top destination country for R&D investments, although Japanese R&D investments in the United States have declined recently. In 2007, Germany invested USD 5.6 billion in R&D in the United States, and the United States invested the same amount in Germany. The United Kingdom invested USD 10.4 billion in R&D in the United States, and France invested USD 5.3 billion.

The main trends in the geographic breakdown of outward R&D investment by the United States are the decline of the European Union as a destination and the rising share of the Asia-Pacific region and of China in particular. Despite its relative decline, Europe still attracts over 60% of the R&D investment of US multinationals.

US R&D investment in China recorded sharp growth (of over 60% a year) between 1997 and 2007 but is still relatively modest in absolute value. It reached USD 1.1 billion in 2007, roughly the same amount as it invested in R&D in Belgium or in Ireland.

Source

- OECD, *AFA Database* and OECD estimates, January 2010.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris, *www.oecd.org/sti/measuring-globalisation*.
- OECD (2008), *Recent Trends in the Internationalisation of R&D in the Enterprise Sector*, OECD, Paris.
- OECD (2008), *The Internationalisation of Business R&D: Evidence, Impacts and Implications*, OECD, Paris.

Defining the R&D expenditure of offshore affiliates of parent companies in a compiling country

A compiling country's offshore affiliates comprise the foreign-based affiliates of all of that country's parent companies. The activities of those affiliates, including their research and development, should be broken down by sector and by country of location, according to the recommendations of OECD (2005). For these affiliates' activities abroad, the *Handbook* stipulates that all affiliates controlled either directly or indirectly by parent companies in the compiling country should be included.

A parent company may exercise indirect control over an affiliate without holding a majority interest in the affiliate's equity. For the US data, however, a different principle is adopted for all variables, including those involving R&D: in contrast to the other OECD countries, the United States includes an indirectly controlled firm only if the parent company or company wielding ultimate control has a direct majority stake in the affiliate's equity. From this standpoint, it may be concluded that the activities of American affiliates abroad are underestimated as compared with those of other countries.

Moreover, to calculate the activity of offshore affiliates for a set of countries belonging to a given area such as the European Union or the OECD, and to avoid double counting, the only activity that should be included is that of affiliates controlled directly by parent companies in the compiling country (OECD, 2005, Chapter 3, §§ 390-391).

Measuring a country's outward R&D investment

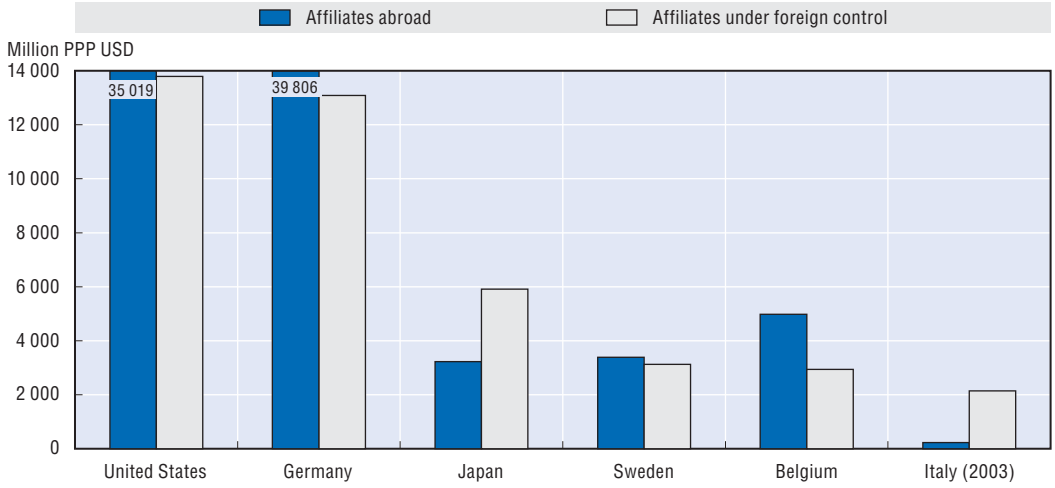
Measuring a country's outward R&D investment raises a number of difficulties. The most important of these stems from the fact that a great many countries lack surveys on the activities of their own affiliates abroad, in particular as regards R&D.

Identifying the countries in which multinationals establish research laboratories entails making estimates on the basis of figures reported by host countries. Such reporting has two limitations: first, it cannot be used for non-OECD countries, since such countries are not compiling countries in OECD surveys; and second, there may be a lack of symmetry between the figures reported by investing countries and host countries. Data reconstitution assumes that asymmetries, if any, are small.

At present, the countries that compile data on the R&D activity of their affiliates abroad, broken down by destination country, are the United States, Japan, Sweden, Italy and Belgium.

K.7. Outward activity: R&D by affiliates abroad

Figure K.7.1. **R&D expenditures by foreign-controlled affiliates and by affiliates abroad of the compiling country, 2007**



StatLink http://dx.doi.org/10.1787/845535882563

Table K.7.1. **R&D expenditure of affiliates abroad by country of destination, 2007**

Billions of current USD PPP

		Country of origin				
		United States	Japan	Germany	France	United Kingdom
Country of destination	United States	–	1 627	5 638	5 377	10 469
	Japan	4 252	–	336	3 383	159
	Germany	5 638	185	–	1 549	1 711
	France	5 377	61	869	–	354
	United Kingdom	10 469	249	528	1 037	–
	Italy	359	45	275	202	225
	Belgium	291	108	168	410	483
	Finland	333	21	28	9	65
	Norway	–	–	27	33	39
	Sweden	314	34	119	60	949

StatLink http://dx.doi.org/10.1787/845551323303



PART V

Global Value Chains as a New Form of Globalisation

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L. GLOBAL VALUE CHAINS

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L.1. Production depth and export share of production

The globalisation of value chains is central to today's globalisation process. It is linked to the growth of global production networks in which multinational companies play an important role and has resulted in the physical fragmentation of production with an optimal location of the various stages. It has thus given rise to significant firm restructuring to include outsourcing and offshoring.

Some aggregate measures clearly show the increasing importance of global value chains. First, there is a general trend towards a decline in "production depth" in most OECD countries. The decreasing share of value added in production reflects greater use of intermediate inputs in the production process. It may be due to domestic or international outsourcing.

Second, manufacturing exports and imports of individual countries are increasingly moving together and are growing much faster than production, a sign that trade interactions between countries are growing rapidly. As a result of growing vertical integration and international production sharing, (parts of) products are manufactured in one country and then exported to (imported by) other countries as inputs in the next production steps. Very high growth in exports and imports were recorded between 1980 and 2008, especially in smaller countries with a significant presence of multinational companies. The high export-to-production ratios of Belgium, Luxembourg and the Netherlands may be biased to some extent by re-exports.

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 as intra-industry trade (see next section).

Source

- *OECD STAN Indicators Database*, January 2010.

Exports, value added and production: production depth and export share of production

Production depth relates to one important aspect of the production structure in a national economy. The indicator reflects the share of national production that is created in the country itself. The indicator is calculated as the value added share of production:

(Value added/Production) × 100.

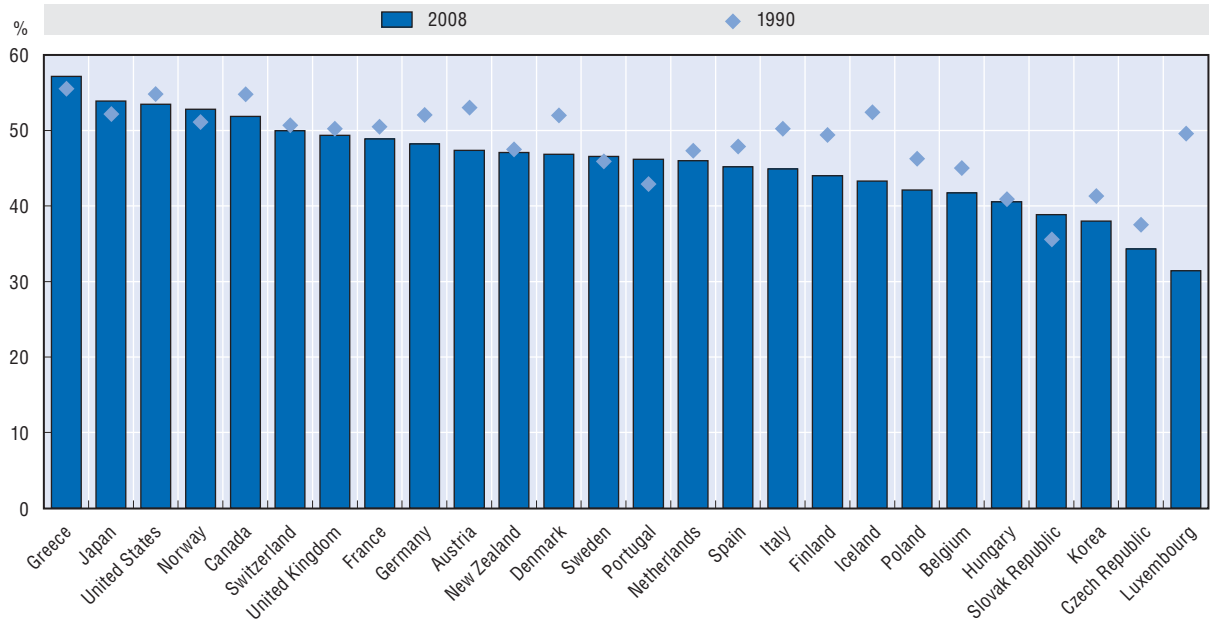
The export share of production reflects the export effort of an economy and is calculated as:

(Exports/Production) × 100.

With exports relating to the exports of goods and production relating to the manufacturing industry.

L.1. Production depth and export share of production

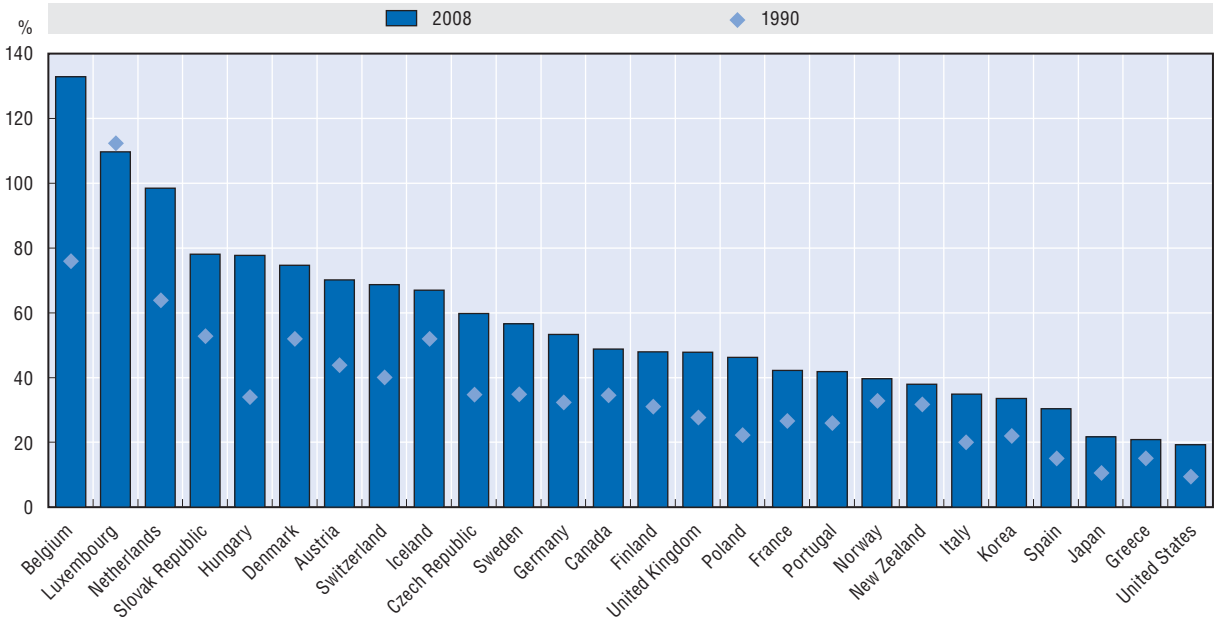
Figure L.1.1. **Value added as a percentage of production, 1990[1] and 2008[2]**



1. 1991 for Hungary, 1993 for the Czech Republic and the Slovak Republic, 1994 for Poland, 1995 for Belgium and Greece.
2. 2007 for Greece, Hungary, Iceland, Korea, Luxembourg, Switzerland and the United States, 2006 for Japan, Portugal, Spain, Sweden and the United Kingdom, 2005 for Canada and 2004 for New Zealand.

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Figure L.1.2. **Exports of goods as a percentage of manufacturing production, 1990[1] and 2008[2]**



StatLink http://dx.doi.org/10.1787/845654410688

1. 1992 for Hungary, 1993 for the Czech Republic, 1994 for Korea and Poland, 1997 for the Slovak Republic and 1999 for Luxembourg.
2. 2007 for Greece, Hungary, Iceland, Luxembourg, Spain, Switzerland and the United States, 2006 for Japan, Portugal, Sweden and the United Kingdom, 2005 for Canada and 2004 for New Zealand.

L.2. Intra-industry trade

■ Simultaneous exports and imports within the same industry are generally labelled as intra-industry trade. They typically occur among rich countries with a similar economic structure and level of development that are geographically close. Intra-industry trade often accompanies foreign direct investment, as multinational companies locate affiliates in different countries and trade goods and services between the affiliates and the parent company.

■ From 1997 to 2008, the average index of intra-industry trade in manufactures was relatively high (over 70%) in many OECD countries, as well as in Estonia and in Slovenia. Since 2001, growth in intra-industry trade in manufactures has been strong in Iceland, Turkey, Poland, Portugal, Finland and the Slovak Republic. In several other OECD countries, intra-industry trade in manufacturing remains fairly vibrant but has not increased significantly over the past five years.

■ The relatively high growth rates of India and Indonesia (3.2% and 2.4%, respectively) confirm their increasing production and trade of intermediate goods. China's economy is well integrated and its intra-industry trade in manufactures has grown at the rate of 0.4% on average, over the seven past years.

■ In some Central and Eastern European countries, the high level and fast growth of intra-industry trade in manufactures likely stems from the large volume of direct investment, notably from Germany.

Source

- *OECD STAN Indicators database*, January 2010.

For further reading

- OECD (2005), *Measuring Globalisation: OECD Handbook on Economic Globalisation Indicators*, OECD, Paris.

The measurement of intra-industry trade

Intra-industry trade flows are conventionally defined as the two-way exchange of goods within standard industrial classifications. The extent of intra-industry trade is commonly measured by Grubel-Lloyd indexes based on commodity group transactions. Thus, for any particular product class i, an index of the extent of intra-industry trade in the product class *i* between countries A and B is given by the following ratio:

$$IIT_{i.AB} = \left(\frac{(X_i + M_i) - |X_i - M_i|}{(X_i + M_i)} \right) \bullet 100 \qquad [1]$$

This index takes the minimum value of zero when there are no products in the same class that are both imported and exported, and the maximum value of 100 when all trade is intra-industry (in this case X_i is equal to M_i). Bilateral indices of intra-industry trade in the product class *i* between country A and all its trading partners are obtained as a weighted average of the bilateral indices [1] for each partner country B, using as weights the share of total trade of A accounted for by trade with B. Bilateral indices of intra-industry trade between country A and country B for total manufacturing are the weighted average of the indexes in [1] for all product classes i, with weights given by the share of total trade of *i* over total manufacturing trade:

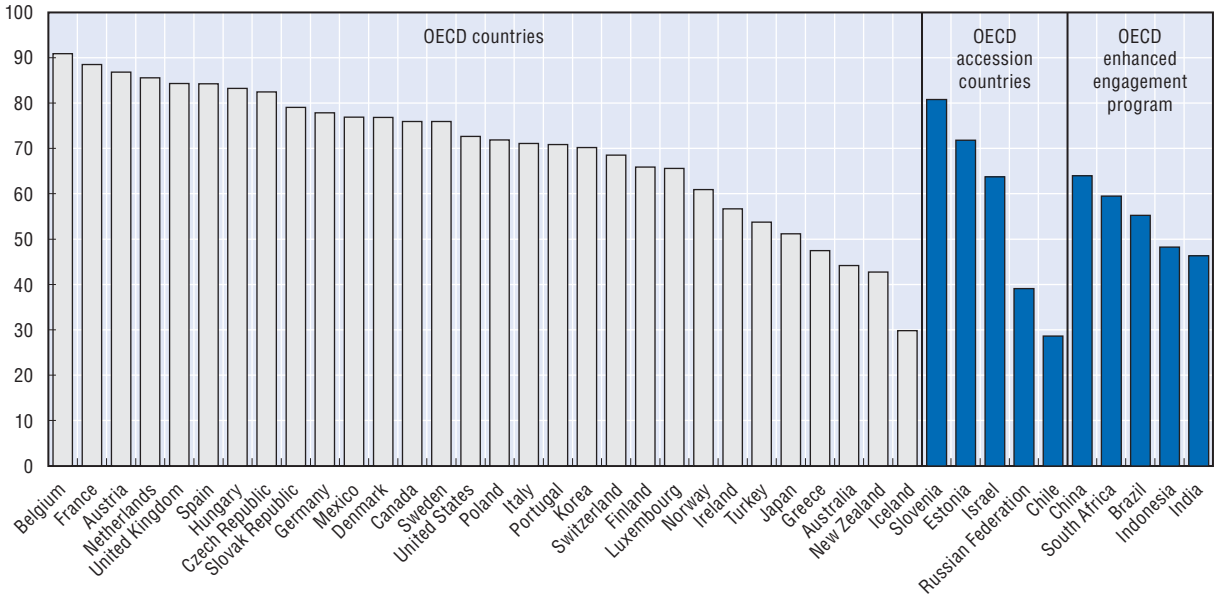
$$IIT_{AB} = \sum_i \left(\frac{(X_i + M_i) - |X_i - M_i|}{(X_i + M_i)} \right) \bullet \left(\frac{(X_i + M_i)}{\sum_i (X_i + M_i)} \right) \bullet 100 \qquad [2]$$

A degree of caution must be used when comparing and interpreting intra-industry indices because their measurement crucially depends on the level of disaggregation chosen for the analysis. In assessing the importance of the division of the production process across countries, it should be recognised that, as well as measuring trade in intermediate goods at various stages of production, much intra-industry trade is trade in similar, but often highly differentiated, finished products.

The limitations of the intra-industry trade indicators are presented in OECD (2005), Chapter 5, Section 5.3.5.

L.2. Intra-industry trade

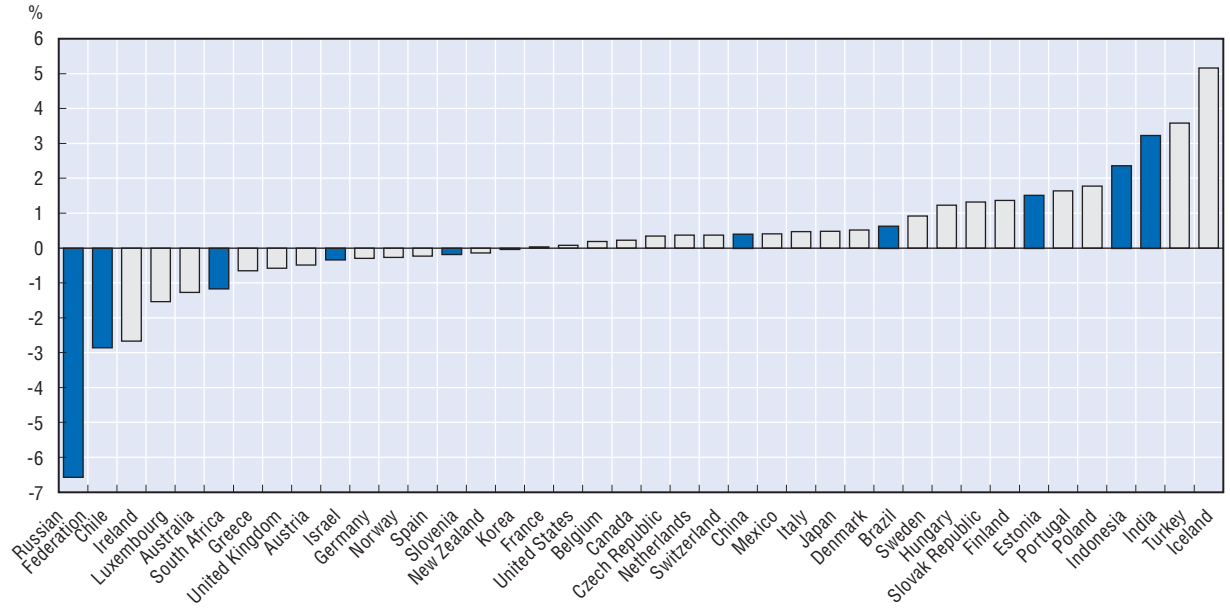
Figure L.2.1. **Index of intra-industry trade in manufactures, average 1997-2008**[1]



1. 2000-08 for South Africa.

StatLink http://dx.doi.org/10.1787/845820714132

Figure L.2.2. **Index of intra-industry trade in manufactures, average annual change 2001-08**



StatLink http://dx.doi.org/10.1787/845862481526

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

L.3. Trade in intermediate goods

Due to the increasing importance of international production sharing and global value chains, trade in intermediate inputs has been steadily growing. Previous research has shown that multinational companies are more dependent on international sourcing than "domestic" firms. Intra-firm trade among affiliates and the parent company within the multinational network has resulted in higher trade flows of intermediate inputs and a higher ratio of use of foreign inputs over domestic inputs.

Between 1995 and 2006 trade in intermediate inputs grew at an average annual rate of 6.2% for goods and 7% for services (in volume terms). In 2006 intermediate inputs represented 56% of goods trade and 73% of services trade. This suggests that trade flows are dominated by products that are not consumed but used in the production of other goods and services. The share of intermediates in total trade has, perhaps surprisingly, remained fairly constant because trade in final goods and capital goods have grown at the same pace.

The ratio of imported to domestic inputs increased significantly between 1995 and 2005 in most countries, owing to greater use of international sourcing of inputs. Because of their limited size, smaller countries are typically more internationally oriented and tend to import more intermediates from abroad. In Ireland for example, domestic and international sourcing is equally important, *i.e.* equal amounts of intermediates are sourced internationally and nationally (*i.e.* within the Irish economy).

Sources

- OECD, *Input-Output Database*, January 2010.
- OECD, *Bilateral Trade Database*, September 2009.

For further reading

- Lanz, R., S. Miroudot and A. Ragoussis (2009), "Trade in intermediate goods and services", *OECD Trade Policy Working Paper No. 93, www.oecd.org/trade*.
- De Backer, K. and N. Yamano (2007), "The measurement of globalisation using international input-output tables", *Science, Technology and Industry Working Paper 2007/8, www.oecd.org/sti/working-papers*.

Trade in intermediate goods

An intermediate good is broadly defined as an input to the production process that has itself been produced and, unlike capital, is used up in production. The measurement of trade in intermediates is not straightforward, especially in the case of services.

Trade in intermediate goods can be assessed using the United Nation's Broad Economic Categories (BEC) classification. This classification groups commodities according to their main end use into capital goods, intermediate goods and consumption goods, the three basic classes of goods in the System of National Accounts (SNA). The traded commodities themselves are defined in terms of the Standard International Trade Classification, Revision 3 (SITC Rev. 3). Hence, BEC assigns SITC Rev. 3 commodities to 19 basic categories of goods, eight of which are categories of intermediate goods.

One major drawback of the BEC classification is that the allocation of commodities according to their main use is based on expert judgment, which is by nature subjective. Many goods might be either final or intermediate depending on the context. Another shortcoming is that the BEC classification does not allow for a similar classification of trade in services because of the high level of aggregation in services trade data.

Input/Output tables are another source of information on the value of intermediate goods and services that have been imported from outside the country. Country I-O tables are presented in matrix format and show how much of the output of one industry is used as an input by another. Furthermore, I-O tables generally consist of a domestic and an import table which indicate the use of domestic and imported inputs respectively.

A key advantage of I/O tables is that they classify goods according to their use (as an input into another sector's production or as final demand) instead of as intermediate and other categories based on their descriptive characteristics. I/O tables also include information on (domestic and international) inputs of/in services sectors which allows for monitoring the fast-growing sourcing of services activities.

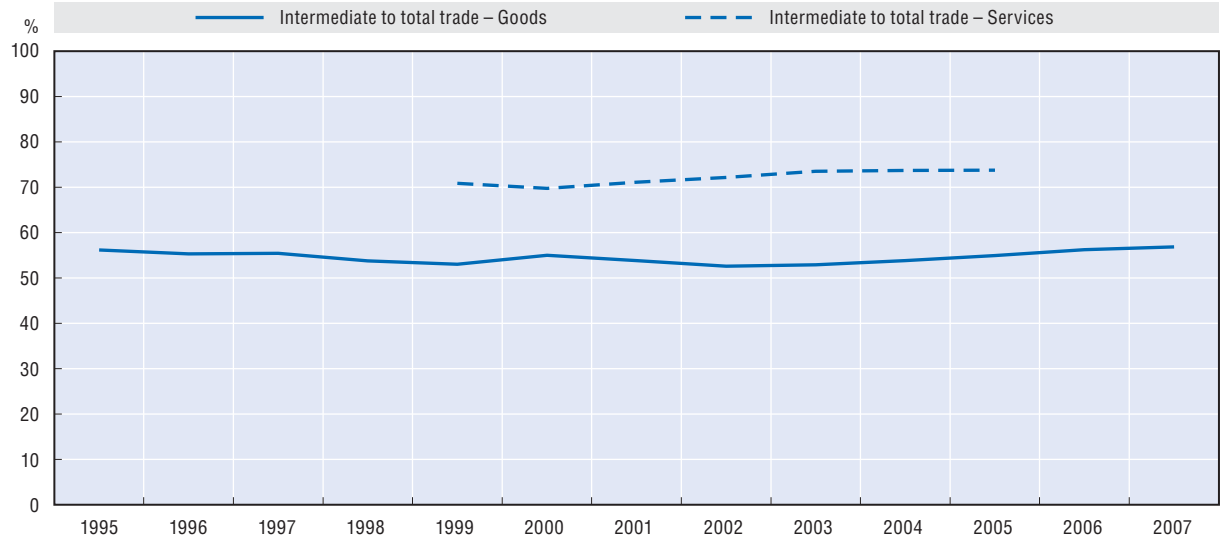
The ratio of imported to domestic sourcing of inputs is based on I/O tables and calculated as:

$$\left(\sum_i \sum_j x_m^{ij}\right) / \left(\sum_i \sum_j x_d^{ij}\right)$$

where x_d^{ij} and x_m^{ij} are respectively the domestic and imported transactions of intermediates from sector *i* to sector *j*.

L.3. Trade in intermediate goods

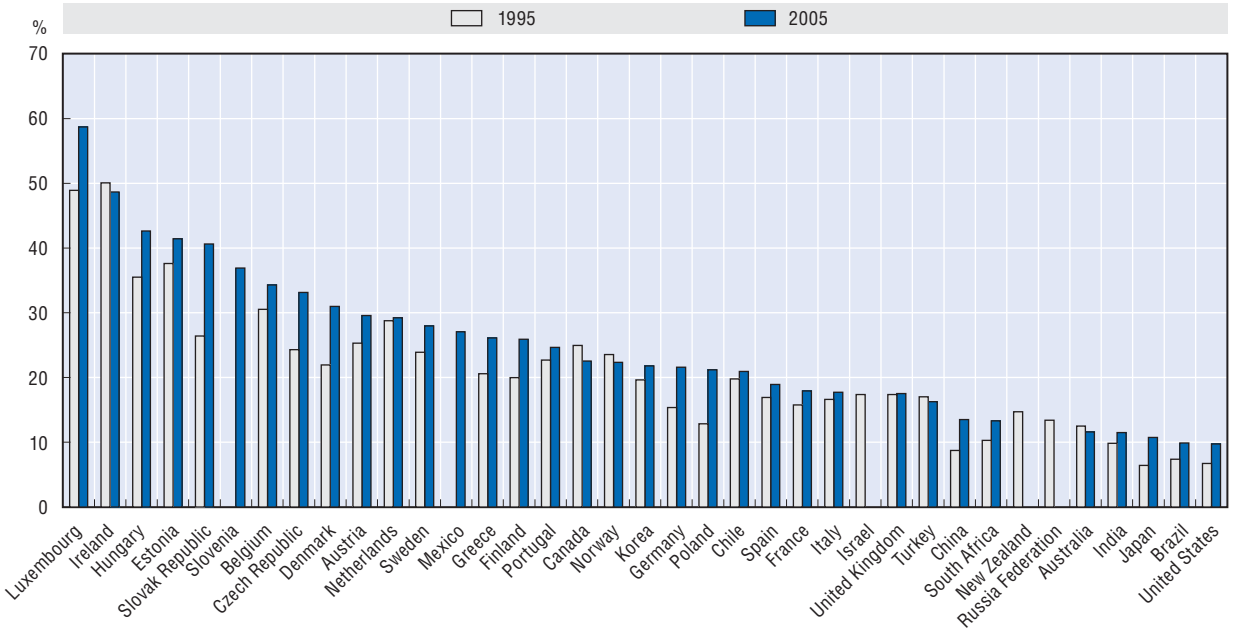
Figure L.3.1. **Share of intermediate trade in total trade, OECD**[1]



1. 20 countries for services.

StatLink http://dx.doi.org/10.1787/845870267428

Figure L.3.2. **Imported intermediates/domestic intermediates, by country**



StatLink http://dx.doi.org/10.1787/845883053582

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

A corrigendum has been issued for this page. See: http://www.oecd.org/dataoecd/0/2/46101158.pdf

L.4. Trade in intermediate goods: geographical distribution

■ The geographical distribution of intermediate imports of goods and services shows that in value the largest transactions are within and among three regions: Europe, North America and Asia. In the OECD area most inputs are sourced from within the OECD area; when accession countries and enhanced engagement economies are added, about 85% of trade flows are accounted for.

■ Intra-regional imports are generally higher than inter-regional imports. Europe has the most intra-regional trade in value. The results include all trade flows between EU countries, which significantly increases the value of Europe's intra-industry trade. Large intra-regional trade is also found for Asia and North America.

■ The largest inter-regional flow of intermediate goods is exports from the Middle East and North Africa to Asia, and includes primary resources such as oil or gas. Nevertheless, overall trade in intermediate inputs is mostly between developed countries; flows with regions with developing economies are very small.

■ Asian countries seem to trade relatively more manufacturing intermediates. Asia is a net exporter of intermediate goods to Europe and North America.

■ North America and Europe trade more services inputs than Asia and are also important exporters and importers of intermediate goods. Between Europe and North America, the pattern is the opposite for goods and services. Europe imports more intermediate services from North America but exports more intermediate goods.

Sources

- OECD, *Input-Output Database*, January 2010.
- OECD, *Bilateral Trade Database*, September 2009.

For further reading

- Lanz, R., S. Miroudot and A. Ragoussis (2009), "Trade in intermediate goods and services", *OECD Trade Policy Working Paper No. 93, www.oecd.org/trade*.

L.4. Trade in intermediate goods: geographical distribution

Figure L.4.1. **Intra- and inter-regional imports of intermediate goods, by region**
Billion USD, 2005

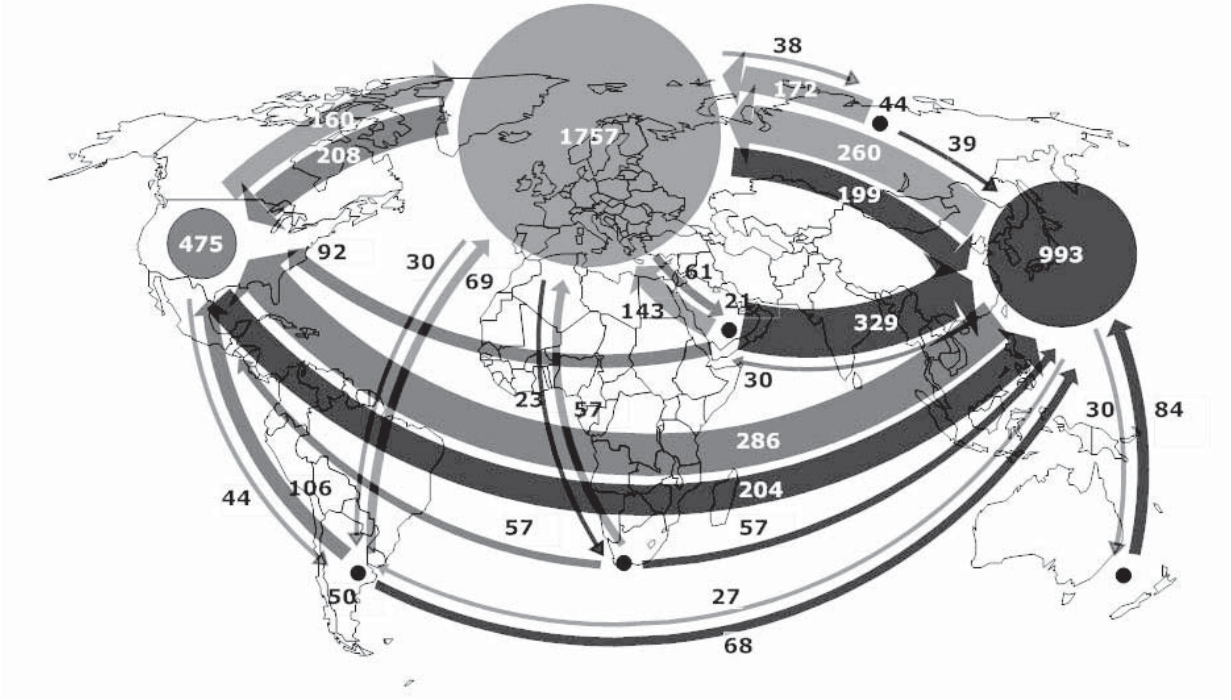
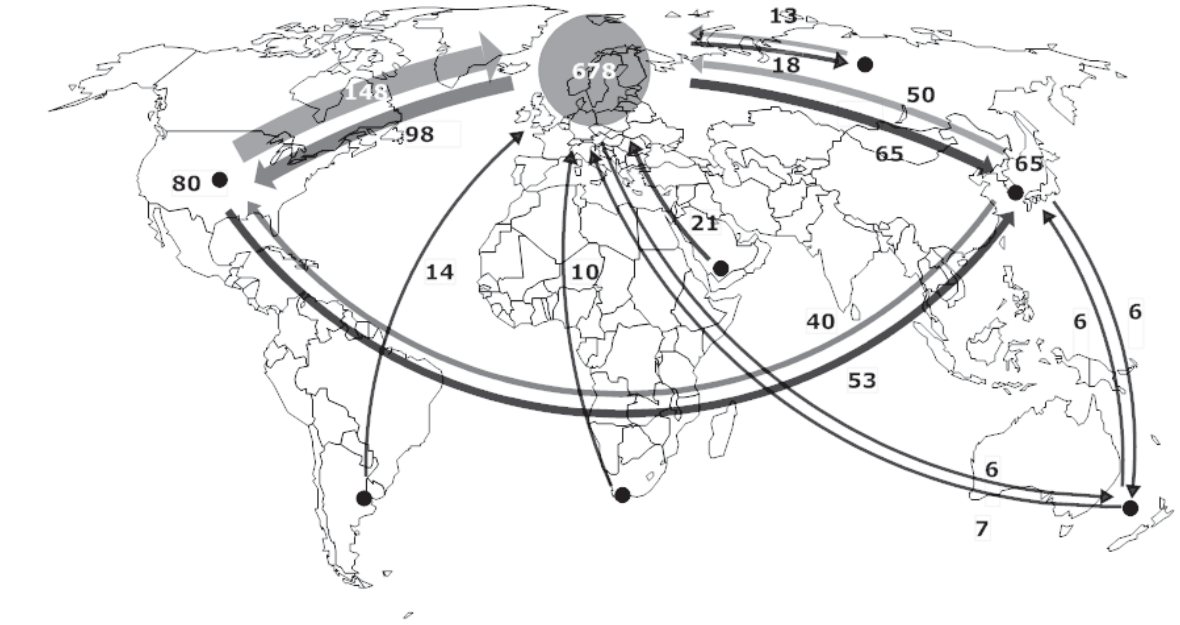


Figure L.4.2. **Intra- and inter-regional imports of intermediate services, by region**
Billion USD, 2005



L.5. Trade in intermediate goods: producer and user industries

■ Industries that produce imported intermediates are more or less the industries that "traditionally" produce inputs for other domestic industries: mining and quarrying, chemicals, metal products, transport and storage, and motor vehicles.

■ Some industries that are large producers of imported intermediates are also large users of imported intermediates. Clear examples are motor vehicles, chemicals, metal products, and transport and storage. These industries are large users not only of imported but also of domestic intermediates as the domestic transaction flows between industries reveal.

■ The user industries source a significant share of their imported intermediates from the same industries abroad, although differences exist across industries and countries. Domestic and international intra-industry sourcing have increasingly become alternatives in the search for intermediates of the right quality at the right price. All this suggests the importance of global value chains in today's global economy. Within these international production networks, intermediates are sourced from abroad through arm's length relationships or through multinational companies' networks.

Sources

- OECD, *Input-Output Database*, January 2010.
- OECD, *Bilateral Trade Database*, September 2009

For further reading

- Lanz, R., S. Miroudot and A. Ragoussis (2009), "Trade in intermediate goods and services", *OECD Trade Policy Working Paper No. 93*, *www.oecd.org/trade*.

Trade in intermediate goods: distribution by producer and user industry

In order to calculate imported intermediates by user industry, trade statistics were combined with Input/Output tables. This requires first converting the trade statistics from their product classifications to the industry classification of I-O tables. These tables are classified according to industrial activity in terms of the International Standard Industrial Classification, Revision 3 (ISIC Rev. 3), while trade data are compiled according to product classifications, *i.e.* Standard International Trade Classification Revision 3 (SITC Rev. 3) for goods and the Extended Balance of Payments Services Classification (EBOPS) for services. Therefore, approach is slightly different for goods and services.

Bilateral imports of intermediates from trade data are combined with the information on the usage of intermediate imports found in I-O tables, which makes it possible to add the dimension of the user industry to trade flows of intermediate goods and services. As a result, obtained import flows have five dimensions: importer *i*, exporter *j*, industry of origin (intermediate input) *p*, using industry *k* and year *t*.

In the case of goods, the imports of intermediate input *p* from country *j* by user industry *k* in country *i* is calculated as:

$$I_{ijpkt} = \alpha_{ipkt}.m_{ijpt}$$

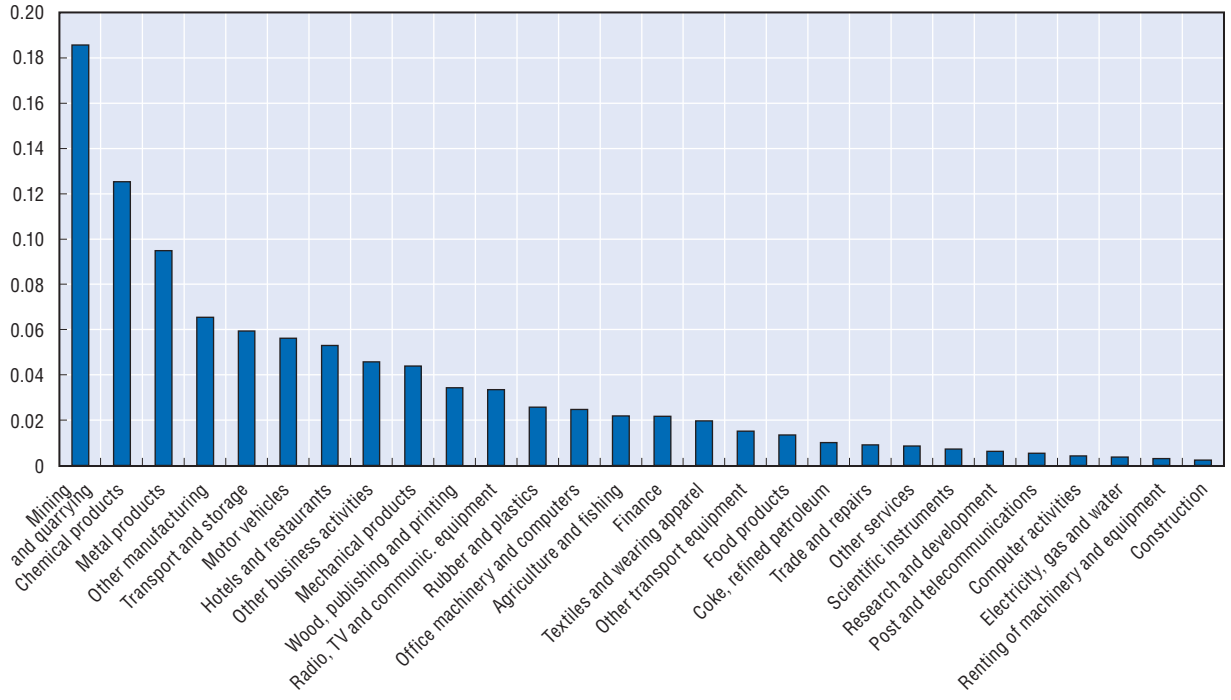
where α_{ipkt} is the share of imported inputs *p* by user industry *k* in overall imported inputs *p* of country *i* (as calculated from I-O tables) and m_{ijpt} are the imports of input *p* of country *i* from country *j* (as measured by trade data using the BEC classification).

This allocation of bilateral intermediate imports across user industries assumes that import coefficients are the same for all trade partners.

For services trade data, no classification distinguishes final and intermediate services, but an additional assumption makes it possible to calculate trade in intermediate services. In the case of services imports, $\alpha^{ipk}t$ is the share of imported service inputs *p* used by industry *k* in total imports of *p* (both final and intermediate) of country *i*. Besides the assumption that all trading partners have the same distribution of intermediate imports *p* across using industries *k*, the share of intermediate services in overall bilateral services imports of country *i* must be the same across all partner countries *j*.

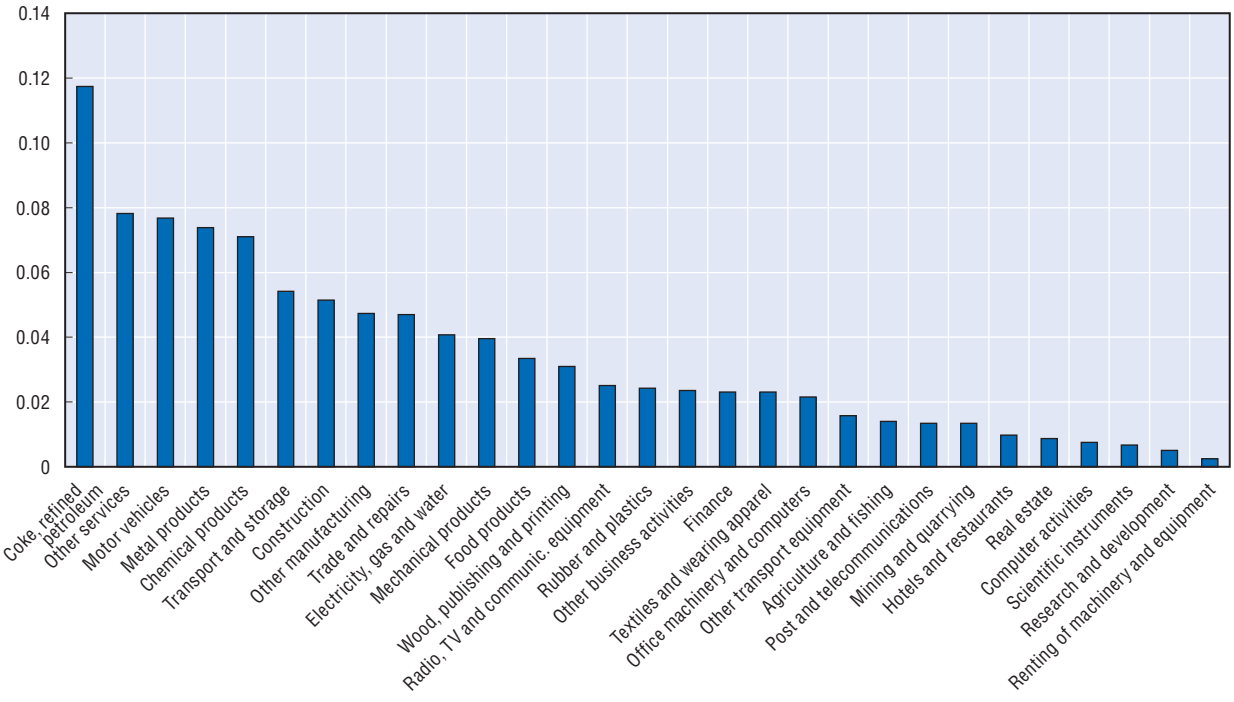
L.5. Trade in intermediate goods: producer and user industries

Figure L.5.1. **Share of industries in total imports of intermediates, producing industry, 2005**



StatLink http://dx.doi.org/10.1787/846033633802

Figure L.5.2. **Share of industries in total imports of intermediates, using industry, 2005**



Note: Total imports of intermediates of 34 countries amounted to USD 5 309 140 million in 2005. For some countries trade flows are missing for certain industries, especially services industries. For these industries the shares of the industry of origin will be underestimated.

StatLink http://dx.doi.org/10.1787/846061526804

L.6. Offshoring/outsourcing abroad

In line with the increasing importance of imported intermediates, offshoring or outsourcing abroad has increased in almost all countries over 1995-2005. In Luxembourg, Ireland, Hungary, the Slovak Republic and Estonia, the sourcing of intermediates abroad has increased significantly.

Smaller countries, notably Luxembourg, Ireland and Hungary, typically report higher offshoring indicators. Two large OECD countries, Japan (10%) and the United States (11%) offshore relatively little compared to other OECD countries. Although the level in large non-member countries such as Brazil, India, Argentina and China remains below the OECD average, the offshoring of intermediates has also increased in importance in these countries.

The offshoring of business activities has gained much policy attention in recent years because of its supposed adverse effects on national employment. However, the link between offshoring and employment is complex, and various effects have to be taken into account. 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, there may be positive impacts on productivity, thereby reducing costs and prices both in the activity that is directly affected and in other activities that use the products of this activity downstream.

Sources

- OECD, *Input-Output Database*, January 2010.
- OECD, *Bilateral Trade Database*, January 2010

For further reading

- De Backer, K. and N. Yamano (2007), "The Measurement of Globalisation Using International Input-Output Tables", OECD, *Science, Technology and Industry Working Paper 2007/8, www.oecd.org/sti/working-papers*.

Index of offshoring/outsourcing abroad

The index of outsourcing abroad (OI_i) is constructed as follows:

For a sector i and for a set of goods and services j, the index of outsourcing (OI_i) is:

$$OI_i = \sum_i \left[\frac{\textit{purchases of inputs } j \textit{ by industry } i}{\textit{total inputs used by industry } i} \right] \bullet \left[\frac{M_j}{D_j} \right]$$

where M_j are the imports of goods or services j

D_j is the domestic demand for goods or services j

where $D_j = Y_j - X_j + M_j$

with: Y_j is the production of goods or services j

X_j are the exports of goods or services j

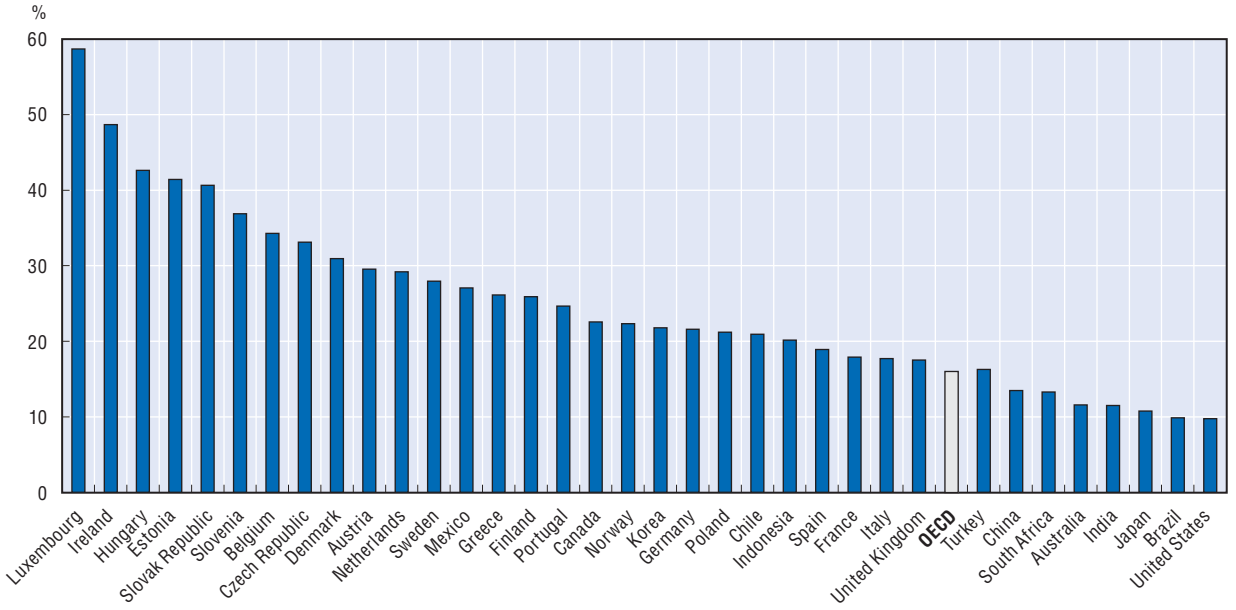
In other words, the more imports of goods or services j are purchased by industry i as input for its production, the more the outsourcing of industry i is important.

These indices make it possible, at an aggregate level (but also at the sectoral level), for a compiling country to measure the extent of outsourcing abroad of its manufacturing industry with respect to both goods and services, as well as the extent of outsourcing abroad of services with respect to both goods and services.

Calculations are typically made from Input-Output tables and trade data. The latest set of OECD Input-Output tables covers 42 countries with data for 1995, 2000 and 2005. The 5-year time interval is appropriate because I-O tables describe the structure of national economies and coefficients are therefore not subject to large fluctuations. OECD Input-Output tables cover 48 industries, but many countries actually report fewer industries. In order to ensure country comparability, some industries are aggregated.

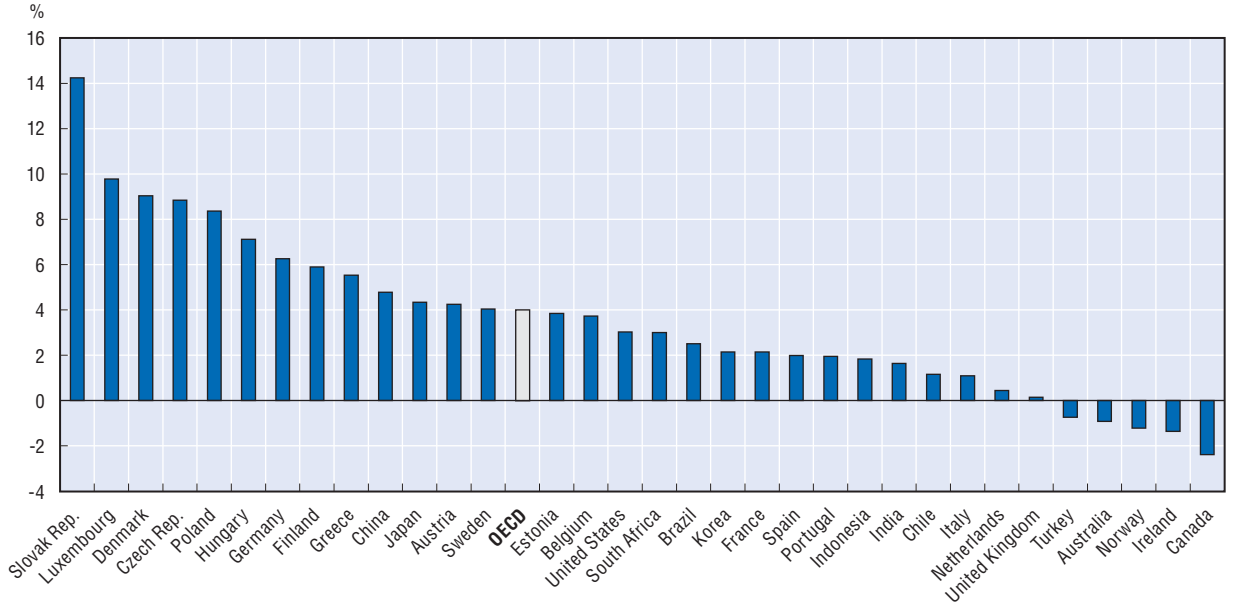
L.6. Offshoring/outsourcing abroad

Figure L.6.1. **Index of outsourcing abroad by country, 2005**



StatLink http://dx.doi.org/10.1787/846145113445

Figure L.6.2. **Change in offshoring, by country, 1995-2005**



StatLink http://dx.doi.org/10.1787/846183013775

L.7. Offshoring/outsourcing abroad: manufacturing and services

■ The offshoring indicator calculated separately for manufacturing and services shows that except for Luxembourg and Ireland, international sourcing of intermediates is on average more important in manufacturing. The specific cases of Luxembourg and Ireland are likely to be due to the significant presence of financial and call centre activities in these countries.

■ Over 1995-2005, the level of offshoring in manufacturing generally increased relatively little except in eastern European countries. Following their adhesion to the European Union, these countries attracted a large number of (western European) multinational companies. As a result of the international sourcing strategies of these companies, offshoring in these countries increased.

■ In contrast, the level of offshoring increased significantly in the services sector. The sourcing of intermediates abroad has increased in almost all countries in market services. These results suggest that while offshoring of intermediates, like the trade of final products, has traditionally taken place in manufacturing industries, the emergence of global value chains increasingly encompasses services sectors. Nonetheless, the level of offshoring is still much lower in market services than in the total of manufacturing industries.

Sources

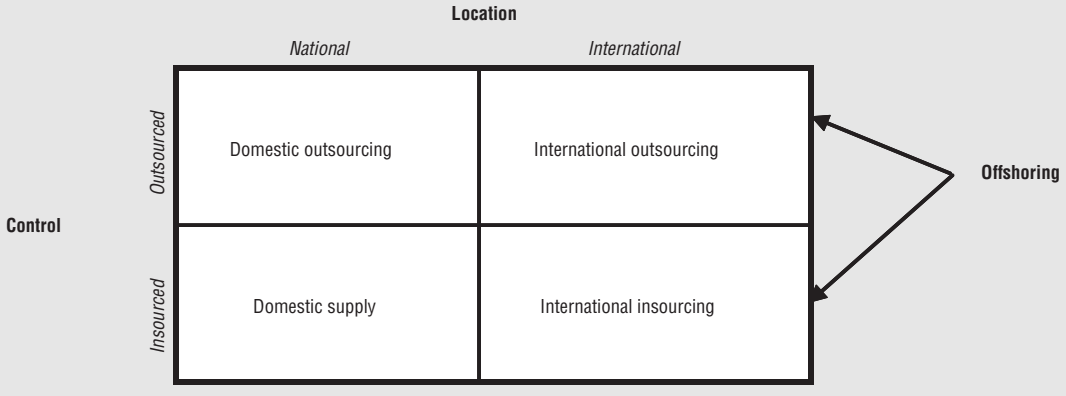
- *OECD Input-Output Database*, January 2010.
- *OECD Bilateral Trade Database*, January 2010.

For further reading

- De Backer. K. and N. Yamano (2007), "The Measurement of Globalisation using International Input-Output Tables", OECD, *Science, Technology and Industry Working Paper 2007/8*.
- Feenstra, R.C. and G.H. Hanson (1996), "Globalisation, Outsourcing and Wage Inequality", *American Economic Review*, Vol. 86(2), pp. 240-245.
- 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(3).

Index of offshoring/outsourcing abroad (2)

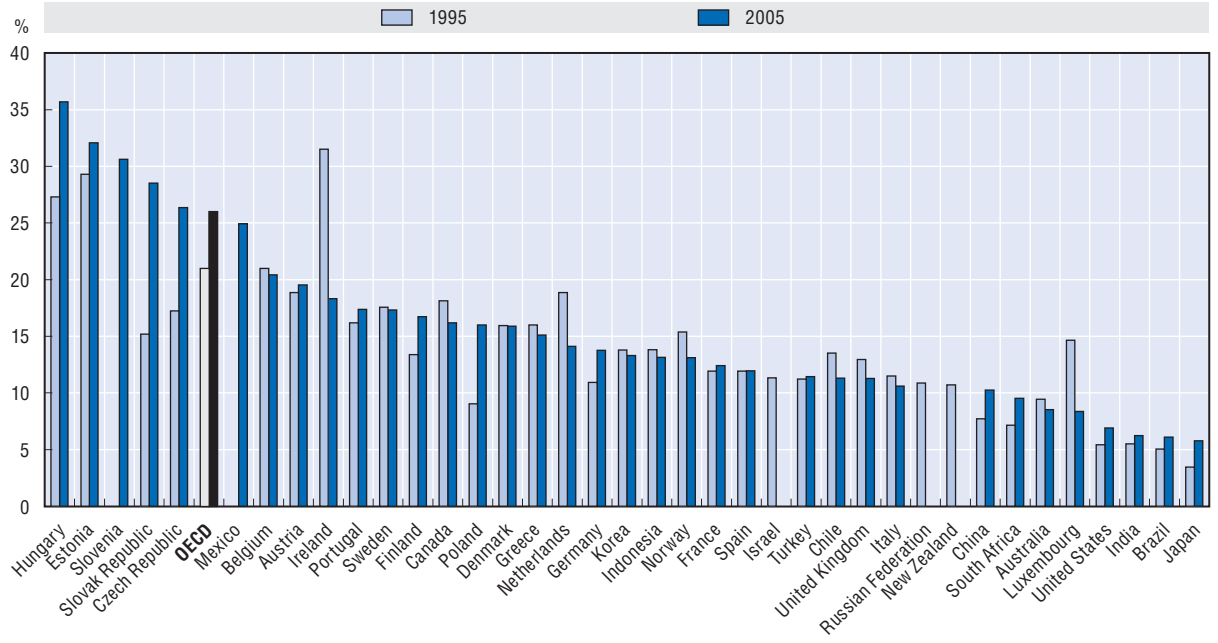
There is some confusion about the definition of offshoring and outsourcing. The index of offshoring/international outsourcing presented here is based on the indicator proposed by Feenstra and Hanson (1996, 1999) who have presented it as an indicator of outsourcing. Offshoring is generally defined as companies' purchases 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, *i.e.* to foreign affiliates. Outsourcing refers to the purchasing of intermediate goods and services from outside specialist providers at arm's length either nationally or internationally. The cross-border aspect is the distinguishing feature of offshoring, *i.e.* whether goods and services are sourced abroad as opposed to the domestic economy, not whether they are sourced from within the same firm or from external suppliers.



OECD ECONOMIC GLOBALISATION INDICATORS © OECD 2010

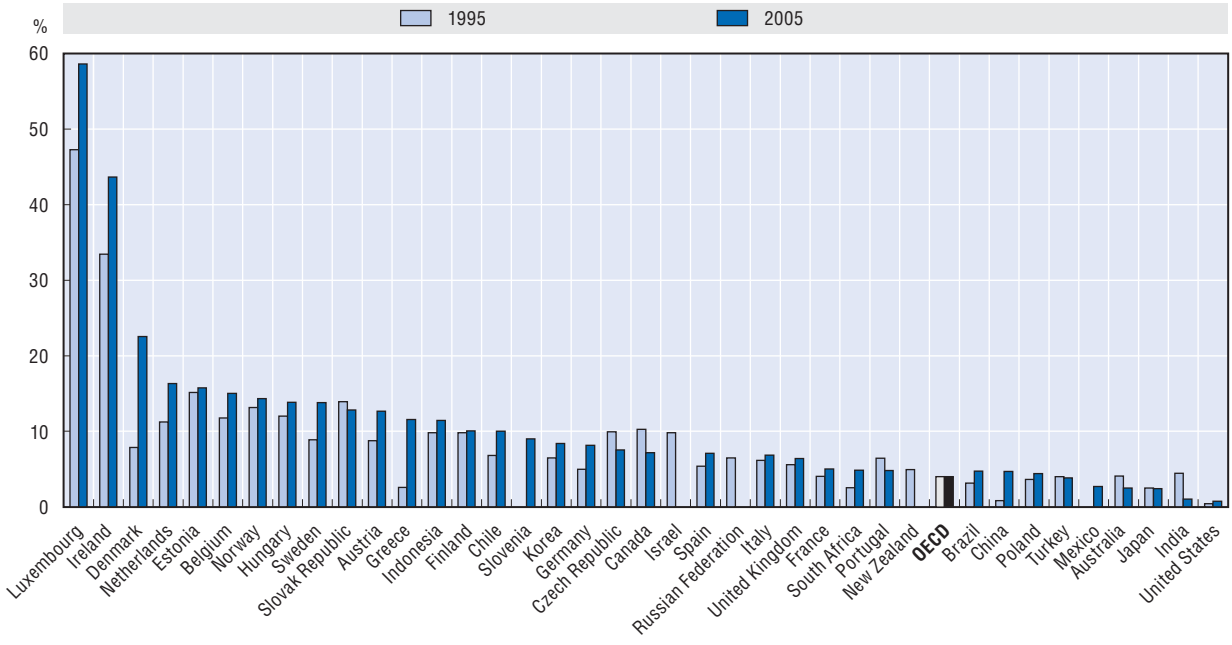
L.7. Offshoring/outsourcing abroad: manufacturing and services

Figure L.7.1. **Offshoring of manufacturing, by country**



StatLink http://dx.doi.org/10.1787/846187758814

Figure L.7.2. **Offshoring of services, by country**



StatLink http://dx.doi.org/10.1787/846200606741

Information on data for Israel: *http://dx.doi.org/10.1787/888932315602*.

L.8. Offshoring/outsourcing abroad by technology level

■ The sourcing of intermediates abroad appears to be more important in higher-technology than in lower-technology industries (higher-technology industries are defined as high- and medium-high-technology industries, ISIC Rev. 3: 24, 29-33, 35; lower-technology industries are defined as medium-low- and low-technology industries, ISIC Rev. 3: 15-23, 25-28, 34, 36-37). In most countries the offshoring indicator is higher for higher-technology industries than for lower-technology industries, owing to the generally greater complexity of technology-intensive goods which typically require a broad range of inputs.

■ Smaller countries source relatively more internationally, especially those with a significant presence of multinational firms. This observation is consistent with earlier reported results.

■ The level of offshoring has increased in the majority of countries, both in the higher-technology and the lower-technology manufacturing industries. Sourcing of intermediates abroad seems to have grown more strongly in higher-technology industries in most OECD countries.

■ The level of offshoring is especially high in the ICT manufacturing industries, even above that of the broader group of higher-technology industries. For this group of industries the differences in offshoring are smaller across countries (compared to higher-and lower-technology industries); in addition, the level of offshoring increased in almost all countries over 1995-2005. The OECD average increased from 38% in 1995 to 64% in 2005.

Sources

- *OECD Input-Output Database*, January 2010.
- *OECD Bilateral Trade Database*, January 2010.

For further reading

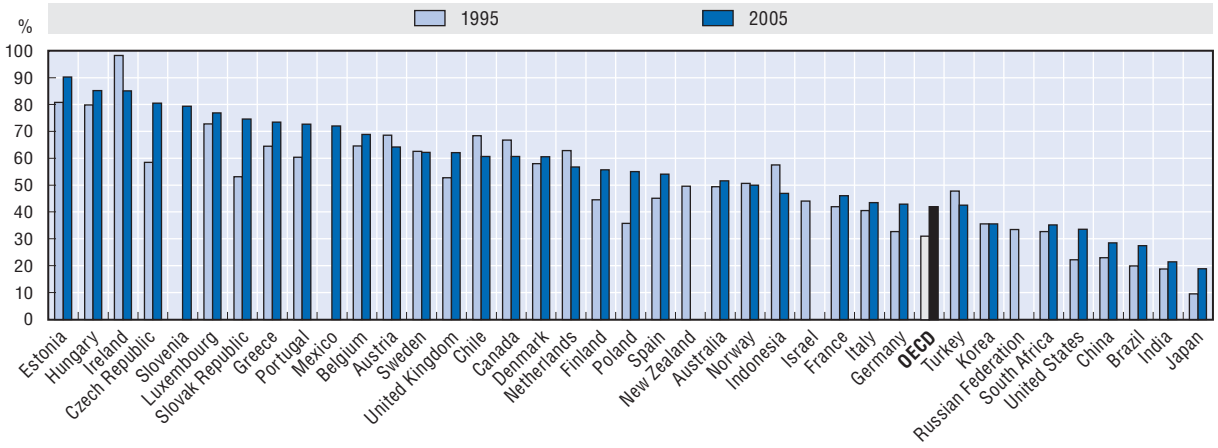
- Criscuolo C. and M. Leaver (2005), "Offshore Outsourcing and Productivity", mimeo.
- De Backer, K. and N. Yamano (2007), "The Measurement of Globalisation using International Input-Output Tables", *OECD Science, Technology and Industry Working Paper 2007/8*, *www.oecd.org/sti/working-papers*.
- Egger, H. and P. Egger (2001), "International Outsourcing and the Productivity of Low-skilled Labour in the EU", *WIFO Working Paper*, No. 152 (*Economic Inquiry*, Vol. 44, Issue 1, 2006).
- 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.
- Görg, H., A. Hanley and E. Strobl (2004), "Outsourcing, Foreign Ownership, Exporting and Productivity: An Empirical Investigation with Plant Level Data", *Research Paper 08*, University of Nottingham.

Index of offshoring/outsourcing abroad (3)

While the Feenstra and Hanson measure (see Section L.7) has often been used, there is no consensus that it is the most appropriate measure. Girma and Görg (2004) argue that it is too wide, especially for analyses on the firm level; instead they prefer a measure which includes only the contracting out of machine maintenance services, engineering and drafting services, accounting services and computer services. Egger and Egger (2001) also use a narrower measure which restricts outsourcing to outward processing. Others, such as Görg *et al.* (2004) and Criscuolo and Leaver (2005), have more direct data on intermediate inputs, including raw materials and components, and services inputs as well as the proportion of these sources abroad.

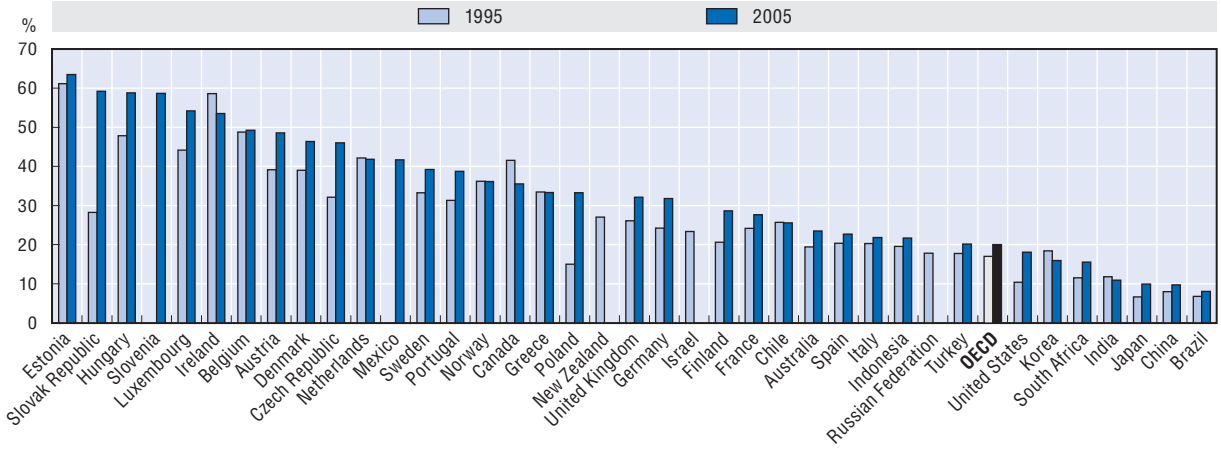
L.8. Offshoring/outsourcing abroad by technology level

Figure L.8.1. **Offshoring, higher-technology manufacturing industry, by country**



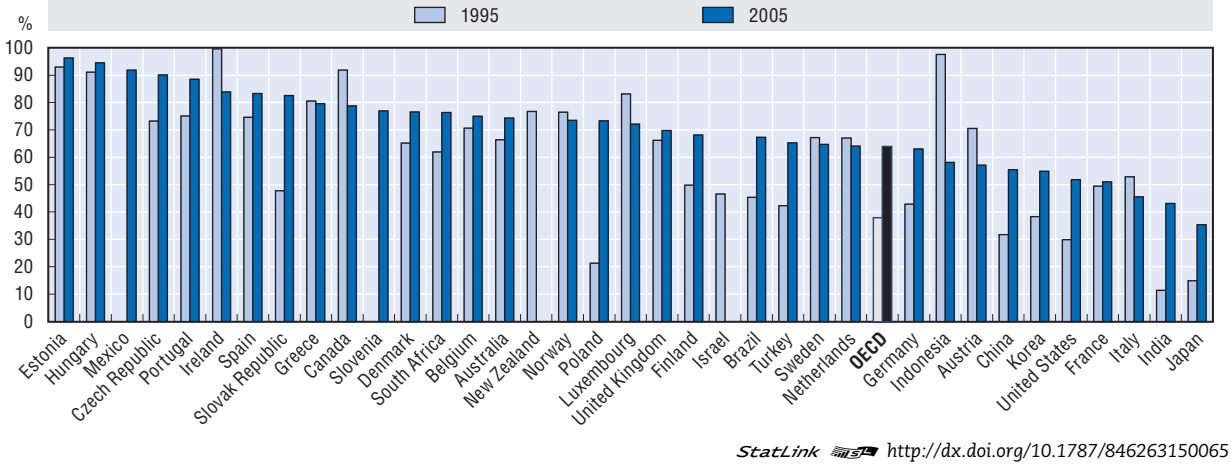
StatLink http://dx.doi.org/10.1787/846242632506

Figure L.8.2. **Offshoring, lower-technology manufacturing industry, by country**



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Figure L.8.3. **Offshoring, ICT manufacturing industry, by country**



StatLink http://dx.doi.org/10.1787/846263150065

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

L.9. Vertical specialisation: import content of exports

■ With the emergence of global value chains, imports and exports increasingly move together since companies' production processes are increasingly characterised by sequential production and movements back and forth. This vertical trade is made up of intra-firm trade within multinational companies as well as arm's length relations between independent companies.

■ Exports are increasingly composed of intermediate inputs imported from abroad; the import content of exports (also called "vertical specialisation in trade") represented on average 23% of total trade among OECD countries in 2005.

■ In Luxembourg, Hungary, Ireland and Estonia, the import content of exports exceeded 50% in 2005. The United States, the Russian Federation, Australia, Brazil and India import relatively less through vertical trade than other countries because of their size.

■ Between 1995 and 2005, the import dependency of exports increased in almost all countries. The increase was particularly strong in Luxembourg, Poland, the Slovak Republic, China and Greece. While imports may originate from affiliates of the parent group abroad or from non-affiliated firms, the increase in vertical specialisation is most evident in countries with a strong presence of multinationals. Foreign affiliates in different host countries produce intermediates which are then exported to final consumers but also to other affiliates and to the headquarters of the multinational company.

■ The import content of exports is particularly large in more basic industries which are heavy users of primary goods such as coke and refined petroleum, basic metals, chemicals, and rubber and plastics. A second group of industries that display a rather high import content of exports are the more technology-intensive industries that produce modular products. Parts and components are often produced in one country before being exported to another in which they are assembled. This international division of labour is found in electrical machinery, radio/television and communication equipment, office, accounting and computing machinery but also motor vehicles.

Sources

- *OECD Input-Output Database*, January 2010.
- *OECD Bilateral Trade Database*, January 2010.

Import content of exports

An important aspect of globalisation is the link between a country's exports and imports. This link may be complex if a number of countries are producing parts of the same final goods and services. For example, if a motor car manufacturer imports certain components (*e.g.* the chassis) the direct import contribution will be the ratio of the value of the chassis to the total value of the car. And if the car manufacturer purchases other components from domestic manufacturers, who in turn use imports in their production process, those imports must be included in the car's value. These indirect imports should be included in any statistic that attempts to measure the contribution of imports to the production of motor cars for export.

Hummels *et al.* (1998, 2001) introduced the term "vertical specialisation" in calculating the direct and indirect imported inputs that are included in a country's exports. As a result of global value chains and the corresponding geographical fragmentation of activities, countries become vertically specialised within the production process for some good or service, as companies tend to concentrate different production stages for a single good in each country. The vertical specialisation measures try to reflect the process by which different countries become part of a single production chain, linking the imported inputs required by one country with its exports.

The import content of exports can be calculated as the foreign value added embodied in exports:

$$= \textit{Imported intermediates } x \textit{ (exports/gross output)}$$

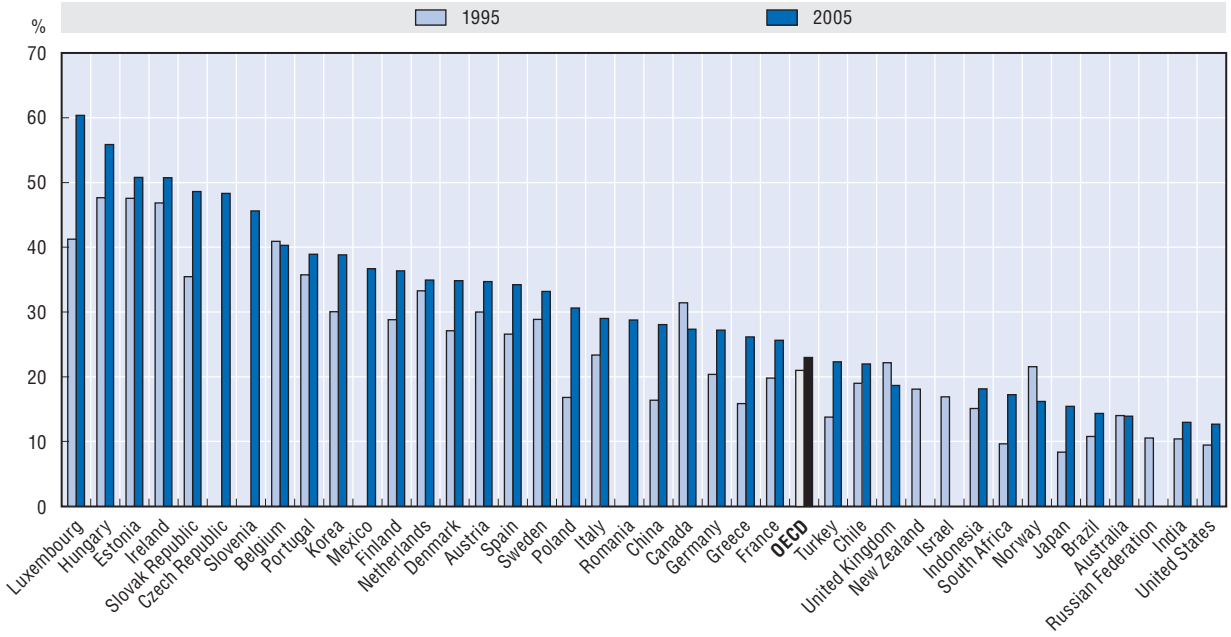
$$= u * Am * (I\text{-}Ad)\text{-}1 * X/X_k$$

where Am and Ad contain the input-output coefficient for imported and domestic transactions respectively; u denotes an $1 \times n$ vector each of whose components is unity, the matrix X is an $n \times 1$ vector of exports and X_k is total country exports.

The calculation is based on bilateral trade data and Input-Output tables. I-O tables measure the relations between the producers of goods and services (including imports) within an economy and the users of the same goods and services (including exports). As such, they can be used to estimate the contribution that imports make in the production of any good or service for export. An import content of exports of 20% for example means that 20% of the exports are directly and indirectly based on intermediates that have been imported.

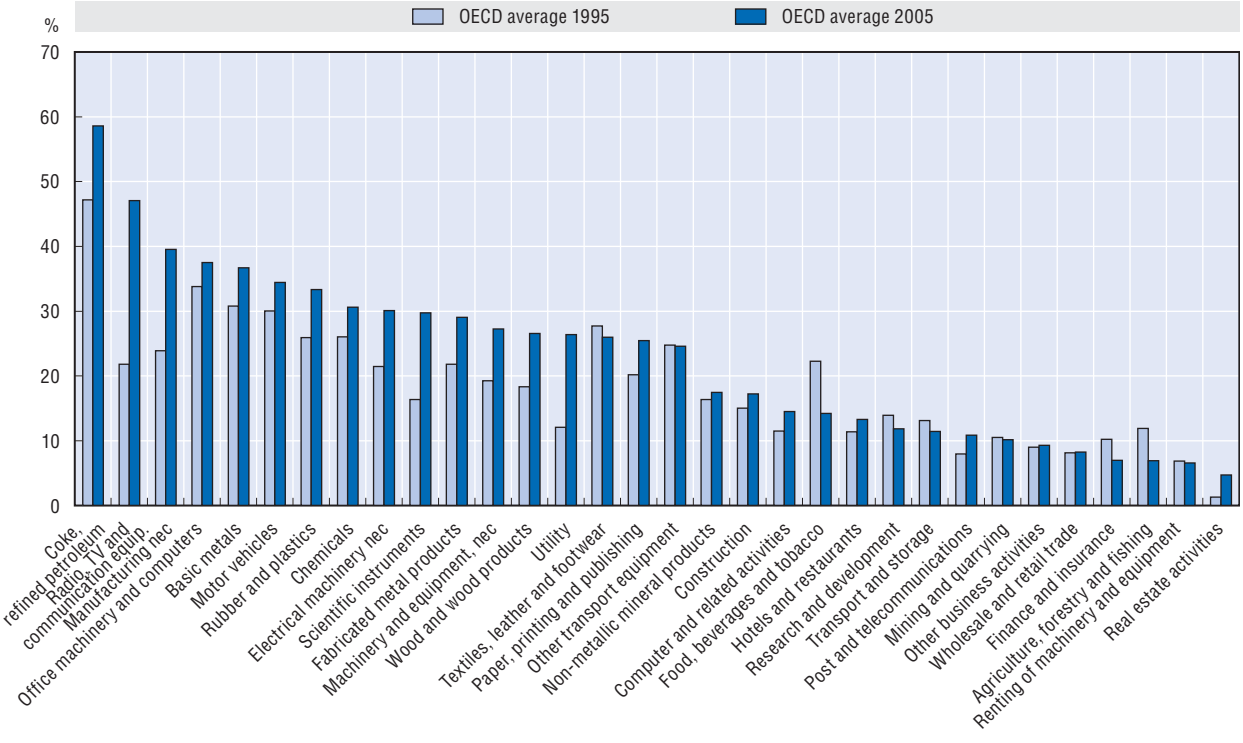
L.9. Vertical specialisation: import content of exports

Figure L.9.1. **Import content of exports, by country**



StatLink http://dx.doi.org/10.1787/846282515538

Figure L.9.2. **Import content of exports, by industry**



StatLink http://dx.doi.org/10.1787/846312557232

Information on data for Israel: http://dx.doi.org/10.1787/888932315602.

L.10. Import content of exports by partner countries

The distribution of the vertical specialisation measures by partner countries/zones shows the importance of distance and trade costs for vertical trade. Countries tend to source intermediates particularly from neighbouring countries and incorporate them in their exports.

The import content of exports of European countries is largely from other European countries. In most countries around three-quarters of the intermediates embodied in exports are sourced from Europe. The situation of Ireland is somewhat different owing to relatively high sourcing from NAFTA countries; the significant presence of US multinational companies in particular is likely the reason.

Within the NAFTA region, Canada and Mexico are heavily oriented towards other NAFTA countries: more than 50% of the imported intermediates embodied in their exports originate in the NAFTA zone. For the United States, the two other NAFTA countries have less importance owing to the relatively large share of East Asian countries (Korea, Japan, China and Chinese Taipei).

In Japan, China and Korea, the majority of intermediates embodied in exports are sourced from within the region. Previous research has revealed a triangular trade pattern in this region, with parts and components produced by the more developed Japan, Chinese Taipei and Korea and then exported to emerging economies such as China, where the different intermediates are assembled into finished products.

The assembled final products and intermediates are then exported from China to these economies because Asian firms re-import a growing part of the production they relocate. Assembled products from China are also exported to other developed countries/regions such as Europe and the United States where they may undergo some minor changes (packaging, marketing, etc.) and hence appear in the vertical trade of these countries. The case of Apple's iPod clearly illustrates this: components for this product are produced in Japan, Korea and the United States, assembled in China and then exported to the United States.

Sources

- *OECD Input-Output Database*, January 2010.
- *OECD Bilateral Trade Database*, January 2010.

Import content of exports: shortcomings

A first shortcoming of the indicator of vertical specialisation relates to its calculation, which is based on input-output information and some implicit assumptions. For example, it is typically assumed that the same input-output requirements apply for the goods and services that are exported and those that are destined for final demand. The calculations are also based on the assumption that countries' imports originate entirely from foreign sources, which is not necessarily the case. However, it is very difficult to measure the domestic content of countries' imports owing to the lack of an input-output table that applies to the rest of the world.

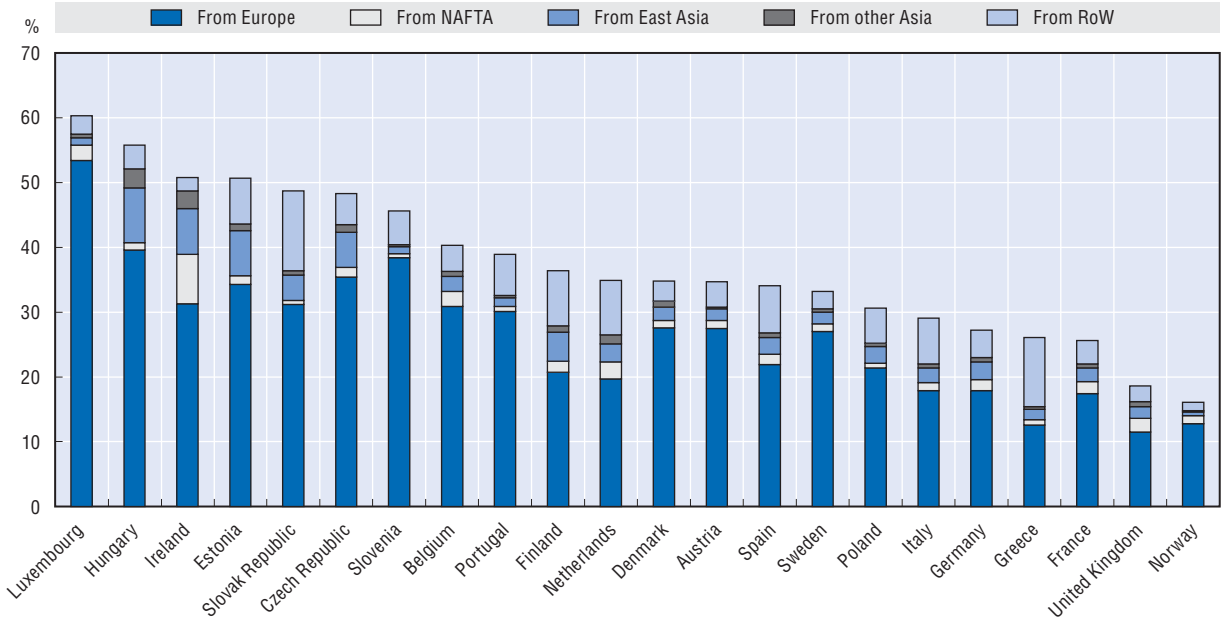
Second, the level of sector aggregation in the Input-Output tables can lead to biases in computing the "true" level of country and sector vertical specialisation. At the sector level, whenever there is a positive (negative) correlation between exports and the imported inputs to gross output ratio, the calculated vertical specialisation values will be downward (upward) biased.

Third, the import content of exports or vertical specialisation indicator captures the importance of global value chains and international fragmentation. It does not allow for identifying the "actors" that shape these international value chains. Since the indicator is computed at aggregate industry and/or economy levels, it does not allow for distinguishing between the share of vertical trade that is realised by multinational firms and the share that takes place through arm's length relations.

As such, this indicator should be interpreted with care in policy discussions. An increase in the foreign content of exports does not necessarily indicate that a country is losing competitiveness. It may even be gaining if it succeeds in becoming part of the global value chains of high-growth industries. The import content of exports is above all an indicator which describes the (changing) structure and dynamics of countries that, together with other appropriate indicators, can be used in discussing countries' competitiveness.

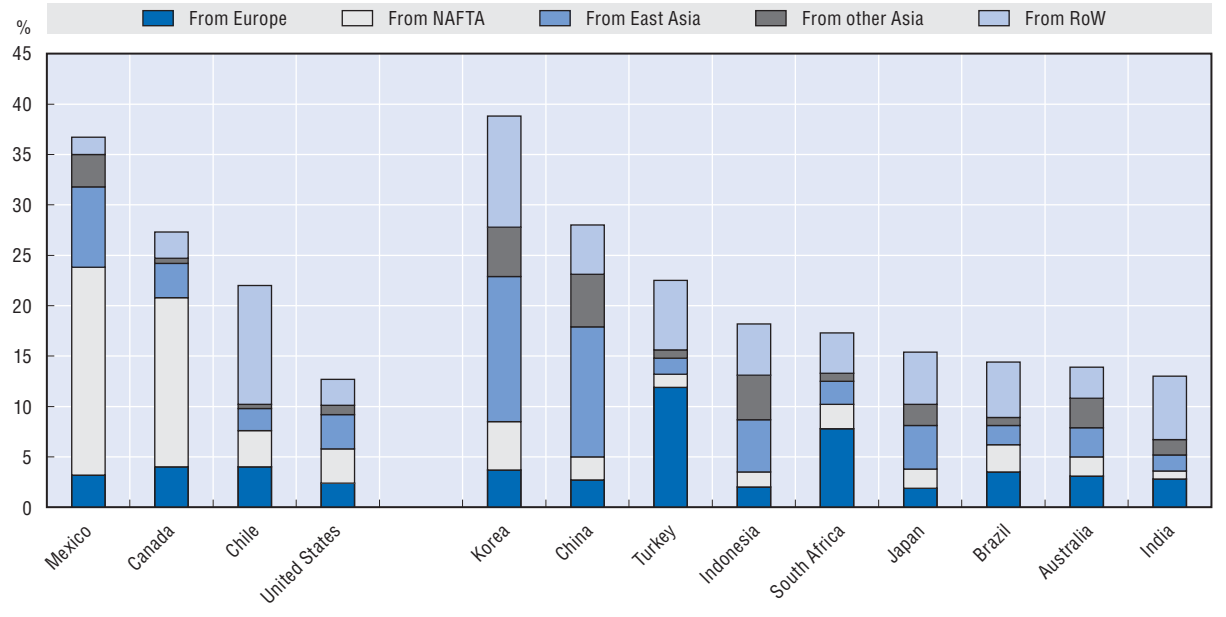
L.10. Import content of exports by partner countries

Figure L.10.1. **Import content of exports with partner countries, European countries**



StatLink http://dx.doi.org/10.1787/846346143080

Figure L.10.2. **Import content of exports with partner countries, other countries**



StatLink http://dx.doi.org/10.1787/846348821313

ANNEX

Main OECD Databases Used

Databases of the OECD's Directorate for Science, Technology and Industry

AFA: The ***Activities of Foreign Affiliates Database*** presents detailed data on the performance of foreign affiliates in the **manufacturing** industry of OECD countries (inward and outward activity of multinationals). The data indicate the increasing importance of foreign affiliates in the economies of host countries, particularly in production, employment, value added, research and development, exports, wages and salaries. AFA contains 16 variables broken down by country of origin (inward investment) or location (outward investment) and by industrial sector (based on ISIC Revision 3) for 25 OECD countries and three OECD Accession countries (Estonia, Israel and Slovenia).

Publication: OECD, *Measuring Globalisation: Activities of Multinationals*, 2007 Edition. Vol. I: Manufacturing. Also available on CD-ROM and on line *via* SourceOECD (*www.sourceoecd.org*).

FATS: This database gives detailed data on the **activities of foreign affiliates** in the **services** sector of OECD countries (inward and outward activity of multinationals). The data indicate the increasing importance of foreign affiliates in the economies of host countries and of affiliates of national firms implanted abroad. FATS contains 14 variables broken down by country of origin (inward investment) or destination (outward investment) and by industrial sector (based on ISIC Revision 3) for 24 OECD countries.

Publication: OECD, *Measuring Globalisation: Activities of Multinationals*, 2007 Edition. Vol. II: Services.

STAN – Industry: The *STAN Database* for **Industrial Analysis** includes annual measures of output, labour input, investment and international trade by economic activity, which allow users to construct a wide range of indicators focused on areas such as productivity growth, competitiveness and general structural change. The industry list provides sufficient details to enable users to highlight high-technology sectors and is compatible with those used in related OECD databases in the "STAN" family (see below). STAN-Industry is primarily based on member countries' annual National Accounts by activity tables and uses data from other sources, such as national industrial surveys/censuses, to estimate any missing detail. Since many of the data points in STAN are estimated, they do not represent the official member country submissions. See: *www.oecd.org/sti/stan*.

Publication: STAN-industry is available on line *via* SourceOECD (*www.sourceoecd.org* where it is regularly updated (new tables are made available as soon as they are ready). A "snapshot" of STAN-industry is also available on CD-ROM together with the latest

versions of STAN – R&D (ANBERD), STAN – Bilateral Trade and a set of derived STAN Indicators. See *www.oecd.org/sti/stan/indicators*.

STAN – Bilateral Trade (BTD): This database presents detailed **trade flows** by manufacturing industry between OECD and several non-OECD *declaring* countries and a selection of 70 *partner* countries or zones. The data are derived from the OECD's *International Trade by Commodity Statistics* (ITCS) *Database* and are converted from product classification schemes to an activity classification scheme based on the ISIC Revision 3. BTD's industry list is compatible with those used in the OECD's STAN-Industry, Input-Output tables and *ANBERD Databases*. Data are presented in thousands of USD at current prices, and cover the period 1988-2008. See: *www.oecd.org/sti/btd*.

Publication: OECD (2007), *Bilateral Trade Database, 2007*. BTD is available on line *via* SourceOECD (under the STAN heading) as well as on the STAN family CD-ROM.

STAN – I-O: The latest set of OECD **Input-Output** tables consists of matrices of inter-industrial flows of transaction of goods and services (domestically produced and imported) in current prices for all OECD countries except Iceland and 13 non-member economies (OECD Accession and Enhanced Engagement countries plus Argentina, Chinese Taipei and Romania) covering the years 1995, 2000 and 2005 or nearest years. The tables are based on ISIC Revision 3 and can be accessed via OECD's data dissemination service OECD.Stat and as a suite of Excel files. See: *www.oecd.org/sti/inputoutput*.

R&D: The ***R&D Database*** contains the full results of the OECD surveys on **R&D expenditure and personnel.** This database serves, *inter alia*, as raw material for the *MSTI Database*.

Publication: OECD (2010), *Research and Development Statistics: 2009 Edition*. Also available on line *via* SourceOECD and on CD-ROM with the latest edition of *Main Science and Technology Indicators* as *OECD Science, Technology and R&D Statistics*.

MSTI: The ***Main Science and Technology Indicators Database*** provides a selection of the most frequently used annual data on the scientific and technological performance of OECD member countries and nine non-member economies (Argentina, China, Israel, Romania, the Russian Federation, Singapore, Slovenia, South Africa, Chinese Taipei). The indicators, expressed in the form of ratios, percentages, growth rates, cover resources devoted to R&D, patent families, technology balance of payments and international trade in highly R&D-intensive industries.

Publication: OECD (2010), *Main Science and Technology Indicators 2009/2*. Biannual. Also available on line *via* SourceOECD and on CD-ROM (see above).

Patent Database: This database covers data on patent applications to the European Patent Office (EPO), the US Patent and Trademark Office (USPTO), patent applications filed under the Patent Co-operation Treaty (PCT) that designate the EPO, as well as Triadic Patent Families. Data mainly derives from the *EPO's Worldwide Patent Statistical Database* (PATSTAT) which provides a harmonised and comparable set of information on patent applications taken in patent offices worldwide. See: *www.oecd.org/sti/ipr-statistics*.

The series are published on a regular basis in OECD, *Main Science and Technology Indicators* and are available *via* OECD's data dissemination service OECD.Stat.

TBP: The ***TBP Database*** presents information on the **technology balance of payments**. The database serves, *inter alia*, as raw material for the *MSTI Database* and publications.

Other OECD databases

Foreign Direct Investment:

- *International Direct Investment Database* (Directorate for Financial and Enterprise Affairs)

National Accounts:

- *Annual National Accounts of OECD Countries* (Statistics Directorate)
- *OECD Quarterly National Accounts Database* (Statistics Directorate)

Education:

Education Database (Directorate for Education)

Trade:

- *International Trade by Commodity Statistics Database* (Statistics Directorate)
- *Monthly Statistics on International Trade Database* (Statistics Directorate)
- *Database on Trade in Services by Partner Country* (Statistics Directorate)
- OECD Trade Indicators (Statistics Directorate)

Economic Indicators:

- *Main Economic Indicators Database* (Statistics Directorate)

Further details on OECD statistics are available at: *www.oecd.org/statistics*.

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