

Chapter II. The ICT sector

There is no immediate reason why a country with a small or no ICT-producing industry, should not benefit from the positive effects on growth of new information technologies. Yet, the question of the role of the ICT-producing sector has been debated, in particular from the perspective of a comparison of European economies with that of the United States. What is the ICT sector? What is its size, how fast it is growing, what is its contribution to economic activity? How do OECD countries compare in terms of specialisation in ICT production?

In 1998, OECD member countries agreed on a definition of the ICT sector as a combination of manufacturing and services industries that capture, transmit and display data and information electronically (see Annex 1). One important feature of this definition, based on an international standard classification of activities (ISIC Rev. 3), is that it breaks the traditional ISIC dichotomy between manufacturing and services activities. While the production or distribution of ICT products can be found everywhere in the economy, the identification of sectors whose main activity is to produce or distribute ICT products constitutes a first-order approximation of the "ICT sector".

The importance of the ICT sector has grown over time, especially in northern European countries, such as Finland, Sweden, Norway, the Netherlands and the United Kingdom. The composition of the ICT-producing industry varies considerably across OECD countries. Patterns of trade specialisation and comparative advantage seem to suggest the presence of economies of scale in ICT production. Finland and Sweden, for example, have built up their competitive advantage in this sector over the last few years by expanding their communication equipment sector. This might indicate that there is space for new entrants in ICT markets. Moreover, the relative specialisation of some countries in ICT production depends heavily on the presence of foreign affiliates. This is the case for Ireland and Hungary, where a large portion of ICT production is due to foreign affiliates.

On average, Europe lags the United States in terms of specialisation in ICT production, but averages hide wide differences between smaller northern European countries and larger European countries. The latter lag in terms of ICT production, imports of embodied ICT technology and, possibly more importantly, R&D.

While the ICT sector still accounts for a relatively small share of OECD business sector GDP, about 10% in 2000, it can make a relatively large contribution to growth and productivity performance if it grows more rapidly than the rest of the economy. Few OECD countries are specialised in the parts of the ICT sector that are characterised by very rapid technological progress, e.g. the production of semiconductors and computers. This is not necessarily a problem for countries that do not produce such goods, since a substantial part of the benefits of ICT production accrue to importing countries and to users, as these can benefit from cheap investment and consumer goods.

The survey data collected from member countries, as well as methodological information about sources and methods used to collect the data on the ICT sector, is being published for the first time in the electronic version of *Measuring the Information Economy 2002* (see www.oecd.org/sti/measuring-infoeconomy). The data provided by member countries have then been combined with different data sources to estimate ICT aggregates compatible with national accounts totals. The estimates compatible with national accounts have been used to construct the figures for ICT-sector production, value added and employment in this chapter. For this reason, the indicators presented here may differ from figures contained in national reports and in previous OECD publications.

ICT-producing sectors

- National accounts estimates of production values, based on the OECD definition of ICT-producing industries, show that ICT production as a share of business sector production (excluding agriculture) ranged between 4% and 15% in OECD countries in 2000. Sweden and Finland became increasingly specialised in the production of communication equipment, and almost doubled their share of ICT production in total production over the 1995-2000 period.
- When ICT manufacturing is compared to total manufacturing, Finland's specialisation in ICT production is over 20%, Korea's is 19%, and Sweden's is 17%, well above the shares for Japan (14%) and the United States (11% in 1999).
- Overall the composition of ICT production differs across OECD countries. Few are specialised in the parts of the ICT sector that are characterised by very rapid technological progress, e.g. the production of semiconductors and computers. Some countries are specialised in the manufacturing of communication equipment (e.g. Finland, Korea, Mexico, Japan and Sweden). Other countries have experienced a growing weight of computer services in ICT production. This is especially the case in Denmark, France, Italy, the Netherlands, Norway, and the United Kingdom where computer services now account for over 30% of total ICT production.

Box 2.1. International comparisons of ICT activities

In 1998, OECD member countries agreed on a definition of the ICT sector as a combination of manufacturing and services industries that capture, transmit and display data and information electronically (see Annex 1). The existence of a widely accepted definition of the ICT sector is the first step towards comparisons across time and countries. The quality and comparability of the data collected at the OECD has improved, and some member countries use their national classifications to provide more accurate measures of the ICT sector.

The capacity to provide data according to the OECD definition of the ICT sector is a function of the similarity between national classifications and ISIC Rev. 3. While NACE, the European classification, matches ISIC at the required level of detail and provides an even finer breakdown, specific concordances and estimates have to be provided for NAICS (Canada, the United States), ANZIC (Australia, New Zealand) and SIC (Japan). Table A.1 in Annex 1 shows the concordance between the ISIC Rev. 3 classes included in the OECD definition of the ICT sector and the more detailed national classifications currently used by member countries to provide data to the OECD. While it is generally possible to calculate ICT manufacturing aggregates, a few problems remain for reaching the level of service industry detail required for the ICT sector definition. In particular:

(a) *The treatment of ICT wholesale.* In 1998 it was recommended that member countries identify and provide the part of the class attributable to the wholesaling of ICT products. National classifications are currently being used by a number of countries – albeit with varying degrees of precision – to isolate ICT wholesale. The United States and Canada differ slightly in their definition of wholesale of ICT products. Australia uses a part-class procedure in which data on ICT specialist businesses are compiled. Australia excluded from wholesale of machinery and equipment (ANZIC 4611) only the wholesale of farm and construction machinery.

(b) *ISIC Rev. 3 class 6420 (Telecommunications services).* For reasons of confidentiality, some countries are unable to separate data for this class from data related to post and telecommunications. Germany, Greece and Turkey have very limited coverage in terms of variables and time series.

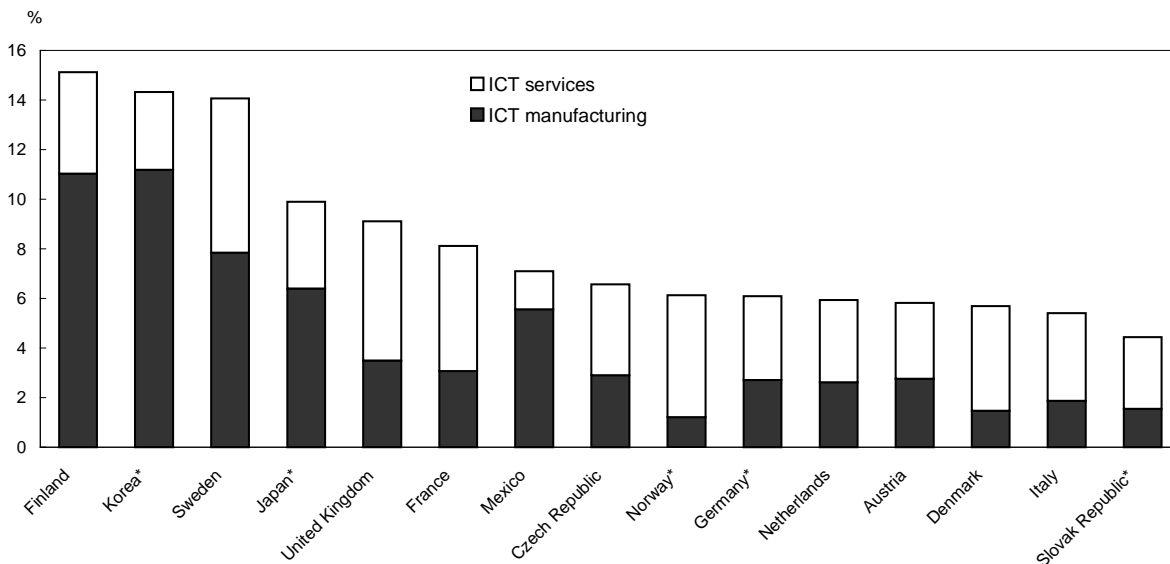
(c) *Rental of office machinery and equipment.* About one-third of countries are currently unable to provide data for ISIC class 7123.

The survey data collected from member countries, as well as methodological information about sources and methods used to collect the data, are being published for the first time in the electronic version of *Measuring the Information Economy 2002* (www.oecd.org/sti/measuring-infoeconomy). The data provided by member countries have been combined with different data sources to estimate ICT aggregates compatible with national accounts totals. These have been used to construct the figures relating to production for the ICT sector, value added and employment in this publication. For this reason, the statistics presented here may differ from figures contained in national reports and in previous OECD publications.

ICT-producing sectors

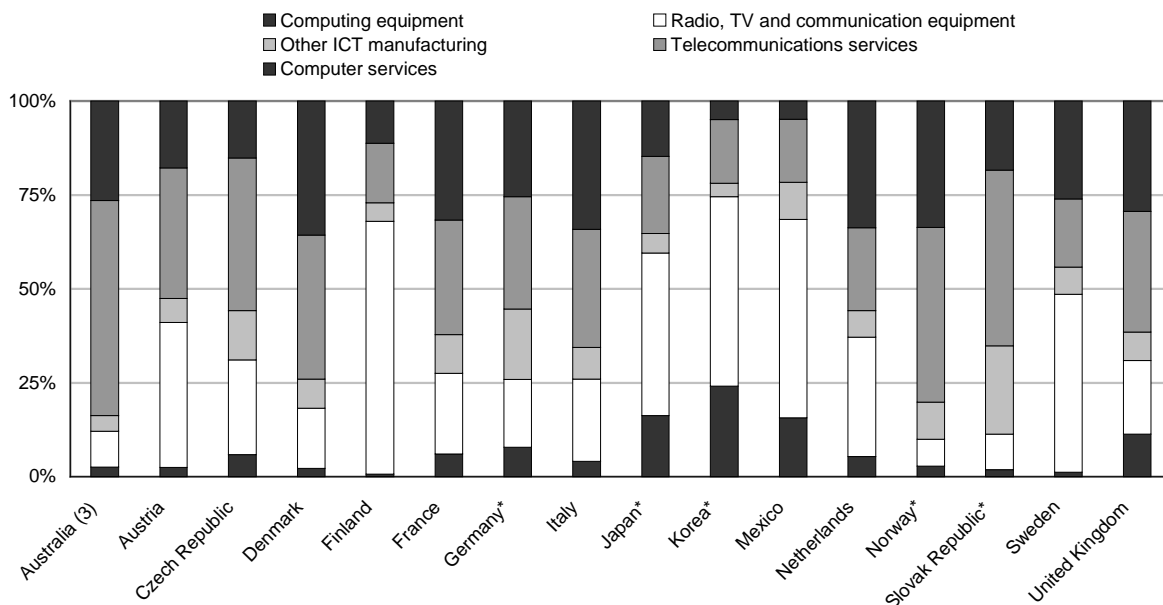
Share of ICT-producing activities in the non-agriculture business sector,¹ 2000

Percentages



Composition of ICT sector production,² 2000

Percentage share



* 1999 instead of 2000.

1. Totals for the ICT-producing sector exclude production values in ICT wholesaling and ICT rental services.

2. "Other ICT manufacturing" includes insulated wire and cable and precision instruments.

3. 2000-01.

Source: OECD estimates, based on national sources; STAN and National Accounts databases, August 2002.

Size and growth of the ICT sector

- The importance of the ICT sector within OECD economies has been growing over the 1990s. Rapid growth is especially apparent in northern European countries (Finland, Sweden, Norway, the Netherlands and the United Kingdom). In Finland, the ICT sector's share of value added increased by 7.2 percentage points over the 1995-2000 period and now represents over 15% of total business value added. On average, however, the ICT sector still accounts for a relatively small share of OECD business-sector GDP. In 2000, ICT value added represented between 5% and 16.5% of total business sector value added and the average share in the OECD (25 countries) was about 9.7%, while in the European Union reached 8.5%.
- Ireland, Finland, Korea, Japan and Mexico are specialised in the manufacture of ICT goods. In Finland, for example, ICT accounts for almost 22% of total manufacturing value added. Except for Ireland, where computing and office equipment accounts for over 10% of manufacturing value added, the largest contribution to economic activity

typically comes from the manufacture of telecommunication equipment. ICT services, such as telecommunication and computer services, generally constitute between 70% and 90% of total ICT sector value added.

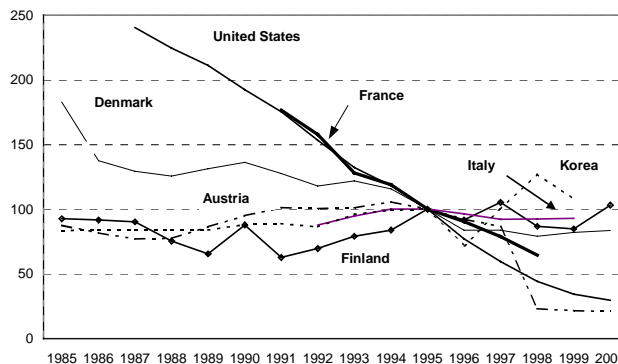
- Most OECD countries already have a well-developed telecommunication services sector, which is reflected in its sizeable contribution to ICT sector value added. Hungary and the Czech Republic, with the highest relative share of telecommunication services, are reaping the benefits of liberalisation reforms in the mid-1990s. At the same time, there is a noticeable increase in the contribution of computer and related services, mainly software services. The share of computer and related services in business services value added was highest in Ireland (7% in 1999), Sweden (5.7% in 2000), and the United Kingdom (4.2% in 2000). Software consultancy accounts for between 60% and 80% of computer services.

Box 2.2. Measuring the contribution of the ICT sector to value added

Examining the real contribution of ICT to value added would require an analysis based on volume measures. This is particularly problematic in the case of the ICT sector. On the one hand, there is the issue of measuring prices in sectors characterised by the significant quality improvements associated with technological advances in goods such as computers and semiconductors. On the other hand, there is the problem of measuring output in the telecommunications industry. Some countries use consumer price indices for phone rates to deflate value added; others use physical quantity indices for calls, telexes and other services to measure volume changes in output; and some countries use a composite index of producer price indices for the relevant components.

Several countries currently use hedonic methods to deflate output in the computer industry (e.g. Canada, Denmark, France and the United States). The production price deflator for the computer industry (ISIC Rev. 3, Division 30) is reported below. It shows a very rapid decline in production price indices for France and the United States, and a gradual decline in Denmark since 1984, but relatively little change in some other countries. These differences may partly reflect the use of a hedonic deflator in both France and the United States, the use of an exchange-rate-adjusted US hedonic deflator by Denmark, and the use of conventional deflators in the other countries.

Producer price indexes for the computer industry, 1995=100

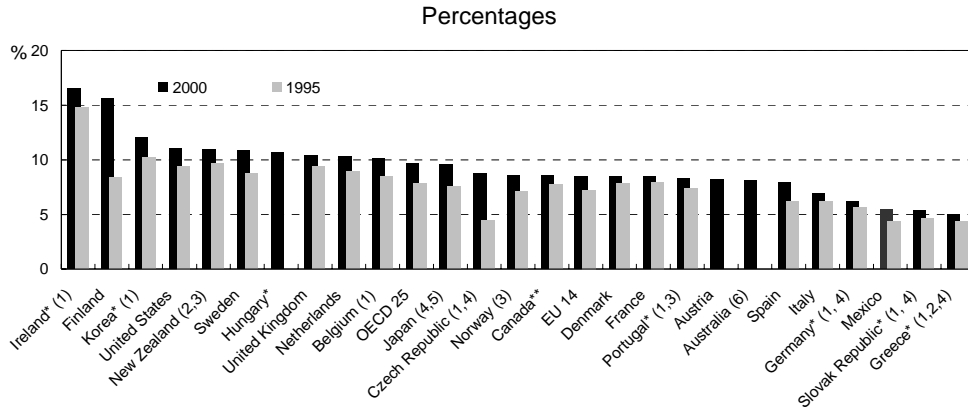


Source: OECD calculations on the basis of the STAN database.

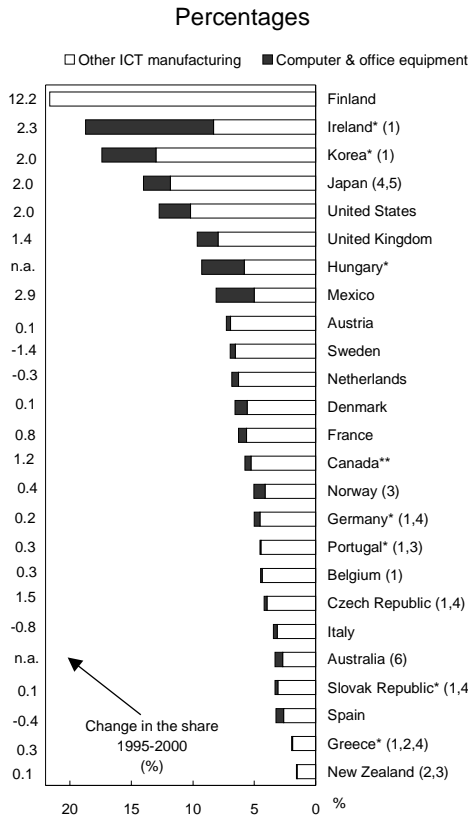
Adjusting for these methodological differences in computer deflators for the purpose of a cross-country comparison is difficult, however, since there are considerable cross-country differences in industrial specialisation. Only a few OECD countries produce computers or semiconductors, where price declines have been very rapid; many only produce peripheral equipment, such as computer terminals. For further information, see Pilat, D., F. Lee and B. Van Ark, "Production and use of ICT: A sectoral perspective on productivity growth in the OECD area", forthcoming in *OECD Economic Studies*, No. 35, Paris (forthcoming).

Size and growth of the ICT sector

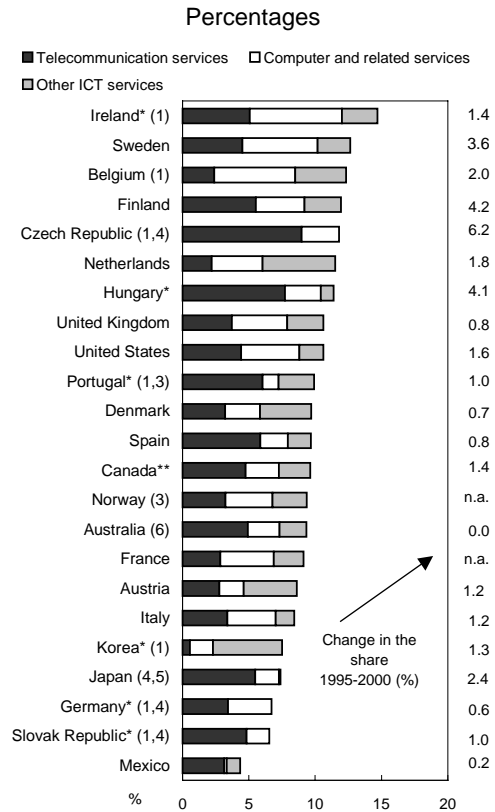
Share of ICT value added in business sector value added, 2000



Share of ICT manufacturing in total manufacturing value added, 2000⁷



Share of ICT services in total business services value added, 2000⁷



* 1999; ** 1998.

1. Rental of ICT goods (7123) is not available.
2. Postal services included with telecommunications services.
3. 1996 instead of 1995.
4. ICT wholesale (5150) is not available.
5. Includes only part of computer related activities (72).
6. 2000-2001.

7. "Other ICT manufacturing" includes communication equipment, insulated wire and cable and precision instruments. "Other ICT service" includes wholesale and rental of ICT goods.

Source: OECD estimates, based on national sources; STAN and National Accounts databases, August 2002.

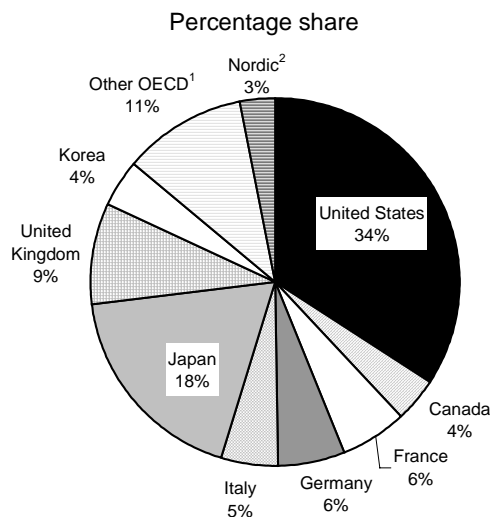
The contribution of the ICT sector to employment growth

- In 2000, the 20 OECD countries for which estimates are available employed 16 million persons in the ICT sector, about 6.4% of total business employment. The United States and the EU (excluding Greece, Iceland, Ireland and Luxembourg) each represented 34% of this total and Japan 18%.
- The ICT sector has been a major source of employment growth. Over the 1995-2000 period, OECD-area employment in the sector grew by almost 3 million persons, *i.e.* an average annual growth rate of over 4% a year, almost 3 times that of overall business sector employment. ICT services have been driving this growth; employment in the ICT manufacturing sector has generally followed the declining trend of overall manufacturing employment, albeit to a lesser extent. Exceptions are Finland and Mexico, where ICT manufacturing employment grew by over 9% a year, and Canada, the Czech Republic, the Nordic countries, Spain and the United Kingdom where it grew between 3% and 5%.
- Over the 1995-2000 period, ICT services employment grew everywhere except in Austria.

The United Kingdom (10.5%), the Netherlands (10.2%), Finland (9.8%) and the United States (9.5%), the Czech Republic and Spain (7.3%) registered annual growth rates above the OECD average (6.3%). Employment in computer-related services, mainly software services, was the most dynamic component, growing by an average of 11% a year in the OECD-20 area and by over 19% in the United Kingdom.

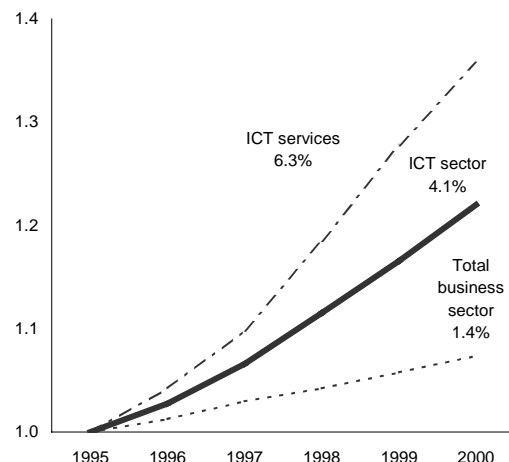
- In 2000, the share of ICT employment in total business sector employment was higher than the OECD average in Finland (10.9%), Sweden (9.0%), Canada (8.4%), the Netherlands (8%), the United Kingdom and Japan (about 8.2%), Belgium and France (about 7.3%).
- Over the 1995-2000 period, the contribution of ICT manufacturing to total manufacturing employment was stable in most OECD countries. It varies widely across the OECD area, ranging from 13.8% in Korea to 1.3% in Italy. The average share of ICT services employment in market services, instead, has grown over time to about 5.9% in the OECD-20 area in 2000.

Employment in the ICT sector, selected OECD countries, 2000



The contribution of ICT services to business sector employment growth, selected OECD countries

Average annual growth rate 1995-2000, index 1995=100



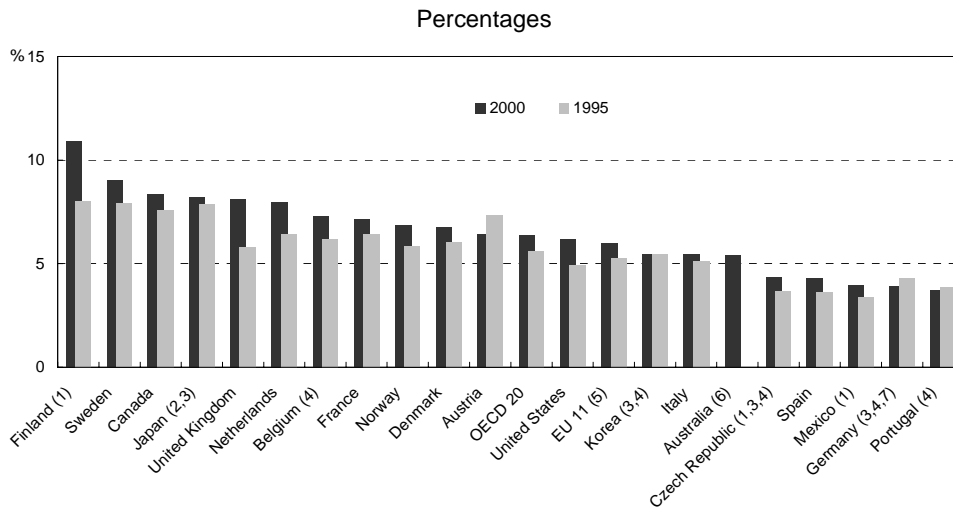
1. "Other OECD": Australia, Austria, Belgium, Czech Republic, Mexico, the Netherlands, Spain and Portugal.

2. Denmark, Finland, Norway and Sweden.

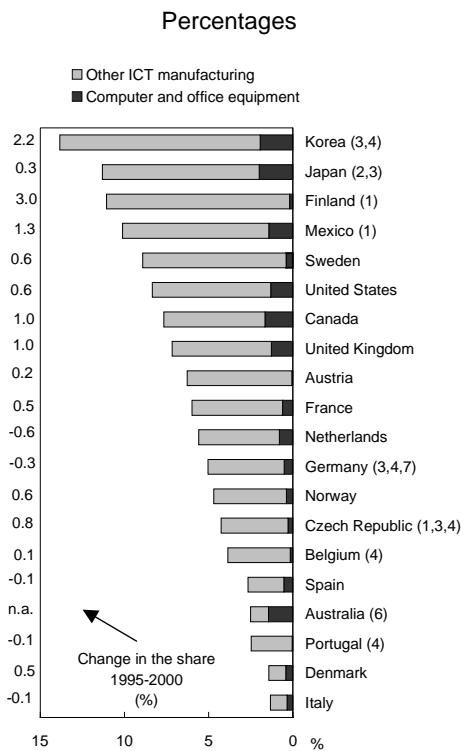
Source: OECD estimates, based on national sources; STAN and National Accounts databases, August 2002.

The contribution of the ICT sector to employment growth

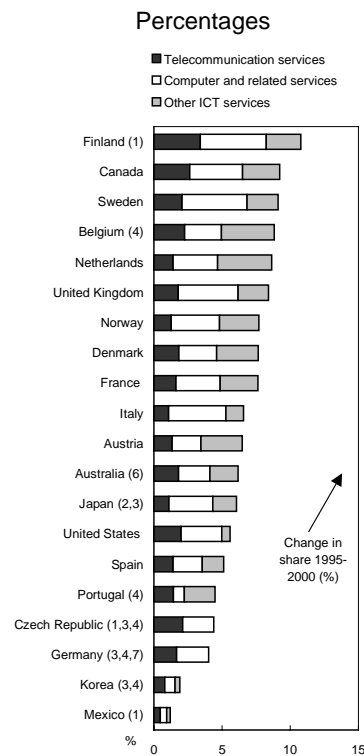
Share of ICT employment in business sector employment, 2000



Share of ICT manufacturing in manufacturing employment, 2000



Share of ICT services in market services employment, 2000⁸



1. Based on employee figures only.
 2. ICT services include market research and public opinion polling.
 3. ICT wholesale (5150) is not available.
 4. Rental of ICT goods (7123) is not available.
 5. Greece, Iceland, Ireland, Luxembourg missing.
 6. 2000-2001.
 7. Telecommunication services (642) are not available.
 8. "Other ICT manufacturing" includes communication equipment, insulated wire and cable and precision instruments. "Other ICT service" includes wholesale and rental of ICT goods.
 Source: OECD estimates, based on national sources; STAN and National Accounts databases, August 2002.

R&D in selected ICT industries

- The ICT sector invests heavily in R&D and is highly innovative. In 2000, ICT manufacturing industries accounted for more than a quarter of total manufacturing business R&D expenditure in most OECD countries, and more than half in Finland, Korea and Ireland.
- Data for 19 OECD countries show that, in 2000, business R&D expenditure in the ICT manufacturing sector was approximately USD 111 billion (current PPP dollars), while for the ICT services industries, data for 14 OECD countries show expenditure of at least USD 21 billion. The US ICT sector performs some 50% of OECD-wide R&D spending by the ICT manufacturing sector, followed by Japan with about 21%.
- In the 1990s, in countries with data for both manufacturing and services industries, ICT-related expenditure on R&D generally expanded much more rapidly in the services industries. Average annual growth rates for ICT-related manufacturing R&D expenditure were about 6% but for ICT-related services they were about 14%.
- For ICT industries, the ratio of R&D expenditure to GDP or to total business enterprise R&D can indicate the R&D specialisation of ICT industries. Finland, Korea and Sweden are relatively more specialised than large countries in both ICT manufacturing and services. Only Finland allocated more than 1% of GDP to ICT-related manufacturing R&D in 2000.
- ICT-related R&D intensities of the large European economies are well below those of the United States and Japan. The share of ICT-related manufacturing R&D expenditure in GDP in Germany and France is about 0.3%, compared to 0.6% and 0.7% in the United States and Japan, respectively.

Box 2.3 - Measuring R&D expenditure in selected ICT industries

The OECD definition of the ICT sector is largely based on the four-digit level of ISIC Rev. 3; however, data on R&D expenditure at the four-digit level are scarce. Therefore, the ICT R&D indicators reported here are calculated at the two-digit level for selected ICT industries and include the following ISIC Rev. 3 divisions:

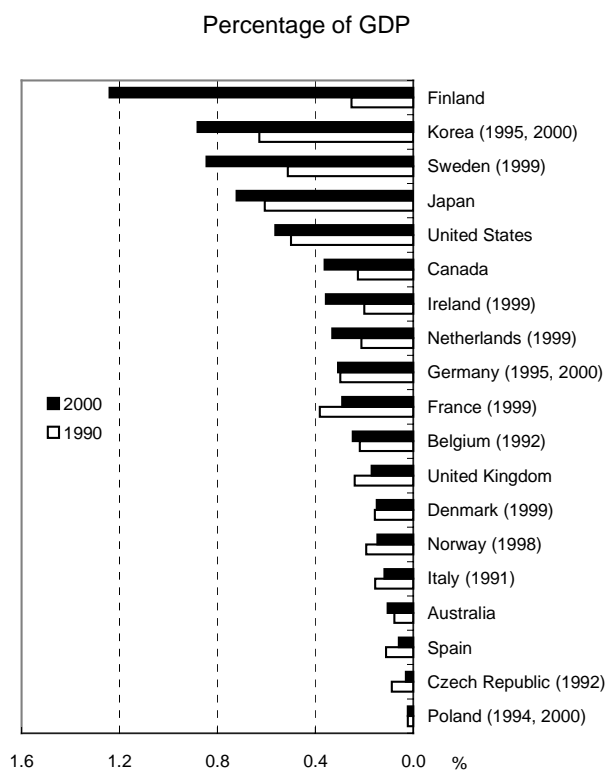
- Manufacturing industries: 30 (Office, accounting and computing machinery); 32 (Manufacture of radio, television and communication equipment apparatus); and 33 (Manufacture of medical, precision and optical instruments, watches and clocks).
- Services industries: 64 (Post and communications); and 72 (Computer and related activities). Two major weaknesses exist with data on R&D in services. In certain countries, the R&D surveys only give partial coverage of the service industries. Additionally, the definition of R&D is better suited to manufacturing industries than to services industries.

Data for R&D expenditure for selected ICT industries are from OECD's Analytical Business Enterprise R&D expenditure (ANBERD) database, which is closer to product field than to enterprise level. ANBERD data are estimated by the OECD on the basis of official business enterprise R&D data (OFFBERD) and may differ significantly from official data.

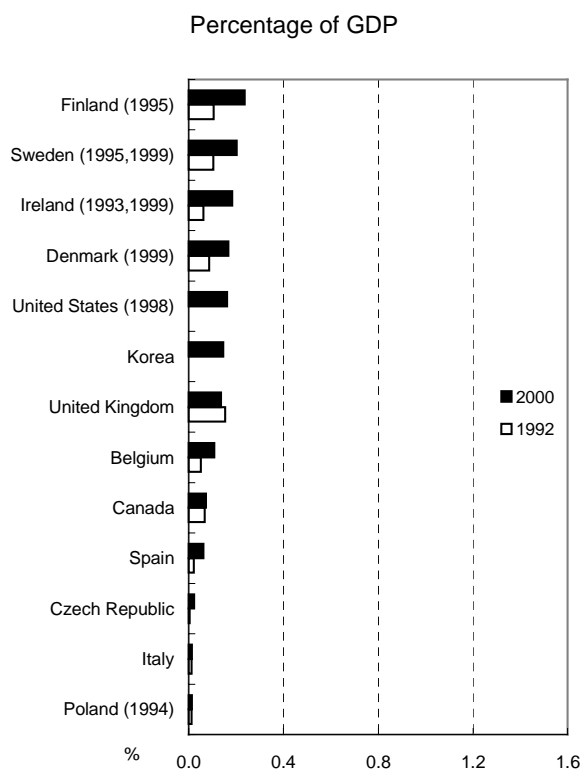
For further information, see *Research and Development Expenditure in Industry*, OECD, Paris, 2002.

R&D in selected ICT industries

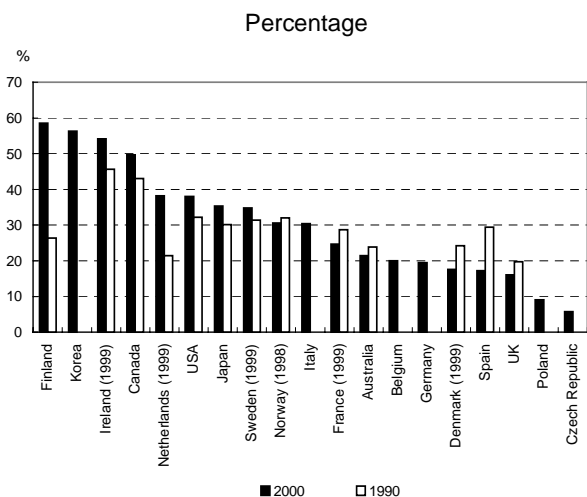
Business R&D expenditure by selected ICT manufacturing industries, 1990-2000¹



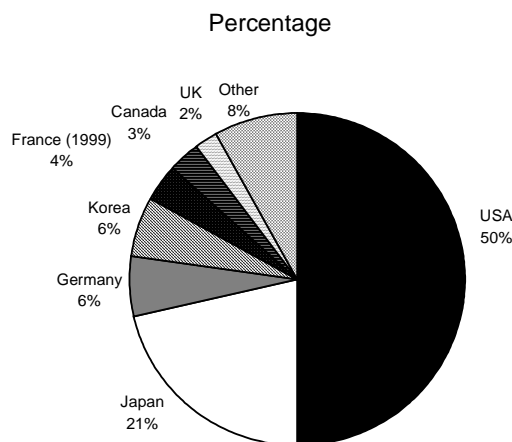
Business R&D expenditure by selected ICT services industries, 1992-2000^{1,2}



Share of ICT manufacturing in total R&D expenditure of the manufacturing sector, 1990-2000



Share of OECD³ countries in OECD-wide R&D expenditure in ICT manufacturing, 2000



1. 2000 or latest available year. Data are for 1990 or closest year for manufacturing industries, and 1992 or closest year for services industries.

2. Owing to unavailability of R&D data for class 642 (Telecommunications), division 64 (Post and telecommunications) is used as a proxy. Available information shows that in the United States, class 642 accounts for 97-98% of division 64 total.

3. Figures based on only 19 OECD countries.

Source: OECD, ANBERD database, August 2002.

The contribution of the ICT sector to international trade

- The 1990s witnessed a shift in the composition of OECD international trade in manufactured goods towards ICT products. Converting trade in ICT products into trade by ICT activities (see box), shows the growing importance of the ICT sector in total manufacturing trade. In 1990, trade in ICT goods, defined as the average of imports and exports, accounted for over 12% of OECD-wide trade in goods; by 2000, the share had reached almost 20%. ICT imports and exports contributed to total imports and exports by roughly the same amount (18% of imports and 17% of exports).
- The 2001 data mark a reversal of the 1990s trend. The share of ICT manufacturing in total manufacturing trade dropped significantly for the majority of OECD countries. For the 16 countries for which data are available, the share of ICT manufacturing trade dropped on average by 2.4 percentage points since 2000, with Korea and Sweden experiencing decreases of over 4 percentage points. In Ireland, the share of ICT trade increased by 3.5 percentage points.
- Data on ICT trade in services are limited to telecommunications services (for 11 countries) and computer-related services (for 24 countries). They generally only cover the period 1996-99. In 1999, ICT services accounted for little over 3% of the total services balance of payments.
- The ICT manufacturing sector plays a particularly important role in Ireland (41% of manufacturing trade) and Korea (30%). In Hungary the Netherlands, Mexico and Japan, it represented about a quarter of total manufacturing trade in 2000/2001.
- The overall trade balance shows countries' relative comparative advantage in ICT manufacturing. Only seven countries showed a positive ICT trade balance in 2000/2001. The ICT trade surplus was highest in Ireland, Korea and Japan. The main source of comparative advantage in Finland and Sweden is trade in telecommunications equipment; in Ireland, it is trade in computers.

Box 2.4. Measuring ICT sector trade

In the absence of tables of international trade in goods and services by detailed industrial activity which are compatible with the national accounts, ICT sector exports and imports at current prices have been estimated using the OECD's International Trade in Commodity Statistics (ITCS) database. The OECD definition of the ICT manufacturing sector, based on ISIC Rev. 3 has been used as the basis for the ICT trade indicators. Current price exports and imports for this sector have been derived from the product-based data in OECD's International Trade in Commodity Statistics (ITCS) database by applying a standard Harmonised System Rev. 1 (HS1) to ISIC Rev. 3 conversion key. Thus, the trade indicators constructed here reflect trade in goods for which the ICT manufacturing sector can be considered the origin (exports) or the destination (imports) according to the UN standard conversion table. This type of aggregation, as well as the use of a single conversion key for all OECD countries, means that the figures reported here are not strictly comparable with those published in national accounts.

Data on selected ICT services (telecommunications and computer and related services) are instead estimated within a Balance of Payments (BPM5) framework and, as a general rule, cannot be compared to data on trade in ICT goods based on customs returns and related surveys. It was therefore not possible to calculate indicators of overall trade in ICT goods and services.

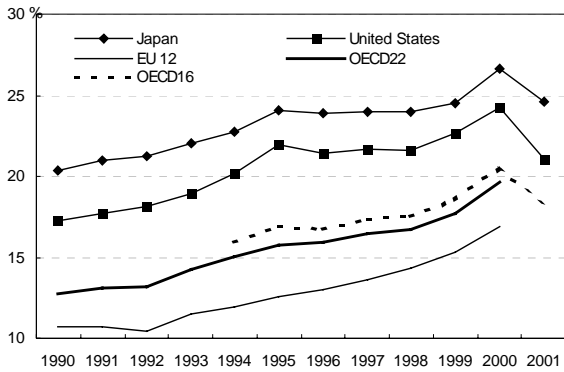
Finally, data for both imports and exports of individual countries include imported goods that are subsequently re-exported. Imports and subsequent re-exports may be in the same or in different reference periods. In the latter case, this may influence not only indicators of countries' relative trade performance but also indicators of individual countries' trade balances.

The ICT sector trade balance is calculated as ICT exports minus ICT imports divided by total manufacturing trade (the average of exports and imports).

The contribution of the ICT sector to international trade

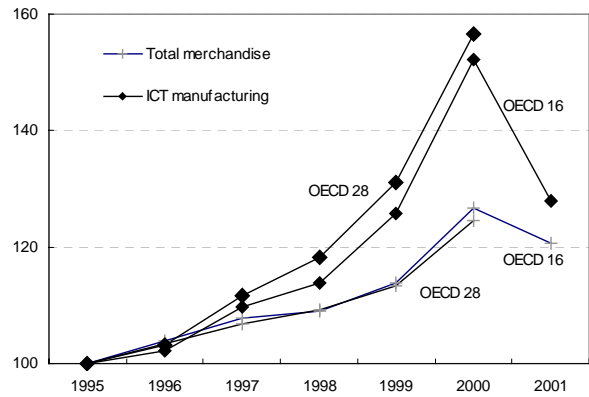
ICT trade by area, 1990-2001^{1,2}

Share of total manufacturing trade



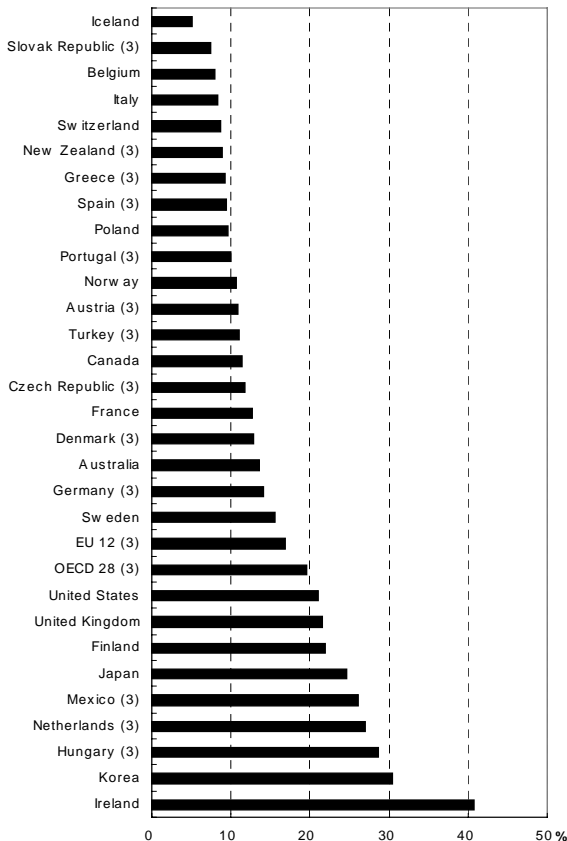
OECD 16² and ICT-related trade, 1990-2001

Index: 1995=100

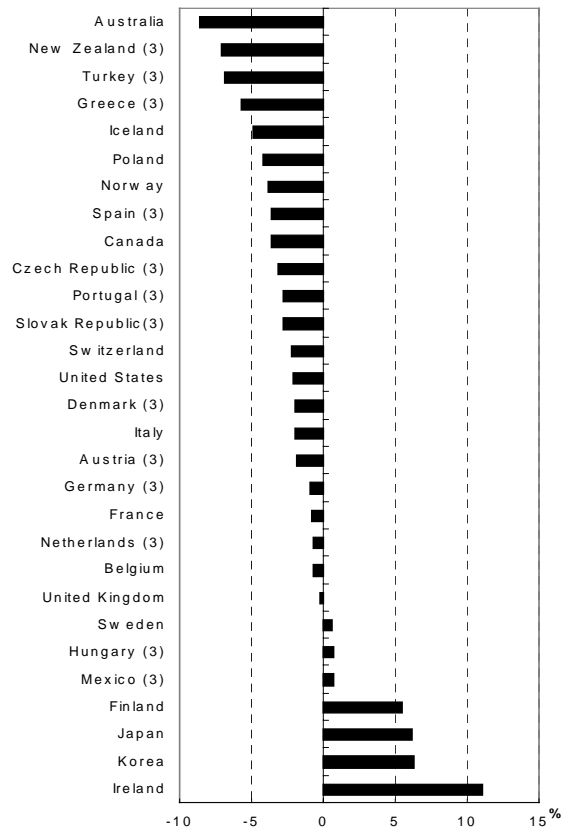


ICT manufacturing trade,¹ 2001 or latest year available

Share of total goods trade



ICT sector trade balance, 2001 or latest year available



1. Average of imports and exports.

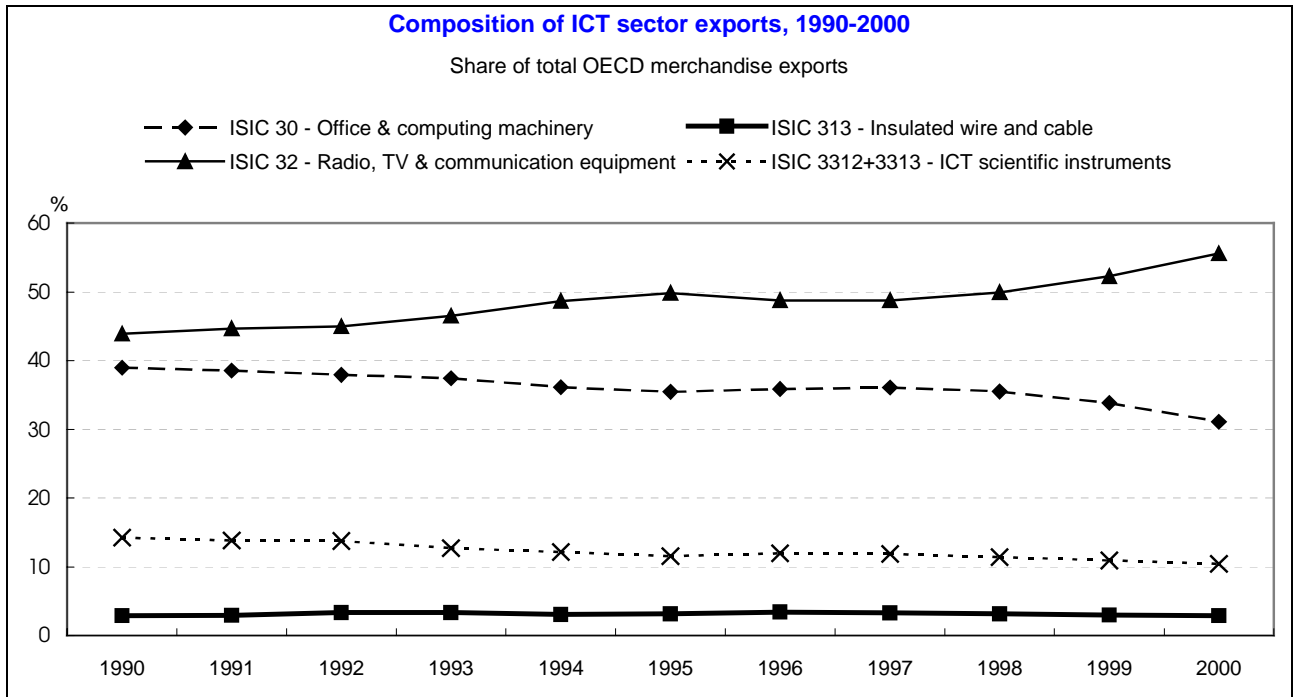
2. EU 12 includes all European Union member states except Austria, Belgium and Luxembourg. OECD 28 includes all OECD member countries except for the Slovak Republic and Luxembourg. OECD 22 includes member countries with complete data from 1990 to 2000 and includes EU 12, Australia, Canada, Iceland, Japan, Mexico, New Zealand, Norway, Switzerland, Turkey and the United States. OECD 16 includes member countries with data from 1994 to 2001 and covers Australia, Belgium, Canada, Finland, France, Iceland, Ireland, Italy, Japan, Korea, Norway, Poland, Sweden, Switzerland, United Kingdom and the United States.

3. 2000 data.

Source: OECD, ITCS and STAN databases, August 2002.

ICT sector exports: share in total exports and composition

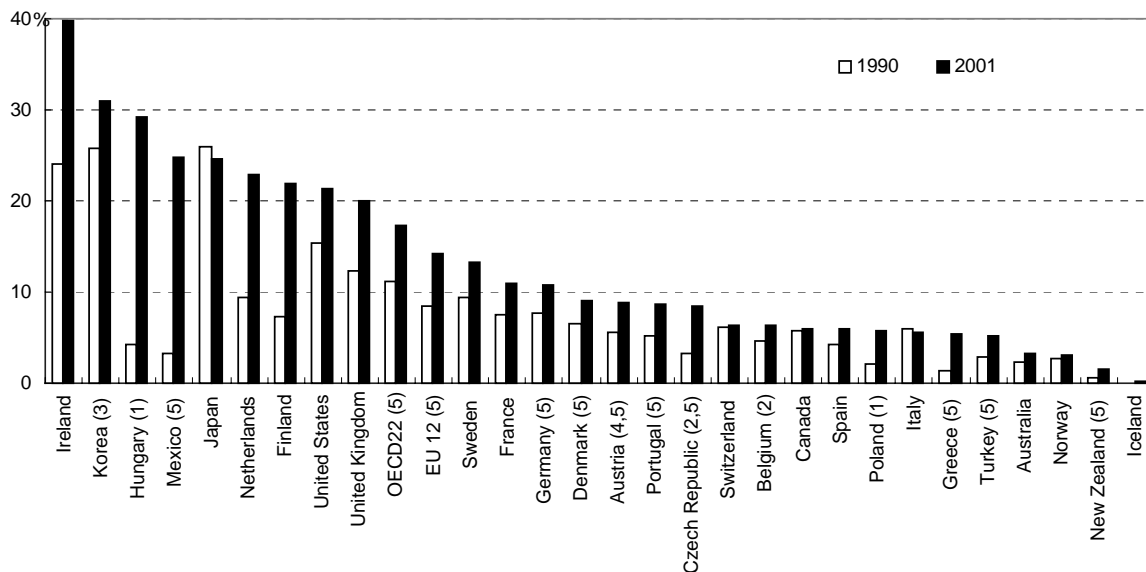
- Relative to other sectors, the ICT sector is highly globalised. In 2001, Ireland reported the highest share of ICT sector exports in total merchandise exports (40%). In contrast, Iceland was the country with the smallest share of ICTs in total merchandise exports (0.2%).
- Generally, OECD countries with large ICT sector exports' share at the end of the decade also had large exports at the beginning. However, Mexico, Finland and the Netherlands rapidly increased their ICT sector exports during the 1990s. Japan and Italy were the only countries where the share of ICT sector exports was lower in 2001 than in 1990.
- In the OECD area, the composition of ICT sector exports changed somewhat over the past decade.
 - The share of office and computing machinery fell from 39% in 1990 to 31% in 2000, while the share of radio, TV and communication equipment increased from about 44% in 1990 to just under 56% in 2000.
 - The composition of ICT sector exports also differs considerably. In Hungary and Ireland, computer equipment (contained within the office and computing machinery class) represents the bulk of ICT sector exports. In contrast, Finland and Sweden's ICT sector exports are almost completely composed of communication equipment.



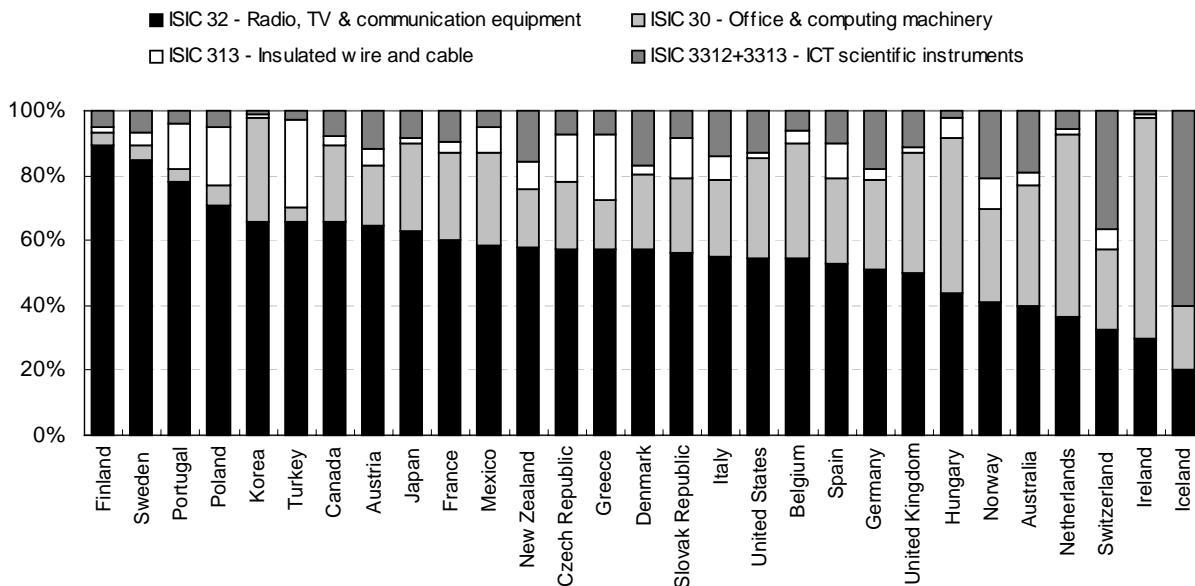
Source: OECD, ITCS and STAN databases, August 2002.

ICT sector exports: share in total exports and composition

Share of ICT sector exports in total merchandise exports, 1990-2001



The composition of ICT sector exports, 2000



1. 1992.
2. 1993.
3. 1994.
4. 1995.
5. 2000.

Source: OECD, ITCS and STAN databases, August 2002.

ICT trade specialisation and comparative advantage

- Three variables of trade specialisation in ICT goods – export specialisation, import specialisation and intra-industry specialisation – offer a view of countries’ performance in terms of the relative “openness” of the ICT sector compared to the industry average (see box).
- Several ICT manufacturing producers – Ireland, Korea, Hungary, Japan – have a high export specialisation in ICT sector exports. This index of revealed comparative advantage is quite skewed, as only ten countries are above the OECD average. Among the countries who had a comparative advantage in 1995 and 2000, only Korea and the Netherlands have managed to consolidate their comparative advantage; Japan has lost the most export market share and Hungary, Finland and Sweden have emerged as new actors.
- On the one hand, this unequal distribution may reflect the presence of economies of scale in ICT production. On the other, the fact that countries like Finland and Sweden have built up their competitive advantage in this sector over recent years may indicate that there is space for new entrants in ICT markets.
- Even if a country is not an ICT producer, the benefits of ICT technology may be apparent in its imports of ICT goods. Australia is the prime example of a non-producer that has a relatively high import propensity in ICT goods. Some activity in both imports and exports may be a sign of re-export. The intra-industry trade index (IIT) indicates whether the ICT sector imports and exports roughly the same quantity of ICT goods. Hungary, Mexico and the Netherlands have a relatively high IIT and are also relatively specialised in both exports and imports.
- Based on indicators of manufacturing trade specialisation and comparative advantage in ICT, the European Union lags behind the United States and Japan. However, the European average hides wide differences between smaller and northern European countries and the larger economies. Ireland, Finland, the Netherlands and Sweden have a comparative advantage in ICT sector trade. Relatively high levels of ICT intra-industry trade can instead be found in Germany, France and the United Kingdom.

Box 2.5. ICT specialisation indices

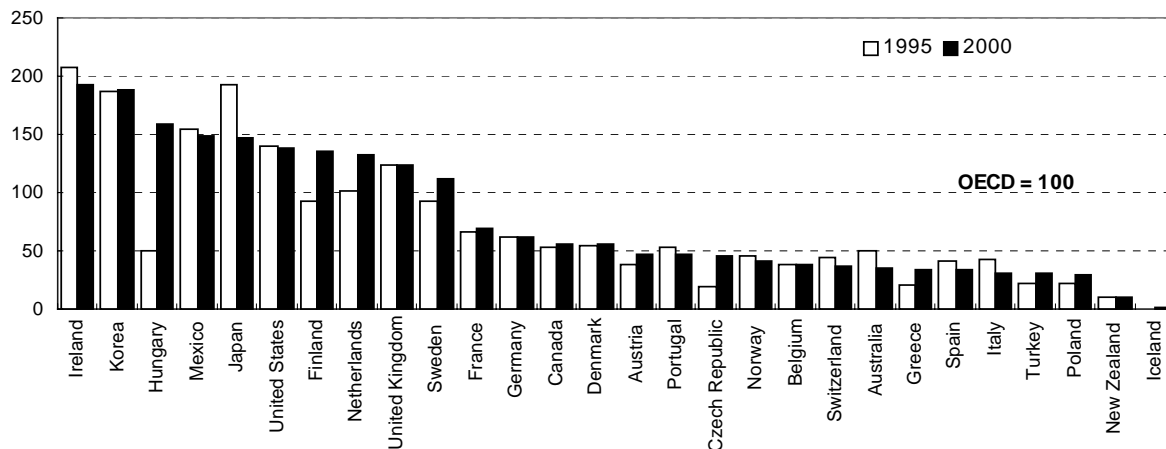
Indicators of import and export specialisation show a country’s imports/exports for a given industry relative to total manufacturing imports/exports, divided by OECD imports/exports of the same industry relative to OECD total manufacturing imports/exports. For a given country, a value above 100 in a certain industry implies that, relative to the OECD average, the country specialises in imports or in exports in that industry. The indicator of export specialisation is also commonly known as revealed comparative advantage.

Intra-industry trade is the value of total trade remaining after subtracting the absolute value of an industry’s net exports and imports. For comparisons of countries and industries, this measure is expressed as a percentage of each industry’s combined exports and imports (intra-industry trade index or IIT). This index varies between 0 and 100. If a country exports and imports roughly equal quantities of a certain product, the IIT index is high. If trade is mainly one-way (whether exporting or importing), the IIT index is low.

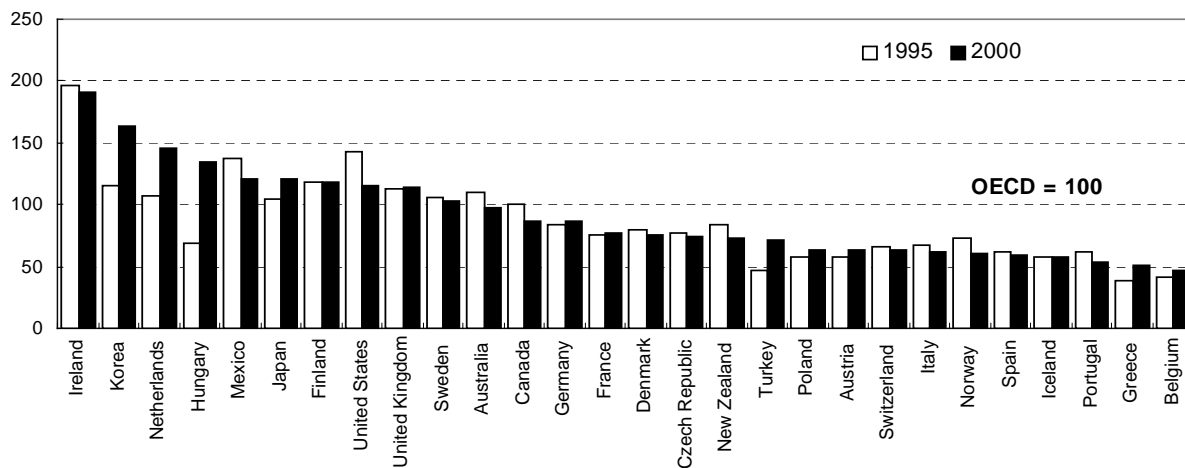
Part of intra-industry trade may be intra-firm trade, *i.e.* cross-border transactions between affiliates of multinational companies. In 2000, US intra-firm trade accounted for 47% of the total value of merchandise imports and 32% of merchandise exports (*Information Technology Outlook*, OECD, Paris, 2002).

ICT trade specialisation and comparative advantage

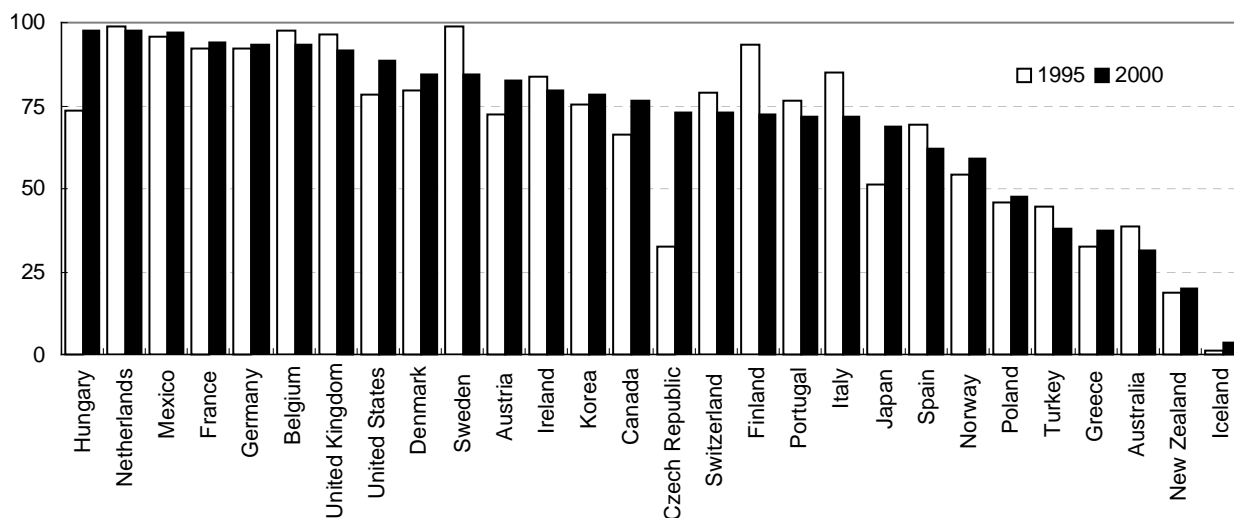
ICT export specialisation index, 1995-2000



ICT import propensity index, 1995-2000



ICT intra-industry specialisation index, 1995-2000



Source: OECD, based on STAN indicators, August 2002.

Foreign affiliates in the ICT sector

- Since the mid-1980s and the increase in globalisation, foreign direct investment has been central to industrial restructuring. Most firms have found the establishment of an affiliate to be a particularly effective way of penetrating markets. As data on foreign direct investment data do not capture this phenomenon directly, indicators on the activities of foreign affiliates provide important complementary information.
- In the ICT sector, the role of foreign affiliates varies considerably, depending on the part of the sector concerned. In computer manufacturing (ISIC 30), almost all production in Ireland and Hungary is due to foreign affiliates, while in the United States and Germany, only a small share of production is attributable to foreign affiliates.
- Foreign affiliates also make a strong contribution to the manufacturing of electronic equipment (ISIC 32). Hungary and Ireland are again the countries with the largest share (almost 90%), but the United Kingdom also has a very high share of foreign multinationals. In the Netherlands, Finland and Sweden, foreign affiliates account for only a small share of the production of electronic equipment, possibly owing to the strong position of domestic firms in these markets.
- In the telecommunications sector (ISIC 642), foreign affiliates play a minor role in almost all OECD countries, Hungary and Portugal being exceptions. This partly reflects the degree of liberalisation of telecommunications markets – for instance the limits that were, until recently, imposed by many countries on foreign investment. In 1998, foreign affiliates in Ireland and Italy accounted for 0% of production in this sector.
- In the other major ICT service sector, computer services (ISIC 72), foreign affiliates play a more substantial role. The share of foreign affiliates is relatively high in Belgium, Norway and the United Kingdom, but very low in Turkey and the United States.
- For manufacturing segments of the ICT sector, there is a close link between the shares of foreign affiliates in employment and in production. In most cases, the share of production is slightly higher, an indication that, on average, the labour productivity of foreign affiliates is somewhat higher than that of domestic firms.
- Foreign affiliates also account for a considerable share of R&D in the ICT sector, particularly in Ireland. In large OECD countries, such as France and the United Kingdom, a considerable share of R&D in ICT manufacturing is due to foreign affiliates, a sign that many firms are establishing R&D laboratories outside their home countries.

Box 2.6 - Activity of foreign affiliates

The possession of 10% of a company's voting shares or voting power is considered to indicate the existence of a direct relationship and influence over the management of the firm in question.

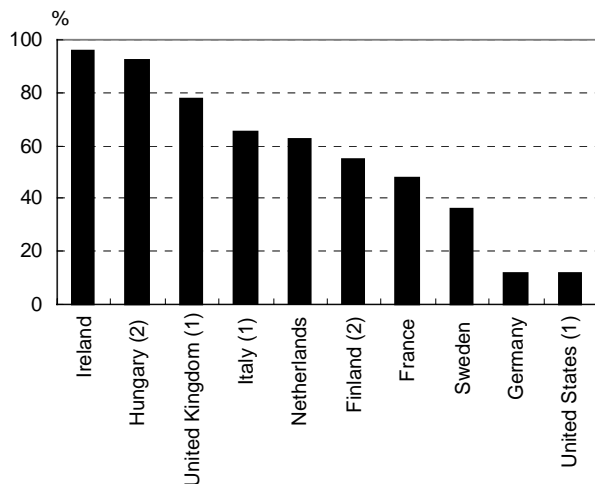
The ownership of a majority of ordinary shares (more than 50%) or voting power on the board of directors implies control and the ability to shape a company's activities. Variables such as turnover, number of employees or exports are attributed in full to the controlling investor.

The term "foreign affiliate" is restricted to majority-owned foreign affiliates. Accordingly, the geographical origin of a foreign affiliate is defined as the country of the parent company if it holds, directly or indirectly, more than 50% of the affiliate's voting shares.

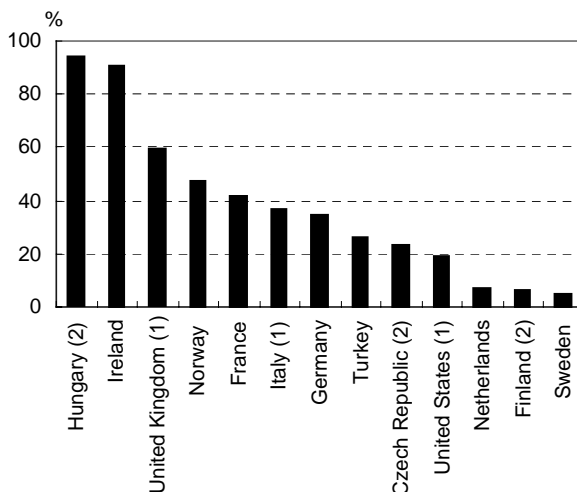
However, the majority-holding criterion is not used for the United States and Hungary, as these countries include minority foreign-owned firms in their statistics.

Foreign affiliates in the ICT sector

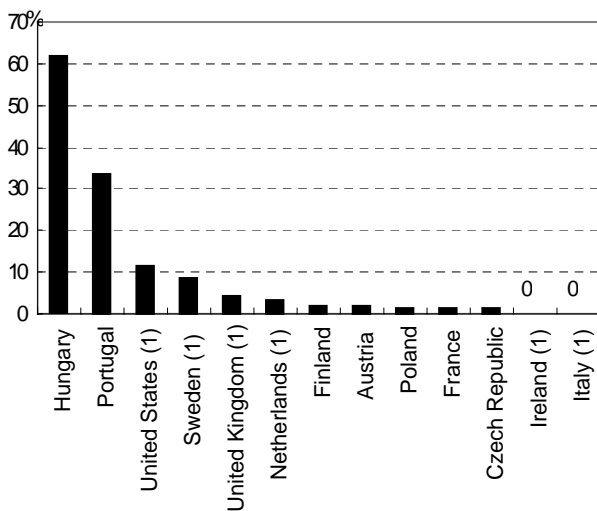
Share of production (turnover) of foreign affiliates in computer manufacturing (ISIC 30), 1998



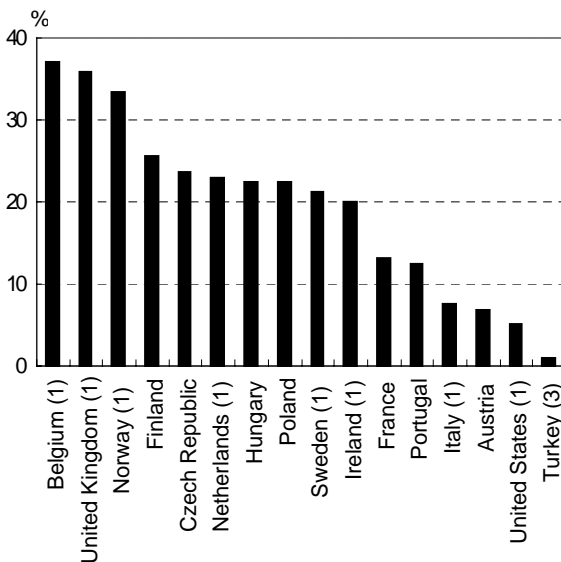
Share of production (turnover) of foreign affiliates in electronic equipment manufacturing (ISIC 32), 1998



Share of production (turnover) of foreign affiliates in the telecommunications sector (ISIC 642), 1998



Share of production (turnover) of foreign affiliates in computer-related services (ISIC 72), 1998

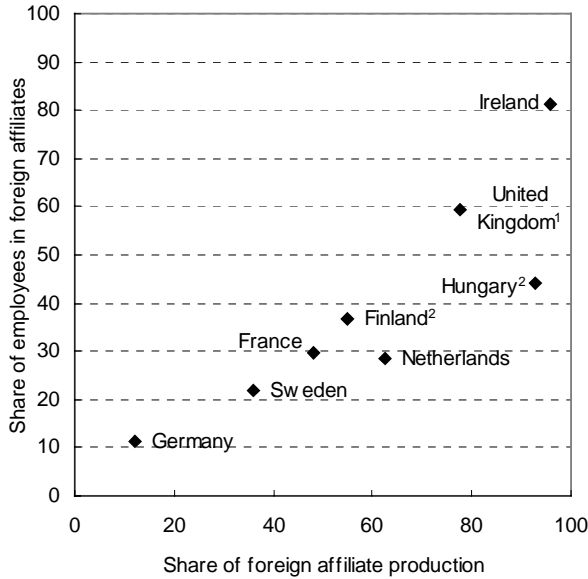


- 1. 1997.
- 2. 1999.
- 3. 1994.

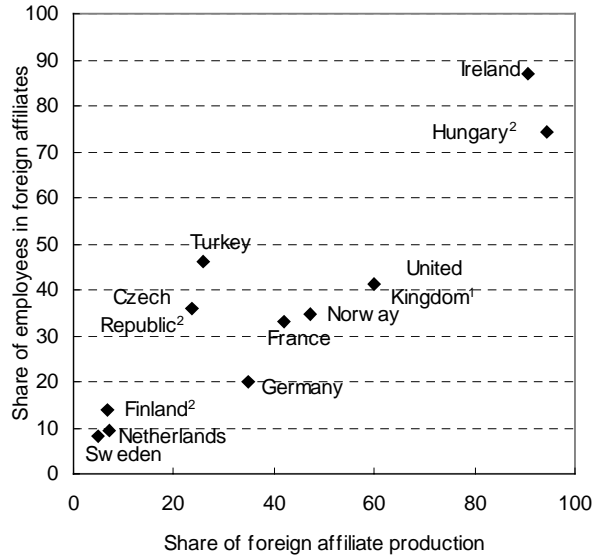
Source: OECD, Activities of Foreign Affiliates (AFA) and Foreign Affiliates Trading Services (FATS) databases.

Foreign affiliates in the ICT sector

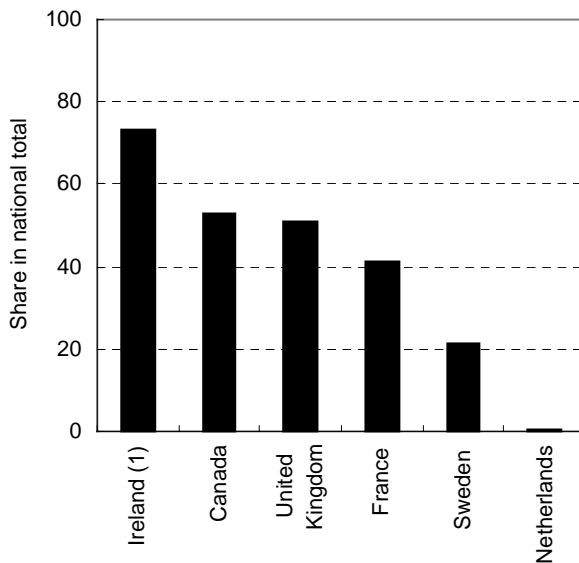
Relationship between share of production and employees of foreign affiliates in computer manufacturing (ISIC 30), 1998



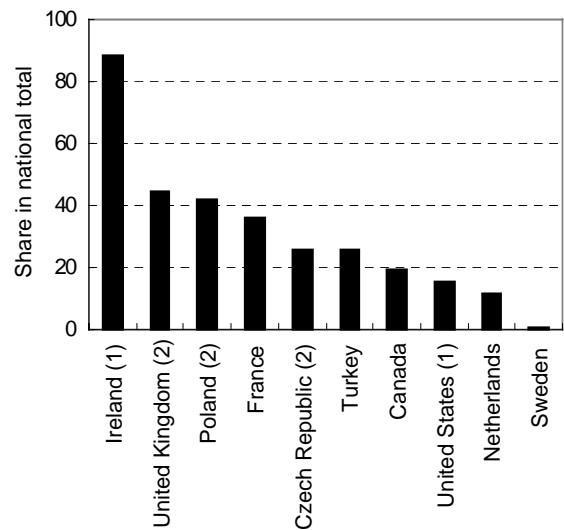
Relationship between share of production and employees of foreign affiliates in radio, TV and communications equipment (ISIC 32), 1998



Share of R&D by foreign affiliates in office, accounting and computing machinery (ISIC 30), 1998



Share of R&D by foreign affiliates in radio, TV and communications equipment (ISIC 32), 1998



1. 1997 data.

2. 1999 data.

Source: OECD, Activities of Foreign Affiliates (AFA) and Foreign Affiliates Trading Services (FATS) databases.