Chapter 2

RECENT DEVELOPMENTS IN SCIENCE, TECHNOLOGY AND INNOVATION POLICIES

Innovation has been an area of considerable policy development in recent years and, in most cases, of growing public funding. Governments have developed strategic plans for enhancing innovation performance and accelerating their nations' transformation into knowledge-based economies. They have forged more explicit links to industry and other stakeholders so as to solicit expert opinion and advice that can inform policy development. This chapter reviews recent developments in science, technology and innovation policy in OECD countries. It reviews the main directions and objectives of national policies and addresses policy developments related to public-sector research, government support for private-sector R&D and innovation, collaboration and networking among innovating organisations, human resources for S&T, and policy evaluation.

Introduction

As the pace of technological change quickens and innovation requires more complex and interactive management (Tidd, Bessant, and Pavitt, 1997), policy makers continue to adapt science, technology and innovation policies. This chapter reviews recent developments in these policies in OECD countries and in observers to its Committee for Scientific and Technological Policy (CSTP), focusing on changes introduced in 2002-04.[1] It draws on responses to an OECD questionnaire sent to national delegates concerning topics that are high on the agendas of policy makers in these areas. The chapter first outlines general trends in science, technology and innovation policies and reviews the main directions and objectives of national policies. It then addresses policy developments related to public-sector research, government support for private-sector R&D and innovation, collaboration and networking among innovating organisations, human resources for S&T, and policy evaluation.[2]

In spite of considerable differences in their economic situations, industry structure and innovation systems, OECD countries recognise that innovation makes an increasingly important contribution to sustainable economic growth (OECD, 2001a, 2001b). Their science, technology and innovation policies show a number of common general trends:

- *Strategic planning for innovation*. Innovation has become a priority on the national agendas of most OECD countries. Many have developed strategic plans that establish explicit objectives for innovation policy, mainly to transform the nation into a knowledge-based economy.
- *New governance structures for innovation policy*. To increase the efficiency of national innovation systems, many OECD countries have implemented or amended laws and institutional structures governing innovation policy. The primary objectives are to enhance co-ordination when developing and implementing innovation policy, to reduce bureaucracy in universities and public research organisations, to strengthen the contribution of science to socio-economic concerns, and to integrate research better with industrial development.
- *Increased public* R&D *expenditures*. Despite budget constraints, public expenditures on R&D continue to grow. Much of the increase is focused on specific fields, in particular information and communication technology (ICT), biotechnology and nanotechnology, which are expected to contribute to economic growth and employment. Many EU countries have national targets for expanding R&D expenditures in accordance with the objective set by the Barcelona European Council in March 2002.[3] Japan increased government R&D expenditures by approximately JPY 24 trillion from fiscal year (FY) 2001 to FY 2005, and Korea's target is to double national R&D investment between 2001 and 2007. US government expenditures on R&D continue to rise since 2002, driven largely by concerns about safety and security.
- *Transition to more project–based funding in public research institutions*. Almost all OECD countries are financing a larger share of public research via project-based funds (*e.g.* contracts and grants) instead of institutional funds (*e.g.* block grants). Their aims are to: *i*) stimulate competition and co-operation among research centres while maintaining their independence; and *ii*) encourage public institutions to seek external funds based on their ability to meet users' needs.
- *Strengthening policy initiatives to encourage industrial* R&D *and innovation*. In general, OECD countries have increased the scope and intensity of programmes to boost business R&D and innovation through a range of policy instruments: direct public funding of business R&D and innovation (*e.g.* grants and loans); tax incentives for R&D; strengthened intellectual property rights (IPR) regimes; development of venture capital; and support for R&D and innovation in small and medium-sized enterprises (SMEs) and new technology-based firms. In general, support for direct

financing mechanisms has declined, while that for indirect mechanisms (*e.g.* tax incentives, IPR) has increased.

- I*ncreased attention to industry-science linkages*. OECD governments have taken a number of steps to increase linkages between the public research system and industry to facilitate technology transfer and enhance the responsiveness of research to the needs of industry and society. Several countries have implemented legislation to grant ownership of intellectual property resulting from government-funded research to the performing institution rather than to researchers. Others have expanded support for public/private partnership (P/PP) programmes to link universities, government research laboratories and industry for research and innovation.
- G*rowing concern about human resources for science and technology*. Almost all OECD countries are increasingly concerned about future supplies of human resources for science and technology. They note a growing demand for researchers in a knowledge-based economy but declining interest in science and technology among students. Efforts to address such concerns include programmes to improve public understanding of science, reform education curricula and enhance career prospects in the public research sector. Most countries have expanded programmes to encourage international mobility of S&T workers and promote return migration of expatriated researchers.
- G*reater attention to policy evaluation*. OECD countries have increased their demand for policy evaluation at all levels: individual policy instruments, key institutions and national innovation systems. In the Czech Republic, Denmark, the Netherlands, New Zealand, Sweden and Switzerland, formal evaluations of national innovation policies have become compulsory. Australia has already undertaken extensive evaluations of all innovation policies.

Main directions for science, technology, and innovation policies

Innovation has been an area of considerable policy development in recent years and, in most cases, of growing public funding. Governments have developed strategic plans for enhancing innovation performance and accelerating their nations' transformation into knowledge-based economies. To implement these plans and achieve their objectives, countries have modified institutional structures for policy formulation and governance of the innovation system. Recognising the wide range of policy domains that impinge on innovation, many countries have also created or revamped structures for ensuring greater co-ordination among government ministries, departments and agencies. They have also forged more explicit links to industry and other stakeholders so as to solicit expert opinion and advice that can inform policy development.

National plans for science, technology and innovation

In recent years, nearly all OECD countries have developed high-level policy documents outlining their ambitions and strategies for improving innovation capabilities (Table 2.1). Australia, Canada and Norway have set up overarching innovation plans that cross the policy domains of many government ministries. Hungary and Ireland have placed science, technology and innovation policies in a more prominent position in overall national development strategies. Japan, Korea and Spain have introduced new science and technology strategies for achieving a knowledge-based society. A number of these developments are reviewed below.

In November 2002, Australia's Prime Minister announced that science and innovation was one of the government's nine strategic priorities and announced four National Research Priorities (described later in this chapter). The Backing Australia's Ability (BAA) initiative, which was introduced in 2001, has been expanded in recognition of the critical role that innovation plays in Australia's future prosperity. The government recently announced the follow-up package to BAA, Backing Australia's Ability – Building Our Future through Science and Innovation; funding will be increased to more than AUD 1 billion a year (until 2010-11) to fund research in areas of particular social, economic and

environmental importance. The programme's whole-of-government focus should help to improve research and broader policy outcomes.

Austria's Research and Technology Council, an advisory body of the federal government, issued a new planning document, the *National Action Plan for Research and Innovation*. Its main objectives are: increased efficiency by better leveraging public and private funding; co-operation and networking to attain critical mass and size in research and technological innovation; excellence in basic research; investment in education, training and qualification for highly skilled, motivated knowledge workers; improved fiscal incentives for enterprises engaged in research and technological innovation; and structural reorganisation to reduce bureaucracy in public research organisations.

In February 2002, Canada launched its innovation strategy with the release of two key documents: *Achieving Excellence* and *Knowledge Matters*. After extensive consultations with Canadians, a National Summit on Innovation and Learning (November 2002) identified a variety of priorities for action. In February 2004, the government announced the goal of making Canada a world leader in the path-breaking technologies of the 21st century: biotechnology, environmental technology, information and communications technologies, health technologies and nanotechnology. In 2001, Canada had already set a goal of reaching the top five within the OECD in terms of R&D funding as a share of GDP.

The Czech Republic made innovation a priority issue in the National Research and Development Policy of the Czech Republic 2004-08, which was approved in January 2004. Key elements include improvement of research evaluation, international and inter-regional co-operation, human resources, and transfer of R&D results to industry. In March 2004, the Czech government approved the National Innovation Strategy. Via the Technology Centre of Academy of Sciences, the Czech Republic plans to undertake technology foresight exercises to identify priority fields for its national research programme.

Knowledge in Growth, an ambitious plan to strengthen the Danish knowledge system, was released in January 2003. This White Paper lays out Denmark's overall vision and puts forward a strategy to strengthen Denmark's position as a leading knowledge society which increasingly produces, attracts, spreads and utilises knowledge. A new Act on Technology and Innovation defines the following aims: *i*) co-operation and dissemination of knowledge between knowledge-producing and knowledge-using institutions; *ii*) development, diffusion, utilisation and commercialising of research results, new technology, organisational and market knowledge; *iii*) development of knowledge- and technology-based companies; *iv*) provision of finance and competence for knowledge- and technology-based companies; and *v*) international co-operation on the utilisation of knowledge and technology. From 2001 to 2004, the government is carrying out a technological foresight pilot programme, which will be closely linked to the establishment of a new Future Fund for the development of generic technologies of importance to the nation, including biotechnology, ICT and nanotechnology.

Finland's new government emphasises strengthening expertise and entrepreneurship, recognising that the keys to maintaining Finland's competitiveness are promoting R&D, raising the educational level of the population, pursuing a co-operative approach to income policy, boosting productivity of the public sector, and speeding application of ICT. The triennial review of the Science and Technology Policy Council, entitled *Knowledge, Innovation and Internationalisation*, found that success in innovation is a key factor for the success of both business enterprises and societies.

The Hungarian government's programme for 2002-06 and its medium-term economic policy programme define science and technology policy as important government tools to promote social and economic development. Four of the priorities defined by the programme are: *i*) a legal framework that is conducive to innovation; *ii*) making Hungary an attractive location for R&D; *iii*) enhancing protection of IPR; and *iv*) increasing the resources for innovation for SMEs.

Ireland has a strong policy focus on the role of science and technology in supporting economic growth and development. Ireland has been extraordinarily successful in attracting foreign investment, and industry policy has shifted its focus to high-value, knowledge-driven industry, both from abroad and at home. This goal is underpinned by investment in education – particularly higher education.

Table 2.1. **Summary of national plans for science, technology and innovation policy in OECD countries**

	National plan	Main objectives
Australia	Backing Australia's Ability (BAA)	Strengthen Australia's ability to generate ideas and undertake research; accelerate the commercialisation of ideas, and develop and maintain skills.
Austria	National Action Plan for Research and Innovation	Improve efficiency of national innovation system by strengthening public and private sector actors and the interactions between them.
Canada	Achieving Excellence; Knowledge Matters	Become one of the world's most innovative economies and societies.
Czech Republic	National Research and Development Policy	Improve research evaluation, international and inter-regional co-operation, human resources and transfer of R&D results to industry.
Denmark	Knowledge in Growth	Strengthen Denmark's position as a knowledge-based society that produces, attracts, disseminates and utilises knowledge.
Finland	Knowledge, Innovation and Internationalisation	Boost the success of business and society via innovation, entrepreneurship and expertise.
Hungary	Government Programme 2002-06; Medium-Term Economic Policy Programme	Promote social and economic development by constructing a legal framework that is conducive to innovation, attracting R&D, enhancing the protection of intellectual property, and increasing resources for innovation in SMEs.
Iceland		Strengthen S&T efforts to underpin Iceland's cultural and economic position in an internationally competitive environment and secure continued high living standards and quality of life for Icelanders.
Ireland		Promote R&D to become an innovation-driven economy; improve competitiveness; remain attractive for FDI; maximise social cohesion.
Japan	S&T Basic Plan	Boost economic effects and social benefits of intellectual assets.
Korea		Transform the nation into a science- and technology-based society
Luxembourg		Improve the overall competitiveness of the economic sector by strengthening the science base and raising overall R&D investment levels.
Mexico	Special Programme of Science and Technology	Improve competitiveness and innovation of companies.
Netherlands	Science Budget 2004; Innovation Letter	Focus and concentration, knowledge that promotes economic activity, human resources and quality; set out a rolling agenda of steps for government to take to strengthen the innovative ability of the Dutch business sector.
New Zealand	i^3 Challenge	Define national needs, strengthen long-term research capabilities and extract greater commercial value from research.
Norway	From Idea to Value: A Plan for a Comprehensive Innovation Policy	Become one of the most innovative countries in the world, where resourceful and creative enterprises and people are given opportunities to develop a profitable business.
Poland	Knowledge, Computerisation, Competitiveness: Poland on the Way to a Knowledge-based Economy	Develop science and research potential; build the Polish Research Area as a part of the European Research Area; prepare and implement regional innovation strategies; promote the information society.
Slovak Republic	National S&T Policy to 2005	Ensure long-term co-ordination of national S&T policy with other policies; create conditions for raising S&T to levels of comparable EU countries by 2005; create conditions for international S&T co-operation; increase the efficiency of R&D.
Spain	National Plan for Scientific Research, Technological Development and Innovation	Develop the Spanish science-technology-enterprise system; improve enterprise competitiveness; focus on citizen services, improvement of social welfare and knowledge generation.
Sweden		Integrate parts of industrial policy and of research policy; increase commercialisation of university research.
Switzerland	Promotion of Education, Research and Technology; Action Plan for Promotion of Innovation and Entrepreneurship	Update teaching structures; increase research activities; promote innovation; Intensify national and international co-operation; strengthen education, research and technology; further entrepreneurship; enhance science-industry relationships; learn through international benchmarking.
United Kingdom	Science and Innovation Investment Framework	Retain and build world-class centres of excellence; improve responsiveness of publicly-funded research; increase business investment in R&D; strengthen supplies of scientists, engineers and technologists; ensure sustainable and financially robust universities and public laboratories; boost public confidence in and awareness of scientific research.

Ireland established Science Foundation Ireland as a statutory body in 2003 and by mid-2004 had committed EUR 320 million in support of basic research in two strategic areas: biotechnology and ICT.

In developing its second Science and Technology Basic Plan, Japan's strategic decisions on R&D priorities were based on the objectives of enhancing intellectual assets and boosting economic and social benefits. Japan has placed science and technology at the core of regional development by establishing intellectual clusters (being implemented in 15 regions in 2003) and co-operative research and innovation projects (in 19 regions in 2002 and 9 regions in 2003) which encourage co-operation among industry, academia and government in local areas.

In 2003, the Korean government placed science and technology at the top of the policy agenda with a view making Korea a science- and technology-based society. The policy goal is to make another leap in national development. To this end, the government has established a framework for science, technology and innovation policies and programmes. The major features of the policy framework include strengthening S&T capability, ensuring efficient and balanced allocation of resources, and encouraging the participation of civil society and private industry in the S&T policy-making process.

Mexico's 2001-06 Special Programme of Science and Technology defines general guidelines for developing science, technology and innovation. It establishes three main strategic objectives: *i*) to have a state policy on science and technology; *ii*) to increase scientific and technological capacity; and *iii*) to improve the competitiveness and innovativeness of companies.

In the Netherlands, the government that took office in June 2003 identified education, research and innovation as important pillars of policy aimed at stimulating the Dutch economy. This resulted in the allocation of additional funds during a period of general retrenchment in public spending, the drafting of a policy paper on innovation (Innovation Letter) and the establishment of an Innovation Platform with representatives from all the actors of the Dutch national system of innovation. The White Paper on science policy, *Science Budget* 2004: *Focus on Excellence and Greater Value*, sets out policy initiatives, with the following main themes: *i*) focus and concentration; *ii*) knowledge that promotes economic activity; *iii*) human resources; and *iv*) quality.

In February 2003, New Zealand launched the i^3 Challenge, a major policy initiative focused on defining national needs, strengthening long-term research capabilities and extracting greater commercial value. The catalyst for this initiative was stakeholder consultation through the 2002 Research, Science and Technology (RS&T) Directions Forum, an annual event that provides a platform for a wide range of stakeholders to identify issues and suggest improvements to the RS&T system.

The Norwegian government launched in October 2003 a national policy plan, "From Idea to Value – A Comprehensive Innovation Policy". It addresses general framework conditions for innovation and focuses on five R&D-related topics: *i*) raising Norway's total R&D investments (as percentage of GDP) at least to the OECD average by 2005; *ii*) pursuing increased quality and internationalisation of Norwegian research; *iii*) stimulating R&D investments by industry; *iv*) promoting commercialisation of research findings; and *v*) fostering better interaction between knowledge institutions and the business community.

Spain's new National Plan for Scientific Research, Technological Development and Innovation (2004-07) has been approved. The public R&D budget for the first two years is EUR 9.2 million, after which it will be subject to revision and verification that its initial targets have been met. The plan aims not only to raise enterprises' technological and innovative capacity but also to promote an innovative business community and better public-private interaction. New aims of the plan are to: *i*) improve co-ordination with science, technology and innovation policies of regional governments; *ii*) implement new fiscal measures to boost support for R&D and innovation in the private sector; *iii*) improve Spain's position in the international arena; *iv*) monitor and evaluate the plan's programmes and actions; and *v*) improve science culture in society.

In 2002 Sweden initiated a process to set up a new innovation policy to deal with the so-called Swedish paradox of slow long-term economic growth despite high R&D spending, primarily by industry.

A new strategy for innovation policy calls for integration of parts of industrial and of research policy. The Prime Minister, the Minister of Education and Science, and the Minister of Industry, Employment and Communications argued for an improved innovation system as a way to increase economic growth. One aspect of the debate concerns the commercialisation of university research and how to increase it. The results of a technology foresight exercise had considerable influence on the debate on future priorities concerning investments in higher education and research and resulted in the directing of major efforts to research in biotechnology and information technology.

The Swiss parliament accepted education, research and technology as a priority field for government policy and agreed to an above-average increase in financing. As a complementary measure, the Federal Department of Economic Affairs launched an action plan to stimulate innovation and entrepreneurship, highlighting four main topics: *i*) strengthening education, research and technology; *ii*) furthering entrepreneurship; *iii*) enhancing science-industry relationships; and *iv*) learning through international benchmarking.

The United Kingdom continues to invest heavily in research and training of university students, ensuring that funding is allocated to research of the highest quality. It is committed to ensuring that science plays its full role in supporting innovation through the exchange of knowledge between the

Box 2.1. S&T policy in South Africa

In 2002, South Africa developed the National Research and Development Strategy (NR&DS) and the Research and Development Strategy, which represent major milestones in creating an enabling environment for the country's national system of innovation. The new R&D strategy rests on three pillars: *i*) innovation; *ii*) human resources for science, engineering and technology; and *iii*) creating an effective government S&T system. The NR&DS is the key innovation strategy to address the "innovation chasm", *i.e.* the gap between research and products and services created from technologies developed through such research. The strategy involves the establishment and funding of technology missions critical to promoting economic and social development.

Like many OECD countries, the South African government has set a target of doubling its current investment in science and technology (from 0.7% of GDP to about 1.1%) over a three-year period. The priority technologies include biotechnology, ICT, manufacturing technology, technology to leverage knowledge and technology, to add value to natural resource sectors, and to reduce poverty. In addition to establishing the Department of Science and Technology as an entity separate from the previous Department of Arts, Culture, Science and Technology, South Africa plans to create a comprehensive performance management system for all government-owned laboratories and institutions.

Government supports private R&D and innovation mainly through four programmes: *i*) Technology and Human Resources for Industry Programme (THRIP); *ii*) Support Programme for Industrial Innovation (SPII); *iii*) Innovation Fund; and *iv*) Poverty Relief Programme. THRIP aims to contribute to the increase in the number and quality of people with the appropriate skills to develop and manage technology for industry and to promote increased interaction among industry researchers and technology managers. The SPII was initiated in 1993 to promote technology development in manufacturing industries through support for innovation of competitive products and processes. The SPII has three schemes: the Matching Scheme, the Feasibility Scheme and the Partnership Scheme. The Poverty Reduction programme deals with encouraging science councils and tertiary institutions to transfer technology to communities, as well as to provide business training and mentorship.

Because the South African science and technology system faces the problem of an ageing and shrinking scientific population and needs to increase the numbers of young people choosing science as a career, there is a special focus on increasing the number of women and persons from previously disadvantaged communities who enter and remain in the sciences. The South African Agency for Science and Technology Awareness was established to help improve public understanding of science. Its mandate is to stimulate public debate and provide factual information on various issues in science and technology. For women and disadvantaged communities, the CREST Research Project on Gender Equity in Science and Technology, the Distinguished Woman Scientist Award, and Women Scientist Scholarships were implemented.

science base and both business and the community. In its *Science and Innovation Investment Framework* 2004–2014, the United Kingdom identifies the attributes of a successful science and innovation system for the nation and the policies it will set in place to make progress against these goals.[4] As part of the process of developing future policy, the UK government intends to maintain an on-going dialogue with business and the private non-profit sector. Its efforts are based on the belief that science, technology and innovation are central to meeting the challenge of raising productivity and improving welfare.

Changing institutional frameworks for innovation policy

To increase the efficiency of national innovation systems, many countries have modified their institutional structures for developing and implementing science, technology and innovation policies and in some cases have implemented new legislation to do so. The main aims are to better co-ordinate policy making and implementation, reduce bureaucracy in universities and public research organisations, strengthen links between scientific research and socio-economic concerns, and connect research policy better to industrial development. Such reforms have led to changes in ministerial structures or responsibilities, the establishment of inter-ministerial working groups, or the creation of new advisory committees that involve stakeholders from outside government to provide additional perspectives on policy needs.

New institutional structures

Changes in institutional structures for science, technology and innovation policy have resulted in some cases from explicit attempts to consolidate responsibility for related policy areas under a single institutional umbrella as a way to improve co-ordination or to reflect the higher priority being given to these fields. In other cases, they reflect changes in government and a reshuffling of responsibilities.

In Denmark, responsibility for universities, research and innovation policy, and ICT policy has been given to the Ministry of Science, Technology and Innovation. In addition the government has begun to reform the entire public research and innovation system, via the Act on Technology and Innovation and new laws developed for the Danish National Research Foundation and government research institutions. In Poland, the Office of the State Committee for Scientific Research became the Ministry of Scientific Research and Information Technology in April 2002, with a typical ministerial structure. The Act on Scientific Research Financing is to be implemented in 2004. These reforms aim to make the Polish research sector more open, more flexible and more eager to use opportunities created by accession to the EU and the influx of foreign investments into the industrial sector.

In Belgium, the new development plan of the Brussels-Capital Region recognises for the first time the major role of R&D as an essential vector for economic growth. A new legal framework was put in place to guide regional developments in science, technology and innovation policy, which is now administered by a new institute for the encouragement of scientific research and innovation. It is supported by a new agency in Brussels: a "one-stop shop" to encourage the development of enterprises by guiding them through the services they need. In Flanders, both the Minister for Education and the Minister for Economy were formerly responsible for research, which is now under the responsibility of a single minister to facilitate the development of an integrated policy. In 2004, the Austrian federal government proposed a new Research Funding Reform Act to Parliament. It proposes to set up a new funding agency to bring together major organisations that have previously operated separately.

In Ireland, government elections in April 2002 resulted in the transfer of the science, technology and innovation portfolio from the Minister of State (a junior minister) to the T*ánaiste* (deputy Prime Minister) and the Minister for Enterprise, Trade and Employment. Spain had a Ministry of Science and Technology for four years (2000-04), but early in 2004, after a change in government, the ministerial structure was changed and the Ministry of Education and Science has taken responsibility for scientific research, technological development and innovation policy, together with university education. A newly created Ministry of Industry, Tourism and Commerce has responsibility for strategic actions for the

renewal or promotion of industry in disadvantaged sectors and in areas such communications and information society (formerly under the Ministry of Science and Technology), as well as tourism and commerce (previously under the Ministry of Economy). Korea's president has moved to strengthen the role of the Ministry of Science and Technology as the central agency for inter-ministerial co-ordination of S&T policy and R&D activities, while reducing its involvement in the execution of R&D programmes. He also announced that the Minister of Science and Technology would be named a deputy prime minister to give him/her full responsibility for allocating government R&D funding.

Improving co-ordination

In addition to restructuring ministries, OECD countries have taken steps to improve co-ordination among ministries involved in science, technology and innovation. In Luxembourg, the government set up in 2003 an inter-ministerial working group with members of the Ministry of Culture, Higher Education and Research, Ministry of Economic Affairs, Ministry of SMEs, and Ministry of Work and Employment to design a co-ordinated multi-year action plan in the spirit of the European Commission's Action Plan, *More Research for Europe*. In the United Kingdom, the Prime Minister has asked the Secretary of State for Trade and Industry to chair a ministerial team to lead the innovation agenda across government and drive the implementation of the Department of Trade and Industry's (DTI) Innovation Report.[5]

Other countries have expanded such co-ordinating bodies to include stakeholders from outside government. The Netherlands, for example, has created a national Innovation Platform, chaired by the Prime Minister and encompassing leading figures from research and industry, as well as the Ministers for Education, Culture and Science and for Economics Affairs. Similarly, Norway established a ministerial committee chaired by the Ministry of Trade and Industry for the development and co-ordination of innovation policy. It has also set up a forum consisting of ministers, the business community and other key players to improve co-operation between public authorities and private players with a view to policy design and implementation. New Zealand has actively encouraged a whole-of-government approach to policy development and the formation of new collaborations among stakeholders. A recent example is the emergence of the Science Enterprises Group, which represents a broad cross-section of research, science and technology providers: Crown Research Institutes, universities and industry research associations.

Advisory councils

Several countries have created new advisory councils to provide input into science, technology and innovation policy making. While some consist only of government officials, many include representatives of industry and the research community. Austria has established a new Science Council to advise the minister about the future development of the public universities. In Belgium, the French Community has a new council for science policy, so that all the Belgian authorities now have their own council. In April 2002, the Mexican Congress approved the National Council on Science and Technology's (Conacyt) Organic Law and modified the way Conacyt operates so that it can fulfil more efficiently the objectives of the Science and Technology Bill (*Ley de Ciencia y Tecnología*, LCyT).

In 2003, Hungary established the Science and Technology Policy Council as the top-level science and technology policy-making and co-ordination body. It is presided by the Prime Minister with the aid of a Science and Technology Policy Advisory Body, composed of highly respected representatives of science and industry. At the operative level, the National Office for Research and Technology (NORT) was created in December 2003 as the primary policy-making institution for research, development and innovation. The Research and Technological Innovation Council, a body composed of representatives of both the public and private sectors, essentially serves as a board for NORT and a counsel for developing the government's R&D strategy.

In Iceland, new legislation took effect in April 2003, establishing the Science and Technology Policy Council under the Office of the Prime Minister and authorising public support to scientific research via the Ministry of Education, Science and Culture and to technological development via the Ministry of Industry and Trade. The Council is composed of five ministers and 14 additional members. Its two

subcommittees, the Science Board and the Technology Board, both draw nine members from the 14 non-ministerial members of the Council. The resulting overlap of four members on the two committees is intended to ensure a strong policy link between science and socio-economic concerns, including support to innovation.

In order to incorporate the interests of industries into national S&T and R&D policy processes, the Korean government includes leaders from industry in the membership of the National Science and Technology Council, which governs S&T policy and government R&D resource allocation. Industry also participates in the management of government research institutes by its presence on the boards of the research councils that are responsible for the operation of government R&D organisations. The government encourages industry participation in national R&D programmes. Research proposals involving industry are given preferential treatment in the funding process. Other efforts involve the creation of public/private partnerships and regional clusters.

Increasing public R&D *expenditures*

Consistent with the higher priority given to science, technology and innovation, OECD countries have substantially increased publicly funded R&D, despite persistent budget constraints and overall reductions in government funding in some countries. Several countries have established explicit targets for public expenditure on R&D and taken preliminary steps to achieve them. Such targets reflects the growing recognition of the linkages among R&D, innovation and economic growth and more widespread attempts to use science and technology policy (*e.g.* R&D funding policy) to meet economic objectives.

Among EU countries much of the increase in R&D spending reflects the aim to increase R&D expenditures to 3% of GDP by 2010 (Barcelona objective). For example, the Austrian federal government committed to raising R&D to 2.5% of GDP in 2006. Austria's R&D expenditures were 2.19% of GDP in 2003 and estimated to reach 2.27% in 2004. Ireland's gross expenditure on R&D is currently 1.4% of GNP, and its goal is to achieve 2.5% of GNP by 2010. Public-sector funding of research in Ireland is rising at about 5% a year in real terms. Spain's target for R&D expenditure, according to the National Plan (2004-07), is to reach 1.22% of GDP in 2005 and 1.40% of GDP by 2007. The plan also has a target of 2.1% of GDP for innovation expenditures in 2005 and over 2.5% of GDP in 2007. Although the Luxembourg government fully endorses the Lisbon strategy and the Barcelona objective, no specific target has been set so far.

Other EU countries have also boosted public R&D funding. Denmark has allocated funds for further public-sector investments in knowledge and science. The budget for 2003 and 2004 allocates supplementary appropriations of just under DKK 7.4 billion for university programmes, research, ICT and innovation for 2003-07. The United Kingdom has set a target to increase R&D intensity from the current level of 1.9% of GDP to 2.5% by 2014. In keeping with this objective, the *Science and Innovation Investment Framework* announces the government's intention to increase investments in the public science base at least as fast as the trend growth rate of the economy between 2004 and 2014 and increasing science spending as a proportion of GDP. The Framework calls for the public science budget to increase 5.8% a year (in real terms) during the period from 2004-05 to 2007-08.

Eastern European countries that joined the EU in May 2004 also anticipate growing R&D spending. In the Czech Republic, the ratio of government R&D expenditures to GDP is expected to increase from 0.58% in 2004 to 0.60% in 2006. Poland's ambition is to boost R&D spending to 1.5% of GDP by 2006 and reach 3% in 2010, of which two-thirds from the private sector, in accordance with the Barcelona target.

Outside of Europe, OECD countries have also achieved significant increases in public R&D funding, in some cases linked to specific spending targets:

- Australia has increased R&D expenditure via the BAA initiative. BAA funding is phased, with AUD 193 million in 2001-02, AUD 419 million in 2002-03, AUD 634 million in 2000-04, and AUD 1 billion in 2005-06. R&D funding has been extended through the follow-up package to BAA, Backing Australia's Ability – Building Our Future through Science and Innovation, at over AUD 1 billion a year until 2010-11.

- Canada increased overall public funding for R&D by 8.7% from 2002-03 to 2003-04. Since 1995, spending on R&D has increased steadily from just over 2% to just over 3% of total government expenditures. To support Canada's research base, the government in its March 2004 budget again increased the permanent budgets of Canada's three federal granting councils: the Natural Sciences and Engineering Research Council (NSERC); the Canadian Institutes of Health Research (CHIR); and the Social Sciences and Humanities Research Council of Canada.
- Japan raised the total amount of government R&D spending by some JPY 24 trillion from FY2001 to FY2005 so that spending as a share of GDP would remain equivalent to that of leading European countries and the United States. The rise was based on the assumption that government R&D investment should be 1% of GDP, requiring a nominal growth rate of 3.5%, during the period of the Second Basic Plan.
- The Korean government set a target to double national R&D investment between 2001 and 2007 when the term of the current government ends.
- In Mexico, one of the most important commitments of the current administration is to increase R&D spending from 0.4% of GDP in 2001 to 1% in 2006. To achieve this goal, the public sector will need to maintain the spending increments earmarked for this activity during the next few years, and private spending must increase.
- In the United States, the government budget for R&D climbed from USD 83.8 billion in 2000 to USD 118 billion in 2003. It is projected to rise to USD 126 billion in 2004 and USD 132 billion in 2005. The largest increases have been in the R&D budgets of the Department of Defense and the National Institutes of Health, which saw growth of USD 19 billion and USD 9 billion, respectively between fiscal years 2000 and 2003. The National Science Foundation received an additional USD 1 billion in R&D funds.

Prioritisation of public R&D *expenditures*

Increases in R&D funding have not been evenly distributed across scientific and technological fields. Most countries have identified a limited number of priority sectors to receive above-average amounts of new funding because of their anticipated leverage in terms of future economic growth, employment and overall social value. While there are variations, the broad areas receiving the most attention are ICT, biotechnology and nanotechnology (Table 2.2).

In some cases, funding for priority areas is tied to national innovation strategies. Austria's priority research areas are emphasised in its National Plan for Research and Innovation, and the Hungarian government's National Development Plan for 2004-06 identifies seven scientific areas for priority funding. Australia's priority areas are outlined in its National Research Priorities and the aims of the Backing Australia's Ability initiative. These are areas of particular social, economic and environmental importance to Australia, and areas in which a whole-of-government focus has the potential to improve research and broader policy outcomes. State and territory governments also play an increasingly important role in establishing research infrastructure and related industry clusters in fields such as biotechnology, ICT and resource processing. In the United Kingdom, research council funding reinforces cross-council priorities, which include stem cells (GBP 40 million), a sustainable energy economy (GBP 28 million), and rural economy and land use (GBP 20 million), as well as continued investment in existing priorities for post-genomics and proteomics (GBP 246 million), e-science (GBP 213 million) and basic technology (GBP 104 million), which were established in 2001-02.

Funding of priority areas is also linked with new funds and funding instruments. The Danish government proposed in 2004 the establishment of a Future Fund for Danish investments in prosperous high-tech areas, such as biotechnology, nanotechnology and ICT. In Mexico, 14 sectoral funds began operating in several areas of applied research and technological development (*e.g.* health, communications, environment, housing, agriculture and economic development) and for the advancement of knowledge more generally. The Cabinet of the Netherlands has introduced more than 30 knowledge infrastructure projects, funded from natural gas revenues. These projects (to be carried

Table 2.2. **Science and technology priorities in OECD countries**

	Priority fields of science and technology
Australia	Environmentally sustainable Australia; Promoting and maintaining good health; frontier technologies for building and transforming Australian industries; safeguarding Australia.
Austria	Life sciences; ICT; nanosciences and micro technologies; mobility, transport, space and aeronautics; environment, energy and sustainability; social sciences, humanities, and cultural studies.
Czech Republic	Embryonic cell research.
Denmark	Biotechnology; nanotechnology; and ICT.
France	Research for health; development of renewable energy; resource management (water and food); diffusion of knowledge and promotion of scientific culture.
Germany	ICT; microsystems engineering; optical technology; materials research; clean processes and production technologies; biotechnology; nanotechnology.
Hungary	Material science, production engineering and equipment; energy; transport; electronics, measurement and control technology; biotechnology; environmental protection; and ICT and its applications.
Iceland	Environment; ICT; and nanotechnology.
Ireland	Biotechnology; and ICT.
Japan	Life sciences; ICT; environment; and nanotechnology and materials.
Korea	Digital TV and broadcasting; displays; intelligent robots; new-generation automobiles (intelligent car, clean car, etc.); next-generation semiconductors, next-generation mobile communication; intelligent home-networks; digital content and solutions; next-generation batteries; and biomedicine (bio-chips, artificial organs, etc.).
Mexico	ICT; biotechnology; materials; design; and manufacturing processes. In addition, sectoral funds have been established for applied research and technology development in areas such as health, communications, environment, housing, and agriculture.
Netherlands	Life sciences and genomics; nanotechnology; and ICT.
New Zealand	Biotechnology; ICT; and creative industries.
Norway	Marine research; medical and health research; ICT; energy and environment; functional genomics; and new materials (*i.e.* nanotechnology).
Spain	Chemistry; materials (including nanotechnology); industrial design; quality of life (including biomedicine and biotechnology); space; physics; information society; social sciences and humanities; security.
United Kingdom	Stem cells; sustainable energy; post-genomics and proteomics; e-science; and basic technologies.
United States	Inter-agency priorities include: homeland security; networking and information technology; nanotechnology; priority areas of the physical sciences; biology of complex systems; climate, water and hydrogen.

Source: OECD, based on national sources.

out by public-private consortia) are mainly in the fields of life sciences and genomics, ICT and nanotechnology. For its part, Norway created a fund with income from its petroleum sector in 1999; interest is used to fund long-term basic research in general and in four priority areas: marine research, medical and health research, ICT and energy and environment. Special funding has also been allocated to functional genomics and new materials (*i.e.* nanotechnology). In Germany, new funding programmes have been established for fields that are of vital importance for the future (*e.g.* biotechnology, genome research, laser technology, ICT, nanotechnology), and funding rules have been published.

Priorities have also influenced the allocation of government funding across research performers. In Ireland, the volume of research has grown much more rapidly in the university sector than in the public research laboratories. A marked shift from applied research related to natural resources towards basic research, industrial technologies and, in particular, towards biomedical and health-related research and development can be seen over recent decades. In New Zealand, in the period 2002-03 to 2003-04, there have been significant shifts in funding between research providers, with both universities and other organisations (such as research associations, research consortia and private-sector science companies) increasing their share of funding at the expense of Crown Research Institutes (CRIs).

Strengthening public sector research and public research organisations

Public sector research plays an important role in national innovation systems. It not only develops new knowledge which can be used to stimulate innovation in the private sector and help to improve health and security and meet other social objectives, it also contributes to the training of scientists and engineers, promotes development of innovation networks and specific technologies, and supports diffusion of technology, especially to small actors. As the role of R&D and innovation in creating growth and jobs in the knowledge-based economy has become more pronounced (OECD, 1998), governments have taken various steps to improve the quality and efficiency of public science systems, including changes in governance structures, funding mechanisms and links to the private sector. The aim of these changes is to increase flexibility and autonomy, provide greater transparency and less bureaucracy, improve the quality of public research and the ability to contribute to economic growth and other social objectives.

Changes in legal status

Even as OECD countries take a more strategic approach to innovation policy and introduce more top-down priority setting for research, they are working to provide universities and other public research organisations with greater autonomy. Such changes are seen as steps towards increasing their flexibility, transparency and efficiency and enabling them to collaborate more with industry. A key step in such reforms is to change the legal status of universities and other public research organisations to make them independent legal entities. Denmark, Japan and the Slovak Republic have introduced such reforms in recent years.

Responding to an OECD review of its university system in 2002, the Danish Parliament passed a new University Act in 2003 making all universities independent public foundations regulated by law and supervised by the Minister for Science, Technology and Innovation. Inspired by European-wide university reforms, the Danish reform replaces centuries of collegiate governance with boards constituted by a majority of external members appointed independently of government. A central aim of the governance reform is to strengthen external relations and to make exchange of knowledge with business and society a central mission of universities. Based on a review, the Danish government also presented in 2003 a reform of its government research institutions, which would include a new Act on Government Research Institutes. The Act would make institutions independent of the relevant ministries with regard to management and would subject their research to continuous, independent evaluation based on uniform and recognised principles. The aim of such reforms is to strengthen research and ensure better interaction between universities and government research institutions.

Japan also transformed its national universities into national university corporations in April 2004. The change was intended to enhance the independence of university management and enable more flexible human resource management, as faculty are no longer considered civil servants. Japanese reforms also extend to certain research institutions. These organisations are being transformed into incorporated administrative agencies, which are legal entities without government status. The aim is to replace *a priori* government interventions and controls with *ex-post* reviews to the extent possible and to ensure flexible, effective and transparent administration to meet citizens' needs. Agencies are expected to raise transparency through *ex-ante* evaluation of plans submitted, *ex-post* evaluation of accomplishments, and disclosure of pay standards and financial statements. In addition, agencies can promote R&D through newly adopted, more flexible financial and personnel systems. Japan inaugurated the National Institute of Advanced Industrial Science and Technology (AIST) as an Incorporated Administrative Agency in April 2001, unifying 16 research institutions under the Ministry of Economy, Trade and Industry (METI).

The Slovak Republic has privatised its public research sector, with some research institutes no longer receiving funding directly from the government budget, but via contracts and grants from government ministries. The structure of the Slovak Academy of Sciences was also modified, and some of its institutes were privatised. The main goals of privatisation were to decrease financing from the state budget and increase the efficiency of R&D institutions. In the university sector, the newly

approved Act on Universities transformed universities and higher education institutions (apart from those belonging to the Ministry of Interior and the Ministry of Defence) into independent, not-for-profit organisations with a view to new forms of management and performance review that would allow universities to better utilise their resources.

In Spain, universities are autonomous, but depend administratively on regional governments. A new law of 2002 changed university governance structures to increase the involvement of social organisations and regional administrations. A system of quality assurance and performance evaluation has been implemented.

N*ew funding models: more project-based funding*

Across the OECD, the structure of funding of universities and other public research organisations has shifted in recent years away from institutional block grants and towards project-oriented grants and contracts.[6] The underlying driver of this trend is the desire to stimulate competition and co-operation among research centres while maintaining their legal independence, and the goal is to encourage public institutions to seek external funds based on their capability to meet users' needs.

Notable changes have been made in the financing structures of the German Helmholtz Association Laboratories and the Hungarian Academy of Sciences:

- In Germany, the federal government, the L*änder* (federal states) and the research centres themselves agreed to a reform of the Helmholtz Association in 2001. The core element of the reform is programme-based funding of Helmholtz Association labs. This means that the work of the centres focuses on research programmes which are evaluated on a regular basis and that the distribution of funds is based on the evaluated programmes rather than the centres. This allows priority setting for the Helmholtz Association as a whole and stimulates competition and co-operation among centres. Under this new procedure, the federal government and the L*änder* determine a research policy framework for the research fields, while the centres develop the scientific subjects jointly, although on a competitive basis.
- Hungary has also reformed its funding structure for public research. Today only 60% of the income of the Hungarian Academy of Science is guaranteed from public sources (block grants); the remaining 40% has to be generated from competitive government programmes or other sources. This has also led to a shift in the type of research performed. Formerly described as an institution doing nearly exclusively basic research, the Academy now claims to be involved in a number of applied programmes together with industry.

Other countries are taking similar steps. The Danish reform of government research institutes, introduced in 2003, requires public research funds to be distributed in more open competition. In Iceland, the first major policy recommendation of the Science and Technology Policy Council, in its policy statement of December 2003, was to increase the volume of competitive funding. Korea has been reducing institutional block funding to encourage public institutions to seek external funds based on their ability to meet users' needs. New Zealand also allocated approximately 90% of funds (with the exception of non-specific output funding) on a fully contestable basis in the period 2002-03. Luxembourg is an exception to this general trend: from 2004, the financing of public research centres has moved from an essentially project-based financing system to a broader approach that includes institutional financing.

In the United Kingdom, which has already seen a shift toward more project-oriented funding, efforts have been made to enable universities to manage research funded from a diverse set of sources. The Transparent Approach to Costing, a system of activity-based costing, is being implemented across the sector. Recognising the range of funding sources and stakeholders, the UK government has also established a Funders' Forum to bring together all parties with an interest in the long-term sustainability of the university research base (charities, industry, universities, funding councils, research councils, regional development agencies and government departments) to take a strategic overview of the working of the science base.

Facilitating interaction with industry

In many OECD countries, interaction between public research organisations and industry is an area of continuing significant reform. All OECD countries seek to strengthen industry-science relationships, and a key policy area is the management of IPR in public research organisations. In recent years, countries have passed legislation requiring universities and other public research organisations to transfer technology to the private sector and have begun to put in place the regulatory framework to enable a variety of transactions, including the creation of spin-off companies and licensing of intellectual property rights. In Japan, which implemented the Law for Promoting University-Industry Technology Transfer in 1998, there were 36 technology licensing organisations for national and private universities as of December 2003.

Mandating technology transfer

In some countries, new legislation puts more pressure on universities and public research organisations to transfer technology to the private sector. Denmark's new University Act, for example, makes knowledge and technology transfer an integral part of universities' charters. The new Act on Technology Transfer promotes the transfer of knowledge and technology from public research institutions to trade and industry, including the creation of new science-based enterprises. This allows Danish universities and government research institutions to found and invest in commercial companies for the purpose of technology transfer. Dutch universities are also required to promote spin-offs from scientific research. The Minister for Education, Culture and Science wants to emphasise this by highlighting the underlying law (Higher Education and Scientific Research Act) and designating which part of universities' research funding should be used for valorisation.[7]

In its 2002 Act on Universities and Colleges, Norway gave universities and colleges new responsibilities for co-operating with industry and working actively for the dissemination and use of their research results for industrial purposes. In the revised law of the federal institutes of technology (ETH), Switzerland also added the use of knowledge and public relations to the mission statement. Luxembourg encourages interaction between industry and its first full university, the University of Luxembourg, whose founding principles, as set out in October 2003, call for: *i*) interdisciplinary co-operation; *ii*) symbiosis between teaching and research; and *iii*) international co-operation. The university will develop and exploit basic, applied and technological research that will be implemented through research projects on a contractual basis with other research institutions and with industry. Special emphasis will be put on mobility of students and researchers, which can further stimulate industry interaction. In the United Kingdom, the government will agree on targets for knowledge transfer with each of the Research Councils.

In some cases, governments are making available additional funding to support the efforts of universities and public laboratories to transfer technology to industry. In Canada, the March 2004 Budget allocated CAD 50 million over five years to Industry Canada for a pilot competitive fund aimed at promoting commercialisation of federally funded research at universities, research hospitals and granting councils, as well as CAD 25 million for a similar pilot competitive commercialisation fund, over five years for federal research labs. The United Kingdom plans to boost funding for the Higher Education Innovation Fund (HEIF) to GBP 110 million by 2007-08, up from GBP 80 million in 2001. The HEIF is a joint effort of the Higher Education Funding Council for England and the UK Department of Trade and Industry that supplements existing grants schemes for universities' education and research activities with special funding to increase their responsiveness to industry and their ability to contribute to economic growth and competitiveness.

Changing ownership of IPR

Other recent legislative reforms affect the ownership of IPR resulting from publicly funded research. In January 2003, Norway amended the Act on the Ownership of Inventions made by Employees by repealing the so-called exception for teachers. Rules on ownership of inventions made

by researchers employed at universities and state colleges became, with a few remaining exceptions, the same as for employees in other establishments. The institutions now own the IPR, but researchers retain the right to publish their results, even if publication harms patentability. Researchers receive assistance from their institutions for the exploitation of an invention to allow them to concentrate more on research and teaching. The institution must, for its part, ensure that the rights of both the researchers and the institution are safeguarded and that inventions are patented and made available to commerce and industry. Any income resulting from the inventions should be distributed between the institution and the researcher. It is recommended that the income be distributed equally among the institution, the researcher and the research group.

Other countries have taken similar steps. The Icelandic government has presented a bill to amend laws regarding employee inventions with a view to inducing further use of knowledge to economic advantage and to encourage universities and research institutes to register patents more frequently. With the revised law of the federal institutes of technology, Switzerland set clear rules for IPR: ownership of intellectual property (except copyright) arising from work within the federal institutes of technology belongs to the respective organisations. Researchers get an appropriate share of the profits arising from commercialisation. The revised law also gives organisations the right to take interests in private firms that commercialise their research results. Finland is preparing new legislation on university IPR to clarify the situation regarding ownership and the economic benefits for the partners concerned.

Guidelines for IP *management*

Short of implementing legislative changes, several countries have developed national guidelines for intellectual property (IP) management. In 2001, Australia developed a set of national principles for best-practice IP identification, protection and management by researchers and research institutions. The principles are incorporated into all funding agreements administered by the Australian Research Council and the National Health and Medical Research Council. Under the principles, research institutions are required to have: policies aimed at ensuring that commercially valuable research is recognised by researchers and identified by the research institution; policies to ensure that valuable IP is protected against premature public disclosure or inadequate laboratory records; a clear and appropriate policy regarding employee and student entitlement to IPR; procedures to guide researchers in assessing existing IP in the field; procedures for reviewing the commercial potential of IP and for advising its creators; policies which recognise the rights and needs of all stakeholders involved in the research which define how those stakeholders benefit from the exploitation of the IP; and policies regarding potential conflicts of interest.

In April 2003, the Irish Council for Science, Technology and Innovation (ICSTI) issued a statement, "Utilising Intellectual Property for Competitive Advantage", which reviewed the technology practices of several countries and recommended a code of practice to support the identification and exploitation of intellectual property. In April 2004, ICSTI published the National Code of Practice for management of intellectual property arising from 100% publicly funded research. Its aim is to build on existing knowledge and expertise and to harmonise IP management systems across public research organisations. It provides guidelines and a framework for commercialisation of public investment in Irish R&D. Public research organisations are encouraged to adopt the Code to ensure robust, harmonised IP management systems. In addition, a new fund, "Intellectual Property Protection Fund for the Higher Education Sector", was launched in 2004 to supplement existing support in the sector. Under the scheme, an institution can seek support for patent protection relating to discoveries and inventions for which it has identified sufficient commercial potential to justify the expense of patenting.

To strengthen their technology transfer activities, organisations have formed networks for identifying and sharing good practices. The technology transfer offices of Swiss universities, of universities of applied sciences and of the federal institutes of technology have founded an association (SwiTT) to enhance knowledge exchange, to educate those working in technology transfer and to improve framework conditions for technology transfer. In order to exploit the potential of universities'

patents and licences, the Austrian government, all universities and other relevant organisations have developed "Uni:Invent", which supports the activities of innovation scouts who give universities advice aimed at better commercialisation of IPR and will finance patenting costs.

Institutional evaluation

A desire to increase the quality of public research and education, as well as to enhance the efficiency of public research funding, has led to renewed emphasis on the evaluation of public research organisations in many OECD countries. This has resulted in the establishment of new institutions and requirements and guidelines for conducting an evaluation.

In Austria, for example, the newly established Austrian Quality Assurance Agency helps universities to implement evaluation cycles and develop evaluation standards for research, education and training. Evaluation of the main funding body for academic research (the FWF) serves as a basis for the current reform. Such evaluations are an integral part of a new organisational framework for Austrian public universities, implemented in 2004, that allows them greater autonomy and requires more formal evaluation of their activities and output (education and research).

Norway has introduced a series of reforms to strengthen the evaluation of universities, with a view to improving the quality of higher education. The reforms are linked to a new results-oriented funding model for higher education institutions introduced in budget year 2002. The main indicators for evaluation include: *i*) completed student credits; *ii*) number of graduates (beginning in 2005); *iii*) number of international exchange students (in and out); *iv*) funding from research co-operation within the EU and from the Research Council of Norway; and *v*) number of higher academic positions (*e.g.* professors) and scientific publications (beginning in 2006). As part of the plan, the Norwegian Agency for Quality Assurance in Education (NOKUT) was established on 1 January 2003 as an independent state body to monitor the quality of Norway's higher education institutions by means of accreditation and evaluation.

Similar approaches are taken in France, Luxembourg and Switzerland. In France, each research establishment is dependent upon the results of both internal and external evaluation. France uses the following indicators in its evaluations of public research organisations: structuring of research, intellectual property, contract research, enterprise creation, entrepreneurship, and service expertise. Since 2003, Luxembourg's public research centres have to provide annually a set of commonly agreed performance indicators that measure productivity and socio-economic contribution. These quantitative and qualitative indicators take into account the different missions of the centres. In Switzerland, to underpin and promote the quality of teaching and research at universities, the Centre for Accreditation and Quality Assurance (OAQ) of Swiss universities was founded in October 2001. Its tasks are to develop guidelines and quality standards for academic accreditation in Switzerland, to perform the accreditation of public and private institutions as well as programmes at university level, and to draw up recommendations for quality assurance at universities.

The Netherlands also seeks to use evaluation to improve accountability and quality control in its public research sector. A meta-evaluation committee monitors the quality of analyses of research results and the way in which conclusions and recommendations are acted upon. The science community – the Association of Dutch Universities (VSNU), the Research Council (NOW) and the Royal Academy of Arts and Science (KNAW) – have agreed with the Minister of Education, Culture and Science to determine research quality through a system in which peers compare Dutch research groups with foreign counterparts.

Developments can be expected in other OECD countries. The Belgian Federal Minister for Science Policy supported the publication of a White Paper by the directors of the federal scientific institutes which focuses on steps to promote the quality of the services of federal scientific institutes and to restructure their management to achieve greater efficiency. In Iceland, the notion of formal evaluations of programmes and institutions is somewhat underdeveloped; it has been introduced into the educational system at primary and secondary level but not at tertiary level as yet. Interest in strengthening the position of universities as research organisations led the Science and Technology

Policy Council to recommend systematic evaluation of research carried out by universities and to link institutional appropriations to research performance. Methods for evaluation and monitoring of quality in research are under development in a evaluation of scientific effort at the University of Iceland.

Support for business R&D and innovation

Business enterprises are the main source of innovation. They combine technological and organisational knowledge to produce new and better products, processes and services. They also play the primary role in funding and performing R&D in most OECD countries and are strongly influenced in their choice of technological strategies by conditions in their home countries (Porter, 1990; Nelson, 1993). Although OECD countries vary widely in their attitudes towards government involvement in business R&D and innovation, the general trend in recent years has been towards increasing the scope and intensity of programmes to boost business R&D and innovation through a variety of policy instruments, primarily direct public funding of business R&D and innovation, tax incentives for R&D, and support for entrepreneurship. Other programmes have also been established (see Box 2.2). For the most part, indirect support for business R&D is supplanting direct grants and loans, but new programmes of various types have been introduced in recent years.

Box 2.2. Forms of public support for business innovation

In addition to financing of business R&D, tax incentives and support for entrepreneurship, OECD countries have introduced a range of other programmes aimed at stimulating business innovation. A few examples are reviewed below. Most aim at building competence for innovation and innovation management within firms or providing access to necessary infrastructure.

Australian government programmes such as Commercialising Emerging Technologies (COMET), the New Industrial Development Program (NIDP) and Building IT through Strengths (BITS) provide support to increase the commercialisation capacity of firms, including by developing skills and building networks and supply chains. In addition, the government promotes innovation and business competitiveness through initiatives to increase access to technologies and raise awareness of the benefits of innovation, entrepreneurship and commercialisation within the community. The National Innovation Awareness Strategy (NIAS) is a five-year initiative to raise awareness in the community and in SMEs of the importance and benefits of innovation, entrepreneurship and science. The Innovation Access Programme (IAP) aims to promote innovation and competitiveness by increasing access to global research and technologies and facilitating their uptake by Australian researchers and companies.

In Belgium, the Flemish community established three new business services centres in 2003. They are designed to respond to the needs of business in three areas: software, geo-informatics, and mechatronics. A specialised centre for automotive technologies is expected to be added. The 2003 budget included EUR 30 million for the three centres. The centres will be financed for five years, after which they are expected to find alternative sources of funding. In 2003, the Icelandic government established the IMPRA Innovation Centre, which offers advisory support for innovation and technological development. An important function of the centre is to establish co-operation among the public bodies that comprise the support network for innovation. Its principal task is to shape and operate support projects for SMEs and individuals, particularly for new entrepreneurs who undertake new business ventures. A special effort is made to encourage women entrepreneurs.

While Japan's technology and R&D levels are high, it lacks technology managers. The establishment of management of technology (MOT) courses in universities, etc., is urgently needed. METI has established the "Entrepreneurship Promotion Programme" to solicit proposals for MOT development programmes (course offerings, teaching materials and case study materials) from universities, graduate schools and other educational institutions and to develop, test and evaluate such programmes in co-operation with industry. The Ministry of Education, Culture, Sports, Science and Technology (MEXT) also promotes support programmes for MOT and/or intellectual property experts at universities.

Direct public funding

Most OECD countries continue to provide some form of direct support for business R&D and innovation, with the objective of improving economic competitiveness.[8] New direct financing programmes, including grants and loans, increasingly require matching contributions from programme participants, but this requirement is not universal, especially in countries with limited industry financing of business R&D. Improvements to existing instruments are typically aimed at increasing the additionality effects of the government contribution – increasing the amount of additional business R&D performed as a result of government financing (so-called input additionality) and at influencing firm R&D strategy (also known as behavioural additionality). Other reforms aim to streamline programmes and create better synergy between research and innovation.

In Australia, the main source of direct government funding for business R&D is currently the R&D Start programme, which provides grants and loans on the basis of competitive proposals from all sectors. It will be merged into the new Commercial Ready programme introduced under the revised and expanded Backing Australia's Ability initiative. Targeted assistance is also available through various sector initiatives including: the Automotive Competitiveness and Investment Scheme, the Food Industry Innovation Scheme, and the Pharmaceuticals Partnership Programme for business R&D. Canada also has a number of programmes to stimulate business R&D in specific technology areas. In February 2003, the Medical and Related Sciences (MaRS) project was announced; it was founded by leaders from Canada's academic, business and scientific communities to fuel the commercialisation of medical research. The federal government has also provided CAD 30 million for a new Canadian Photonics Fabrication Centre that has been set up in Ottawa to contribute to the development of a world-class photonics technology sector.

In Luxembourg, the main instrument for co-financing industrial research is the framework law on economic development and diversification, which provides a clear R&D incentive scheme. To stimulate the development of R&D, it provides for co-financing of investments in R&D that are of general economic interest and are performed by private-sector industries and research centres. In addition, the SNCI[9] (*Société nationale de crédit et d'investissement*) provides loans to finance expenditures related to R&D projects whose aim is to introduce new products and services or develop new production and marketing processes. These loans have a fixed interest rate that is below the current market rate. The Mexican government supports private-sector R&D and innovation through mixed funds with state and municipal governments. These funds are set up with contributions from the private, academic and governmental sectors, in proportions determined for each project. Their goal is to advance scientific and technological activities and strengthen regional and local research and development capabilities. Mixed funds have been operating since 2001; to date, 26 mixed funds and one municipal fund have been set up.

Recent reviews of innovation policy have prompted reforms in the Netherlands and the United Kingdom. After several critical evaluations, the Netherlands began at the end of 2002 to restructure its innovation policy instruments to minimise overlap, increase transparency and accessibility and make them more responsive to a changing market environment. The outcome has been a significant reduction in the number of instruments, better co-ordination between relevant ministries, a shift toward generic instead of sector-specific innovation programmes, and greater R&D co-operation between companies and public research organisations. Following the recent DTI Innovation Report, the United Kingdom is developing and implementing a business-focused Technology Strategy and associated Technology Programme, which helps businesses to extract technologies in priority areas from the United Kingdom and international academic base by providing funding and sharing risk in taking new technologies to the market. The Technology Strategy will have funding of GBP 178 million by 2007-08. It takes a more strategic approach to the spending of government money on knowledge transfer, focusing on technologies with wide potential applications across business sectors.

Iceland has also streamlined its innovation programmes. The Technology Fund of the Icelandic Research Council (RANNÍS) was merged with the Science Fund under the 2003 law, and the demarcation in funding criteria between basic research and applied research was removed. Its mission is to support

technological development and research to support innovation in the Icelandic economy. The New Business Venture Fund (NBVF) provides early-risk financing to the private sector.

Eastern European countries have established a number of new programmes to boost business R&D. The Czech Republic now has three programmes to support business R&D: *i*) POKROK, which supports emerging technologies and manufacturing processes and systems and is integrated in the National Research Programme under the Ministry of Education Youth and Sports; *ii*) TANDEM, which supports industry-oriented research; and *iii*) IMPULS, which supports innovation, development and industrial research. Research project costs are shared between participating private companies and the state. Hungary established the Research and Technological Innovation Fund in November 2003 to promote demand-driven innovation and knowledge-based competitiveness and encourage redistribution of private-sector resources towards innovative activities with the help of matching public funds. The Fund is financed by small, mandatory contributions from almost all companies registered in Hungary; these are matched by the government. Firms' own R&D expenditures (both intramural and sourced from public research organisations) can be deducted from the contribution; in effect, innovative companies may be exempt. Fund resources are spent through competitive awards that are intended to benefit the private sector directly or indirectly; at least 25% of the funding is allocated for regional innovation purposes. The Slovak Republic has three state R&D programmes that provide grants to private firms: Development of Progressive Technologies for Efficient Economy, Implementation of Progressive Principles of Production and Energy Transformation, and Utilisation of Domestic Raw Materials and Resources.

More favourable tax treatment of business R&D

R&D tax concessions are extensively used by OECD countries as an indirect way of encouraging business R&D expenditures, on the understanding that R&D expenditures have benefits that cannot be fully appropriated by the investing firms, making them reluctant to invest in socially optimal levels of R&D. Recent years have seen the introduction of new tax incentive schemes, as well as changes in existing schemes to make them more generous. While many existing tax incentive programmes reward incremental increases in R&D investment (based on various formulas), a number of new incentives are based on the level of R&D spending in a given year (Table 2.3). Special tax incentives have also been introduced for SMEs or specific technological sectors. Even in countries that do not have specific tax incentives for R&D (*e.g.* Germany, Iceland, Luxembourg), reduced corporate tax rates have lowered tax burdens on firms and may have encouraged greater spending on R&D.

Table 2.3. **R&D tax incentives in OECD countries, 2004**

	Level of R&D	Increment of R&D	Additional incentives for SMEs
R&D tax credits	Canada (20%) France (5%)[1] Japan (10%-12%) Korea (7% on facilities) Mexico (30%) Netherlands (13%) Norway (18%) Portugal (20%)[1] Spain (30%)[1]	France (45%)[1] Ireland (20%) Korea (40%) Portugal (50%)[1] Spain (50%)[1] United States (20%)	Canada (35% of level) France[2] Italy (30% of level) Japan (15% of level) Korea (15% of level, 50% of increment) Netherlands (40% of level) Norway (20% of level)
R&D allowances	Australia (125%)[1] Austria (125%)[1] Belgium (113.5%) Denmark (150%) Hungary (100%-300%) United Kingdom (125%)	Australia (175%) Austria (135%)	Belgium (118.5% of level) Denmark (150%) United Kingdom (150% of level)

1. Tax incentive is based on a combination of level of R&D investment and incremental increase in R&D investment.
2. France has a generous tax system in place for young, innovative firms. Details are provided in the text.

Source: OECD, 2004, based on national sources.

New tax incentives for R&D

Between 2002 and 2004, Belgium, Hungary and Ireland introduced new tax schemes for increasing private-sector R&D expenditures. Belgium's federal government decided in 2004 to offer tax credits to firms collaborating with universities or not-for-profit organisations for their research. Hungary introduced a 100% tax allowance for research and technology development that also applies to subcontracted R&D activities if the partner is a public or not-for-profit research organisation; the allowance increases to 300% if the company's R&D lab is located at a university or public research site. Hungary also introduced a 150% corporate tax allowance for donations to foundations supporting R&D activities and allows tax-free employment of students up to HUF 53 000 per month (equal to the official minimum wage). Ireland's new tax incentive system was introduced in 2004 and provides a credit of 20% for incremental or new R&D spending.

Norway and the United Kingdom have extended their tax incentive schemes to large firms as well as SMEs. Norway established a tax deduction scheme for R&D in SMEs in 2002 and redefined it to cover all companies in 2003. The scheme covers projects carried out either by the firm or in co-operation with an authorised research institution. Foreign firms may receive tax deductions if they are subject to taxes in Norway. Firms with fewer than 250 employees continue to enjoy higher deductions than other firms (20% versus 18%), and annual limits on qualifying expenses per firm continue to make the scheme more favourable to small firms. The United Kingdom extended its scheme to all firms in 2002, after implementing an allowance for SMEs in 2000. The new scheme provides a 125% allowance on R&D expenditures (compared with a 150% allowance for SMEs), including firms' expenditures on R&D carried out in collaboration with universities or public research organisations.

Changes to existing schemes

Many countries that have tax incentives for R&D made them more generous in recent years. Under its revised and expanded Backing Australia's Ability initiative, for example, the Australian government has maintained its 125% R&D tax concession programme and has extended initiatives to encourage business expenditure on R&D: a tax offset to assist small companies,[10] a 175% premium tax concession for additional R&D, and effective life treatment of R&D plant expenditure. In Austria, the system of tax concessions for R&D was broadened in 2002 and 2003 to provide more generous incentives. Firms are now entitled to deduct up to 25% of total R&D expenditures and up to 35% of incremental R&D expenditures from their taxable income. In addition, a tax bonus can be granted if the firm does not generate profits (*e.g.* in the case of many start-ups). The Japanese government modified its tax incentive system in 2003 to allow a deduction of between 10% and 12% of total R&D expenditure; the precise percentage is determined by the ratio of R&D expenditure to total sales volume, which is seen as a way of encouraging companies to increase their R&D intensity. In Mexico, the tax incentive was changed in 2001 from a 20% tax credit on eligible incremental expenditures on R&D to 30% of total R&D expenditure, regardless of size or industrial sector. The Dutch government plans to increase the budget for its wage-based R&D tax incentive system (WBSO) by 30% or EUR 100 million between 2004 and 2006.[11] The total budget of WBSO will amount to EUR 450 million in 2007.

In France, the 2004 budget law made several changes to its R&D tax credit scheme. It is now based on both volume and incremental expenditures, 5% and 45%, respectively, rather than on increment only. Second, the definition of eligible expenditures has been broadened to include costs of defending patents and monitoring technology (*veille technologique*). Third, R&D contracts with universities and public research institutes can be included for double their actual amount. Finally, the ceiling for the tax credit that an individual enterprise can claim has been increased from EUR 6.1 million to EUR 8 million. France also created a new scheme for innovative, young firms that meet several criteria: they must be less than eight years old, employ fewer than 250 workers and devote at least 15% of their total expenditures to R&D. Such firms are exonerated from taxes on their profits for three years, followed by a 50% exoneration for the next two years. In addition, as long as they qualify as young, innovative companies, they are exonerated from several other taxes.

In spring 2002, the Danish Parliament decided to grant firms a 150% deduction on sponsorships of research at universities and government research institutions. To give SMEs an additional incentive to

participate in such activities, the action plan, "Turning Science into Business", calls for them to receive a 150% deduction on their own research expenses when participating in a collaborative project with a public research institution.

Spain, which by various measures already has one of the most generous tax incentive systems among OECD countries, modified the system's administration in 2003 to make it easier for firms to use, with a view to increasing participation. A streamlined procedure has been set up to improve framework conditions and guarantees for companies investing in R&D or innovation. The former Ministry of Science and Technology was authorised by the tax administration to certify the eligibility of firms' research, technological development and innovation projects for the tax incentive system. Previously, the tax administration had to verify eligibility.

Lowering corporate taxes

Some countries have also taken steps to reduce corporate tax rates in order to allow firms to allocate more resources to R&D. In its 2001 and 2003 budgets, for example, the Canadian government introduced a number of measures to benefit technology-based businesses, particularly SMEs: *i*) the amount of income subject to the 12% small business tax rate has been increased from CAD 200 000 to CAD 300 000 over four years; *ii*) the threshold for access to enhanced Scientific Research and Experimental Development tax credits has been lowered; and *iii*) the range of renewable energy and energy-efficiency equipment eligible for accelerated tax write-off has been considerably expanded. The March 2004 budget further improved the tax treatment of technology-based industry, particularly the ICT sector, by increasing capital cost allowance rates for computer equipment from 30% to 45% and for broadband and Internet infrastructure from 20% to 30%. The fiscal cost of these two measures is estimated at CAD 365 million over the next two years.

Icelandic authorities have in past years worked towards simplifying tax rules and lowering tax percentages so that firms retain a higher share of their income, which can be used for R&D. The corporate income tax in Iceland has been lowered in recent years from 53% to 18%, and a flat tax rate of 10% is applied to capital income. The current taxation levels have met with generally favourable approval from the business community, and companies have decided to expand their international operations from an Icelandic base rather than move abroad. In Luxembourg, innovative firms benefit, under certain conditions, from three types of tax incentive measures, none of which is specific to R&D and innovation. In 2002, the tax level for companies decreased from 30% to 22% to help firms maintain their competitiveness.

Protecting intellectual property

To provide firms with healthy business environments, several OECD countries have strengthened the patent system and introduced patent awareness-raising programmes. For example, the Czech Republic harmonised its patent law with EU standards by setting up a new Act on Patent Attorneys and is now negotiating a new decree on the existing Trademarks Law Act. Luxembourg introduced the online registration of patents and copyright to facilitate and speed up the patent and copyright registration process. In December 2003, the Norwegian Parliament voted to transpose the EU Patent Directive into national law, mainly by amending the Patent Act. The main thrust of the adopted amendments is to make it clear that, in principle, biotechnological inventions are patentable in Norway like any other type of inventions, albeit with certain exceptions and special rules. The United Kingdom has developed a new national strategy for dealing with IP crime. The Netherlands is considering lowering annual fees and possible implementation of a differentiated patent system to address sector-specific needs.

Stimulating entrepreneurship

Entrepreneurship is widely seen as an important element of business innovation. Technology-based start-ups are key vehicles for transferring knowledge from universities and public research organisations to the private sector, commercialising the results of public research and bringing innovative ideas to market. Although small firms are an important part of national economies, in particular in terms of

employment, they are limited, compared to large firms, in their ability to access technological expertise and mobilise resources for innovation. Therefore, OECD countries have not only introduced preferential programmes for SMEs in almost all national R&D and venture capital programmes, they have also set up dedicated programmes to stimulate entrepreneurship and assist SMEs.

Support for venture capital

A key factor in the commercialisation of research outcomes is the availability of early-stage investment capital. To induce venture capitalists to invest in projects to transform research outputs from universities or public research organisations into commercial ventures, OECD countries have intensified support for venture capital in several ways: allocating more funds to venture capital, especially for SMEs or technology-based start-ups; providing tax incentives to non-resident investors; and forming partnerships with private venture capitalists.

Australia has introduced a range of programmes to increase access to venture capital, including the Venture Capital Limited Partnerships (VCLP), the Innovation Investment Fund (IIF), the Pooled Development Funds (PDF) and the Renewable Energy Equity Fund (REEF). The VCLP programme provides for the registration of limited partnerships as VCLPs and is designed to increase the supply of venture capital to Australian companies by providing tax incentives to non-resident investors in Australian venture capital. The IIF is a venture capital programme that involves investment in nine private-sector venture capital funds to assist technology-based SMEs in the early stages of development to commercialise the results of Australian R&D. The PDF programme is designed to increase the supply of equity capital for growing SMEs. The REEF programme is a specialist renewable energy equity fund based on the Innovation Investment Fund (IIF) model. It provides venture capital (equity) to assist SMEs to commercialise R&D in renewable energy technologies.

In Belgium, to facilitate access to venture capital for SMEs and start-ups, the Flemish government adopted the ARK decree (Activation of Risk Capital) and, at the same time, launched an ARKimedes Fund, which is fed by institutional investors and the general public. As a result, citizens can benefit from fiscal allowances. In addition, both the Walloon and the Flemish Regions have set up "one-stop shop" organisations to facilitate access to the various possibilities for venture capital. Enterprise Ireland, an agency of the Irish government, has formed a series of partnerships with private-sector institutions, corporations and venture capitalists to establish new venture capital funds to invest in Irish SMEs and to encourage growth and development of Ireland's venture capital sector.

The Business Development Bank of Canada (BDC) has invested in hundreds of companies and has many times gone through the full venture capital cycle of seeding, nurturing and harvesting. In 2003, the BDC venture capital portfolio stood at over CAD 430 million, with an objective over the next five years of reaching the CAD 1 billion mark. In the February 2003 budget, the government made an additional investment of CAD 190 million in BDC to provide additional equity financing for knowledge-based and export-oriented businesses, and to increase the financing available to women entrepreneurs. The March 2004 budget allocated a further CAD 250 million to the BDC to augment pre-seed and seed funding, specialised venture capital and risk capital for innovative start-ups and early-stage companies.

The German government has established a new joint venture capital fund of funds of the European Recovery Program (ERP) special fund and the European Investment Fund (EIF) that will invest in German venture capital funds for early-stage and growth companies together with private investors. Both partners will provide a total of EUR 500 million over five years. Including the contributions from private investors, up to approximately EUR 1.7 billion will be available to innovative, growth-oriented firms in Germany. The government is also examining the possibility of launching a seed fund for R&D-based start-ups. It would be designed to ensure sufficient financing opportunities in the early stage of a start-up in which private investors (venture capital funds, etc.) have not yet made any commitments.

The United Kingdom has a number of targeted interventions to support the development of venture capital and thus to address perceived financing gaps. Regional venture capital funds have been set up across the country. They are investing GBP 270 million in SMEs with growth potential, backed by GBP 80 million of government funding. The Early Growth Funding Programme complements the regional

funds by providing smaller amounts of risk capital for start-up and early-stage businesses. There are similar arrangements in Scotland and Wales. The government also supports the UK High Technology Fund – a fund of funds – which supports early-stage high-technology businesses across the United Kingdom.

R&D *funding for small firms*

Dedicated support for R&D in SMEs has been growing. The Canadian budget of February 2003, for example, provided for a permanent funding increase of CAD 25 million a year to the Industrial Research Assistance Programme (IRAP) of the National Research Council, which provides industrial technology assistance to Canadian SMEs.[12] New Zealand provides grant assistance primarily to technology-aware SMEs to undertake R&D projects that have the potential to stretch their technological capability. From July 2002 to June 2003 a total of 231 grants were approved for a total value of NZD 14.8 million.

In Finland, SMEs and new technology-based firms have for some time been a special concern of Finnish innovation policy. Tekes' efforts to develop business, marketing and internationalisation competencies in SMEs are usually embodied as standard features in conventional Tekes financing instruments. The efforts are bearing fruit: in 2003 almost a quarter of the client firms of Tekes were new start-up companies.[13] The same year, SMEs received 58% of Tekes' R&D financing. Between 1998 and 2002, the German government increased the sums made available to SMEs to promote R&D by 32% to about EUR 732.5 million, and there has been a significant shift of emphasis in favour of SMEs in specialised programmes based on cross-sectoral technologies. The number of medium-sized companies supported by the Ministry of Education and Research (BMBF) rose by 50% to about 1 700 over the past six years. Under a number of programmes, which include biotechnology and production research, SMEs today receive the bulk of all funds to promote R&D.

P*referential financial support for* SME*s*

Several new programmes provide financial support to SME. The Czech-Moravian Guarantee and Development Bank helps SMEs obtain access to financial capital and shares their business risk via a scheme of bank guarantees, preferential loans and specific subsidy programmes. The Danish government's Danish Growth Fund (V*ækst*F*onden*) supports Danish companies by financing R&D. The fund advances loans to development projects and grants financial aid to pre-projects. Set up in 1992, the fund has allocated a total of DKK 2 billion to Danish companies, plus DKK 284 million in relation to a bank loan guarantee scheme for firms with fewer than 50 employees that are unable to obtain loans through the traditional banking system. In 2002, Hungary established the SME Development Finance Co. (KVFP) with EUR 13 million in equity. KVFP's mission is to invest in profitable SMEs with clear and realistic development plans, good management and significant growth potential. France provides public support to business incubators; between 2000 and 2003, the government, in partnership with the EU and regional and local authorities, provided EUR 25 million to 31 incubators that nurtured 900 projects, created 520 innovative firms and about 1 800 jobs. The programme was evaluated in 2003. The German government has set up the Innovation and Future Technologies in the SME Sector High-tech Master Plan to remove obstacles to the establishment and growth of young innovative companies and to ensure financing conditions that encourage their growth.

O*ther forms of assistance*

Countries are also experimenting with other forms of integrated support for innovation in SMEs. In Australia, one of the main sources of support for SMEs is the Innovation Access Programme to promote innovation and competitiveness by increasing Australian access to global research and technologies, and facilitating their uptake by Australian researchers and companies. Other programmes that assist SMEs to increase their innovation capacity building, by building management skills and awareness, include the Commercialising Emerging Technologies programme and Information Technology Online (ITOL) Programme, which encourages industry (especially clusters of SMEs) to adopt business-to-business e-commerce solutions and embrace innovative e-commerce solutions that deliver sustainable economy-wide returns and increase competitiveness.

Korea has expanded technical and financial assistance for SMEs and new start-ups by introducing new policies to accept technology (knowledge assets) as collateral for bank loans, to provide SMEs with subsidies for employing R&D personnel, and to furnish SMEs with technical information and services.

The Mexican government has several programmes to assist SMEs. The Compite Programme is designed to improve the competitive position of micro-enterprises and SMEs. The Technological Services Information System (SISTEC) helps to build technological awareness among micro-enterprises and SMEs and provides them with information on the services provided by Applied Research and Technological Development Centres and Institutes. Mexico also promotes technological innovation via the AVANCE programme,[14] which provides support for researchers, entrepreneurs, companies and research institutions wishing to transform their discoveries and scientific and technological developments into successful businesses. The AVANCE programme supports various types of projects but gives preference to the following fields: information technologies; electronics and telecommunications; health (medicine, systems for diagnosis, materials and equipment); agricultural, fishing and food development; advanced materials; sustainable development and environment; energy; design and manufacturing; housing and construction; and attention to poverty and social needs.

Box 2.3. Support to business innovation in China

China has been reforming its S&T innovation policy framework in order to develop a more efficient national innovation system and create a more market-oriented approach to encouraging technological innovation. Recent developments include efforts to increase R&D expenditures, actively support private business R&D and innovation, commercialise R&D institutes, develop a regional innovation system and encourage the return of overseas Chinese graduates. China has seen an acceleration of R&D expenditures. Total R&D spending in 2002 reached RMB 128.76 billion – up RMB 24.52 billion (or 23.5%) from the preceding year.

To support private R&D and innovation, China has introduced several reforms. First, tax incentives have been introduced. Business firms whose expenditures on developing new products, technologies and techniques attain real growth of 10% or more enjoy a direct reduction of taxes equal to 50% of accrued expenditures. Software and ICT businesses benefit from favourable treatment for value-added tax, income tax and depreciation of production equipment. Second, the National Science and Technology Plan establishes industrial involvement in R&D as an important condition for establishing a priority project. In 2003, the Small and Medium Science and Technology Business Innovation Fund allocated nearly RMB 3.05 billion to support 4 195 projects implemented by SMEs. Third, following the issue of the document "Comments on Establishing a Venture Capital Investment Mechanism", venture capital has gradually been developed. The issuance of Regulations on the Management of Foreign Investment in Venture Capital Businesses provides more definite policies regarding the establishment of foreign-invested venture capital firms and associated operations. Boosting innovation in the service sector also receives policy attention. The document "Comments on the Policies and Measures to Accelerate the Development of Service Industry during the 10th Five-Year Period", was issued in 2002.

Related to its efforts to improve business innovation, China continues to deepen the reform of R&D institutes to enhance their innovative capacity. At the end of 2002, 1 185 R&D institutes had been converted or were in the process of conversion, an increase of 43 units from the preceding year. The conversion of R&D institutes shows three patterns: notable progress in the industrialisation process, enhanced technical innovation capacity and enhanced technology diffusion capacity. Related to efforts to strengthen co-operation and networking among innovation institutes, China has promoted regional innovation systems through experiments in regions such as the Yangtze River Delta and the Pan Pearl River Delta. National technology transfer centres and campus science and technology parks have been promoted in order to enhance collaboration between universities and industry and to transfer technology.

In order to attract overseas Chinese graduates back to China, the construction of industrial parks for overseas Chinese graduates has accelerated and communication channels between inland and overseas Chinese students have been expanded.

To improve the climate for technology-based start-ups, the Netherlands introduced the Action Programme TechnoPartner, which combines and streamlines existing initiatives for technology-based start-ups. The programme consists of: the TechnoPartner Seed Facility, the TechnoPartner Subsidy Scheme for Knowledge Exploitation (SKE) and the TechnoPartner platform. The TechnoPartner Seed Facility mobilises the lower level of the Dutch risk capital market by stimulating small business investment companies (SBICs). These private companies finance start-ups and small firms. Private parties can establish an SBIC and have their capital matched by government loans. The SKE aims at encouraging the use of scientific knowledge by high-technology start-ups both outside and in universities and research institutions. These institutions can, when operating in a public-private consortium, request a subsidy for a high-technology start-up. The task of the TechnoPartner platform is to foster awareness of high-technology entrepreneurship in the Netherlands and take stock of problems and bottlenecks related to high-technology start-ups.

The Danish government issued an action plan on entrepreneurship in January 2003, focusing on innovative and high-technology entrepreneurs. For the first time, the plan viewed entrepreneurship as an integral part of the commercialisation of research. Its goal is to develop a strong and coherent infrastructure for commercialisation. The action plan was followed by the establishment of a ministerial commission to look into the general culture of entrepreneurship in Denmark. This included discussions of the culture of entrepreneurship and commercialisation specifically at universities and research institutions. The role of the Danish Academy of Entrepreneurship, established in 2004, is to strengthen the availability of education in innovation and entrepreneurship in the educational system. It is expected to be the centre of activities regarding entrepreneurship and will be the driving force to improve the educational system's capacity to provide the right framework for encouraging students to become more entrepreneurial.

Enhancing collaboration and networking among innovating organisations

It has been widely recognised in recent years that the effectiveness and efficiency of innovation systems are determined to a considerable extent by the degree and quality of linkages and interactions among different actors, including firms, universities, research institutes and government agencies. The potentially wide-ranging impact of innovation networks and co-operative interaction has received increasing attention in many OECD countries. Networking, intensified co-operation and technology diffusion within innovation systems among firms, research organisations, universities and other key stakeholders remain a key priority area in government innovation policy.

Public/private partnerships for research and innovation

Public/private partnerships (P/PPs) have been widely used by OECD countries to improve the performance of national innovation systems. The last two years have seen a stronger focus on the contribution to commercial outputs and a number of existing P/PPs have been expanded. For example:

- Australia's Cooperative Research Centre (CRC) programme[15] will see its budget increase to AUD 192 million in 2004-05, and to AUD 259 million in 2005-06. The programme supported 71 centres in 2003-04. Following a full evaluation of the CRC programme in 2003,[16] changes were made to the guidelines for the 2004 CRC selection round. From 2004, the government will provide an additional AUD 65 million over six years from 2005-06 for CRCs with a stronger commercial focus.
- Austria is currently revising its Competence Centre programmes in order to improve their effectiveness in creating new structures for science-industry co-operation. A mid-term assessment of the programmes has recently been completed and constitutes a basis for a number of decisions on the future of P/PPs.
- In Sweden, the Competence Centres Programme is a long-term effort to strengthen the link between academic research groups and industrial R&D in the Swedish innovation system. In 2004, the programme will be extended with new Competence Centres that specialise in areas of working life and transport.

In addition, several new partnership programmes were established:

- The Czech Republic launched a joint R&D programme "Research Centres – B" to promote co-operation between the state research sector and industrial companies, hospitals and other users of research results.
- A new Irish initiative is the Centres for Science, Engineering and Technology funded by Science Foundation Ireland. These centres fund scientists who develop internationally competitive research clusters allied to industry through collaborative efforts. Grants normally range from EUR 1 million to EUR 5 million a year for up to five years.
- In Hungary, five Co-operative Research Centres (CRC) started operations in 2001. These are research and engineering centres located at major universities. Their objective is to develop technological partnerships and networks involving institutions of higher education, other not-for-profit research institutions and the business sector, in particular SMEs.
- In 2001, Switzerland set up a new instrument for research promotion, the National Centres of Competence in Research (NCCR). To date, 14 centres have been established. For 2004-07, an additional CHF 30 million will be provided to finance five or six new NCCRs.

While the above P/PPs all take the form of research centres, a number of countries have begun developing looser, network-style P/PPs. In Belgium, the federal government launched in 2002 a programme of technological poles of attraction to create networks of academic laboratories, collective research centres and, eventually, federal scientific establishments. The objective is to consolidate scientific and technological capabilities in specific areas of competence, which to date include telecommunications for the information society, standardisation and space. A budget of EUR 5.3 million has been allocated for a three-year period. Denmark has launched a Technology Network scheme to support business enterprises and knowledge institutions to establish knowledge networks at regional, national and international levels. These networks are to promote long-term collaborative partnerships between different stakeholders – business enterprises, universities, government research institutions, approved technology service institutes, centres for tertiary education and others.

The Dutch Cabinet is very much in favour of arrangements under which the knowledge chain, from basic research to innovative products, is steered comprehensively in areas of national importance. In 2001, the Cabinet instituted a steering committee to run the national genomics programme. A similar body for catalysis was set up in 2002, and ICT research will follow in 2004. Industry participates in these steering committees and in the programmes. To encourage R&D collaboration further, the Netherlands introduced in January 2004 *Projectmatig Samenwerkingsinstrument*, a new project-based collaboration tool. It is aimed at pre-commercial co-operation on R&D among companies and between companies and the research infrastructure as a set of third-generation instruments for P/PPs on breakthrough technologies like genomics.

New Zealand established research consortia as a relatively new investment model in 2002-03, which matches public funds with private-sector investment. These are user-led partnerships between the private sector and public research organisations that are designed to increase private-sector investment in R&D; build enduring relationships between public research providers and the private sector; increase the relevance of publicly funded research to users; and increase the likelihood of that research being commercialised for the benefit of New Zealand.

In 2003, Switzerland carried out a pilot study to examine the setting up of an Internet-based technology platform to provide information for private companies on new technologies or specific knowledge, and to foster co-operation and networking between public and private partners. A central objective of the initiative is improvement of technology transfer between public research institutes and private companies and of knowledge transfer between private companies. Another newly introduced platform is *www.swissbiotech.org*. Its goal is to bring together important actors, such as private companies, public research laboratories, training institutions and organisations that provide financing or public support. Furthermore, the platform serves as an international marketing instrument for Swiss biotechnology. Switzerland also launched one important P/PP project under the government's information society strategy. With the objectives "ICT to learn" and "learn ICT", the cantons, the federal government and private firms will work together to increase ICT competencies in schools.

Following its Innovation Review, the United Kingdom expects to launch programmes such as Collaborative R&D and Knowledge Transfer Networks to foster collaboration and networking for innovation, adopting principles from past successful schemes. Knowledge Transfer Partnerships also provide direct support for knowledge transfer by enabling universities and others in the science, engineering and technology base across the United Kingdom to work with businesses using recently qualified graduates who have an academic supervisor, to undertake specific knowledge-transfer projects in firms of all sizes. This builds on the former Teaching Company Scheme (TCS). Successive reviews of TCS confirmed the value to the business of the technology transferred.

Promoting regional innovative clusters

Because tacit knowledge, which is critical to innovation, is not easy to communicate and obtaining it requires practical experience, learning and interaction are widely accepted to be basic elements of technological innovation (Nelson and Winter, 1982; Rosenberg, 1982). Firm-level innovation increasingly requires active acquisition and exploitation of knowledge from other firms, universities and public research organisations; this favours geographical proximity among learners (Saxenian, 1994). OECD countries have taken the cluster-based approach to regional development and have implemented numerous initiatives in recent years.[17]

Canada's National Research Council (NRC), which plays a key role in reinforcing Canada's system of innovation on the basis of local strengths, is working to tighten links between its research labs and local industry by sponsoring community-level meetings and workshops to allow regional stakeholders to define the existing and potential local technology base and to identify local strengths and weaknesses in the areas of business, financing, research and infrastructure. In addition to reinforcing existing partnerships, these small gatherings provide an opportunity to establish local and national networks.

Denmark has modified its approach to regional clusters. From 2001 to 2003 the government supported regional networks that linked companies, educational institutions and other relevant institutions for research, education and knowledge transfer. It established 18 regional networks in different business areas across the country. Since 2003, Denmark has replaced the former initiative (Centre Contracts) with innovation consortia aimed at co-operation on innovative projects between at least two companies, one research institute and one knowledge diffusion organisation (typically a technological service institute). The primary criterion for supporting an innovation consortium is that the research should lead to new products, processes and services and that the project builds competencies that are in wide demand by Danish companies, especially SMEs, in the technological service institutes.

Iceland wishes to encourage universities, institutes and firms to work together to create research facilities in areas defined for a common purpose and emphasises that universities and research institutes in regions outside the Reykjavik area should continue to carry out research and technological development in fields well-suited to reinforcing innovation in the local economy and business life of the respective region. Regional support programmes were established for this purpose.

New Zealand has a large number of clusters, some embryonic and others that have already achieved international reach. Initiatives are under way via New Zealand Trade and Enterprise (NZTE) to stimulate existing clusters through cluster development and support. Over 40 cluster development initiatives are currently in progress in a range of areas, including biotechnology, optics, nutraceuticals, organics, software, film and wool. NZTE's Cluster Development Programme provides a total grant of up to NZD 50 000, which must be matched by the applicants and can make available a cluster facilitator to advance the cluster's development.[18] In addition, the Regional Partnerships Programme works with regional stakeholders to put in place the foundations and preconditions for taking advantage of regional economic development opportunities and facilitates the building of regional economic development and leadership capability. The programme has facilitated 26 regional partnerships.

As part of Norway's comprehensive innovation policy plan, the Minister of Trade and Industry has defined several projects addressing particular commercial and industrial sectors under the heading "Innovation 2010". Some of these projects focus on regional issues, such as the particular challenges of northern Norway or rural districts in central parts of the country. Others focus on the potential in

important commercial sectors, such as the public service and the maritime sectors. The intention is to motivate and mobilise individuals, companies, private capital, research institutions and the educational system to focus on opportunities and to foster ideas that can trigger entrepreneurship and commercial activity across the country.

Poland is preparing projects for the implementation of its regional innovation strategies, which are among the priorities described in the National Plan of Growth 2004-06. The aim is to foster co-operation between R&D institutions and industry and to strengthen innovation in the regions.

In spring 2002, Sweden launched a new programme, VINNVÄXT, to develop strong innovation systems with high-quality environments for R&D and competitive and dynamic regional networks. In each region, the programme promotes co-operation between companies, R&D organisations and the political system with a view to allowing the regions to become internationally competitive in specific growth areas.

Human resources for S&T

Human resources in science and technology (HRST) are essential to advancing science and innovation and generating productivity growth, but many OECD countries are concerned about future supplies of scientists and engineers. Several countries report waning interest in science and engineering among youth and declines in science and engineering graduates. For example, in Korea, the share of secondary school graduates applying for university-level studies in science and engineering dropped from 42.4% in 1998 to 26.9% in 2002. In Denmark, the number of science and

Box 2.4. **HRST and S&T policy in Russia**

In Russia, the number of HRST has been declining steadily, with the greatest decrease in R&D employment in the higher education sector (22.3% between 1994 and 2002). To attract young people to S&T, the Russian government has established competitive grants for young scientists (under 35 years) and lump-sum payments to supervisors of studies of these young scientists. In addition, Russia increased the official salaries of the principal categories of personnel in budget-funded R&D institutions.

Other efforts to improve HRST are linked to overall developments in Russia's science and technology policy, which is in the midst of reform. Since 1999, the federal budget for R&D has increased regularly, and federal funding for civil R&D in 2002 was 1.74 times higher than in 2000. As a share of GDP, federal funding rose from 0.29% in 2000 to 0.35% in 2002. In March 2002, Russia issued two documents defining national initiatives in the field of science and technology: *i*) "Basic Principles of the Russian Federation Policy in the Field of Development of Science and Technologies for the Period up to 2010 and Further Perspective"; and *ii*) a specified list of priority areas of science, technology and engineering. The focus of government S&T and innovation policy in 2002-03 was: *i*) improving priority support for R&D and specifying priority areas for S&T development; *ii*) improving the formation and implementation of federal goal-oriented programmes; *iii*) improving intellectual property legislation; and *iv*) creating incentives for developing the innovation infrastructure and small innovating enterprises.

In terms of private R&D and innovation, intensive efforts were made in the field of intellectual property rights, in preparation for Russia's entry into the World Trade Organization (WTO). At the end of 2002, amendments were made in the Patent Law of the Russian Federation to harmonise Russian legislation with the most important international treaties on the protection of IPR and the TRIPS Agreement. Direct government support of private R&D was given for 12 major innovation projects of national importance. Financial support for technological development programmes was carried out on the basis of consolidation of funds of the budget, the developer and the manufacturer of final products. To promote stronger industry-science relationships, Russia established six Technology Transfer Centres (TTC) and market-oriented research clusters. A large-scale programme, Biotechnology for Medicine and Agriculture, was set up by four Russian ministries in 2001. It provides government funding at a pre-competitive stage of R&D and for industrial scale-up of results for the manufacture of competitive and high-quality biotechnological products with the assistance of private business. Such programmes are intended to boost Russia's innovative capacities and may help create further employment opportunities for HRST.

engineering graduates decreased from 3 929 in 1994 to 3 274 in 2001.[19] A number of OECD countries have therefore put in place policies to increase the supply of HRST. These include programmes to increase domestic supply of HRST and to tap into the growing pool of scientists and engineers in other countries, often outside the OECD.

Boosting domestic supplies of HRST

The first step for many OECD countries has been to build up domestic supplies of HRST. Most of these efforts have focused on increasing interest in science and engineering, financing studies at the graduate and postgraduate level, attracting more women to scientific and technical careers, reforming educational curricula and teacher training, and attracting more scientific and highly skilled personnel from abroad. In a few countries demand-side policies have also been drawn up to stimulate job creation for scientists and engineers.

Increasing interest in science and technology

OECD countries have implemented a range of policies to raise interest in science and technology. These take two forms: efforts aimed at enhancing public understanding of science and technology generally and specific efforts to attract students to science and engineering studies. The two often operate in a complementary fashion. For example, the Australian government is raising public awareness of the importance and benefits of science to the community and SMEs through the National Innovation Awareness Strategy. Smart Moves, a touring science and innovation outreach programme for secondary school students, provides a number of inspirational case studies of Australian entrepreneurial achievements and promotes the study of science and engineering.

Similar programmes to increase public understanding of science have been adopted in various countries. Austria's programme, which was implemented in 2002, will be continued. Hungary supports related activities through the first competitive proposal scheme based on the resources of the Research and Technological Innovation Fund. Luxembourg has implemented the science festival, the Mini-research contest and the Science Club. The mission of Switzerland's "*Science et Cité*" foundation is to encourage public debate about and with science and to create a climate of mutual trust between scientists and the public. In 2002 and 2003, the foundation focused on an informed debate about stem cells, globalisation and climate change.

Several programmes specifically focus on students. Germany encourages young people to participate in the national mathematics and computer science competitions and in the International Mathematical, Physics, Chemical and Biological Olympiads. The research competition *Jugend forscht* helps to develop young people's interest in scientific research, mathematics and technology. Iceland has introduced a series of scientist visits to schools and student visits to scientific institutions and institute open-house events. In October 2003 it held a science week of organised events with extensive media coverage, and innovation competition and awards ceremonies are organised annually at all levels of the education system. Japan has designated super-science high schools, model schools for the promotion of science education (the *Rika Daisuki* School for elementary and junior high school) and has developed advanced digital study materials for science and technology education. The United Kingdom also works with schools to provide a network of local centres for science, engineering, technology and mathematics and an S&E ambassador programme.

The Czech Republic and Ireland have established programmes with mixed objectives. The former recently launched the programme Widening Access to Research and Development Results for the General Czech Public to promote public understanding of science and to encourage young people to study technical sciences at universities. Ireland has launched Discover Engineering and Science to raise general awareness of the physical sciences, encourage more students to study the subjects in secondary and tertiary schools, and to pursue careers in this area.

Outreach to women

In many OECD countries women represent a sizeable source of talent but remain under-represented in science and engineering. Several countries have introduced measures specifically designed to encourage women to pursue research careers in these fields. The objective of Austria's f-FORTE programme, launched in 2002, for example, is to increase women's presence and enhance their career opportunities in science and technology, and includes measures on various educational and professional levels. In Finland, an equality plan adopted in 2000 to promote gender equality in science indicates that the minority gender (currently women) should occupy at least 40% of all research posts. Ireland's Women in Technology and Science (WITS) initiative promotes their participation in science, engineering and technology, and its Gender Equality Unit in the Department of Education and Science works to create awareness of gender equality among all stakeholders in the Irish education system.

Korea has also launched a Women into Science and Engineering (WISE) programme and requires public research institutes to increase the proportion of woman scientists and engineers to at least 25% of total employees. In 2000, the Swiss University Conference published a federal programme on equal opportunities for men and women at universities; its main objective is to double the number of female professors at Swiss universities by 2006. To improve the number of female research personnel in higher ranks at Dutch universities, the Dutch Research Council (NOW) runs the Aspasia programme, which has already operated since 2000 and will be continued. It has led to a significant increase in female assistant professors. In 2005 EUR 1.5 million will be made available for the programme, and funding will be raised to EUR 2 million annually from 2006.

In addition, countries such as Iceland and the United Kingdom have introduced programmes to encourage more female students to enter higher education in natural science, engineering and technology. The United Kingdom has found that proportionately fewer women study for pre-university qualifications in chemistry and physics. Hence, in addition to working with children of school age and projects such as SPARK magazine to counter gender stereotypes and inspire girls to study science, engineering and technology, the UK government plans to work with employers through a new Resource Centre for Women as a part of the new strategy published in 2003.[20]

Reforming curricula and training

Interest has also grown in reforming educational curricula for science and engineering to make them more relevant and in making teaching more effective through improved teacher training. Hungary has a plan to upgrade higher education curricula to better match the specific needs of companies and other knowledge users, including promotion of inter- and multidisciplinary training and increased emphasis on subjects important for the knowledge-based society and economy (*e.g.* ICT and computing). Following the recommendations of the Roberts' Review,[21] the United Kingdom is implementing measures to improve education standards for scientists and engineers, to modernise curricula to develop practical understanding of science, to recruit more people to science teacher training courses, and to allocate significant funding for better-quality science labs. Korea has been encouraging universities to improve curricula to reflect the changes in knowledge and skills required in industrial fields. In Ireland, the Task Force on the Physical Sciences (in its report of March 2002[22]) examined the decline in interest in the physical sciences among young people and put forward a comprehensive set of recommendations on issues such as curriculum reform and teacher training to address the problem: implementation is under way.

In Austria, the Innovations in Mathematics, Science and Technology Teaching initiative aims at contributing to a lasting improvement in the quality of mathematics and science teaching in both general and vocational schools for the 15-19 age group. Schools will receive support for their efforts to improve their teaching quality. Students will be given opportunities for independent learning, problem-solving, building arguments and critical assessment of their own performance. Science in Your School is an academic programme conceived, co-ordinated and implemented in 2002 by a group of Mexican scientists who are members of the Mexican Academy of Science. Their objective is to improve the attitude of basic and middle education teachers to mathematics and science and to bring them up

to date on new findings in these disciplines. The programme brings scientists and teachers into closer contact to raise the teaching level of science and mathematics in primary and secondary schools. Norway, in 2003, started new education programmes in some universities for teachers in mathematics and sciences.

Financial support for science and technology studies

Financial support is a key element of efforts to attract and retain science and engineering students, especially at graduate levels. OECD countries support research training programmes and postdoctoral fellowships and are expanding them where possible. For example, the Australian government invests in postgraduate research and researcher training through a number of schemes, such as the Research Training Scheme, Australian Postgraduate Awards Scheme, International Postgraduate Research Scholarships Scheme, and the Australian Research Council's (ARC) National Competitive Grants Programme. The government has also increased financial support for a variety of postdoctoral fellowships for early-career researchers to develop appropriate research skills: ARC Discovery Projects, the National Health and Medical Research Council's People Support grants, the Commonwealth Scientific and Industrial Research Organisation (CSIRO) Postdoctoral Fellowships, and the ARC Linkage programme.

Austria invests in postgraduate research and researcher training through a number of schemes, such as the DOC programme for PhD students, the APART programme, Schroedinger fellowships, Buehler fellowships, and the START programme for post-docs. Korea has a National Research Fellow programme to support research and training of top graduate students selected to lead the future development of science and technology. In Luxembourg, the national grant system allocates funds to doctoral and postdoctoral students, independently of their citizenship, for scientifically excellent research projects with the condition that the project is linked in some way to Luxembourg, *i.e.* the research is (at least partly) performed in Luxembourg and/or the results of the research are expected to have an impact at national level. In 2002, an innovative pilot project of grants called Luxembourg International Advanced Studies in Information Technologies was set up in the field of IT research.

Norway has an annual budget of EUR 4.7 million to increase recruitment for undergraduate studies in engineering (Bachelor in Engineering), and has established 40 one-year classes (each with at least 30 students) for students with a vocational secondary education background. Norway is also increasing its expenditure on postgraduate research training, with a goal of increasing the number of PhD degrees from 700 to 1 100 (total for all disciplines) a year by 2010. To deal with the significant decline in the technical and agricultural sciences, the Slovak Republic has introduced "Development of Personality and Talent of Young Employees and PhD graduates up to Age 35" and the "Prize of the Minister of Education". Science Foundation Ireland, the Irish Research Council for Science, Engineering and Technology and the Irish Research Council for the Humanities and Social Sciences have introduced several programmes to fund post-graduate researchers in tertiary-level institutions.

Demand side policies

While most policy development for HRST has addressed the supply side (*i.e.* increasing the supply of scientists and engineers) a few countries have explicitly begun to address the demand side. For example, the Korean government has introduced a Research Officer programme to provide young PhDs with career opportunities as research scientists and engineers in the military sector and has set up Human Resource Incubating Centres which will retain young unemployed scientists and engineers temporarily for practical training. In 2003, Norway established a National Centre for Contact with the Business Community on MST subjects (RENATE) to increase contact between education institutions and the business community and thus ensure the recruitment of students studying science, mathematics and technology. Luxembourg's new full university has meant an increase in the demand for teachers and researchers.

Attracting foreign scientists and engineers

Additional effort has been put into supplementing domestic supply with scientists and engineers recruited from foreign countries. Some of these programmes attempt to address growing concerns about brain drain from countries with limited science and technology infrastructure, but most attempt to tap into sources of foreign workers to meet domestic needs. Primary mechanisms include reforms to immigration laws and procedures, scholarships for foreign researchers and efforts to attract expatriate researchers.

Reforming immigration procedure

A first step toward recruiting foreign scientists and engineers has been to revise immigration procedures to ease their entry into host countries. In the United Kingdom, the Highly Skilled Migrant Programme, introduced in 2002, successfully enabled highly skilled individuals to enter the country to seek and enter work without the need for a prior offer of employment. The scheme has recently been strengthened by introducing a new category of eligibility for younger workers and by extending the duration of work permits from 4 years to 5 years. In response to concerns from employers regarding delays in the processing of highly skilled immigrants, Canada provided CAD 6.6 million over two years in the February 2003 budget to launch a fast-track system for skilled workers with permanent job offers from a Canadian employer. The budget also allocated CAD 41.4 million over two years to attract and integrate skilled immigrants into Canada's labour market. New Zealand also attracts highly skilled migrants in accordance with the Government's Immigration Programme. The Dutch Cabinet has decided to simplify procedures for immigrating science and technology workers and to lower fees for entering the country (making them more comparable with those for other European countries), in order to facilitate the influx of foreign knowledge workers into the Netherlands. In Australia, where demand for skilled ICT workers has declined, previous reforms have been repealed (Box 2.5).

Recruiting foreign students and researchers

Recognising that foreign students and researchers can help relieve domestic shortages in the supply of science, technology, engineering and mathematics skills, OECD countries actively recruit them in their home countries. Recently introduced programmes aim to attract researchers at various stages of their careers; some emphasise graduate students and others post-doctoral researchers depending on country-specific needs and capabilities.

The United Kingdom, for instance, has focused on special scholarships for foreign PhD students. In 2003 the Prime Minister announced a new GBP 10 million initiative to bring high-quality PhD

Box 2.5. **Immigration reform for ICT workers in Australia**

At the time Backing Australia's Ability was announced, Australia was suffering from a shortage of ICT workers, and initiatives were implemented to attract such workers. A Ministerial Direction was issued on 1 February 2001 to all immigration decision makers requiring them to give immediate processing priority to ICT professionals.

By March 2003, in response to the changing labour market for ICT professionals, the Migrant Occupations in Demand List (MODL) lists – which lists occupations and skills for which the government has identified a shortage across Australia – was reduced to just four ICT specialisations. Such measures have since been wound back in response to lesser demand for ICT skills; the ICT priority processing directive was suspended in July 2002 and the MODL list was amended so that no ICT specialisations were listed in November 2003. The Australian Computer Society also tightened the IT qualification assessment requirements for overseas visa applicants.

students from overseas to top UK universities to study science. The new Dorothy Hodgkin Postgraduate Awards will allow over 100 PhD students from India, China, Hong Kong (China), Russia and the developing world to study in the United Kingdom.

Other countries have focused more on post-doctoral students. In France, for instance, a post-doctoral programme has already succeeded in attracting 900 foreign researchers to top research labs. The objective for 2004 is to recruit 110 additional foreign post-doctoral researchers through a competitive call for proposals by the hosting research teams. Japan has a Postdoctoral Fellowships for Foreign Researchers programme to invite bright young researchers to Japan. In Hungary, various post-doc fellowships are also open to researchers from abroad.[23]

Spain's focus has been on hiring PhD-level researchers to staff public research organisations. Its *Ramon y Cajal* programme hires domestic and foreign researchers from all fields on five-year contracts. The total cost estimates for the five-year duration of the programme is EUR 320 million. Of the 2 000 contracts to date, 17% have been for foreigners and 21% for Spanish researchers working abroad.

Germany has set a target to increase the share of foreign students in Germany from 8.5% to 10% over the next few years. To do so, it has implemented academic exchange programmes and special post-graduate programmes to facilitate the enrolment of highly qualified applicants from abroad.

Attracting expatriate researchers

For a number of countries, expatriate researchers are a key source of foreign workers. Returning overseas researchers not only reduce the domestic shortage of scientists and engineers, they also establish international research networks to facilitate additional inflows of foreign knowledge. The Australian government has taken a number of measures to promote return migration of expatriate researchers, such as Federation Fellowships and National Health and Medical Research Council support. In 2002, Belgium established a number of awards to promote the return migration of expatriated Belgian researchers. In that year, 14 awards of two years were made for a total of EUR 1.24 million. The Brussels-Capital region has established an international network to promote mobility and communication among researchers. In Hungary, the Szent-Györgyi fellowship enables internationally acknowledged Hungarian or foreign researchers living outside Hungary to work in Hungarian institutions of higher education. Mexico has a programme of economic support for repatriating Mexican researchers working abroad. In New Zealand, the New Leaders initiative is aimed at repatriating researchers back to New Zealand.

Evaluating innovation policies

Evaluation is central to formulating good policy. Government programmes need to be evaluated periodically to ensure their effectiveness and to improve their design. OECD countries have undertaken many evaluations of science and innovation policy over the last two years, some encompassing the entire innovation system and others focusing on specific elements or funding agencies. Outcomes of evaluations often become input for preparation of new policies, and *ex–ante* evaluations are becoming more common to clarify possible impacts of new policies.

Broad evaluations

Several countries have recently completed or announced plans for broad evaluations covering almost all innovation policies. In 2003, the Australian government announced the release of *Mapping Australia's Science and Innovation*, which laid the groundwork for future policy development by identifying areas of strength and weaknesses in science and innovation performance and areas where collaboration between the federal government, the states and territories could be improved. The Prime Minister of Canada indicated in December 2003 that the government would undertake a comprehensive assessment of federal support for research and development.[24] The Czech Republic has a regular evaluation system, which furnishes important input for the preparation of new R&D policy; evaluation of the previous National Research and Development Policy, which was adopted in 2000, was carried out

during preparation of the Analysis of Previous Trends and Existing State of Research and Development, published in 2002. This analysis, which represented important source material for the preparation of the new R&D policy, includes conclusions of the evaluation and recommendations for the future.

Nearly all the Belgian authorities have decided to launch or to reinforce the evaluation of their science, technology and innovation policies. In Flanders, the *Bijzonder Onderzoeksfonds* (BOF) Fund has been significantly increased, but access to the Fund is subject to *ex-ante* and *ex-post* evaluations. The Walloon Council for Science Policy also decided to launch an evaluation of the Walloon science policy. Hungary did an *ex-ante* evaluation in 2003 to clarify the possible future impacts of the bill on research and technological innovation (social and economic dimensions). The goal of the exercise was to identify obstacles to the innovation process, to suggest feasible ways to eliminate them, and at the same time to examine future impacts, and to find concrete solutions in legal and technical terms. The evaluation used SWOT analysis (which identifies strengths, weaknesses, opportunities, and threats), a questionnaire, extended interviews and independent external expert panels.

In 2002, Finland launched the ProAct programme to increase understanding of the effects of research and technology policy on society and the economy, and the effects of society on technological development. The second stage of the programme started in January 2004, with 33 projects. In December 2002, an international evaluation of the impact of public funding of biotechnology in Finland was issued, in preparation of a new funding scheme for biocentres. The Academy of Finland published in November 2003 the third review of the quality and impact of Finnish scientific research. These reviews are prepared on a triennial basis and give a general picture on the development of the quality and international visibility of Finnish science. Finland uses both qualitative and quantitative methods and is considering development of impact analysis methodologies.

In Ireland, there is increased evaluation activity in public-sector funding agencies, some of which (*e.g.* Health Research Board, Teagasc, and Enterprise Ireland) have recently established a formal evaluation function. Forfás has responsibility for the evaluation of industry-oriented national science and technology programmes. The two major programmes – Programme for Research in Third Level Institutions, run by the Higher Education Authority, and Science Foundation Ireland – are currently being evaluated by independent international panels. The methodologies used in evaluations of key Irish national funding programmes draw on international good practice. Luxembourg makes regular and systematic evaluations of the programmes and the results obtained by financed projects, which lead, if necessary, to a readjustment of funding priorities. In Austria, the most important political stakeholders in the field of R&D (ministries, public research organisations) established the Platform for Evaluation of Research and Technologies.[25] All activities directed towards better and more transparent evaluations to achieve better strategic planning in R&D policy, standards and evaluation guidelines are being supported.

A mid-term evaluation of the Spanish National Research Technological Development and Innovation (RTDI) Plan (2000-03) was performed at the end of 2002 by analysing opinions of stakeholders and public and private beneficiaries of actions. Out of 64 main recommendations suggested in the evaluation, the new National Plan for 2004-07 takes 55 on board. They concern the plan's strategic objectives, its structure, scientific and technical objectives (priorities) of the thematic areas, instruments for implementation and financing and, finally, the management of calls for proposals.

New requirements for evaluation

In some countries, evaluation of innovation systems has become compulsory. Since 1 January 2002, policy evaluation and policy preparation in the Netherlands are subject to the ministerial decree on performance measurement and evaluation (*Regeling Prestatiegegevens en Evaluatieonderzoek*, RPE). The decree imposes a number of requirements, *e.g. ex ante* evaluation (which implies that policy makers have to consider different policy alternatives), monitoring and *ex post* evaluation. Every instrument now has to be evaluated every five years.

In New Zealand, all government agencies involved in national innovation policy are required to undertake evaluations (through output agreements) which are subject to scrutiny by parliament.

Evaluation objectives are enshrined in legislation governing the management of research, science and technology, such as the requirement in the Foundation for Research, Science and Technology Act and the Crown Research Institutes Act that their funding and research activities must benefit the nation. The Ministry of Research, Science and Technology reviews the results of R&D investments on a five-year rolling cycle. At programme level, purchase agents evaluate the achievements and benefits arising from investment decisions. These are compared to outputs in the agencies' annual performance and achievement reports. The recent introduction of performance-based research funding in New Zealand tertiary institutions has required an extensive evaluation of the skills and capabilities of institutional departments. This is the first such comprehensive study in New Zealand.

In January 2001, the Swedish Parliament founded the Swedish Institute for Growth Policy Studies (ITPS). According to the Ordinance on Instructions to the ITPS (2000:1133), the institute's main task is to initiate, commission and evaluate industrial, innovation and regional policy measures. In addition, it is to provide the policy-making system with analysis of economic development and growth as a basis for decision making and to develop and disseminate methods for facilitating learning and evaluation. In 2003 the government gave the institute two special commissions in the innovation area. One was to evaluate some of the R&D programmes initiated by the VINNOVA. Another was to make a survey of actors in the Swedish innovation system.

According to Article 170 of the Swiss Constitution, the Federal Parliament ensures that the effectiveness of measures taken by the Confederation is evaluated. This task is specified in the new law on Parliament. Article 141 states that legislative or regulatory changes proposed by the Federal Council have to be accompanied by a report (so-called message) giving information about the impact of new legislation in various fields, for example, on society, economy and the environment, on the equal treatment of men and women and on its general costs and benefits. With this new article, *ex–ante* evaluation becomes more important for policy formulation in Switzerland. Evaluations of horizontal policies and programmes have become more popular in the Swiss policy-making system (for example, an evaluation of federal measures concerning the information society was conducted by CEST – the Centre for Science and Technology Studies – in 2002[26]).

The United Kingdom is fully committed to evaluating its science and innovation policies. Such information is an integral part of its evidence-based approach to policy making. DTI is required to demonstrate the achievements of its programmes across all areas of the Department's work, including innovation policy. To this end, a central committee agrees an annual work programme of evaluations. Evaluations may be undertaken by in-house evaluators, who have no responsibility for the programmes themselves, or by consultants appointed for the purpose.

NOTES

1. As of September 2004, four countries held Observer status in the CSTP: China, Israel, Russia and South Africa.
2. The policy questionnaire also inquired about programmes to promote innovation in the service sector. These are reviewed in Chapter 4.
3. At the March 2002 meeting of the European Council in Barcelona, European Ministers announced a goal of "… turning the EU into the most competitive knowledge-based economy in the world". One identified objective for achieving this status is to raise spending on R&D and innovation in the EU so that it approaches 3% of GDP by 2010.
4. The United Kingdom's *Science and Innovation Investment Framework* is available on line at: *www.hm-treasury.gov.uk/spending_review/spend_sr04/associated_documents/spending_sr04_science.cfm*.
5. Available at: *www.dti.gov.uk/innovationreport/index.htm*.
6. *Institutional funding* refers to block funds that governments or funding agencies allocate annually to research-performing institutions. Institutions are free to use these funds in any way they see fit, as they do not come with strings attached. *Project funding* is normally granted when research performers apply for grants from competitive funding programmes of public research funding agencies, usually research councils. This includes funding through the "responsive mode", since application grants need to be made in order to obtain funding through this mechanism. *Contract funding* of public sector research from business or private non-profit organisations also falls into this category because funding is for specific projects (OECD, 2003).
7. This funding would not be earmarked for this purpose, but by describing the amount, the minister hopes that universities will more easily justify spending money on valorisation.
8. A notable exception is Sweden, where public funding of research carried out in companies is unusual. Swedish research and technology programmes are mainly aimed at raising the level of research within universities in areas of future interest to companies. Greater efforts are made to increase involvement of industry in the form of co-funding or actual work in co-operation with universities and institutes.
9. The SNCI is a banking institution governed by public law and specialised in providing medium- and long-term financing to Luxembourg businesses.
10. The offset allows firms with turnover of less than AUD 5 million, R&D expenditures of less than AUD 1 million and no tax liability to receive a cash rebate equivalent to the value of the tax concession. Alternatively, such firms can carry over the tax concession for a period of 3 years.
11. The Dutch WBSO stimulates business research by reducing wage tax and social security contributions for companies with employees and deducts a fixed amount from the profit for self-employed persons.
12. It has some 260 industrial technology advisors, located in 90 communities across Canada, who work with approximately 12 000 SMEs a year, helping clients to tap into sources of specialised expertise that can resolve a broad variety of technology-related business problems.
13. Tekes, the National Technology Agency of Finland is the main public financing and expert organisation for research and technological development in Finland.
14. "Avance" is Spanish for advance; it is also the acronym for a programme that seeks to produce high value added businesses linking knowledge with visionary entrepreneurs.
15. *www.crc.gov.au/*.
16. *www.crc.gov.au/Information/Programme_Evaluation.asp*.
17. Clusters can be defined as networks of production of strongly interdependent firms (including specialised suppliers) linked to each other in a value-adding production chain. In some cases, clusters also encompass strategic alliances with universities, research institutes, knowledge-intensive business services, bridging institutions and customers (OECD, 1999).
18. Additional information is available at *www.nzte.govt.nz/*.
19. A more detailed discussion of the supply of HRST can be found in Chapter 5.
20. Additional information is available online at *www2.set4women.gov.uk/set4women/research/the_greenfield_response.htm*.

21. The United Kingdom's Roberts' Review is available online at *www.hm-treasury.gov.uk*/Documents/Enterprise_and_Productivity/Research_and_Enterprise/*ent_res_roberts.cfm*.
22. *www.education.ie/servlet/blobservlet/physical_sciences_report.pdf*.
23. Additional information on the Hungarian scholarship programme is available at *www.fpi.hu*.
24. In addition, Canada introduced accountability measures in budget 2003 for publicly funded foundations to ensure that these organisations fulfil the objectives of their respective mandates. These measures require foundations to provide corporate plans, annual reports and regular independent evaluations to the minister responsible for the funding agreement. Departments are also expected to include significant expected results in the Departmental Reports on Plans and Priorities and to include any findings from evaluations in their Departmental Performance Reports.
25. For additional information, see *www.fteval.at*.
26. The report is available in English at *www.cest.ch*/P*ublikationen*/2002/CEST_2002_5_*e.pdf*. In addition, CEST has conducted comprehensive evaluations of some extra-university research institutions.

REFERENCES

Nelson, R. (ed.) (1993), *National Innovation Systems*, Oxford University Press, Oxford.

Nelson, R. and Winter. S.G. (1982), *An Evolutionary Theory of Economic Change*, The Belknap Press of Harvard University Press, Cambridge, Massachusetts.

OECD (1998), *Technology, Productivity and Job Creation*, OECD, Paris.

OECD (1999), *Boosting Innovation: The Cluster Approach*, OECD, Paris.

OECD (2001a), *The New Economy: Beyond the Hype – The OECD Growth Project*, OECD, Paris.

OECD (2001b), *Science, Technology and Industry Outlook – Drivers of Growth: Information Technology, Innovation and Entrepreneurship*, OECD, Paris.

OECD (2003), *Governance of Public Research*, OECD, Paris.

Porter, M. (1990), *The Competitive Advantage of Nations*, Macmillan, London.

Rosenberg, N. (1982), *Inside the Black Box: Technology and Economics*, Cambridge, Cambridge University Press.

Saxenian, A. (1994), *Regional Advantage: Culture and Competition in Silicon Valley and Route 128*. Harvard University Press, Cambridge, Massachusetts.

Tidd, J., J. Bessant and K. Pavitt (1997), *Managing Innovation*, Wiley, Chichester, UK.

Statistical Annex

MAIN OECD DATABASES USED

Databases maintained by the Directorate for Science, Technology and Industry (DSTI)

Industrial structure and performance

STAN: The database for **Industrial Analysis** includes annual measures of output, labour input, investment and international trade 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. STAN 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.

The latest version of STAN is based on the International Standard Industrial Classification (ISIC) Rev. 3 and covers all activities (including services). Further details on STAN are available on the Internet at: *www.oecd.org/sti/stan*.

P*ublication*: STAN is available on line on SourceOECD (*www.sourceoecd.org*), updated on a "rolling" basis (*i.e.* new tables are posted as soon as they are ready) to maximise timeliness. In May 2004, a CDROM was published providing a snapshot of the STAN industrial database together with related databases covering R&D Expenditure and Bilateral Trade by industry (ANBERD and BTD) as well as a set of derived indicators (*http://oecdpublications.gfi-nb.com/cgi-bin/*OECDB*ookS*h*op.storefront*/EN/*product*/922004063C3).

Science and technology

R&D and TBP: The **R&D** database contains the full results of the OECD surveys on **R&D expenditure and personnel** from the 1960s. The **TBP** database presents information on the **technology balance of payments**. These databases serve, *inter alia*, as the raw material for both the ANBERD and MSTI databases.

P*ublication*: OECD (2004), *Research and Development Statistics*: 2003 E*dition*. Annual on CD-ROM (a printed edition is also available every two years).

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 eight non-member economies (Argentina, China, Israel, Romania, Russian Federation, Singapore, Slovenia, 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.

P*ublication*: OECD (2004), *Main Science and Technology Indicators* 2004/1. Biannual. Also available on CD-ROM.

ANBERD: The **Analytical Business Enterprise Research and Development** database is an estimated database constructed with a view to creating a consistent data set that overcomes the problems of international comparability and time discontinuity associated with the official business enterprise R&D data provided to the OECD by its member countries. ANBERD contains R&D expenditures for the period 1987-2001, by industry (ISIC Rev. 3), for 19 OECD countries.

P*ublication*: OECD (forthcoming), *Research and Development Expenditure in Industry*, 1987-2002. Annual. Also available on line and on the CD-Rom STAN Structural Analysis databases (*http://oecdpublications.gfi-nb.com/cgi-bin/*OECDB*ookS*h*op.storefront*/EN/*product*/922004063C3).

Patent database: This database contains patents filed at the largest national patent offices – European Patent Office (EPO); US Patent and Trademark Office (USPTO); Japanese Patent Office (JPO) – and other national or regional offices. Each patent is referenced by: patent numbers and dates (publication, application and priority); names and countries of residence of the applicants and of the inventors; and technological categories, using the national patent classification as well as the International Patent Classification (IPC). The compiled indicators mainly refer to single patent counts in a selected patent office, as well as counts of "triadic" patent families (patents filed at the EPO, the USPTO and the JPO to protect a single invention).

The series are published on a regular basis in OECD, *Main Science and Technology Indicators*.

Globalisation and international trade

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 investment). 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 18 variables broken down by partner country and by industrial sector (based on ISIC Rev. 3) for 22 OECD countries.

Publication: OECD, *Measuring Globalisation: The Role of Multinationals in* OECD *Economies*, 2001 Edition. Vol. I: Manufacturing. Biennial. Also available on line on SourceOECD (*www.sourceoecd.org*).

FATS: This database gives detailed data on the **activities of foreign affiliates** in the **service** sector of OECD countries (inward and outward investment). 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 five variables (production, employment, value added, imports and exports) broken down by country of origin (inward investments) or implantation (outward investments) and by industrial sector (based on ISIC Rev. 3) for 19 OECD countries.

Publication: OECD, *Measuring Globalisation: The Role of Multinationals in* OECD *Economies*, 2001 Edition. Vol. II: Services. Biennial. Soon available on line.

Bilateral Trade (BTD): This database for industrial analysis includes detailed trade flows by manufacturing industry between a set of OECD *declaring* countries and a selection of *partner* countries and geographical regions. Data are presented in thousands of USD at current prices, and cover the period 1988-2001. The data have been derived from the OECD database *International Trade by Commodities Statistics* (ITCS – formerly *Foreign Trade Statistics* or FTS). Imports and exports are grouped according to the country of origin and the country of destination of the goods. The data have been converted from product classification schemes to an activity classification scheme based on ISIC Rev.3, that matches the classification currently used for the OECD's STAN, Input-Output tables and ANBERD databases.

Publication: OECD, *Bilateral Trade Database*, 2002. Also available on CD-ROM with STAN and ANBERD databases (*http://oecdpublications.gfi-nb.com/cgi-bin/*OECDBookShop.storefront/EN/*product*/922004063C3).

Information and communication technology (ICT)

Telecommunications: This database is produced in association with the biennial *Communications Outlook*. It provides time-series data covering all OECD countries for the period 1980-2001. It contains both telecommunication and economic indicators.

Publication: OECD (2003), *Telecommunications Database* 2003. Only available on diskette and CD-ROM.

ICT: Work is under way to develop a database on ICT supply and ICT usage statistics. Statistics on employment, value added, production, wages and salaries, number of enterprises, R&D, imports and exports for the ICT sector are been collected following the OECD ICT sector definition based on ISIC Rev. 3.

Publication: OECD (2002), *Measuring the Information Economy*, 2002. Freely available as a Web book with "clickable" access to the data used in charts and figures at: *www.oecd.org/sti/measuring-infoeconomy*.

Current country coverage of main DSTI databases used in this publication

	Industry	Science and technology					Globalisation			ICT
	STAN	R&D	TBP	MSTI	ANBERD	Patents	AFA	FATS	BTD	Telecom.
Australia	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Austria	✓	✓	✓	✓		✓		✓	✓	✓
Belgium	✓	✓	✓	✓	✓	✓		✓	✓	✓
Canada	✓	✓	✓	✓	✓	✓	✓		✓	✓
Czech Republic	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Denmark	✓	✓	✓	✓	✓	✓			✓	✓
Finland	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
France	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Germany	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Greece	✓	✓		✓		✓	✓	✓	✓	✓
Hungary	✓	✓	✓	✓		✓	✓	✓	✓	✓
Iceland		✓		✓		✓			✓	✓
Ireland		✓		✓	✓	✓	✓	✓	✓	✓
Italy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Japan	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Korea	✓	✓	✓	✓	✓	✓			✓	✓
Luxembourg	✓			✓		✓	✓	✓	✓	✓
Mexico	✓	✓	✓	✓		✓	✓		✓	✓
Netherlands	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
New Zealand	✓	✓	✓	✓		✓			✓	✓
Norway	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Poland	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Portugal	✓	✓	✓	✓		✓	✓	✓	✓	✓
Slovak Republic	✓	✓	✓	✓		✓	✓		✓	✓
Spain	✓	✓	✓	✓	✓	✓	✓		✓	✓
Sweden	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Switzerland		✓	✓	✓		✓			✓	✓
Turkey		✓		✓		✓	✓	✓	✓	✓
United Kingdom	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
United States	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Other OECD databases

ADB: Analytical DataBase (Economics Department).

ANA: Annual National Accounts (Statistics Directorate).

Education database (Directorate for Education).

ITCS: International Trade in Commodities Statistics (Statistics Directorate).

International Direct Investment (Directorate for Financial, Fiscal and Enterprise Affairs).

LFS: Labour Force Statistics (Statistics Directorate).

SSIS: Structural Statistics for Industry and Services (Statistics Directorate).

Services: Value Added and Employment (Statistics Directorate).

Further details on OECD statistics are available on the Internet at: *www.oecd.org/statistics/*.

STANDARD STATISTICAL NOTES USED IN THIS PUBLICATION FOR SCIENCE AND TECHNOLOGY INDICATORS

a) Break in series with previous year.
b) Estimate.
c) Defence excluded (all or mostly).
d) Including R&D in the social sciences and humanities.
e) Excluding R&D in the social sciences and humanities.
f) Federal or central government only.
g) Excludes data for the R&D content of general payment to the higher education sector for combined education and research.
h) Excludes most or all capital expenditure.
i) Total intramural R&D expenditure instead of current intramural R&D expenditure.
j) Overestimated or based on overestimated data.
k) Underestimated or based on underestimated data.
l) Included elsewhere.
m) Includes other classes.
n) Provisional.
o) At current exchange rate and not at current purchasing power parities.
p) Unrevised breakdown not adding to the revised total.
q) Does not correspond exactly to the OECD recommendations.
r) Including extramural R&D expenditure.

STANDARD INDUSTRY AGGREGATION BY TECHNOLOGY LEVEL

(*based on* ISIC Revision3)

The *high-technology* industries (HT) are defined as the sum of:

- Pharmaceuticals (2423),
- Office and computing machinery (30),
- Radio, TV and communication equipment (32),
- Medical, precision and optical equipment (33),
- Aircraft and spacecraft (353).

The *medium-high-technology* industries (MHT) are defined as the sum of:

- Chemicals excluding pharmaceuticals (24 excl. 2423),
- Machinery and equipment (29),
- Electrical machinery and apparatus (31),
- Motor vehicles and trailers (34),
- Railroad and transport equipment (352+359).

The *medium-low-technology* industries (MLT) are defined as the sum of:

- Coke, refined petroleum products and nuclear fuel (23),
- Rubber and plastic products (25),
- Other non-metallic mineral products (26),
- Basic metals (27),
- Fabricated metal products except machinery and equipment (28),
- Building and repairing of ships and boats (351).

The *low-technology industries* (LT) are defined as the sum of:

- Food products, beverages and tobacco (15-16),
- Textiles, textile products, leather and footwear (17-19),
- Wood, pulp, paper, paper products, printing and publishing (20-22),
- Manufacturing n.e.c. and recycling (36-37).

ANNEX TABLES

Table 1. Breakdown of GDP per capita into its components, 1990-2003

United States = 100

	GDP per capita (US=100)		Effect of labour force participation (%)										GDP per person employed (US=100)		GDP per hour worked (US=100)	
			Total effect		Working-age population[1] to total population		Labour force to working-age population		Unemployment		Working hours					
	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)=(1)-(2)	
	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003	1990	2003
Australia[2]	73	78	-1	1	-10	-10	9	11	-1	0	1	1	75	77	73	77
Austria	82	79	-	-	-10	-9	14	14	1	0	-	-13	77	74	-	87
Belgium	78	76	-26	-30	-10	-12	-6	1	-1	-2	-9	-17	95	89	104	106
Canada	83	83	-3	3	-12	-10	14	15	-2	-1	-2	-2	83	79	86	81
Czech Republic	48	43	1	2	-7	-3	7	3	1	-1	-	3	47	44	-	41
Denmark	79	80	-11	-14	-10	-12	17	16	-1	0	-17	-19	73	75	90	93
Finland	78	73	-1	-9	-10	-10	12	9	2	-2	-5	-6	74	77	79	82
France	79	77	-25	-30	-12	-13	0	5	-3	-3	-10	-19	94	88	104	106
Germany	96	70	-14	-19	-9	-9	8	10	1	-2	-14	-18	95	72	110	90
Greece	49	54	-12	-10	-9	-10	-5	-1	-1	-2	3	4	64	67	61	63
Hungary[3]	35	39	-3	-9	-5	-4	1	-5	1	0	-	-	38	48	-	-
Iceland	87	80	10	12	-15	-12	23	21	3	2	0	0	77	69	77	68
Ireland	56	90	-21	-13	-13	-11	-5	5	-6	1	4	-8	80	94	77	102
Italy	75	70	-31	-29	-9	-9	-9	-6	-4	-3	-9	-12	97	88	106	100
Japan[2]	81	74	12	3	-7	-8	9	12	3	0	7	0	76	71	69	71
Korea	32	47	-4	-1	-3	-3	-2	1	1	1	-	-	36	48	-	-
Luxembourg	108	137	-14	-13	-10	-18	-9	2	6	4	-	-	122	150	-	-
Mexico	27	26	-47	-35	-32	-27	-17	-10	2	2	-	1	74	61	-	60
Netherlands	77	80	-46	-37	-8	-9	-12	1	0	3	-26	-31	97	86	123	117
New Zealand	60	62	-7	1	-2	0	-3	0	-2	1	-1	0	66	61	67	61
Norway	78	96	-21	-27	-13	-16	13	20	0	1	-22	-32	77	92	99	123
Poland	26	31	-4	-7	-4	-2	-	-2	-	-6	-	3	-	41	-	38
Portugal	46	49	-2	-3	-7	-6	4	7	0	0	1	-4	49	48	48	53
Slovak Republic[4]	28	35	-5	-6	-4	-3	1	2	-3	-5	-	0	33	41	-	41
Spain	57	62	-24	-10	-9	-8	-10	3	-5	-4	0	0	81	72	81	72
Sweden	81	75	-6	-13	-14	-13	19	12	3	1	-14	-13	74	75	87	88
Switzerland	107	82	8	3	-11	-10	27	23	5	1	-12	-11	86	68	98	80
Turkey	20	18	-8	-10	-5	-3	-2	-6	-1	-1	-	-	28	29	-	-
United Kingdom	71	78	-4	-5	-11	-12	11	12	0	1	-3	-6	72	77	75	83
United States	100	100	0	0	0	0	0	0	0	0	0	0	100	100	100	100
Total OECD	**69**	**81**	**-28**	**-9**	**-10**	**2**	**-3**	**2**	**1**	**-1**	**-17**	**-13**	**81**	**77**	**97**	**90**
EU-25[4]	**65**	**69**	**-11**	**-4**	**-9**	**-6**	**1**	**4**	**-4**	**-2**	**-**	**-**	**76**	**73**	**-**	**-**
EU-15	**76**	**75**	**-20**	**-15**	**-10**	**-7**	**1**	**6**	**-1**	**-2**	**-10**	**-12**	**86**	**78**	**96**	**90**

1. 15-64 years. 2. 2002 instead of 2003. 3. 1991 instead of 1990. 4. 1994 instead of 1990.

Source: OECD, GDP from National Accounts database; other data from *OECD Economic Outlook* 75, 2004.
Complementary estimates for hours worked from *OECD Employment Outlook*, 2004.

StatLink: http://dx.doi.org/10.1787/515628628843

Table 2. Income and productivity levels in the OECD, 1950-2002

	GDP per capita (US=100)						GDP per hour worked (US=100)					
	1950	1973	1980	1990	2000	2003	1950	1973	1980	1990	2000	2003
Australia[1]	77	76	75	73	74	78	72	69	72	73	77	77
Austria	42	73	81	82	79	79	-	-	-	-	90	87
Belgium	60	76	81	78	73	76	59	85	102	104	108	106
Canada	81	86	91	83	80	83	85	86	88	86	84	81
Czech Republic	50	57	58	48	39	43	-	-	-	-	37	41
Denmark	80	91	87	79	79	80	60	81	89	90	95	93
Finland	46	69	74	78	72	73	35	60	64	79	84	82
France	55	78	82	79	73	77	46	77	88	104	103	106
Germany	42	74	78	96	70	70	39	76	88	110	92	90
Greece	24	56	57	49	47	54	-	-	-	61	60	63
Hungary[2]	39	51	43	35	33	39	-	-	-	-	-	-
Iceland	-	72	87	87	79	80	-	59	74	77	69	68
Ireland	38	43	49	56	79	90	-	46	58	77	96	102
Italy	41	70	78	75	70	70	43	83	97	106	108	100
Japan	20	67	71	81	73	-	15	47	55	69	72	72
Korea	9	15	20	32	43	47	7	10	16	-	-	-
Luxembourg	-	98	92	108	137	137	-	-	-	-	-	-
Mexico	27	31	35	27	26	26	31	42	-	-	63	60
Netherlands	67	83	84	77	76	-	59	92	106	123	116	117
New Zealand	94	79	68	60	58	62	-	81	71	67	63	61
Norway	63	74	91	78	101	96	57	79	101	99	133	123
Poland	29	36	35	26	29	31	-	-	-	-	35	38
Portugal	22	44	43	46	48	49	19	40	-	48	53	53
Slovak Republic	38	43	44	-	30	35	-	-	-	-	35	41
Spain	28	57	56	57	57	62	25	56	69	81	75	72
Sweden	69	78	78	81	75	75	58	79	83	87	90	88
Switzerland	100	114	106	107	84	82	86	96	101	98	86	80
Turkey	15	17	17	20	19	18	-	-	-	-	-	-
United Kingdom	72	72	69	71	71	78	61	64	70	75	81	83
United States	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*	*100*

1. 2002 instead of 2003. 2. 1991 instead of 1990.

Source: Previous annex; *OECD Science, Technology and Industry Scoreboard,* 2003.

StatLink: http://dx.doi.org/10.1787/482201516226

Table 3. Gross R&D expenditures, 1981-2003

Millions constant USD (1995 PPPs)

	1981	1991	1995	2000	2001	2002	2003
Australia[1, 2]	2 362	5 141	6 570	7 107	-	-	-
Austria	1 457	2 488 [b]	2 821 [b]	3 855 [b]	4 019 [b,n]	4 098 [b,n]	4 131 [b,n]
Belgium[3]	2 605 [a]	3 350 [b]	3 762	5 110	5 488	-	-
Canada	5 843	9 373	11 250	15 373	16 529	16 072 [n]	16 065 [b,n]
Czech Republic	-	2 324 [c,q]	1 257 [a]	1 760	1 771	1 800	-
Denmark[4]	945	1 773	2 159	2 854	3 272	3 471	-
Finland	904 [a]	1 938 [a]	2 218	4 162	4 221	4 374	-
France	17 870 [a]	27 961	28 461	30 646 [a]	31 994	31 923 [n]	-
Germany	27 895	41 987 [a]	39 412 [b]	47 838 [b]	48 518	48 934 [b]	48 426 [b]
Greece[4]	205 [a]	484	671 [a]	1 056	1 106 [b]	-	-
Hungary	-	981 [c,q]	684 [c]	908 [c]	1 116 [c]	1 249 [c]	-
Iceland	29	68	93	207 [b]	237	238 [b]	-
Ireland	251	487 [b]	822 [b]	1 184 [b]	1 253 [b]	-	-
Italy	7 914 [r]	13 880 [a]	11 892	13 975	14 830	-	-
Japan	38 752 [b,j]	74 412 [b,j]	75 659 [b,j]	90 184	93 007	94 172	-
Korea	-	7 563 [e]	12 919 [e]	17 374 [e]	19 721 [e]	20 858 [e]	-
Luxembourg	-	-	-	318	-	-	-
Mexico	-	-	1 935	3 037	3 194	-	-
Netherlands	4 304	6 076	6 650	7 649	7 670	-	-
New Zealand[4]	-	524	605	712	873 [a]	-	-
Norway[4]	937	1 512	1 765 [a]	2 055	2 296	2 358 [b]	-
Poland	-	-	1 881 [a]	2 472	2 407	2 244	-
Portugal[5, 1]	271	780	751	1 279 [b]	1 371	1 512 [b]	-
Slovak Republic	-	868 [b,c,q]	405 [c]	340 [k]	346 [k]	326 [k]	-
Spain	1 754	4 944	5 010	6 998	7 314	8 090	-
Sweden[4]	3 234 [a,k]	4 883 [k]	6 294 [a,k]	7 715 [k]	9 503 [k]	-	-
Switzerland[1, 2]	3 233 [b]	4 739	4 971	5 255	-	-	-
Turkey	-	1 538	1 284	2 627	-	-	-
United Kingdom	19 201 [a]	21 673	22 498	24 816	25 530	26 207	-
United States	114 530 [h]	176 578 [h]	184 079 [h]	243 271 [h]	246 187 [h]	245 430 [h,n]	248 064 [b,h,n]
Total OECD	**254 691 [b]**	**414 522 [a,b]**	**438 558 [a,b]**	**553 399 [b]**	**569 275 [b]**	**574 708 [b,n]**	**-**
EU-25	**-**	**-**	**138 328 [b]**	**166 859 [b]**	**172 704 [b]**	**175 929 [b,n]**	**-**
EU-15	**88 551 [b]**	**132 558 [a,b]**	**133 421**	**160 547 [b]**	**166 123 [b]**	**169 525 [b,n]**	**-**
China	-	13 824 [k]	18 022 [k]	45 002 [a]	52 399	65 485	-
Israel	-	1 937 [c]	2 630 [c]	5 613 [c]	5 937 [c,n]	5 516 [c,n]	-
Russian Federation	-	23 032	7 475	10 537	12 277	13 651	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 1983 instead of 1981.
4. 1999 instead of 2000.
5. 1982 instead of 1981.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/367403882784

Table 4. GERD intensity, 1981-2003

As a percentage of GDP

	1981	1991	1995	2000	2001	2002	2003
Australia[1, 2]	0.94	1.52	1.66	1.54	-	-	-
Austria	1.13	1.47 [b]	1.56 [a,b]	1.86 [b]	1.92 [b,n]	1.93 [b,n]	1.94 [b,n]
Belgium[3]	1.56 [a]	1.62 [b]	1.72	2.04	2.17	-	-
Canada	1.24	1.60	1.72	1.92	2.03	1.91 [n]	1.87 [b,n]
Czech Republic	-	2.02 [c,q]	1.01 [a]	1.33	1.30	1.30	-
Denmark[4]	1.06	1.64	1.84	2.19	2.40	2.52	-
Finland	1.18 [a]	2.04 [a]	2.28	3.40	3.41	3.46	-
France	1.93 [a]	2.37	2.31	2.18 [a]	2.23	2.20 [n]	-
Germany	2.43	2.52 [a]	2.25 [b]	2.49 [b]	2.51	2.52 [b]	2.50 [b]
Greece[4]	0.17 [a]	0.36	0.49 [a]	0.67	0.65 [b]	-	-
Hungary	-	1.06 [c,q]	0.73 [a,c]	0.80 [c]	0.95 [c]	1.02 [c]	-
Iceland	0.64	1.17	1.57	2.75 [b]	3.06	3.09 [b]	-
Ireland	0.68	0.93 [b]	1.28 [b]	1.15 [b]	1.15 [b]	-	-
Italy	0.88 [r]	1.23 [a]	1.00	1.07	1.11	-	-
Japan	2.12 [j]	2.76 [j]	2.69 [j]	2.99	3.07	3.12	-
Korea	-	1.92 [e]	2.50 [e]	2.65 [e]	2.92 [e]	2.91 [e]	-
Luxembourg	-	-	-	1.71	-	-	-
Mexico	-	-	0.31	0.37	0.39	-	-
Netherlands	1.79	1.97	1.99 [a]	1.90	1.89	-	-
New Zealand[4]	-	0.98	0.96	1.02	1.18 [a]	-	-
Norway[4]	1.18	1.64	1.70 [a]	1.65	1.60	1.67	-
Poland	-	-	0.65 [a]	0.66	0.64	0.59 [b]	-
Portugal[5, 1]	0.30	0.61	0.57 [a]	0.80 [b]	0.85	0.93 [b]	-
Slovak Republic	-	2.13 [c,q]	0.93 [c]	0.65 [k]	0.64 [k]	0.58 [k]	-
Spain	0.41	0.84	0.81 [a]	0.94	0.95	1.03	-
Sweden[4]	2.22 [a,k]	2.72 [k]	3.35 [a,k]	3.65 [k]	4.27 [k]	-	-
Switzerland[1, 2]	2.12 [b]	2.59	2.67	2.57	-	-	-
Turkey	-	0.53	0.38	0.64	-	-	-
United Kingdom	2.38 [a]	2.07	1.95	1.84	1.86	1.88	-
United States	2.34 [h]	2.72 [h]	2.51 [h]	2.72 [h]	2.74 [h]	2.67 [h,n]	2.62 [b,h,n]
Total OECD	**1.93 [b]**	**2.22 [a,b]**	**2.09 [a,b]**	**2.24 [b]**	**2.28 [b]**	**2.26 [b,n]**	**-**
EU-25	**-**	**-**	**1.72 [b]**	**1.80 [b]**	**1.83 [b]**	**1.83 [b,n]**	**-**
EU-15	**1.67 [b]**	**1.90 [a,b]**	**1.80**	**1.88 [b]**	**1.92 [b]**	**1.93 [b,n]**	**-**
China	-	0.74 [k]	0.60 [k]	1.00 [a]	1.07	1.23	-
Israel	-	2.50 [c]	2.74 [c]	4.72 [c]	5.04 [c,n]	4.72 [c,n]	-
Russian Federation	-	1.43	0.85	1.05	1.16	1.24	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 1983 instead of 1981.
4. 1999 instead of 2000.
5. 1982 instead of 1981.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/036108151783

Table 5. GERD by source of funds, 1981-2003

As a percentage of total national R&D expenditures

	Business enterprise						Government					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia[1, 2, 3]	20.2 [p]	44.0	47.8	46.3 [-]	-	-	72.8 [p]	50.2	45.8	45.7 [-]	-	-
Austria	50.2	50.3 [b]	45.3 [b]	39.9 [b,n]	40.3 [b,n]	40.8 [b,n]	46.9	46.5 [b]	47.3 [b]	41.1 [b,n]	40.9 [b,n]	40.4 [b,n]
Belgium[4]	64.8 [a]	64.8 [b]	67.1	64.3	-	-	33.4 [a]	31.3 [b]	23.1	21.4	-	-
Canada	40.8	38.2	45.7	48.3	45.3 [n]	44.3 [n]	50.6	45.7 [b]	35.9 [b]	30.5 [b]	33.3 [b,n]	34.0 [b,n]
Czech Republic	-	-	63.1	52.5	53.7	-	-	-	32.3	43.6	42.1	-
Denmark	42.5 [a]	51.4	45.2	61.5 [s]	-	-	53.5	39.7	39.6	28.0 [s]	-	-
Finland	54.5 [a]	56.3 [a]	59.5	70.8	69.5	-	43.4 [a]	40.9 [a]	35.1	25.5	26.1	-
France	40.9 [a]	42.5	48.4	54.2	-	-	53.4 [a]	48.8	41.9	36.9	-	-
Germany	56.9	61.7 [a]	60.0 [b]	65.7	65.6 [b]	65.1 [b]	41.8	35.9 [a]	37.9 [b]	31.4	31.5 [b]	32.1 [b]
Greece	21.4 [a]	21.8	25.5 [a]	29.7 [b]	-	-	78.6 [a]	57.7	53.9 [a]	46.9 [b]	-	-
Hungary	-	56.0 [c,q,s]	38.4 [c,s]	34.8 [c,s]	29.7 [c,s]	-	-	40.0 [c,q,s]	53.1 [c,s]	53.6 [c,s]	58.6 [c,s]	-
Iceland	5.7	24.5	34.6	46.2	-	-	85.6	69.7	57.3	34.0	-	-
Ireland[3]	37.7	60.6 [b]	72.3 [b,p]	66.0 [b]	-	-	56.5	27.9 [b]	22.5 [b,p]	22.6 [b]	-	-
Italy	50.1 [r]	44.4 [a]	41.7	-	-	-	47.2 [r]	49.6 [a]	53.0	-	-	-
Japan	67.7 [j]	77.4 [j]	72.3 [j]	73.0	73.9	-	24.9 [k]	16.4 [k]	20.9 [k]	18.5 [b]	18.2 [b]	-
Korea	-	-	76.3	72.5 [e]	72.2 [e]	-	-	-	19.0	25.0 [e]	25.4 [e]	-
Luxembourg[3]	-	-	-	91.0 [-]	-	-	-	-	-	7.7 [-]	-	-
Mexico	-	-	17.6	29.8	-	-	-	-	66.2	59.1	-	-
Netherlands	46.3	47.8	46.0	51.8	-	-	47.2	48.6	42.2	36.2	-	-
New Zealand	-	27.4	33.7	37.1 [a]	-	-	-	61.8	52.3	46.4 [a]	-	-
Norway	40.1	44.5	49.9 [a]	51.7	-	-	57.2	49.5	44.0 [a]	39.8	-	-
Poland	-	-	36.0 [a]	30.8	31.0	-	-	-	60.2 [a]	64.8	61.1	-
Portugal[5, 1]	30.0	20.2	19.5	31.5	-	-	61.9	59.4	65.3 [a]	61.0	-	-
Slovak Republic	-	68.3 [c,q]	60.4 [c]	56.1 [j]	53.6 [j]	-	-	31.7 [c,q]	37.8 [c]	41.3	44.1	-
Spain	42.8	48.1	44.5	47.2	48.9	-	56.0	45.7	43.6 [a]	39.9	39.1	-
Sweden	54.9 [a]	61.9	65.5 [a]	71.9	-	-	42.3 [a]	34.0	28.8 [a]	21.0	-	-
Switzerland[1, 2, 3]	75.1 [b]	67.4	67.5	69.1 [-]	-	-	24.9 [b]	28.4	26.9	23.2 [-]	-	-
Turkey[3]	-	28.5	32.9	42.9 [-]	-	-	-	70.1	62.4	50.6 [-]	-	-
United Kingdom	42.1 [a]	49.6	48.2	47.3	46.7	-	48.1 [a,b]	35.0	32.8	28.5	26.9	-
United States	49.4 [h]	57.2 [h]	60.2 [h]	67.3 [h]	64.4 [h,n]	63.1 [h,n]	47.8 [h]	38.9 [h]	35.4 [h]	27.8 [h]	30.2 [h,n]	31.2 [h,n]
Total OECD	**51.7** [b]	**58.7** [a,b]	**59.4** [a,b]	**63.6** [b]	**62.3** [b,n]	**-**	**44.1** [b]	**35.7** [a,b]	**34.0** [a,b]	**28.9** [b]	**29.9** [b,n]	**-**
EU-25	**-**	**-**	**51.9** [b]	**55.4** [b]	**-**	**-**	**-**	**-**	**39.4** [b]	**34.7** [b]	**-**	**-**
EU-15	**48.7** [b]	**52.0** [a,b]	**52.2**	**56.0** [b]	**-**	**-**	**46.7** [b]	**41.1** [a,b]	**39.1**	**34.1** [b]	**-**	**-**
China[3]	-	-	-	57.6 [s]	-	-	-	-	-	33.4 [s]	-	-
Israel[3]	-	43.5 [c]	47.7 [c]	69.6 [c,n]	-	-	-	36.9 [c]	35.9 [c]	24.7 [c]	-	-
Russian Federation	-	-	33.6	33.6	33.1	-	-	-	61.5	57.2	58.4	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 2000 instead of 2001.
4. 1983 instead of 1981.
5. 1982 instead of 1981.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/442056514762

Table 5. GERD by source of funds, 1981-2003 (cont'd)

As a percentage of total national R&D expenditures

	Other national sources						Abroad					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia[1, 2, 3]	2.1 [p]	3.9	4.4	4.8 [-]	-	-	1.0 [p]	1.8	2.1	3.3 [-]	-	-
Austria	0.4	0.3 [b]	0.4 [b]	0.3 [b,n]	0.3 [b,n]	0.3 [b,n]	2.5	3.0 [b]	7.1 [b]	18.7 [b,n]	18.5 [b,n]	18.5 [b,n]
Belgium[4]	0.8 [a]	1.0 [b]	2.3	2.5	-	-	1.0 [a]	3.0 [b]	7.5	11.8	-	-
Canada	4.8	6.7 [b]	6.9 [b]	8.4 [b]	9.4 [b,n]	10.0 [b,n]	3.8	9.4	11.6	12.9	12.0 [n]	11.7 [n]
Czech Republic	-	-	1.3	1.7	1.5	-	-	-	3.3	2.2	2.7	-
Denmark	2.0 [a]	4.6	4.3	2.6 [s]	-	-	2.1	4.4	11.0	7.8 [s]	-	-
Finland	1.1 [a]	1.5 [a]	1.0	1.2	1.2	-	1.0 [a]	1.3 [a]	4.5	2.5	3.1	-
France	0.7 [a]	0.7	1.7	1.7	-	-	5.0 [a]	8.0	8.0	7.2	-	-
Germany	0.4	0.5 [a]	0.3 [b]	0.4	0.4 [b]	0.4 [b]	1.0	2.0 [a]	1.8 [b]	2.5	2.5 [b]	2.4 [b]
Greece	-	0.7	2.5 [a]	2.0 [b]	-	-	-	19.9	18.2 [a]	21.4 [b]	-	-
Hungary	-	0.1 [c,q,s]	0.5 [c,s]	0.4 [c,s]	0.3 [c,s]	-	-	1.8 [c,q,s]	4.9 [c,s]	9.2 [c,s]	10.4 [c,s]	-
Iceland	4.4	1.7	3.7	1.6	-	-	4.3	4.1	4.4	18.3	-	-
Ireland[3]	1.1	2.2 [b]	1.9 [b,p]	2.6 [b]	-	-	4.8	9.4 [b]	8.5 [b,p]	8.9 [b]	-	-
Italy	0.0 [r]	-	-	-	-	-	2.7 [r]	6.1 [a]	5.3	-	-	-
Japan	7.3 [b,k]	6.1 [b,k]	6.7 [b,k]	8.1 [b]	7.6 [b]	-	0.1 [b,k]	0.1 [b,k]	0.1 [b,k]	0.4	0.4	-
Korea	-	-	4.7	2.1 [e]	2.0 [e]	-	-	-	0.0	0.5 [e]	0.4 [e]	-
Luxembourg[3]	-	-	-	-	-	-	-	-	-	1.3 [-]	-	-
Mexico	-	-	9.5	9.8	-	-	-	-	6.7	1.3	-	-
Netherlands	1.3	1.8	2.6	1.1 [a]	-	-	5.2	1.9	9.3	11.0	-	-
New Zealand	-	8.2	10.1	9.9 [a]	-	-	-	2.5	3.9	6.6 [a]	-	-
Norway	1.4	1.3	1.2 [a]	1.4	-	-	1.4	4.6	4.9 [a]	7.1	-	-
Poland	-	-	2.1 [a]	2.0	3.2	-	-	-	1.7 [a]	2.4	4.8	-
Portugal[5, 1]	4.8	5.4	3.3	2.4	-	-	3.3	15.0	11.9 [a]	5.1	4.9 [b]	-
Slovak Republic	-	-	0.1 [c]	0.8 [j]	0.3 [j]	-	-	-	1.6 [c]	1.9 [j]	2.1 [j]	-
Spain	0.1 [l]	0.6	5.2 [a]	5.3	5.2	-	1.1	5.6	6.7	7.7	6.8	-
Sweden	1.4 [a]	2.7	2.2 [a]	3.8	-	-	1.5 [a]	1.5	3.4 [a]	3.4	-	-
Switzerland[1, 2, 3]	-	2.3	2.5	3.4 [-]	-	-	-	1.9	3.1	4.3 [-]	-	-
Turkey[3]	-	1.3	2.7	5.3 [-]	-	-	-	0.2	2.0	1.2 [-]	-	-
United Kingdom	3.0 [a]	3.5	4.5	5.8	5.9	-	6.9 [a]	11.9	14.5	18.4	20.5	-
United States	2.8 [h]	3.9 [h]	4.4 [h]	5.0 [h]	5.4 [h,n]	5.7 [h,n]	-	-	-	-	-	-
Total OECD	**2.9** [b]	**3.5** [a,b]	**4.0** [a,b]	**4.6** [b]	**4.8** [b,n]	**-**	**-**	**-**	**-**	**-**	**-**	**-**
EU-25	**-**	**-**	**1.9** [b]	**2.2** [b]	**-**	**-**	**-**	**-**	**6.7** [b]	**7.6** [b]	**-**	**-**
EU-15	**1.1** [b]	**1.3** [a,b]	**1.8** [b]	**2.2** [b]	**-**	**-**	**3.5** [b]	**5.6** [a,b]	**6.9**	**7.8** [b]	**-**	**-**
China[3]	-	-	-	-	-	-	-	-	-	2.7 [s]	-	-
Israel[3]	-	13.1 [c]	12.0 [c]	2.8 [c,n]	-	-	-	6.5 [c]	4.4 [c]	2.8 [c,n]	-	-
Russian Federation	-	-	0.3	0.5	0.4	-	-	-	4.6	8.6	8.0	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 2000 instead of 2001.
4. 1983 instead of 1981.
5. 1982 instead of 1981.

Source: OECD, MSTI database, May 2004.

Table 6. GERD by two main sources of funds, as a percentage of GDP, 1981-2003

	Industry						Government					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia[1, 2, 3]	0.19 [p]	0.67	0.79	0.71 [-]	-	-	0.69 [p]	0.76	0.76	0.70 [-]	-	-
Austria	0.57	0.74 [b]	0.70 [a,b]	0.77 [b,n]	0.78 [b,n]	0.79 [b,n]	0.53	0.68 [b]	0.74 [a,b]	0.79 [b,n]	0.79 [b,n]	0.78 [b,n]
Belgium[4]	1.01 [a]	1.05 [b]	1.15	1.40	-	-	0.52 [a]	0.51 [b]	0.40	0.47	-	-
Canada	0.51	0.61	0.79	0.98	0.86 [n]	0.83 [b,n]	0.63	0.73 [b]	0.62 [b]	0.62 [b]	0.64 [b,n]	0.64 [b,n]
Czech Republic	-	-	0.64	0.68	0.70	-	-	0.59 [c,k,q]	0.33 [c,k,q]	0.57	0.55	-
Denmark	0.45	0.84	0.83	1.48 [s]	-	-	0.57	0.65	0.73	0.67 [s]	-	-
Finland	0.64 [a]	1.15	1.36	2.41	2.40	-	0.51 [a]	0.83 [a]	0.80	0.87	0.90	-
France	0.79	1.01	1.12	1.21	-	-	1.03 [a]	1.16	0.97	0.82	-	-
Germany	1.38	1.55 [a]	1.35	1.65	1.66 [b]	1.63 [b]	1.01	0.90 [a]	0.85	0.79	0.80 [b]	0.80 [b]
Greece	0.04	0.08	0.12 [a]	0.19	-	-	0.14 [a]	0.21	0.26 [a]	0.31	-	-
Hungary	-	0.59 [m,q,s]	0.28 [a,s]	0.33 [s]	0.30 [s]	-	-	0.42 [c,m,q]	0.39 [a,c,s]	0.51 [c,s]	0.60 [c,s]	-
Iceland	0.04	0.29	0.54	1.41	-	-	0.54	0.82	0.90	1.04	-	-
Ireland[3]	0.26	0.56 [b]	0.92 [b,p]	0.76 [b]	-	-	0.38	0.26 [b]	0.29 [b,p]	0.26 [b]	-	-
Italy	0.44 [r]	0.54 [a]	0.42	-	-	-	0.42 [r]	0.61 [a]	0.53	-	-	-
Japan	1.44 [j]	2.14 [j]	1.95 [j]	2.24	2.31	-	0.53 [b]	0.45 [b]	0.56 [b]	0.57 [b]	0.57 [b]	-
Korea	-	-	1.91	2.12 [e]	2.10 [e]	-	-	-	0.48	0.73 [e]	0.74 [e]	-
Luxembourg[3]	-	-	-	1.56 [-]	-	-	-	-	-	0.13 [-]	-	-
Mexico	-	0.10 [b,j,q]	0.05	0.12	-	-	-	0.21 [f,q]	0.20	0.23	-	-
Netherlands	0.83	0.94	0.91 [a]	0.98	-	-	0.84	0.95	0.84 [a]	0.68	-	-
New Zealand	-	0.27	0.32	0.44 [a]	-	-	-	0.61	0.50	0.55 [a]	-	-
Norway	0.47	0.73	0.85 [a]	0.83	-	-	0.67	0.81	0.75	0.64	-	-
Poland	-	-	0.23	0.20	0.18 [b]	-	-	-	0.39 [a]	0.41	0.36 [b]	-
Portugal[5, 1]	0.09	0.12	0.11 [a]	0.27	-	-	0.18	0.36	0.37 [a]	0.52	-	-
Slovak Republic	-	1.46 [q]	0.56	0.36	0.31	-	-	0.68 [c,q]	0.35 [c]	0.26 [k]	0.25 [k]	-
Spain	0.18	0.40	0.36 [a]	0.45	0.50	-	0.23	0.38	0.35 [a]	0.38	0.40	-
Sweden	1.22 [a,k]	1.69 [k]	2.20 [k]	3.07 [k]	-	-	0.94 [a,k]	0.93 [k]	0.96 [a,k]	0.90 [k]	-	-
Switzerland[1, 2, 3]	1.59 [b]	1.75	1.80	1.77 [-]	-	-	0.53 [b]	0.74	0.72	0.60 [-]	-	-
Turkey[3]	-	0.15	0.13	0.28 [-]	-	-	-	0.37	0.24	0.32 [-]	-	-
United Kingdom	1.00	1.03	0.94	0.88	0.88	-	1.15 [a,b]	0.72	0.64	0.53	0.50	-
United States	1.16 [h]	1.56 [h]	1.51 [h]	1.85 [h]	1.72 [h,n]	1.65 [b,h,n]	1.12 [h]	1.06 [h]	0.89 [h]	0.76 [h]	0.81 [h,n]	0.82 [b,h,n]
Total OECD	**1.00 [b]**	**1.30 [a,b]**	**1.24 [a,b]**	**1.45 [b]**	**1.41 [b,n]**	**-**	**0.85 [b]**	**0.79 [a,b]**	**0.71 [a,b]**	**0.66 [b]**	**0.68 [b,n]**	**-**
EU-25	**-**	**-**	**0.89 [b]**	**1.01 [b]**	**-**	**-**	**-**	**-**	**0.68 [b]**	**0.63 [b]**	**-**	**-**
EU-15	**0.81 [b]**	**0.99 [a,b]**	**0.94**	**1.07 [b]**	**-**	**-**	**0.78 [b]**	**0.78 [a,b]**	**0.70**	**0.65 [b]**	**-**	**-**
China[3]	-	-	-	0.58 [s]	-	-	-	-	-	0.33 [s]	-	-
Israel[3]	-	1.09	1.31	3.29 [n]	-	-	-	0.92 [c]	0.98 [c]	1.17 [c]	-	-
Russian Federation	-	-	0.29	0.39	0.41	-	-	-	0.52	0.67	0.73	-

Times series notes:

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Source: OECD, MSTI database, May 2004.

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Table 7. R&D expenditures by sector of performance, 1981-2003

As a percentage of total national R&D expenditures

	Business enterprise						Higher education					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia[1, 2, 3]	25.0 [b]	44.2	48.2	47.5 [-]	-	-	28.6	26.2	26.3	26.8 [-]	-	-
Austria[4]	55.9	-	-	63.6	-	-	32.8	-	-	29.7	-	-
Belgium[5]	70.6 [a]	66.5 [b]	71.3	73.7	-	-	19.2 [a]	26.2 [b]	23.9	19.2	-	-
Canada	48.1	49.7	58.1	59.6	55.2 [n]	53.7 [n]	26.7	30.6	26.8	29.3	32.8 [n]	34.9 [n]
Czech Republic	-	69.4 [c,q]	65.1 [c,q]	60.2	61.1	-	-	1.6 [c,q]	8.5 [c,q]	15.7	15.6	-
Denmark	49.7	58.5	57.4	68.7	69.3	-	26.7	22.6	24.5	18.8	23.1 [a]	-
Finland	54.7 [a]	57.0 [a]	63.2	71.1	69.9	-	22.2 [a]	22.1 [a]	19.5	18.1	19.2	-
France	58.9 [a]	61.5	61.0	63.2 [a]	62.2 [n]	-	16.4 [a]	15.1	16.7	18.9	19.5 [n]	-
Germany	69.0	69.4 [a]	66.3 [b]	69.9	69.4 [b]	69.1 [b]	17.1	16.2 [a]	18.2 [b]	16.4	16.9 [b]	17.1 [b]
Greece	22.5 [a]	26.1	29.5 [a]	32.7 [b]	-	-	14.5 [a]	33.8	44.3 [a]	44.9 [b]	-	-
Hungary	-	41.4 [c,q,s]	43.4 [c,s]	40.1 [c,s]	35.5 [c,s]	-	-	20.3 [c,q,s]	24.8 [c,s]	25.7 [c,s]	25.2 [c,s]	-
Iceland	9.6	21.8	31.9	58.9	57.2 [b]	-	26.0	29.4	27.5	18.8	16.1 [b]	-
Ireland	43.6	63.6 [b]	70.0 [b]	69.7 [b]	-	-	16.0	23.2 [b]	20.4 [b]	22.4 [b]	-	-
Italy	56.4 [r]	55.8 [a]	53.4	49.1	-	-	17.9 [r]	21.5 [a]	25.5	32.6	-	-
Japan	66.0 [b,j]	75.4 [b,j]	70.3 [b,j]	73.7	74.4	-	17.6 [b,k]	12.1 [b,k]	14.5 [b,k]	14.5	13.9	-
Korea	-	-	73.7	76.2 [e]	74.9 [e]	-	-	-	8.2	10.4 [e]	10.4 [e]	-
Luxembourg[3]	-	-	-	92.6 [-]	-	-	-	-	-	0.3 [-]	-	-
Mexico	-	-	20.8	30.3	-	-	-	-	45.8	30.4	-	-
Netherlands	53.3	49.7	52.1	58.3	-	-	23.2	29.7	28.8	27.0	-	-
New Zealand	-	26.8	27.0	36.5 [a]	-	-	-	28.6	30.7	30.3 [a]	-	-
Norway	52.9	54.6	56.7 [a]	59.7	57.4	-	29.0	26.7	26.0 [a]	25.7	26.8	-
Poland	-	-	38.7 [a]	35.8	21.4	-	-	-	26.3 [a]	32.7	33.5	-
Portugal[6, 1]	31.2	21.7	20.9 [a]	31.8	34.4 [b]	-	20.6	43.0	37.1 [a]	36.7	35.6 [b]	-
Slovak Republic	-	74.6 [c,q]	53.9 [c]	67.3 [j]	64.3 [j]	-	-	3.9 [c,q]	5.9 [c]	9.0 [j]	9.1 [j]	-
Spain	45.5	56.0	48.2	52.4	54.6 [a]	-	23.0	22.2	32.0	30.9 [b]	29.8	-
Sweden	63.7 [a,j]	68.5	74.3 [a]	77.6	-	-	30.0 [a,j]	27.4 [j]	21.9 [a,h,j]	19.4 [j]	-	-
Switzerland[1, 2, 3]	74.2 [b]	70.1	70.7	73.9 [-]	-	-	19.9 [b]	25.0	24.3	22.9 [-]	-	-
Turkey[3]	-	21.1	23.6	33.4 [-]	-	-	-	71.1	69.0	60.4 [-]	-	-
United Kingdom	63.0 [a]	67.1	65.0	66.8 [a]	67.0	-	13.6 [a]	16.7	19.2	21.8	22.6	-
United States	71.2 [h]	72.5 [h]	71.8 [h]	73.0 [h]	70.2 [h,n]	68.9 [h,n]	13.2 [h]	14.5 [h]	15.2 [h]	14.5 [h]	15.9 [h,n]	16.8 [h,n]
Total OECD	**66.2** [b]	**68.8** [a,b]	**67.2** [a,b]	**69.3** [b]	**68.0** [b,n]	**-**	**16.0** [b]	**16.3** [a,b]	**17.5** [a,b]	**17.4** [b]	**18.1** [b,n]	**-**
EU-25	**-**	**-**	**61.6** [b]	**64.0** [b]	**63.6** [b,n]	**-**	**-**	**-**	**20.8** [b]	**21.5** [b]	**-**	**-**
EU-15	**62.3** [b]	**63.4** [a,b]	**62.1** [b]	**64.7** [b]	**64.4** [b,n]	**-**	**17.6** [a,b]	**18.8** [a,b]	**20.8** [a,b]	**21.4** [b]	**-**	**-**
China	-	39.8 [k,s]	43.7 [k,s]	60.4	61.2	-	-	8.6 [j,s]	12.1 [j,s]	9.8	10.1	-
Israel	-	55.7 [c]	58.7 [c]	75.3 [c,n]	73.0 [c,n]	-	-	26.6 [c,e]	25.6 [c,e]	16.1 [c,e,n]	17.5 [c,e,n]	-
Russian Federation	-	77.5	68.5	70.3	69.9	-	-	5.7 [h]	5.4	5.2	5.4	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 2000 instead of 2001.
4. 1998 instead of 2001.
5. 1983 instead of 1981.
6. 1982 instead of 1981.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/458542005788

Table 7. R&D expenditures by sector of performance, 1981-2003 (cont'd)

As a percentage of total national R&D expenditures

	Government						Private non-profit					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia[1, 2, 3]	45.1	28.1	23.5	22.9 [-]	-	-	1.3	1.6	2.1	2.7 [-]	-	-
Austria[4]	9.0	-	-	6.4	-	-	2.3	-	-	0.3	-	-
Belgium[5]	5.6 [a]	6.1 [b]	3.5	6.0	-	-	4.6 [a]	1.2 [b]	1.4	1.1	-	-
Canada	24.4	18.7	14.4	10.9	11.7 [n]	11.2 [n]	0.8	1.0	0.7	0.2	0.2 [n]	0.2 [n]
Czech Republic	-	29.0 [c,q]	26.5 [c,q]	23.7	23.0	-	-	-	0.1	0.5	0.3	-
Denmark	22.7	17.7	17.0	11.7	7.0 [a]	-	0.9	1.2	1.1	0.7	0.6	-
Finland	22.6 [a]	20.2 [a]	16.7	10.2	10.4	-	0.6 [a]	0.7 [a]	0.6	0.6	0.6	-
France	23.6 [a]	22.7	21.0	16.5	17.0 [n]	-	1.1 [a]	0.8	1.3	1.4	1.4 [n]	-
Germany	13.4	14.4 [a]	15.5 [b,m]	13.7 [m]	13.7 [b,m]	13.8 [b,m]	0.5	0.5 [b]	-	-	-	-
Greece	63.1 [a]	40.1	25.5 [a]	22.1 [b]	-	-	-	-	0.7 [a]	0.4 [b]	-	-
Hungary	-	24.5 [c,q,s]	25.6 [c,s]	25.9 [c,s]	32.9 [c,s]	-	-	-	-	-	-	-
Iceland	60.7	44.5	37.5	20.1	24.5 [b]	-	3.7	4.4	3.2	2.3	2.2 [b]	-
Ireland	39.3	11.6 [b]	9.0 [b]	7.9 [b]	-	-	1.1	1.7 [b]	0.8 [b]	-	-	-
Italy	25.7 [r]	22.7 [a]	21.1	18.4	-	-	-	-	-	-	-	-
Japan	12.0 [b,k]	8.1 [b,k]	10.4 [b,k]	9.5	9.5	-	4.5 [b,k]	4.4 [b,k]	4.8 [b,k]	2.3 [a]	2.1	-
Korea	-	-	17.0	12.4 [e]	13.4 [e]	-	-	-	1.2	1.1 [e]	1.3 [e]	-
Luxembourg[3]	-	-	-	7.1 [-]	-	-	-	-	-	-	-	-
Mexico	-	-	33.0	39.1	-	-	-	-	0.4	0.2	-	-
Netherlands	20.8	18.3	18.1	14.2	-	-	2.8	2.3 [a,m]	1.0	0.6	-	-
New Zealand	-	44.6	42.2	33.2 [a]	-	-	-	-	-	-	-	-
Norway	17.7	18.8	17.3 [a]	14.6	15.8	-	0.5	-	-	-	-	-
Poland	-	-	35.0 [a]	31.3	44.9	-	-	-	0.1	0.2	0.3	-
Portugal[6, 1]	43.6	22.1	27.0	20.8	19.8 [b]	-	4.6	13.2	15.0 [a]	10.8	10.2 [b]	-
Slovak Republic	-	21.5 [c,q]	40.2 [c]	23.7 [c]	26.6 [c]	-	-	-	-	0.0	0.0	-
Spain	31.6	21.3	18.6	15.9	15.4	-	-	0.5	1.1	0.8	0.2	-
Sweden	6.1 [a,f]	4.1 [f]	3.7 [a,f]	2.8 [f]	-	-	0.3 [a]	0.1	0.2 [a]	0.1	-	-
Switzerland[1, 2, 3]	5.9 [b]	3.7 [f]	2.5 [f]	1.3 [a,f]	-	-	3.2 [a,h]	1.2	2.5	1.9 [-]	-	-
Turkey[3]	-	7.9	7.4	6.2 [-]	-	-	-	-	-	-	-	-
United Kingdom	20.6 [a]	14.5 [a]	14.6	9.9 [a]	8.9	-	2.9 [a]	1.8	1.3	1.5	1.5	-
United States	12.5 [f]	9.8 [f]	9.4 [f]	7.9 [f]	8.8 [f,n]	9.1 [f,n]	3.1 [h]	3.3 [h]	3.6 [h]	4.7 [h]	5.1 [h,n]	5.3 [h,n]
Total OECD	**15.2** [b]	**12.4** [a,b]	**12.5** [a,b]	**10.5** [b]	**11.0** [b,n]	**-**	**2.6** [b]	**2.6** [a,b]	**2.7** [a,b]	**2.8** [b]	**2.9** [b,n]	**-**
EU-25	**-**	**-**	**16.8** [b]	**13.6** [b]	**13.7** [b,n]	**-**	**-**	**-**	**0.9** [b]	**0.9** [b]	**0.8** [b,n]	**-**
EU-15	**18.8** [b]	**16.9** [a,b]	**16.2** [b]	**13.1** [b]	**13.0** [b,n]	**-**	**1.4** [b]	**0.9** [a,b]	**0.9** [b]	**0.9** [b]	**0.8** [b,n]	**-**
China	-	49.6 [j,s]	42.1 [j,s]	29.7	28.7	-	-	-	-	-	-	-
Israel	-	10.8 [c]	9.9 [c]	5.2 [c,n]	5.8 [c,n]	-	-	6.9 [c]	5.8 [c]	3.4 [c,n]	3.8 [c,n]	-
Russian Federation	-	16.8	26.1	24.3	24.5	-	-	0.0 [h]	0.0	0.2	0.2	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 2000 instead of 2001.
4. 1998 instead of 2001.
5. 1983 instead of 1981.
6. 1982 instead of 1981.

Source: OECD, MSTI database, May 2004.

Table 8. GERD by sector of performance, 1981-2003

As a percentage of GDP

	Business enterprise						Higher education					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia[1, 2, 3]	0.2 [b]	0.7	0.8	0.7	-	-	0.3	0.4	0.4	0.4	-	-
Austria[4]	0.6	-	-	1.1 [b, n]	-	-	0.4	-	-	0.5 [b,n]	-	-
Belgium[5]	1.1 [a,a]	1.1 [b]	1.2	1.6	-	-	0.3 [a]	0.4 [b]	0.4	0.4	-	-
Canada	0.6	0.8	1.0	1.2	1.1 [n]	1.0 [b, n]	0.3	0.5	0.5	0.6	0.6 [n]	0.7 [b,n]
Czech Republic	-	1.4 [c, q]	0.7 [c, q]	0.8	0.8	-	-	0.0 [c,q]	0.1 [c,q]	0.2	0.2	-
Denmark	0.5	1.0	1.1	1.6	1.7	-	0.3	0.4	0.5	0.5	0.6 [a]	-
Finland	0.6 [a]	1.2 [a]	1.4	2.4	2.4	-	0.3 [a]	0.5 [a]	0.4	0.6	0.7	-
France	1.1 [a]	1.5	1.4	1.4 [a]	1.4 [n]	-	0.3 [a]	0.4	0.4	0.4	0.4 [n]	-
Germany	1.7	1.7 [a,a]	1.5 [b]	1.8	1.7 [b]	1.7 [b]	0.4	0.4 [a]	0.4 [b]	0.4	0.4 [b]	0.4 [b]
Greece	0.0 [a]	0.1	0.1 [a]	0.2 [b]	-	-	0.0 [a]	0.1	0.2 [a]	0.3 [b]	-	-
Hungary	-	0.4 [c, q, s]	0.3 [a, c, s]	0.4 [c, s]	0.4 [c, s]	-	-	0.2 [c,q,s]	0.2 [a,c,s]	0.2 [c,s]	0.3 [c,s]	-
Iceland	0.1	0.3	0.5	1.8	1.8 [b]	-	0.2	0.3	0.4	0.6	0.5 [b]	-
Ireland	0.3	0.6 [b]	0.9 [b]	0.8 [b]	-	-	0.1	0.2 [b]	0.3 [b]	0.3 [b]	-	-
Italy	0.5 [r]	0.7 [a]	0.5	0.5	-	-	0.2 [r]	0.3 [a]	0.3	0.4	-	-
Japan	1.4 [b, j]	2.1 [b, j]	1.9 [b, j]	2.3	2.3	-	0.4 [b,j,k]	0.3 [b,j,k]	0.4 [b,j,k]	0.4	0.4	-
Korea	-	-	1.8 [e]	2.2 [e]	2.2 [e]	-	-	-	0.2 [e]	0.3 [e]	0.3 [e]	-
Luxembourg[3]	-	-	-	1.6	-	-	-	-	-	0.0	-	-
Mexico	-	-	0.1	0.1	-	-	-	-	0.1	0.1	-	-
Netherlands	1.0	1.0	1.0 [a]	1.1	-	-	0.4	0.6	0.6 [a]	0.5	-	-
New Zealand	-	0.3	0.3	0.4 [a]	-	-	-	0.3	0.3	0.4 [a]	-	-
Norway	0.6	0.9	1.0 [a]	1.0	1.0	-	0.3	0.4	0.4 [a]	0.4	0.4	-
Poland	-	-	0.3 [a]	0.2	0.1 [b]	-	-	-	0.2 [a]	0.2	0.2 [b]	-
Portugal[6, 1]	0.1	0.1	0.1 [a]	0.3	0.3 [b]	-	0.1	0.3	0.2 [a]	0.3	0.3 [b]	-
Slovak Republic	-	1.6 [c, q]	0.5 [c,c]	0.4 [j, k]	0.4 [j, k]	-	-	0.1 [c,q]	0.1 [c]	0.1 [j,k]	0.1 [j,k]	-
Spain	0.2	0.5	0.4 [a]	0.5	0.6 [a]	-	0.1	0.2	0.3 [a]	0.3 [b]	0.3	-
Sweden	1.4 [a, j, k]	1.9 [k]	2.5 [a, k]	3.3 [k]	-	-	0.7 [a,j,k]	0.7 [j,k]	0.7 [a,h,j,k]	0.8 [j,k]	-	-
Switzerland[1, 2, 3]	1.6 [b]	1.8	1.9	1.9	-	-	0.4 [b]	0.6	0.6	0.6	-	-
Turkey[3]	-	0.1	0.1	0.2	-	-	-	0.4	0.3	0.4	-	-
United Kingdom	1.5 [a]	1.4	1.3	1.2 [a]	1.3	-	0.3 [a]	0.3	0.4	0.4	0.4	-
United States	1.7 [h]	2.0 [h]	1.8 [h]	2.0 [h]	1.9 [h, n]	1.8 [b, h, n]	0.3 [h]	0.4 [h]	0.4 [h]	0.4 [h]	0.4 [h,n]	0.4 [h,n]
Total OECD	**1.3** [b]	**1.5** [a, b]	**1.4** [a, b]	**1.6** [b]	**1.5** [b, n]	**-**	**0.3** [b]	**0.4** [a,b]	**0.4** [a,b]	**0.4** [b]	**0.4** [b,n]	**-**
EU-25	**-**	**-**	**1.1** [b]	**1.2** [b]	**1.2** [b, n]	**-**	**-**	**-**	**0.4** [b]	**0.4** [b]	**-**	**-**
EU-15	**1.0** [b]	**1.2** [a, b]	**1.1** [b]	**1.2** [b]	**1.2** [b, n]	**-**	**0.3** [a,b]	**0.4** [a,b]	**0.4** [a,b]	**0.4** [b]	**-**	**-**
China	-	0.3 [k, s]	0.3 [k, s]	0.6	0.8	-	-	0.1 [j,k,s]	0.1 [j,k,s]	0.1	0.1	-
Israel	-	1.4 [c]	1.6 [c]	3.8 [c, n]	3.4 [c, n]	-	-	0.7 [c,e]	0.7 [c,e]	0.8 [c,e,n]	0.8 [c,e,n]	-
Russian Federation[1]	-	0.6	0.6	0.8	0.9	-	-	0.0 [h]	0.0	0.1	0.1	-

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Source: OECD, MSTI database, May 2004.

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Table 8. GERD by sector of performance, 1981-2003 (cont'd)

As a percentage of GDP

	Government						Private non-profit					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia[1, 2, 3]	0.4	0.4	0.4	0.4	-	-	0.0	0.0	0.0	0.0	-	-
Austria[4]	0.1	-	-	0.1 b,n	-	-	0.0	-	-	0.0	-	-
Belgium[5]	0.1 a	0.1 b	0.1	0.1	-	-	0.1 a	0.0 b	0.0	0.0	-	-
Canada	0.3	0.3	0.2	0.2	0.2 n	0.2 b,n	0.0	0.0	0.0	0.0	0.0 n	0.0 b,n
Czech Republic	-	0.6 c,q	0.3 c,q	0.3	0.3	-	-	-	-	0.0	0.0	-
Denmark	0.2	0.3	0.3	0.3	0.2 a	-	0.0	0.0	0.0	0.0	0.0	-
Finland	0.3 a	0.4 a	0.4	0.3	0.4	-	0.0 a	0.0 a	0.0	0.0	0.0	-
France	0.5 a	0.5	0.5	0.4	0.4 n	-	0.0 a	0.0	0.0	0.0	0.0 n	-
Germany	0.3	0.4 a	0.3 b,m	0.3 m	0.3 b,m	0.3 b,m	0.0	-	-	-	-	-
Greece	0.1 a	0.1	0.1 a	0.1 b	-	-	-	-	0.0 a	0.0 b	-	-
Hungary	-	0.3 c,q,s	0.2 a,c,s	0.2 c,s	0.3 c,s	-	-	-	-	-	-	-
Iceland	0.4	0.5	0.6	0.6	0.8 b	-	0.0	0.1	0.0	0.1	0.1 b	-
Ireland	0.3	0.1 b	0.1 b	0.1 b	-	-	0.0	0.0 b	0.0 b	-	-	-
Italy	0.2 r	0.3 a	0.2	0.2	-	-	-	-	-	-	-	-
Japan	0.3 b,j,k	0.2 b,j,k	0.3 b,j,k	0.3	0.3	-	0.1 b,j,k	0.1 b,j,k	0.1 b,j,k	0.1 a	0.1	-
Korea	-	-	0.4 e	0.4 e	0.4 e	-	-	-	0.0 e	0.0 e	0.0 e	-
Luxembourg[3]	-	-	-	0.1	-	-	-	-	-	-	-	-
Mexico	-	-	0.1	0.2	-	-	-	-	0.0	0.0	-	-
Netherlands	0.4	0.4	0.4 a	0.3	-	-	0.0	0.0 a,m	0.0 a	0.0	-	-
New Zealand	-	0.4	0.4	0.4 a	-	-	-	-	-	-	-	-
Norway	0.2	0.3	0.3 a	0.2	0.3	-	0.0	-	-	-	-	-
Poland	-	-	0.2 a	0.2	0.3 b	-	-	-	-	0.0	0.0 b	-
Portugal[6, 1]	0.1	0.1	0.2 a	0.2	0.2 b	-	0.0	0.1	0.1 a	0.1	0.1 b	-
Slovak Republic	-	0.5 c,q	0.4 c	0.2 k,c	0.2 k,c	-	-	-	-	-	0.0 k	-
Spain	0.1	0.2	0.2 a	0.2	0.2	-	-	0.0	0.0 a	0.0	0.0	-
Sweden	0.1 a,f,k	0.1 f,k	0.1 a,f,k	0.1 f,k	-	-	0.0 a,k	0.0 k	0.0 a,k	0.0 k	-	-
Switzerland[1, 2, 3]	0.1 b	0.1 f	0.1 f	0.0 a,f	-	-	-	0.0	0.1	0.0	-	-
Turkey[3]	-	0.0	0.0	0.0	-	-	-	-	-	-	-	-
United Kingdom	0.5 a	0.3 a	0.3	0.2 a	0.2	-	0.1 a	0.0	0.0	0.0	0.0	-
United States	0.3 f,h	0.3 f,h	0.2 f,h	0.2 f,h	0.2 f,h,n	0.2 b,f,h,n	0.1 h	0.1 h	0.1 h	0.1 h	0.1 h,n	0.1 h,n
Total OECD	**0.3 b**	**0.3 a,b**	**0.3 a,b**	**0.2 b**	**0.2 b,n**	**-**	**0.1 b**	**0.1 a,b**	**0.1 a,b**	**0.1 b**	**0.1 b,n**	**-**
EU-25	**-**	**-**	**0.3 b**	**0.2 b**	**0.3 b,n**	**-**	**-**	**-**	**0.0 b**	**0.0 b**	**0.0 b,n**	**-**
EU-15	**0.3 b**	**0.3 a,b**	**0.3 b**	**0.3 b**	**0.3 b,n**	**-**	**0.0 b**	**0.0 a,b**	**0.0 b**	**0.0 b**	**0.0 b,n**	**-**
China	-	0.4 j,k,s	0.3 j,k,s	0.3	0.4	-	-	-	-	-	-	-
Israel	-	0.3 c	0.3 c	0.3 c,n	0.3 c,n	-	-	0.2 c	0.2 c	0.2 c,n	0.2 c,n	-
Russian Federatior	-	0.1	0.2	0.3	0.3	-	-	0.0 h	0.0	0.0	0.0	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

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5. 1983 instead of 1981.
6. 1982 instead of 1981.

Source: OECD, MSTI database, May 2004.

Table 9. Business R&D expenditures, 1981-2003

	Millions constant USD (1995 PPPs)							As a percentage of total OECD					
	1981	1985	1991	1995	2001	2002	2003	1981	1985	1991	1995	2001	2002
Australia	591 [b]	1 067 [b]	1 896	3 306	3 718	-	-	0.4	0.5	0.7	1.1	0.9	-
Austria[1]	814	949 [b]	-	-	2 214	-	-	0.5	0.4	-	-	0.6	-
Belgium	1 664	2 020	2 228 [b]	2 681	4 042	4 170 [n]	-	1.0	0.9	0.8	0.9	1.0	1.1
Canada	2 811	3 958	4 660	6 536	9 850	8 875 [n]	8 630 [b,n]	1.7	1.7	1.6	2.2	2.5	2.3
Czech Republic	-	-	1 613 [c,q]	818 [a]	1 066	1 100	-	-	-	0.6	0.3	0.3	0.3
Denmark	470	671	1 038	1 239	2 248	2 404	-	0.3	0.3	0.4	0.4	0.6	0.6
Finland	494	797	1 105	1 402	3 001	3 056	-	0.3	0.4	0.4	0.5	0.8	0.8
France	10 528	12 974	17 191	17 356	20 217 [a]	19 853 [n]	-	6.2	5.7	6.0	5.9	5.1	5.1
Germany	19 239	23 586	29 116 [a]	26 122	33 897	33 934 [b]	33 464 [b]	11.4	10.4	10.2	8.9	8.6	8.7
Greece[2]	46	95	126	198	361 [b]	-	-	0.0	0.0	0.0	0.1	0.1	-
Hungary	-	-	406 [q]	297	447	443	-	-	-	0.1	0.1	0.1	0.1
Iceland	3	6	15	29	139	136 [b]	-	0.0	0.0	0.0	0.0	0.0	0.0
Ireland	109	160	310	575	873	-	-	0.1	0.1	0.1	0.2	0.2	-
Italy	4 461 [r]	6 199 [r]	7 746 [a]	6 351	7 278	7 221 [n]	7 313 [n]	2.6	2.7	2.7	2.2	1.8	1.8
Japan	25 562 [j]	37 894 [j]	56 098 [j]	53 174 [j]	68 522	70 103	-	15.2	16.7	19.7	18.0	17.4	17.9
Korea	-	-	-	9 525	15 024	15 621	-	-	-	-	3.2	3.8	4.0
Luxembourg[3]	-	-	-	-	294 [-]	-	-	-	-	-	0.1	-	-
Mexico	-	-	543 [b,j,q]	402	968	-	-	-	-	0.2	0.1	0.2	-
Netherlands	2 292	2 866	3 018	3 466	4 468	4 203 [n]	-	1.4	1.3	1.1	1.2	1.1	1.1
New Zealand	-	-	141	164	319 [a]	-	-	-	-	0.0	0.1	0.1	-
Norway	495	834	825	1 001 [a]	1 372	1 354 [b]	-	0.3	0.4	0.3	0.3	0.3	0.3
Poland	-	-	-	728 [a]	863	480	-	-	-	-	0.2	0.2	0.1
Portugal[4, 2, 5]	85	95	169	157 [a]	436	521 [b]	-	0.0	0.0	0.1	0.1	0.1	0.1
Slovak Republic	-	-	648 [b,c,q]	219 [c]	233	210	-	-	-	0.2	0.1	0.1	0.1
Spain	798	1 351	2 768	2 416	3 830	4 416 [a]	-	0.5	0.6	1.0	0.8	1.0	1.1
Sweden	2 058 [a]	3 024	3 344 [k]	4 673 [a,k]	7 376 [k]	-	-	1.2	1.3	1.2	1.6	1.9	-
Switzerland[2, 5, 6, 3]	2 399 [b]	3 482 [a]	3 321	3 513	3 884 [-]	-	-	1.4	1.5	1.2	1.1	1.0	-
Turkey[2]	-	-	324	303	879 [-]	-	-	-	-	0.1	0.1	0.2	-
United Kingdom	12 089	13 045	14 533	14 615	17 053 [a]	17 564	-	7.2	5.7	5.1	5.0	4.3	4.5
United States	81 589 [h]	112 257 [h]	127 965 [h]	132 109 [h]	179 673 [h]	172 371 [h,n]	170 945 [b,h,n]	48.4	49.4	44.9	44.8	45.5	44.1
Total OECD	**168 685** [b]	**227 013** [b]	**284 999** [a,b]	**294 874** [a,b]	**394 706** [b]	**390 610** [b,n]	**-**	**100**	**100**	**100**	**100**	**100**	**100**
EU-25	**-**	**-**	**-**	**85 141** [b]	**110 640** [b]	**111 945** [b,n]	**-**	**-**	**-**	**-**	**28.9**	**28.0**	**28.7**
EU-15	**55 136** [b]	**67 794** [b]	**84 074** [a,b]	**82 839** [b]	**107 593** [b]	**109 291** [b,n]	**-**	**32.7**	**29.9**	**29.5**	**28.1**	**27.3**	**28.0**
China	-	-	5 505 [k,s]	7 871 [k,s]	31 668	40 066	-	-	-	1.9	2.7	8.0	10.3
Israel	-	-	1 079 [c]	1 544 [c]	4 470 [c,n]	4 024 [c,n]	3 916 [c,n]	-	-	0.4	0.5	1.1	1.0
Russian Federation[5]	-	-	7 532	5 121	8 628	9 539	-	-	-	2.7	1.7	2.2	2.4

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1998 instead of 2001. 2. 1986 instead of 1985. 3. 2000 instead of 2001. 4. 1982 instead of 1981. 5. 1992 instead of 1991. 6. 1996 instead of 1995.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/730082336242

Table 10. BERD intensity, 1981-2003

As a percentage of value added in industry

	1981	1985	1991	1995	2000	2001	2002	2003
Australia	0.3 b	0.5 b	0.8	1.2	1.0	1.1	-	-
Austria[1]	0.9	1.0 b	-	-	1.6 -	-	-	-
Belgium	1.5	1.7	1.6 b	1.8	2.2	2.4	2.5 n	-
Canada	0.8	1.0	1.1	1.4	1.5	1.6 b	1.4 b,n	1.4 b,n
Czech Republic	-	-	1.8 c,q	0.9 a	1.1	1.0	1.1	-
Denmark[2]	0.9	1.1	1.5	1.7	2.3	2.6	2.8	-
Finland	0.9	1.3	1.8	2.2	3.5	3.6	3.6	-
France	1.6	1.9	2.1	2.1	2.0	2.1 a	2.0 n	-
Germany	2.3	2.7	2.5 a	2.1	2.5 b	2.5	2.5 b	2.5 b
Greece[3, 2]	0.0	0.1	0.1	0.2	0.3	0.3 b	-	-
Hungary	-	-	0.6 q	0.5	0.5	0.6	0.6 b	-
Iceland	0.1	0.2	0.4	0.8	2.5 b	2.8 b	2.8 b	-
Ireland	0.4	0.5	0.8	1.3	1.1 b	1.1	-	-
Italy	0.6 r	0.8 r	1.0 a	0.7	0.8	0.8	0.8 n	0.8 n
Japan	1.7 j	2.3 j	2.6 j	2.4 j	2.8	3.0	3.1 b	-
Korea	-	-	-	2.2	2.4	2.8	2.7	-
Luxembourg	-	-	-	-	2.2	-	-	-
Mexico	-	-	0.1 b,j,q	0.1	0.2	0.2	-	-
Netherlands	1.4	1.6	1.4	1.5	1.6	1.6	1.6 n	-
New Zealand[2]	-	-	0.4	0.3	0.4 b	0.6 a,b	-	-
Norway[2]	0.9	1.3	1.3	1.5 a	1.4	1.4	1.4	-
Poland	-	-	-	0.4 a	0.3	0.3	0.2 b	-
Portugal[4, 3, 5]	0.1	0.1	0.2	0.2 a	0.4 b	0.4	0.5 b	-
Slovak Republic	-	-	-	0.7 c	0.6	0.6	0.5	-
Spain	0.2	0.4	0.6	0.5	0.7	0.7	0.8 a	-
Sweden[2]	2.2 a	2.9	3.0 k	3.8 a,k	4.3 k	5.2 k	-	-
Switzerland[3, 5, 6]	1.6 b	2.6 a,b	2.9 b	3.1 b	3.1	-	-	-
Turkey	-	-	0.1	0.1	0.3	-	-	-
United Kingdom	2.1	2.0	2.0	1.8	1.8	1.8 a	1.9	-
United States	2.2 h	2.8 h	2.8 h	2.5 h	2.8 h	2.7 h	2.6 b,h,n	2.5 b,h,n
Total OECD	**1.7 b**	**2.1 b**	**2.1 a,b**	**2.0 a,b**	**2.2 b**	**2.2 b**	**2.1 b,n**	**-**
EU-25	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
EU-15	**1.4 b**	**1.7 b**	**1.7 a,b**	**1.6 b**	**1.8 b**	**1.8 b**	**1.8 b,n**	**-**
China	-	-	0.3 k,s	0.3 k,s	0.7 a	0.7	0.9 b	-
Israel	-	-	-	2.5 c	5.4 c	6.0 c,n	5.4 b,c,n	5.1 b,c,n
Russian Federatior	-	-	0.6	0.7	1.0 b	1.1	1.1 b	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1998 instead of 2000.
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5. 1992 instead of 1991.
6. 1996 instead of 1995.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/754616431240

Table 11. Business R&D expenditures by source of funds, 1981-2003

As a percentage of total national R&D expenditures

	Industry						Government					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia	75.5 b,p	92.7	92.9	88.7	-	-	8.4 b,p	3.0	2.4	5.1	-	-
Austria[1]	88.4	-	-	64.4	-	-	7.4	-	-	5.5	-	-
Belgium	91.5 a	91.4 b	89.2	82.7	83.9 n	-	8.3 a	7.8 b	4.3	5.7	5.9 n	-
Canada	81.9	71.6	74.3	75.9	75.9 n	75.9 n	10.7	9.9	6.2	3.2	3.2 n	3.2 n
Czech Republic	-	-	92.2	84.3	84.0	-	-	6.6 c,q	4.5 c,q	12.2	12.1	-
Denmark	84.4 a	86.0	76.9	87.4	-	-	12.4	7.9	6.1	3.1	-	-
Finland	94.9 a	93.3	89.1	95.6	95.7	-	4.2 a	5.5	5.6	3.4	3.2	-
France	68.2	66.2	76.1	82.9 a	-	-	24.6	22.3	12.7	8.4 a	-	-
Germany	81.7	87.0 a	87.5	90.7	91.2 b	91.0 b	16.9	10.1 a	10.2	6.7	6.2 b	6.4 b
Greece	95.4	74.0	76.1	80.2 b	-	-	4.6	5.5	7.4	2.3 b	-	-
Hungary	-	87.0 q,s	78.3 s	75.7 s	69.4 s	-	-	8.2 q,s	16.2 s	6.1 s	7.2 s	-
Iceland	53.3	84.5	95.5	73.1	-	-	38.3	9.6	3.3	1.4	-	-
Ireland	80.5	89.6	98.2 p	92.8	-	-	13.7	3.7	4.9 p	2.7	-	-
Italy	86.9 r	77.2 a	75.2	78.2	78.0 n	78.2 n	8.8 r	13.2 a	16.7	14.9	15.0 n	14.4 n
Japan	97.9	98.4	98.2	97.8	97.9	-	1.9	1.4	1.6	0.8	1.0	-
Korea	-	-	96.3	91.2	93.0	-	-	-	3.6	8.1	6.4	-
Luxembourg[2]	-	-	-	97.8 -	-	-	-	-	-	1.6 -	-	-
Mexico	-	100.0 b,q	76.2	89.8	-	-	-	0.0 b,k,q	2.8	9.6	-	-
Netherlands	84.3	89.6	80.0	80.3	-	-	7.5	7.5	6.6	5.2	-	-
New Zealand	-	87.8	86.4	78.8 a	-	-	-	7.2	6.9	8.6 a	-	-
Norway	73.0	76.8	82.5 a	81.4	-	-	25.3	15.9	11.9 a	10.3	-	-
Poland	-	-	64.7 a	67.6	86.5	-	-	-	33.8 a	30.4	11.8	-
Portugal[3, 4]	92.9	80.5	78.6 a	94.4	-	-	1.6	9.1	5.1 a	2.1	-	-
Slovak Republic	-	88.6 c,q	87.7 c	78.3	77.5	-	-	11.4 c,q	10.8 c	20.6	21.1	-
Spain	93.6	80.4	84.4	82.5	84.0 a	-	4.1	11.3	9.2	9.5	9.6 a	-
Sweden	84.6 a	88.0	86.8 a	91.2	-	-	13.6 a	10.3	9.5 a	5.8	-	-
Switzerland[4, 5, 2]	98.7 b	95.5	92.5	91.4 -	-	-	1.3 b	1.7 f	2.4 f	2.3 f	-	-
Turkey[2]	-	99.9	91.3	92.4 -	-	-	-	0.0	1.7	4.3 -	-	-
United Kingdom	61.3	69.4	70.5	66.6 a	66.0	-	30.0	14.6	10.5	8.9 a	6.8	-
United States	68.4 h	77.4 h	82.2 h	90.6 h	90.1 h,n	90.0 h,n	31.6	22.6	17.8	9.4	9.9 n	10.0 n
Total OECD	**76.1** b	**82.6** a,b	**85.1** a,b	**89.2** b	**89.2** b,n	**-**	**22.3** b	**14.7** a,b	**11.7** a,b	**7.2** b	**7.1** b,n	**-**
EU-25	**-**	**-**	**80.5** b	**82.6** b	**-**	**-**	**-**	**-**	**10.8** b	**7.9** b	**-**	**-**
EU-15	**76.1** b	**78.9** a,b	**80.5** b	**82.8** b	**-**	**-**	**19.3** b	**13.4** a,b	**10.7** b	**7.7** b	**-**	**-**
China[2]	-	-	-	86.4 a,s	-	-	-	-	-	6.8 a,s	-	-
Israel[2]	-	74.2 c	78.6 c	90.4 c,n	-	-	-	25.8 c	21.3 c	9.6 c	-	-
Russian Federation	-	-	43.7	41.5	40.9	-	-	-	51.1	49.0	50.6	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1998 instead of 2001.
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4. 1992 instead of 1991.
5. 1996 instead of 1995.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/250760635132

Table 11. Business R&D expenditures by source of funds, 1981-2003 (cont'd)

As a percentage of total national R&D expenditures

	Other national sources						Abroad					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia	0.3 [b,p]	0.3	1.7	0.7	-	-	1.6 [b,p]	4.1	3.1	5.6	-	-
Austria[1]	0.1	-	-	0.1	-	-	4.1	-	-	30.1	-	-
Belgium	0.0 [a]	0.0 [b]	0.4	0.1	0.1 [n]	-	0.2 [a]	0.9 [b]	6.1	11.5	10.3 [n]	-
Canada	0.0	0.0	0.0	0.0	0.0 [n]	0.0 [n]	7.4	18.5	19.5	21.0	21.0 [n]	21.0 [n]
Czech Republic	-	-	0.2	1.6	1.6	-	-	-	3.2	1.9	2.3	-
Denmark	0.5 [a]	1.7	1.5	0.3	-	-	2.8	4.4	15.5	9.2	-	-
Finland	0.0	0.1	0.1	0.3	0.1	-	0.9	1.2	5.3	0.7	1.0	-
France	0.1	0.1	0.0	0.0 [a]	-	-	7.1	11.4	11.1	8.7 [a]	-	-
Germany	0.2	0.3 [a]	0.1	0.2	0.2 [b]	0.2 [b]	1.2	2.6 [a]	2.2	2.4	2.4 [b]	2.4 [b]
Greece	-	-	0.0	0.0 [b]	-	-	-	20.6	16.5	17.5 [b]	-	-
Hungary	-	-	-	0.1 [s]	0.1 [s]	-	-	2.8 [q,s]	4.1 [s]	16.9 [s]	22.6 [s]	-
Iceland	0.0	0.0	0.0	0.2	-	-	8.4	5.9	1.2	25.3	-	-
Ireland	0.1	0.2	0.5 [p]	-	-	-	5.7	6.6	3.8 [p]	4.5	-	-
Italy	0.0 [r]	-	-	0.3	0.3 [n]	0.3 [n]	4.3 [r]	9.6 [a]	8.2	6.6	6.8 [n]	7.1 [n]
Japan	0.0	0.1	0.1	0.8	0.6	-	0.1	0.1	0.1	0.5	0.5	-
Korea	-	-	0.2	0.2	0.1	-	-	-	0.0	0.6	0.5	-
Luxembourg[2]	-	-	-	-	-	-	-	-	-	0.6 [-]	-	-
Mexico	-	-	0.4	0.0	-	-	-	-	20.7	0.6	-	-
Netherlands	0.0	0.6	0.1	0.1	-	-	8.2	2.4	13.2	14.4	-	-
New Zealand	-	0.2	1.0	0.9 [a]	-	-	-	4.9	5.7	11.8 [a]	-	-
Norway	0.0	0.1	0.1 [a]	0.0	-	-	1.7	7.2	5.6 [a]	8.4	-	-
Poland	-	-	0.2 [a]	0.2	0.3	-	-	-	1.3 [a]	1.8	1.4	-
Portugal[3, 4]	0.0	- [-]	0.3 [a]	-	-	-	5.5	10.4	16.1 [a]	3.6	2.9 [b]	-
Slovak Republic	-	-	0.0 [c]	0.0	0.3	-	-	-	1.6 [c]	1.1	1.2	-
Spain	0.1	0.2	0.1	0.3	0.5 [a]	-	2.2	8.1	6.4	7.8	5.9 [a]	-
Sweden	0.0 [a]	0.2	0.1 [a]	0.1	-	-	1.8 [a]	1.6	3.7 [a,j]	2.9	-	-
Switzerland[4, 5, 2]	-	0.2	0.7	0.5 [-]	-	-	-	2.7	4.4	5.8 [-]	-	-
Turkey[2]	-	-	1.4	1.4 [-]	-	-	-	0.1	5.6	1.9 [-]	-	-
United Kingdom	-	-	0.0	0.0 [a]	0.0	-	8.7	16.0	19.1	24.4 [a]	27.2	-
United States	0.0	0.0	0.0	0.0	0.0 [n]	0.0 [n]	-	-	-	-	-	-
Total OECD	**0.1** [b]	**0.1** [a,b]	**0.1** [a,b]	**0.2** [b]	**0.2** [b,n]	**-**	**-**	**-**	**-**	**-**	**-**	**-**
EU-25	**-**	**-**	**0.1** [b]	**0.2** [b]	**0.1** [b,n]	**-**	**-**	**-**	**8.6** [b]	**9.2** [b]	**-**	**-**
EU-15	**0.1** [b]	**0.2** [a,b]	**0.1** [b]	**0.1** [b]	**0.1** [b,n]	**-**	**4.6** [b]	**7.5** [a,b]	**8.8** [b]	**9.3** [b]	**-**	**-**
China[2]	-	-	-	-	-	-	-	-	-	4.0 [a,s]	-	-
Israel[2]	-	0.0 [c]	0.1 [c]	0.0 [c]	-	-	-	0.0 [c]	0.0 [c]	0.0 [c]	-	-
Russian Federation	-	-	0.0	0.3	0.1	-	-	-	5.1	9.2	8.4	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1998 instead of 2001.
2. 2000 instead of 2001.
3. 1982 instead of 1981.
4. 1992 instead of 1991.
5. 1996 instead of 1995.

Source: OECD, MSTI database, May 2004.

Table 12. Business R&D expenditures, by two main sources of funds, 1981-2003

As a percentage of GDP

	Industry						Government					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia	0.18 [b,p]	0.54	0.81	0.69	-	-	0.02 [b,p]	0.02	0.02	0.04	-	-
Austria[1]	0.56	-	-	0.73	-	-	0.05	-	-	0.06	-	-
Belgium	0.92 [a]	0.99 [b]	1.09	1.32	1.38 [n]	-	0.08 [a]	0.08 [b]	0.05	0.09	0.10 [n]	-
Canada	0.49	0.57	0.74	0.92	0.80 [n]	0.77 [b,n]	0.06	0.08	0.06	0.04	0.03 [n]	0.03 [b,n]
Czech Republic	-	- [c,q]	0.61 [c,q]	0.66	0.66	-	-	0.09 [c,q]	0.03 [c,q]	0.10	0.10	-
Denmark	0.45 [a]	0.83	0.81	1.44	-	-	0.07	0.08	0.06	0.05	-	-
Finland	0.61 [a]	1.08	1.28	2.31	2.31	-	0.03 [a]	0.06	0.08	0.08	0.08	-
France	0.78	0.97	1.07	1.17 [a]	-	-	0.28	0.33	0.18	0.12 [a]	-	-
Germany	1.36	1.52 [a]	1.30	1.59	1.60 [b]	1.57 [b]	0.28	0.18 [a]	0.15	0.12	0.11 [b]	0.11 [b]
Greece	0.04	0.07	0.11 [a]	0.17 [b]	-	-	0.00	0.00	0.01 [a]	0.00 [b]	-	-
Hungary	-	0.38 [q,s]	0.25 [a,s]	0.29 [s]	0.25 [s]	-	-	0.04 [r,s]	0.05 [a,s]	0.02 [s]	0.03 [s]	-
Iceland	0.03	0.22	0.48	1.32	- [b]	-	0.02	0.02	0.02	0.03	-	-
Ireland	0.23	0.53	0.87 [p]	0.74	-	-	0.04	0.02	0.04 [p]	0.02	-	-
Italy	0.43 [r]	0.52 [a]	0.40	0.43	0.42 [n]	0.43 [n]	0.04 [r]	0.09 [a]	0.09	0.08	0.08 [n]	0.08 [n]
Japan	1.37 [j]	2.05 [j]	1.86 [j]	2.21	2.27	-	0.03 [j]	0.03 [j]	0.03 [j]	0.02	0.02	-
Korea	-	-	1.77	2.03	2.03	-	-	-	0.07	0.18	0.14	-
Luxembourg[2]	-	-	-	1.56 [-]	-	-	-	-	-	0.02 [-]	-	-
Mexico	-	0.09 [b,j,q]	0.05	0.11	-	-	-	-	0.00	0.01	-	-
Netherlands	0.80	0.88	0.83 [a]	0.88	-	-	0.07	0.07	0.07 [a]	0.06	-	-
New Zealand	-	0.23	0.22	0.34 [a]	-	-	-	0.02	0.02	0.04 [a]	-	-
Norway	0.45	0.68	0.79 [a]	0.78	-	-	0.16	0.14	0.11 [a]	0.10	-	-
Poland	-	-	0.16 [a]	0.16	0.11 [b]	-	-	-	0.08 [a]	0.07	0.02 [b]	-
Portugal[3, 4]	0.08	0.10	0.09 [a]	0.25	-	-	0.00	0.01	0.01 [a]	0.01	-	-
Slovak Republic	-	1.41 [c,q]	0.44 [c]	0.34	0.29	-	-	0.18 [c,q]	0.05 [c]	0.09	0.08	-
Spain	0.18	0.38	0.33 [a]	0.41	0.47 [a]	-	0.01	0.05	0.04 [a]	0.05	0.05 [a]	-
Sweden	1.19 [a]	1.65 [k]	2.16 [a,k]	3.03 [k]	-	-	0.19 [a]	0.19 [k]	0.24 [a,k]	0.19 [k]	-	-
Switzerland[4, 5, 2]	1.55 [b]	1.74	1.75	1.74 [-]	-	-	0.02 [b]	0.03 [f]	0.05 [f]	0.04 [f]	-	-
Turkey[2]	-	0.11	0.08	0.19 [-]	-	-	-	0.00	0.00	0.01 [-]	-	-
United Kingdom	0.92	0.96	0.89	0.83 [a]	0.83	-	0.45	0.20	0.13	0.11 [a]	0.09	-
United States	1.14 [h]	1.53 [h]	1.48 [h]	1.81 [h]	1.68 [h,n]	1.63 [b,h,n]	0.53 [h]	0.44 [h]	0.32 [h]	0.19 [h]	0.19 [h,n]	0.18 [b,h]
Total OECD	**0.97** [b]	**1.26** [a,b]	**1.19** [a,b]	**1.41** [b]	**1.37** [b,n]	**-**	**0.28** [b]	**0.22** [a,b]	**0.16** [a,b]	**0.11** [b]	**0.11** [b,n]	**-**
EU-25	**-**	**-**	**0.85** [b]	**0.97** [b]	**-**	**-**	**-**	**-**	**0.11** [b]	**0.09** [b]	**-**	**-**
EU-15	**0.79** [b]	**0.95** [a,b]	**0.90** [b]	**1.03** [b]	**-**	**-**	**0.20** [b]	**0.16** [a,b]	**0.12** [b]	**0.10** [b]	**-**	**-**
China[2]	-	-	-	0.52 [a,s]	-	-	-	-	-	0.04 [a,s]	-	-
Israel[2]	-	1.03 [c]	1.27 [c]	3.22 [c,n]	-	-	-	0.36 [c]	0.34 [c]	0.34 [c]	-	-
Russian Federation	-	-	0.25	0.34	0.36	-	-	-	0.30	0.40	0.44	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1998 instead of 2001.
2. 2000 instead of 2001.
3. 1982 instead of 1981.
4. 1992 instead of 1991.
5. 1996 instead of 1995.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/348312071533

Table 13. Intensity in business R&D expenditures by sector, 1991 and 2001 or nearest years available

As a percentage of value added in industry

		Australia		Belgium		Canada		Czech Republic		Denmark		Finland		France		Germany		Ireland		Italy	
		1991	2000	1992	2001	1991	2000	1992	2001	1991	1999	1991	2001	1991	2000	1991	2001	1991	1999	1991	2001
Total manufacturing	**(15-37)**	**2.9**	**3.3**	**5.2**	**7.7**	**3.6**	**4.1**	**2.8**	**2.1**	**4.4**	**6.0**	**5.6**	**9.4**	**7.2**	**6.9**	**6.5**	**7.7**	**2.1**	**2.2**	**2.9**	**2.4**
Food prod., beverages and tobacco	(15-37)	1.0	1.0 [1]	1.4	1.7	0.4	0.4	0.3	0.1 [1]	1.5	1.5	3.1	2.3	1.0	1.2	0.7	0.7	1.2	1.0	0.3	0.4
Textiles, textile prod., leather and footwear	(17-19)	0.3	0.8 [1]	1.2	3.6	1.1	1.1	2.5	0.4 [1]	0.5	0.8	1.8	2.6	0.5	1.0	1.1	2.3	1.3	1.0	0.0	0.1
Wood, pulp, paper, paper prod., printing & publishing	(20-22)	0.6	0.8 [1]	0.8	1.1	0.7	0.4	0.4	0.0 [1]	0.3	0.3	2.4	1.3	0.3	0.3	0.4	0.3	0.2	0.2	0.0	0.1
Chemical, rubber, plastics and fuel prod.	(23-25)	3.8	4.4 [1]	10.2	14.0	3.8	4.0	3.6	2.6 [1]	10.3	17.5	9.3	12.2	9.8	9.4	9.0	10.1	2.6	1.3	4.9	3.5
Coke, refined petroleum prod. and nuclear fuel	(23)	0.9	1.1 [1]	7.3	2.9	5.8	1.6	3.7	0.3 [1]	0.0	0.0	4.9	5.8	5.6	2.4	2.7	0.8	-	-	2.0	1.9
Chemicals and chemical prod.	(24)	5.7	6.9 [1]	12.0	17.8	4.5	6.6	3.4	4.2 [1]	15.7	23.7	13.8	17.6	14.1	13.9	12.6	15.0	2.8	1.2	7.3	4.8
….Chemicals excluding pharmaceuticals	(24ex2423)	-	-	10.3	-	2.4	2.1	-	2.9 [1]	4.4	8.1	11.6	7.0	10.7	7.1	11.4	12.1	1.1	0.4	4.4	3.2
….Pharmaceuticals	(2423)	-	-	18.6	-	11.4	23.9	-	10.3 [1]	28.2	33.6	20.5	63.7	22.1	26.3	18.3	24.1	10.5	4.5	12.0	7.0
Rubber and plastics prod.	(25)	2.2	1.5 [1]	4.3	4.4	0.6	0.8	3.8	1.1 [1]	1.0	4.4	4.1	6.0	3.7	5.1	2.2	3.4	1.2	2.6	1.5	1.3
Other non-metallic mineral prod.	(26)	1.2	0.8 [1]	1.7	2.9	0.5	0.2	0.7	0.6 [1]	2.1	1.2	2.0	1.7	1.7	2.4	1.9	2.2	1.1	1.1	0.2	0.3
Basic metals and fabricated metal prod.	(27-28)	2.5	2.2 [1]	2.2	3.3	1.9	1.1	2.5	1.0 [1]	1.6	1.0	3.8	3.6	1.7	1.4	1.3	1.5	1.3	1.4	0.8	0.3
Machinery and equipment	(29-33)	9.3	9.6 [1]	12.6	16.5	13.1	17.7	5.0	2.2 [1]	8.3	9.5	12.6	19.8	13.5	12.9	8.7	9.4	4.5	6.0	5.2	4.7
Machinery and equipment, n.e.c.	(29)	3.8	5.1 [1]	5.4	6.5	1.6	2.1	3.8	2.8 [1]	5.4	7.1	5.7	7.3	4.2	5.3	5.4	6.3	2.0	3.6	1.6	1.8
Electrical and optical equipment	(30-33)	14.9	13.6 [1]	18.4	24.7	22.0	30.5	7.2	1.8 [1]	12.9	12.4	22.8	25.9	19.8	17.5	11.7	13.0	5.1	6.3	9.1	8.5
….Office, accounting and computing machinery	(30)	-	-	-	-	61.4	38.1	-87.5	0.5 [1]	14.2	13.9	11.1	23.4	16.1	13.4	13.1	22.0	2.3	1.7	43.5	9.8
….Electrical machinery and apparatus, nec	(31)	-	-	-	-	2.2	5.6	2.9	1.2 [1]	4.8	8.1	9.4	14.6	5.8	6.8	6.1	3.8	3.8	6.4	4.1	2.4
….Radio, television and communication equip.	(32)	-	-	-	-	26.5	36.4	28.5	3.3 [1]	19.5	13.0	46.5	30.2	25.3	33.2	27.5	45.4	23.5	14.1	18.3	21.0
….Medical, precision and optical instruments	(33)	-	-	-	-	-	-	10.3	1.9 [1]	16.5	15.6	20.6	11.0	34.9	16.5	12.5	10.9	2.0	4.2	1.7	5.5
Transport equipment	(34-35)	6.2	6.7 [1]	2.7	4.8	5.4	3.8	6.8	10.3 [1]	2.0	6.4	5.4	4.4	26.1	17.1	16.0	18.0	3.0	3.1	16.4	12.1
Motor vehicles, trailers and semi-trailers	(34)	5.8	8.1 [1]	-	-	0.9	1.4	4.0	10.7 [1]	-	-	5.7	3.7	13.2	13.8	13.1	18.4	6.9	5.9	15.5	12.1
Other transport equipment	(35)	7.4	4.0 [1]	-	-	15.5	10.7	31.3	8.4 [1]	3.1	9.9	5.1	4.8	61.3	24.8	32.3	15.7	0.4	1.4	18.0	12.0
….Building and repairing of ships and boats	(351)	-	-	-	-	-	-	-	0.0 [1]	2.6	13.2	2.7	2.1	1.1	1.9	4.2	1.5	0.0	3.1	2.3	0.9
….Aircraft and spacecraft	(353)	-	-	-	-	23.7	14.0	-	18.5 [1]	-	-	0.9	8.1	112.0	32.5	51.2	20.2	-	-	32.5	24.3
….Railroad equip. and transport equip. n.e.c.	(352+359)	-	-	-	-	-	-	-	3.4 [1]	5.4	0.6	17.4	16.9	8.4	6.6	14.7	9.9	0.4	0.0	6.3	4.0
Manufacturing nec; recycling	(36-37)	-	-	3.0	2.2	-	-	1.3	0.9 [1]	4.9	1.4	1.0	2.8	0.5	2.5	1.3	1.8	0.3	0.9	0.1	0.2
Electricity, gas and water supply	(40-41)	0.4	0.2	0.1	0.7	1.1	0.7	0.0	0.0	0.1	0.2	2.6	2.0	1.2	1.6	0.3	0.2	-	-	0.7	0.1
Construction	(45)	0.0	0.1	0.3	0.4	0.0	0.1	0.1	0.1	0.2	0.1	0.2	0.6	0.2	0.2	0.1	0.1	-	-	0.0	0.0
Total services[5]	**(50-99)**	**0.3**	**0.4**	**0.2**	**0.3**	**0.3**	**0.4**	**1.1**	**0.5**	**0.4**	**0.9**	**0.2**	**0.5**	**0.1**	**0.2**	**0.1**	**0.2**	**0.2**	**0.4**	**0.1**	**0.2**
Wholesale and retail trade; restaurants and hotels	(50-55)	-	-	0.1	0.1	-	-	-	0.1	-	-	-	-	-	0.0	-	-	-	0.0	0.0	0.0
Transport and storage and communication	(60-64)	-	-	0.0	0.6	0.4	0.1	0.1	0.1	-	-	0.3	1.6	-	-	-	-	0.5	1.6	0.0	0.0
Transport and storage	(60-63)	-	-	-	-	0.1	0.1	0.1	-	-	-	0.0	0.2	0.1	1.8	-	0.6	0.0	-	0.0	0.0
Post and telecommunications	(64)	-	-	-	-	0.8	0.2	0.0	-	1.5	4.8	1.0	4.7	-	-	-	-	1.1	-	0.2	0.0
Finance, insurance, real estate and business services	(65-74)	-	-	0.6	0.6	0.6	0.9	3.1	1.3	-	1.7	-	-	-	-	-	-	-	0.8	0.3	0.4
Financial intermediation	(65-67)	-	-	0.5	0.2	0.4	0.2	0.0	0.0	-	0.7	-	-	-	-	-	-	-	0.0	0.0	0.2
Real estate, renting and business activities	(70-74)	-	-	0.6	0.7	0.7	1.2	5.0	1.7	1.2	2.0	-	-	0.3	0.3	-	0.5	-	1.0	0.4	0.5
….Real estate activities	(70)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
….Renting of m&eq and other business activities	(71-74)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
……Other business activities	(74)	-	-	-	-	-	-	3.0	-	3.4	1.7	-	0.3	-	0.5	-	-	-	-	-	0.2
Community social and personal services	(75-99)	-	-	0.0	0.0	-	-	0.0	0.2	-	-	-	0.1	-	-	-	-	-	0.0	0.0	0.0
High-technology manufactures		16.5	15.5 [1]	-	-	24.9	29.3	36.3	5.2 [1]	21.7	23.5	27.2	29.2	35.8	25.9	21.0	22.6	6.2	5.9	15.0	12.7
Medium-high technology manufactures		4.5	5.2 [1]	-	-	1.6	2.0	4.7	4.8 [1]	4.8	7.1	7.8	8.4	8.6	8.6	8.8	10.7	1.8	1.1	4.8	3.6
Medium-low technology manufactures		2.3	1.9 [1]	-	-	2.0	1.0	2.3	0.9 [1]	1.6	2.4	3.6	3.7	2.4	2.4	1.6	2.0	1.2	1.6	0.9	0.5
Low-technology manufactures		-	-	1.3	1.9	0.6	0.5	1.1	0.3 [1]	1.5	1.0	2.4	1.6	0.6	1.0	0.7	0.8	0.8	0.6	0.1	0.2
High- and medium-high technology manufactures		7.3	7.9 [1]	10.0	14.6	8.0	9.6	5.2	4.8 [1]	9.3	13.3	11.7	18.3	16.7	14.3	11.2	13.0	3.8	3.3	7.5	6.0

1. Intensity of the previous year.

2. 1998 instead of 1995.

3. EU includes the 15 EU Members before 1 May 2004 excluding Austria, Greece, Luxembourg, Portugal (for which no Anberd data are available).

4. OECD includes previous EU countries and Canada, Japan, and the United States.

5. Due to differences in data reporting methodologies, service sector R&D figures are not fully comparable across countries.

Source: OECD, STAN Indicators 2004.

StatLink: http://dx.doi.org/10.1787/052066133807

Table 13. Intensity in business R&D expenditures by sector, 1991 and 2001 or nearest years available (cont'd)

As a percentage of value added in industry

		Korea		Netherlands		Norway		Poland		Spain		Sweden		UK		US		EU[3]		OECD[4]	
		1995	2001	1991	2000	1991	1998	1994	2001	1991	2001	1991	2001	1991	2001	1991	2000	1992	1999	1991	1999
Total manufacturing	**(15-37)**	**5.2**	**6.0**	**5.1**	**5.7**	**5.1**	**4.1**	**1.2**	**1.0**	**1.9**	**1.8**	**9.8**	**15.7**	**5.7**	**6.6**	**8.5**	**8.5**	**5.3**	**5.7**	**83.9**	**76.8**
Food prod., beverages and tobacco	(17-19)	0.9	0.9	1.8	2.4	1.2	1.5	0.1	0.1 [1]	0.3	0.7	1.6	1.1	1.2	1.5	1.1	1.1	0.9	0.9	1.5	1.3
Textiles, textile prod., leather and footwear	(20-22)	0.6	1.1	0.7	1.0	0.9	1.8	0.5	0.4 [1]	0.1	0.6	0.9	1.2	0.3	0.5	0.5	0.5	0.4	0.6	0.5	0.4
Wood, pulp, paper, paper prod., printing & publishing	(23-25)	0.6	0.5	0.2	0.3	0.8	0.9	0.1	0.1 [1]	0.2	0.2	1.7	1.7	0.3	0.1	1.0	1.6	0.4	0.4	1.1	1.3
Chemical, rubber, plastics and fuel prod.	(23)	3.4	2.8	10.7	8.1	11.6	7.5	1.7	1.3 [1]	2.8	3.0	14.9	23.3	11.4	14.9	10.3	9.1	8.6	9.2	18.1	15.9
Coke, refined petroleum prod. and nuclear fuel	23	1.3	0.7	6.1	2.0	-	-	1.2	0.6 [1]	1.0	1.0	0.9	3.1	12.7	9.6	8.7	3.1	4.5	4.0	1.7	0.5
Chemicals and chemical prod.	(24)	5.2	5.3	13.9	10.6	-	-	2.3	2.3 [1]	4.3	4.7	20.8	30.7	15.8	23.1	12.9	12.6	12.5	12.9	14.9	14.0
….Chemicals excluding pharmaceuticals	(24ex2423)	6.1	5.5	12.1	7.2	-	-	-	1.8 [1]	2.7	2.0	6.9	6.5	8.4	5.6	9.2	8.0	8.9	7.3	8.1	5.9
….Pharmaceuticals	(2423)	2.9	4.8	27.5	25.4	42.7	19.6	-	3.9 [1]	7.2	10.4	39.5	45.5	32.9	50.0	22.2	20.2	21.9	25.3	6.8	8.1
Rubber and plastics prod.	(25)	2.4	2.6	1.7	1.6	1.3	3.5	1.1	0.5 [1]	1.1	1.2	2.8	2.3	0.7	0.6	3.4	2.9	1.9	2.6	1.5	1.5
Other non-metallic mineral prod.	(26)	1.4	1.1	0.4	1.0	1.9	1.6	0.2	0.2 [1]	0.4	0.4	1.3	1.2	1.2	0.8	2.0	2.2	1.1	1.3	1.0	0.7
Basic metals and fabricated metal prod.	(27-28)	1.8	1.2	1.4	1.5	4.7	3.0	0.7	0.5 [1]	0.7	0.7	1.9	2.6	0.9	0.7	1.6	1.6	1.3	1.2	2.9	2.0
Machinery and equipment	(29-33)	10.7	18.1	11.6	17.9	15.0	11.2	2.8	2.5 [1]	5.3	3.6	21.0	38.1	9.1	10.2	13.6	16.5	9.1	9.1	35.9	35.0
Machinery and equipment, n.e.c.	(29)	5.1	5.3	2.1	9.1	6.9	6.1	2.6	2.5 [1]	1.8	2.4	9.6	10.0	5.3	8.1	3.9	5.5	4.6	4.9	5.6	5.6
Electrical and optical equipment	(30-33)	12.7	22.8	18.2	25.4	23.6	16.4	3.1	2.4 [1]	8.1	4.8	35.4	89.1	11.7	11.5	18.4	21.4	13.1	12.8	30.3	29.4
….Office, accounting and computing machinery	(30)	10.1	21.5	31.3	257.7	34.5	20.8	0.3	1.4 [1]	11.4	4.6	19.1	18.3	13.4	4.2	40.0	30.7	-	15.4	7.9	5.2
….Electrical machinery and apparatus, nec	(31)	5.1	10.5	40.4	7.8	6.8	4.5	2.7	2.1 [1]	3.0	2.4	12.5	7.6	11.8	10.4	8.4	9.6	-	4.3	5.1	3.9
….Radio, television and communication equip.	(32)	15.0	29.0	14.0	0.5	71.2	54.1	5.5	5.3 [1]	16.0	12.6	82.1	-862.9	14.7	18.5	15.9	18.6	-	25.7	11.1	12.6
….Medical, precision and optical instruments	(33)	4.0	4.9	-	-	10.1	6.5	1.4	1.0 [1]	6.7	3.4	3.9	25.8	7.7	8.8	16.9	30.2	-	11.4	6.2	7.8
Transport equipment	(34-35)	11.3	6.7	7.4	3.9	2.0	2.5	3.6	3.2 [1]	4.8	4.7	17.5	24.3	14.3	14.7	25.4	16.2	15.2	15.5	22.4	19.7
Motor vehicles, trailers and semi-trailers	(34)	12.3	7.5	14.7	5.9	4.5	9.2	2.5	2.7 [1]	3.5	2.8	17.9	25.2	10.4	10.3	22.8	15.4	-	13.6	11.3	12.1
Other transport equipment	(35)	7.0	5.4	3.6	1.4	1.8	1.7	4.5	3.8 [1]	9.8	13.3	16.4	20.6	18.4	19.3	27.3	17.5	-	21.0	11.0	7.5
….Building and repairing of ships and boats	(351)	4.0	-	-	1.9	1.7	1.5	-	1.6 [1]	3.1	7.4	5.5	3.1	2.0	6.2	-	-	-	3.5	0.1	0.1
….Aircraft and spacecraft	(353)	49.9	-	-	0.6	1.8	13.5	-	9.0 [1]	35.9	27.9	25.6	29.7	22.8	21.2	31.7	20.8	-	31.6	10.5	6.8
….Railroad equip. and transport equip. n.e.c.	(352+359)	3.0	-	-	1.7	3.4	0.8	-	4.6 [1]	1.8	6.5	5.5	11.0	3.9	28.2	-	-	-	8.9	0.4	0.6
Manufacturing nec; recycling	(36-37)	0.6	3.6	-	0.4	-	-	0.2	0.3 [1]	0.3	0.6	1.5	1.2	0.7	0.5	-	1.3	-	0.9	-	0.6
Electricity, gas and water supply	(40-41)	1.8	0.9	0.1	0.4	0.0	-	0.1	0.2	0.4	0.2	1.5	0.5	1.3	0.6	0.2	0.1	-	-	-	-
Construction	(45)	1.1	0.8	0.1	0.2	0.1	-	0.2	0.1	0.0	0.1	-	0.2	0.1	0.1	-	0.1	-	-	-	-
Total services[5]	**(50-99)**	**0.3**	**0.5**	**0.1**	**0.3**	**0.6**	**0.7**	**0.1**	**0.1**	**0.1**	**0.3**	**0.3**	**0.6**	**0.3**	**0.4**	**0.7**	**0.9**	**0.2**	**0.2**	**14.4**	**20.8**
Wholesale and retail trade; restaurants and hotels	(50-55)	0.0 [2]	0.1	-	-	-	0.0 [1]	0.0	0.0	0.0	0.0	-	0.0	-	-	-	-	-	-	-	-
Transport and storage and communication	(60-64)	1.5 [2]	1.0	-	0.4	0.2	0.7 [1]	0.2	0.3	0.2	0.5	-	0.6	-	1.0	-	-	-	-	-	-
Transport and storage	(60-63)	0.0 [2]	0.0	-	0.1	0.0	0.1 [1]	-	-	0.0	-	-	0.0	-	0.0	-	0.1	-	-	-	-
Post and telecommunications	(64)	4.5 [2]	2.9	-	0.9	1.0	2.7 [1]	-	-	0.6	-	-	1.9	1.9	2.5	-	-	-	-	-	-
Finance, insurance, real estate and business services	(65-74)	0.5 [2]	1.0	-	0.6	2.0	2.0 [1]	0.2	0.1	0.4	0.7	-	1.5	-	-	-	-	-	-	-	-
Financial intermediation	(65-67)	0.0 [2]	0.0	-	0.4	0.2	0.2 [1]	0.0	0.0	0.0	0.1	-	1.1	-	-	-	0.5	-	-	-	-
Real estate, renting and business activities	(70-74)	0.7 [2]	1.6	-	0.7	2.8	2.6 [1]	0.2	0.1	0.5	1.0	-	1.5	1.0	0.7	-	-	-	-	-	-
….Real estate activities	(70)	- [2]	-	-	-	-	- [1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
….Renting of m&eq and other business activities	(71-74)	- [2]	-	-	-	-	- [1]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
……Other business activities	(74)	- [2]	-	-	0.4	2.1	1.0 [1]	-	-	-	-	-	0.1	-	0.4	-	-	-	-	-	-
Community social and personal services	(75-99)	0.1 [2]	0.0	0.2	0.0	-	0.0 [1]	0.1	0.1	0.0	0.0	-	0.0	0.0	0.0	-	-	-	-	-	-
High-technology manufactures		12.5	-	13.2	26.1	34.4	24.6	-	3.5 [1]	11.6	10.3	39.9	81.1	18.9	23.1	23.6	22.5	-	22.0	42.4	40.4
Medium-high technology manufactures		8.3	-	11.7	7.7	-	-	-	2.3 [1]	2.8	2.5	11.6	14.5	8.2	8.7	9.7	9.8	-	7.7	30.6	28.1
Medium-low technology manufactures		1.8	-	1.8	1.5	-	-	-	0.5 [1]	0.8	0.9	2.0	2.5	2.3	1.6	2.9	2.1	-	1.7	7.3	4.8
Low-technology manufactures		0.7	1.0	-	1.2	-	-	0.2	0.2 [1]	0.3	0.5	1.6	1.5	0.7	0.7	-	1.3	-	0.7	-	3.6
High- and medium-high technology manufactures		9.7	11.3	11.9	13.1	-	-	2.9	2.6 [1]	4.9	4.2	20.0	32.0	12.1	14.5	16.0	15.6	11.3	11.6	73.2	68.6

1. Intensity of the previous year.

2. 1998 instead of 1995.

3. EU includes the 15 EU Members before 1 May 2004 excluding Austria, Greece, Luxembourg, Portugal (for which no Anberd data are available).

4. OECD includes previous EU countries and Canada, Japan, and the United States.

5. Due to differences in data reporting methodologies, service sector R&D figures are not fully comparable across countries.

Source: OECD, STAN Indicators 2004.

Table 14. Business R&D expenditures by sector, 1991 and 2001 or nearest years available

As a percentage of total R&D expenditures

	(ISIC Rev.3)	Australia		Belgium		Canada		Czech Republic		Denmark		Finland		France		Germany		Ireland		Italy	
		1991	2000	1992	2001	1991	2001	1992	2001	1991	1999	1991	2001	1991	2000	1991	2001	1991	1999	1991	2001
Total business sector	**(01-99)**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total manufacturing	**(15-37)**	**62.8**	**50.4**	**84.9**	**82.9**	**66.7**	**69.8**	**59.3**	**68.3**	**69.4**	**60.4**	**85.3**	**84.6**	**92.1**	**85.0**	**95.4**	**90.9**	**84.7**	**74.9**	**89.8**	**79.4**
Food prod., beverages and tobacco	(15-16)	4.0	3.5	3.0	2.4	1.3	0.7	1.0	0.4	4.6	2.5	6.6	1.4	1.8	2.0	0.8	0.8	12.3	5.6	0.9	1.2
Textiles, textile prod., leather and footwear	(17-19)	0.4	0.7	1.3	2.1	1.0	0.7	6.6	0.7	0.4	0.2	1.0	0.4	0.5	0.6	0.6	0.6	2.3	0.5	0.2	0.6
Wood, pulp, paper, paper prod., printing & publishing	(20-22)	1.9	1.4	1.1	1.1	2.3	1.4	0.6	0.1	0.6	0.5	9.4	3.1	0.4	0.3	0.5	0.3	1.0	1.2	0.1	0.4
Chemical, rubber, plastics and fuel prod.	(23-25)	12.7	9.5	37.5	39.7	11.7	8.4	7.7	7.1	21.5	28.7	17.7	11.5	20.6	22.6	19.8	19.8	20.7	15.1	20.0	15.7
Coke, refined petroleum prod. and nuclear fuel	(23)	0.5	0.3	2.8	1.0	3.0	0.4	1.4	0.1	0.0	0.0	2.2	0.8	2.0	1.3	0.2	0.2	0.0	0.0	1.3	0.7
Chemicals and chemical prod.	(24)	10.1	8.4	32.0	36.8	8.2	7.3	4.1	5.9	20.8	26.5	13.7	8.9	16.5	18.6	18.1	17.7	19.1	13.6	16.9	13.2
….Chemicals excluding pharmaceuticals	(24ex2423)	5.1	1.6	21.7	16.0	3.4	1.8	3.2	3.2	3.0	3.5	8.7	2.9	8.9	6.1	13.4	10.9	6.3	3.1	6.1	5.1
….Pharmaceuticals	(2423)	5.0	6.8	10.3	20.9	4.8	5.6	0.9	2.7	17.8	23.0	4.9	6.0	7.7	12.4	4.7	6.8	12.8	10.5	10.8	8.1
Rubber and plastics prod.	(25)	2.0	0.9	2.8	1.9	0.5	0.6	2.2	1.1	0.7	2.2	1.9	1.7	2.1	2.7	1.5	2.0	1.5	1.5	1.8	1.8
Other non-metallic mineral prod.	(26)	1.3	0.6	1.5	1.7	0.3	0.1	1.0	2.6	1.5	0.6	1.3	0.5	1.1	1.3	1.0	0.9	1.7	0.9	0.5	0.6
Basic metals and fabricated metal prod.	(27-28)	10.0	4.3	5.4	4.8	4.3	2.8	8.0	4.0	2.6	1.1	6.2	3.5	2.9	2.3	2.4	2.3	2.3	1.1	3.3	1.4
Machinery and equipment	(29-33)	20.4	19.9	29.3	25.7	32.3	44.7	19.8	14.2	31.7	23.9	38.5	62.2	33.6	30.3	38.8	31.7	40.9	48.2	34.6	33.7
Machinery and equipment, n.e.c.	(29)	4.2	4.0	5.5	4.5	1.8	2.3	10.0	7.4	12.6	10.0	10.5	7.6	4.3	4.8	11.4	11.2	3.5	2.9	5.8	7.0
Electrical and optical equipment	(30-33)	16.2	15.9	23.8	21.2	30.5	42.4	9.8	6.8	19.2	13.9	28.1	54.5	29.3	25.5	27.3	20.5	37.4	45.3	28.8	26.7
….Office, accounting and computing machinery	(30)	2.1	1.9	0.3	0.3	6.1	4.1	0.2	0.0	1.5	0.8	0.9	0.2	3.5	1.5	3.9	1.9	8.3	5.1	6.8	1.1
….Electrical machinery and apparatus, nec	(31)	2.6	1.4	4.9	2.2	1.0	2.3	3.0	2.4	2.6	2.9	4.9	4.4	3.0	3.5	7.3	3.0	4.4	4.7	5.9	3.4
….Radio, television and communication equip.	(32)	9.4	9.9	16.1	17.5	22.2	33.7	5.0	2.9	7.3	4.0	16.8	47.5	8.1	13.7	10.1	10.7	21.5	30.6	14.7	18.3
….Medical, precision and optical instruments	(33)	2.2	2.7	2.5	1.2	1.2	2.3	1.5	1.4	7.9	6.1	5.4	2.4	14.7	6.8	6.0	4.9	3.3	5.0	1.3	4.0
Transport equipment	(34-35)	10.5	9.1	4.2	4.7	13.0	10.6	13.4	38.9	1.3	1.9	3.9	1.4	31.0	24.5	30.8	33.9	3.0	1.6	30.2	25.4
Motor vehicles, trailers and semi-trailers	(34)	6.7	7.9	2.3	2.6	1.4	2.6	7.1	34.8	0.0	0.5	1.5	0.4	11.5	13.8	21.4	29.8	2.7	1.2	18.3	14.0
Other transport equipment	(35)	3.8	1.2	1.9	2.1	11.5	8.0	6.3	4.2	1.3	1.5	2.4	1.0	19.5	10.7	9.4	4.1	0.2	0.4	12.0	11.4
….Building and repairing of ships and boats	(351)	1.9	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.9	1.5	0.8	0.3	0.1	0.1	0.3	0.1	0.0	0.1	0.4	0.2
….Aircraft and spacecraft	(353)	1.2	0.1	1.4	1.8	11.5	7.8	4.1	2.8	0.0	0.0	0.1	0.3	18.9	10.2	8.2	3.6	0.0	0.4	10.6	10.2
….Railroad equip. and transport equip. n.e.c.	(352+359)	0.6	0.5	0.5	0.3	0.0	0.2	2.2	1.4	0.4	0.0	1.6	0.4	0.5	0.4	1.0	0.5	0.2	0.0	1.0	1.0
Manufacturing nec; recycling	(36-37)	-	-	1.6	0.8	0.6	0.4	1.3	0.3	5.3	0.9	0.5	0.6	0.3	1.1	0.6	0.6	0.4	0.6	0.2	0.3
Electricity, gas and water supply	(40-41)	2.2	0.7	0.2	1.0	4.4	1.5	0.1	0.0	0.3	0.3	4.5	1.4	1.9	2.1	0.4	0.2	-	-	2.0	0.5
Construction	(45)	0.3	0.9	1.4	1.0	0.2	0.4	0.5	1.2	0.8	0.2	1.1	1.2	0.8	0.6	0.3	0.2	-	-	0.0	0.2
Total services[3]	**(50-99)**	**27.1**	**39.9**	**13.3**	**13.7**	**25.5**	**26.4**	**38.8**	**29.8**	**28.5**	**38.9**	**7.6**	**12.4**	**4.2**	**10.6**	**3.5**	**8.4**	**13.5**	**24.6**	**8.1**	**19.9**
Wholesale and retail trade; restaurants and hotels	(50-55)	-	-	1.3	1.0	-	-	-	1.2	-	-	-	-	-	0.0	-	-	-	0.0	0.0	0.6
Wholesale and retail trade; repairs	(50-52)	-	-	1.3	1.0	4.0	4.4	-	1.2	5.5	7.5	-	0.1	-	0.0	-	-	-	0.0	0.0	0.6
Hotels and restaurants	(55)	-	-	0.0	0.0	-	-	-	0.0	-	-	-	-	-	0.0	-	-	-	0.0	0.0	0.0
Transport and storage and communication	(60-64)	-	-	0.2	2.5	3.3	0.8	0.3	0.9	-	-	1.9	6.4	-	-	-	-	4.2	9.2	0.4	0.2
Transport and storage	(60-63)	-	-	0.1	1.0	0.4	0.3	0.3	0.8	-	-	0.1	0.5	0.3	5.2	-	1.1	0.2	0.0	0.0	0.1
Post and telecommunications	(64)	-	-	0.1	1.5	2.9	0.5	0.0	0.1	2.9	6.8	1.8	5.9	-	-	-	-	4.0	9.2	0.4	0.1
Finance, insurance, real estate and business services	(65-74)	-	-	11.6	9.8	18.3	21.3	38.5	23.8	-	24.6	-	-	-	-	-	-	-	15.3	7.5	19.1
Financial intermediation	(65-67)	-	-	2.4	0.7	2.9	1.6	0.0	0.0	-	2.2	-	-	-	-	-	-	-	0.0	0.0	2.5
Real estate, renting and business activities	(70-74)	-	-	9.2	9.1	15.3	19.7	38.5	23.8	20.0	22.5	-	-	4.0	5.5	-	6.9	-	15.3	7.5	16.6
……..Other business activities	(74)	-	-	4.5	5.0	2.4	3.1	9.2	1.8	15.9	5.6	-	0.5	-	2.9	-	-	-	1.5	0.5	2.2
Community social and personal services	(75-99)	-	-	0.1	0.4	-	-	0.0	3.9	-	-	-	1.0	-	-	-	-	-	0.0	0.2	0.0
High-technology manufactures		19.9	21.4	30.6	41.7	45.8	53.5	11.7	9.8	34.3	34.0	28.2	56.4	52.8	44.6	32.9	27.9	45.9	51.5	44.2	41.6
Medium-high technology manufactures		19.2	15.4	34.9	25.5	7.6	9.1	25.6	49.2	18.6	16.9	27.1	15.8	28.1	28.6	54.5	55.3	17.2	11.8	37.1	30.5
Medium-low technology manufactures		15.8	6.8	12.5	9.3	8.1	3.9	12.6	7.8	5.6	5.4	12.4	6.9	8.2	7.8	5.5	5.4	5.6	3.6	7.2	4.8
Low-technology manufactures		-	-	7.0	6.4	5.2	3.3	9.4	1.5	10.9	4.1	17.5	5.5	2.9	4.0	2.5	2.3	16.1	8.0	1.3	2.5
High- and medium-high technology manufactures		41.0	37.4	65.4	67.2	53.5	62.6	37.3	59.1	53.8	52.4	56.1	72.5	81.1	73.3	87.7	83.2	63.0	63.4	81.8	72.3

1. EU includes the 15 EU Members before 1May 2004 excluding Austria, Greece, Luxembourg, Portugal (for which no Anberd data are available).

2. OECD includes previous countries and Canada, Japan, and the United States.

3. Due to differences in data reporting methodologies, service sector R&D figures are not fully comparable across countries.

Source: OECD, STAN Indicators 2004.

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Table 14. Business R&D expenditures by sector, 1991 and 2001 or nearest years available (cont'd)

As a percentage of total R&D expenditures

	(ISIC Rev.3)	Korea		Netherlands		Norway		Poland		Spain		Sweden		United Kingdom		Unites States		EU[1]		OECD[2]	
		1995	2001	1991	2000	1991	1998	1994	2001	1991	2001	1991	2001	1991	2001	1991	2000	1992	1999	1991	1999
Total business sector	**(01-99)**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Total manufacturing	**(15-37)**	**83.3**	**82.8**	**89.7**	**75.9**	**63.3**	**54.4**	**71.9**	**69.4**	**78.4**	**60.0**	**87.9**	**87.4**	**79.7**	**79.2**	**75.7**	**64.9**	**87.9**	**84.3**	**83.9**	**76.8**
Food prod., beverages and tobacco	(15-16)	1.4	1.4	5.6	5.8	2.5	2.9	1.5	4.7	2.4	3.1	1.4	0.5	2.4	2.5	1.1	0.8	1.8	1.7	1.5	1.3
Textiles, textile prod., leather and footwear	(17-19)	0.7	0.7	0.4	0.3	0.3	0.4	3.7	1.8	0.5	1.5	0.1	0.1	0.3	0.2	0.2	0.1	0.5	0.5	0.5	0.4
Wood, pulp, paper, paper prod., printing & publishing	(20-22)	0.5	0.3	0.5	0.5	2.1	2.3	0.7	0.9	0.8	0.7	3.3	2.0	0.5	0.3	1.2	1.6	0.7	0.7	1.1	1.3
Chemical, rubber, plastics and fuel prod.	(23-25)	10.6	9.3	37.6	21.4	17.4	11.3	16.2	14.9	18.4	17.1	17.0	20.1	28.4	30.4	15.7	12.1	22.3	22.6	18.1	15.9
Coke, refined petroleum prod. and nuclear fuel	(23)	1.3	1.1	2.7	0.7	1.6	1.6	2.3	0.6	1.3	1.0	0.1	0.2	4.5	2.0	2.1	0.6	1.3	0.8	1.7	0.5
Chemicals and chemical prod.	(24)	8.1	7.0	33.9	20.1	15.4	8.7	11.0	12.8	15.2	14.1	16.2	19.5	23.4	28.1	12.5	10.7	19.7	20.0	14.9	14.0
....Chemicals excluding pharmaceuticals	(24ex2423)	6.7	4.8	26.2	11.2	8.4	4.3	8.8	7.0	6.3	4.3	3.1	1.6	8.7	4.1	6.5	4.2	10.1	7.8	8.1	5.9
....Pharmaceuticals	(2423)	1.4	2.2	7.7	8.9	7.0	4.4	2.3	5.8	8.8	9.8	13.1	17.9	14.7	24.0	6.0	6.5	9.5	12.2	6.8	8.1
Rubber and plastics prod.	(25)	1.3	1.3	1.1	0.7	0.4	1.0	2.9	1.5	1.9	2.0	0.7	0.4	0.4	0.4	1.1	0.8	1.4	1.8	1.5	1.5
Other non-metallic mineral prod.	(26)	1.0	0.5	0.3	0.6	0.9	0.8	0.9	0.9	1.3	1.1	0.4	0.2	0.5	0.3	0.4	0.4	0.9	0.9	1.0	0.7
Basic metals and fabricated metal prod.	(27-28)	3.6	1.8	3.2	2.3	7.3	5.6	5.4	4.3	3.2	2.8	2.3	2.0	1.4	0.9	1.4	1.3	2.6	2.2	2.9	2.0
Machinery and equipment	(29-33)	41.1	51.3	36.3	42.0	29.7	26.3	26.4	28.9	31.5	16.9	43.9	43.4	25.8	25.2	31.5	33.0	34.0	30.5	35.9	35.0
Machinery and equipment, n.e.c.	(29)	5.1	4.1	2.8	9.9	7.0	7.3	13.9	14.2	4.8	5.7	11.2	7.4	6.0	7.7	3.0	3.4	7.9	7.5	5.6	5.6
Electrical and optical equipment	(30-33)	36.0	47.2	33.5	32.1	22.7	19.0	12.5	14.7	26.7	11.2	32.7	36.0	19.7	17.5	28.5	29.6	26.0	23.0	30.3	29.4
....Office, accounting and computing machinery	(30)	1.8	7.8	4.1	25.7	1.8	1.0	0.0	0.2	5.9	1.1	2.2	0.8	4.0	0.8	9.6	5.2	3.7	2.5	7.9	5.2
....Electrical machinery and apparatus, nec	(31)	1.9	1.8	15.6	1.6	3.4	2.4	5.4	6.6	4.3	2.8	3.1	1.6	6.4	4.6	2.6	1.9	5.7	3.1	5.1	3.9
....Radio, television and communication equip.	(32)	31.6	36.2	12.8	0.3	15.6	13.5	5.8	6.0	13.1	5.7	26.6	28.9	5.9	8.2	8.8	12.9	10.8	12.6	11.1	12.6
....Medical, precision and optical instruments	(33)	0.7	1.4	1.0	4.5	2.0	2.1	1.3	1.9	3.5	1.5	1.0	4.8	3.4	3.8	7.4	9.6	5.8	4.7	6.2	7.8
Transport equipment	(34-35)	24.1	16.8	5.8	2.7	3.1	4.6	16.6	12.0	19.7	16.0	19.1	19.0	20.2	19.1	23.5	15.1	24.6	24.8	22.4	19.7
Motor vehicles, trailers and semi-trailers	(34)	21.1	11.5	4.0	2.2	0.5	1.8	5.2	5.6	11.4	7.8	13.9	15.9	7.4	6.9	8.9	9.3	13.9	16.1	11.3	12.1
Other transport equipment	(35)	3.0	5.3	1.8	0.4	2.6	2.8	11.4	6.5	8.3	8.3	5.3	3.1	12.8	12.2	14.6	5.8	10.7	8.7	11.0	7.5
....Building and repairing of ships and boats	(351)	1.4	1.0	0.1	0.3	2.1	2.4	1.1	1.6	1.2	1.9	0.3	0.1	0.2	0.7	0.0	0.0	0.3	0.3	0.1	0.1
....Aircraft and spacecraft	(353)	1.5	3.8	1.7	0.1	0.3	0.4	4.4	3.8	6.6	5.2	4.4	2.7	12.4	9.9	14.2	5.2	9.8	7.7	10.5	6.8
....Railroad equip. and transport equip. n.e.c.	(352+359)	0.1	0.4	0.0	0.1	0.3	0.0	5.9	1.1	0.5	1.2	0.5	0.3	0.2	1.6	0.4	0.6	0.6	0.7	0.4	0.6
Manufacturing nec; recycling	(36-37)	0.2	0.6	-	0.4	-	-	0.5	1.0	0.6	0.8	0.4	0.2	0.3	0.3	-	0.4	-	0.6	-	0.6
Electricity, gas and water supply	(40-41)	2.0	1.1	0.3	0.5	0.1	-	0.6	2.3	2.5	0.6	2.3	0.4	2.4	0.8	0.2	0.1	-	-	-	-
Construction	(45)	6.7	3.1	0.5	0.8	0.5	-	4.2	3.6	0.6	0.9	-	0.3	0.2	0.2	-	0.1	-	-	-	-
Total services[3]	**(50-99)**	**7.6**	**12.6**	**6.7**	**19.7**	**41.8**	**48.0**	**14.4**	**18.2**	**16.4**	**37.6**	**9.0**	**11.5**	**15.1**	**18.8**	**24.3**	**34.4**	**8.2**	**12.9**	**14.4**	**20.8**
Wholesale and retail trade; restaurants and hotels	(50-55)	-	0.4	-	-	-	-	0.3	0.3	0.0	0.8	-	0.1	-	-	-	-	-	-	-	-
Wholesale and retail trade; repairs	(50-52)	-	0.4	-	4.0	0.4	-	0.3	0.3	0.0	0.7	-	0.1	-	0.4	-	12.6	-	-	-	-
Hotels and restaurants	(55)	-	0.0	-	-	-	-	0.0	0.0	0.0	0.1	-	0.0	-	-	-	-	-	-	-	-
Transport and storage and communication	(60-64)	-	3.0	-	2.4	2.8	-	4.1	7.7	2.5	8.8	-	1.4	-	5.9	-	-	-	-	-	-
Transport and storage	(60-63)	-	0.0	-	0.6	0.4	-	1.3	2.6	0.0	0.2	-	0.0	-	0.1	-	0.1	-	-	-	-
Post and telecommunications	(64)	-	3.0	-	1.9	2.3	-	2.7	5.1	2.4	8.6	-	1.3	3.9	5.8	-	-	-	-	-	-
Finance, insurance, real estate and business services	(65-74)	-	8.9	-	13.2	38.6	-	5.5	3.5	13.4	27.4	-	10.0	-	-	-	-	-	-	-	-
Financial intermediation	(65-67)	-	0.0	-	2.2	1.1	-	0.0	0.1	0.0	0.6	-	1.1	-	-	-	2.0	-	-	-	-
Real estate, renting and business activities	(70-74)	-	8.9	-	11.0	37.5	-	5.5	3.4	13.4	26.8	-	8.9	10.9	12.3	-	-	-	-	-	-
……..Other business activities	(74)	1.3	2.1	-	3.1	7.1	-	0.0	0.1	6.8	3.9	-	0.3	1.8	2.7	-	-	-	2.2	-	-
Community social and personal services	(75-99)	-	0.3	4.7	0.1	-	-	4.5	6.8	0.4	0.6	-	0.1	0.2	0.1	-	-	-	-	-	-
High-technology manufactures		37.0	51.4	27.3	39.5	26.6	21.4	13.8	17.7	37.9	23.4	47.2	55.1	40.5	46.8	46.1	39.4	39.7	39.7	42.4	40.4
Medium-high technology manufactures		34.9	22.6	48.6	24.9	19.5	15.8	39.1	34.5	27.3	21.7	31.7	26.7	28.7	24.9	21.4	19.4	38.2	35.2	30.6	28.1
Medium-low technology manufactures		8.6	5.7	7.4	4.5	12.2	11.4	12.6	8.8	8.9	8.8	3.8	2.8	7.1	4.2	5.0	3.2	6.5	6.0	7.3	4.8
Low-technology manufactures		2.9	3.1	-	7.0	-	-	6.5	8.4	4.3	6.1	5.2	2.8	3.5	3.2	-	3.0	-	3.4	-	3.6
High- and medium-high technology manufactures		73.3	75.1	76.0	64.7	48.2	39.6	54.0	53.7	66.4	47.0	79.3	81.9	69.4	72.4	67.5	58.8	78.2	75.3	73.2	68.6

1. EU includes the 15 EU Members before 1 May 2004 excluding Austria, Greece, Luxembourg, Portugal (for which no Anberd data are available).

2. OECD includes previous countries and Canada, Japan, and the United States.

3. Due to differences in data reporting methodologies, service sector R&D figures are not fully comparable across countries.

Source: OECD, STAN Indicators 2004.

Table 15. R&D expenditures of affiliates under foreign control, 1991-2002

	As a percentage of total business R&D expenditures							As a percentage of GDP						
	1991	1995	1997	1999	2000	2001	2002	1991	1995	1997	1999	2000	2001	2002
Australia	-	31.1	-	41.8	-	-	-	-	0.27	-	0.28	-	-	-
Canada	-	29.7	34.3	32.6	32.1	31.6 n	-	-	0.30	0.35	0.35	0.37	0.38 p	- p
Czech Republic	-	-	22.1	27.4	36.9	45.3	43.4	- d,t	- a	0.16 d,t	0.21	0.30	0.35	0.34
Finland	-	-	13.3	14.9	12.7	14.3	-	-	-	0.24	0.33	0.31	0.34	-
France[1, 2]	-	17.1	16.4	16.4 -	-	21.5	-	-	0.24	0.22	0.22 -	-	0.30 a	- p
Germany	-	16.1	18.1	19.0	-	-	-	- a	0.24	0.28	0.32	- c	-	- c
Greece	7.6	3.8	3.6	4.5	-	-	-	0.01	0.01 a	0.00	0.01	-	- c	-
Hungary[2]	-	21.8	65.3	78.5 -	-	-	-	- t	0.07 a	0.20	0.20 -	-	-	-
Ireland	68.6	66.2	65.3	63.8	-	65.2	-	0.40	0.59	0.59	0.55	- c	0.52	-
Italy[3]	23.1	-	-	-	-	-	-	0.15	-	-	-	-	-	- p
Japan	0.9	1.4	1.3	3.9	3.6	-	-	0.02 l	0.03 l	0.03	0.08	0.08	-	-
Netherlands	-	-	20.6	21.5	18.7	-	-	-	- a	0.23	0.25	0.21	-	- p
Poland[4]	-	-	-	12.1	12.1	4.6	-	-	- a	-	0.03	0.03	0.01	- b
Portugal	-	-	-	18.0	-	30.8	-	-	- a	-	0.03	- c	0.08	- c
Slovak Republic[4]	-	0.8	-	20.4	20.4	19.0	-	- d,t	0.00 d	- a	0.09	0.09	0.08	-
Spain[5]	38.7 -	26.8	35.7	32.8	-	31.0	-	0.18 -	0.10 a	0.14	0.15	-	0.15	- a
Sweden	17.1	18.4	15.9	34.1	34.0	-	-	0.32 m	0.46 a,m	0.42 m	0.93 m	-	- m	-
Turkey	-	-	14.8	7.3	10.6	-	-	-	-	0.02	0.02	0.02	-	-
United Kingdom	-	29.2	32.8	31.2	31.3	40.6	38.0	-	0.37	0.39	0.39	0.38	0.50 a	0.48
United States	10.2	13.3	12.3	14.7	14.7	14.9	-	0.20 j	0.24 j	0.24 j	0.29 j	0.30 j	0.30 j	- j,p

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1998 instead of 1997. 2. 1998 instead of 1999. 3. 1992 instead of 1991. 4. 2000 instead of 1999. 5. 1990 instead of 1991.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/073550815144

Table 16. Share of public R&D expenditures financed by industry, 1981-2003

As a percentage of total national R&D expenditures of the sector

	Government						
	1981	1985	1991	1995	2001	2002	2003
Australia[1, 2, 3]	1.8 [p]	2.7	5.7	5.7	5.6 [-]	-	-
Austria[4]	1.5	1.3	-	-	3.1	-	-
Belgium[5]	0.0 [a]	0.0	1.2 [b]	2.1	12.4	-	-
Canada	1.0	1.0	1.7	1.8	2.6	2.6 [n]	2.6 [n]
Czech Republic	-	-	-	11.3 [a]	6.6	9.6	-
Denmark	1.6	2.2	3.6	3.5	7.5	5.4 [a]	-
Finland	9.5 [a]	-	11.2 [a]	11.9	15.2	14.2	-
France	1.8	0.7	4.8	5.4	6.3	-	-
Germany	0.8	1.4	1.3 [a]	3.4 [m]	2.3 [m]	2.3 [b,m]	2.3 [b,m]
Greece	0.0	-	1.0	2.3	1.9	-	-
Hungary	-	-	22.0 [c]	15.1 [c]	13.1 [c]	6.4 [c]	-
Iceland	0.5	22.3	10.4	7.2	5.0	-	-
Ireland[3]	3.6	9.0	13.4 [b]	21.8	10.6	8.8 [n]	-
Italy	2.3 [r]	2.0 [r]	1.9 [a]	1.8	3.5	2.2 [n]	2.9 [n]
Japan	1.3	5.4	2.2	0.7	0.7	1.2	-
Korea	-	-	-	16.5 [e]	8.1 [e]	4.6 [e]	-
Luxembourg[3]	-	-	-	-	5.8 [-]	-	-
Mexico	-	-	-	3.3	5.8	-	-
Netherlands	5.7	23.2	14.8	16.7	21.6	18.1	-
New Zealand	-	-	5.7	17.7	20.3	-	-
Norway	3.6	7.6	7.3	10.0	10.6	-	-
Poland	-	-	-	22.6 [a]	14.3	23.3	-
Portugal[6, 7, 1]	0.2	4.1	7.1	0.3	3.5	-	-
Slovak Republic	-	-	9.3 [c,q]	32.6 [c]	14.0 [c]	14.0 [c]	-
Spain	0.7	3.8	3.8	5.3	7.1	4.1	-
Sweden	5.4 [e,f]	4.8 [e,f]	4.8 [e,f]	3.0 [f]	1.6 [f]	-	-
Switzerland[7]	-	3.4 [f]	0.3 [b,f]	-	-	-	-
Turkey[3]	-	-	0.3	3.0	5.4 [-]	-	-
United Kingdom	11.0	14.6 [a]	12.0 [a]	6.9	12.5 [a]	10.7	-
United States	0.0 [f]	0.0 [f]	0.0 [f]	0.0 [f]	0.0 [f]	0.0 [f,n]	0.0 [f,n]
Total OECD	**2.1** [b]	**2.9** [b]	**3.1** [a,b]	**3.7** [a,b]	**3.6** [b]	**-**	**-**
EU-25	**-**	**-**	**-**	**6.0** [b]	**6.7** [b]	**-**	**-**
EU-15	**4.1** [b]	**5.2** [a,b]	**4.8** [a,b]	**5.1** [b]	**6.3** [b]	**-**	**-**
China[3]	-	-	-	-	9.6 [s]	-	-
Israel[3]	-	-	1.4 [c]	0.2 [c]	7.5 [c,n]	-	-
Russian Federation	-	-	-	8.1	12.4	12.2	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 2000 instead of 2001.
4. 1998 instead of 2001.
5. 1983 instead of 1981.
6. 1982 instead of 1981.
7. 1986 instead of 1985.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/702620165887

Table 16. Share of public R&D expenditures financed by industry, 1981-2003 (cont'd)

As a percentage of total national R&D expenditures of the sector

	Higher education						
	1981	1985	1991	1995	2001	2002	2003
Australia[1, 2, 3]	1.4	2.1	2.5	4.7	4.9 [-]	-	-
Austria[4]	1.0	1.7	-	-	1.8	-	-
Belgium[5]	9.4 [a]	8.7	15.4 [b]	13.2	12.7	-	-
Canada	4.1	4.3	7.0	8.1	9.3	9.3 [n]	9.3 [n]
Czech Republic	-	-	-	2.0 [a]	0.7	0.9	-
Denmark	0.7	1.0	1.6	1.9	3.0	4.2 [a]	-
Finland	2.1 [a]	-	3.6 [a]	5.7	6.7	6.2	-
France	1.3 [a]	1.9	4.2	3.3	3.1	-	-
Germany	1.8	5.4	7.0 [a]	8.2	12.2	12.2 [b]	11.3 [b]
Greece	0.0 [a]	-	6.1	5.6 [a]	6.9	-	-
Hungary	-	-	14.4	2.1	4.4	11.8	-
Iceland	1.2	0.6	5.0	5.4	10.9	-	-
Ireland[3]	7.1	6.9	8.6 [b]	6.9 [b]	5.3 [-]	-	-
Italy	2.7	1.5	4.0	4.7	-	-	-
Japan	1.5 [b]	2.4 [b]	3.7 [b]	3.6 [b]	2.3	2.6	-
Korea	-	-	-	22.4 [e]	14.3 [e]	13.9 [e]	-
Luxembourg[3]	-	-	-	-	-	-	-
Mexico	-	-	-	1.4	1.1	-	-
Netherlands	0.3	1.0	1.2	4.0	7.1	-	-
New Zealand	-	-	4.6	9.4	5.3	-	-
Norway	2.9	5.0	4.7	5.3	5.8	-	-
Poland	-	-	-	11.4	6.3	5.8	-
Portugal[6, 1, 2]	0.0	0.9	0.5	0.9 [a]	0.8	-	-
Slovak Republic	-	-	6.1 [q]	1.0 [m]	0.3	0.0	-
Spain	0.0	1.1	10.0	8.3	8.7 [b]	7.6	-
Sweden	2.3 [a]	5.5	5.2	4.6 [a,h]	5.5	-	-
Switzerland[1, 2, 7, 3]	9.5 [b]	3.3 [a,b]	1.8	6.2	5.1 [-]	-	-
Turkey[3]	-	-	10.4	16.1	19.4 [-]	-	-
United Kingdom	2.8 [a]	5.2 [a]	7.8	6.3	6.2	5.8	-
United States	3.3 [h]	4.5 [h]	5.3 [h]	5.5 [h]	5.5 [h]	4.9 [h,n]	4.5 [h,n]
Total OECD	**2.6** [b]	**3.8** [b]	**5.5** [a,b]	**5.8** [a,b]	**6.0** [b]	**5.8** [b,n]	**-**
EU-25	**-**	**-**	**-**	**6.0** [b]	**6.7** [b]	**-**	**-**
EU-15	**2.0** [a,b]	**3.7** [a,b]	**5.8** [a,b]	**5.9** [a,b]	**6.8** [b]	**-**	**-**
China[3]	-	-	-	-	32.4 [s]	-	-
Israel[3]	-	-	7.4 [e]	2.3 [e]	3.7 [e]	-	-
Russian Federation	-	-	-	27.5	26.5	27.2	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1986 instead of 1985.
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6. 1982 instead of 1981.
7. 1996 instead of 1995.

Source: OECD, MSTI database, May 2004.

Table 17. Basic research expenditures, 1981-2003

	As a percentage of GDP						As a percentage of GERD					
	1981	1991	1995	2001	2002	2003	1981	1991	1995	2001	2002	2003
Australia[1, 2, 3]	0.33 [i,p]	0.43 [i]	0.43 [i]	0.40 [i]	-	-	35.1 [i,p]	28.3 [i]	25.9 [i]	26.0 [i]	-	-
Austria[4]	-	-	-	0.27 [a, k]	-	-	-	-	-	15.2 [a, k]	-	-
Czech Republic	-	-	0.17	0.53 [i]	0.49 [i]	-	-	- [c,q]	16.8 [c,q]	40.8 [i]	37.7 [i]	-
Denmark	-	-	-	0.44 [a]	-	-	-	-	-	18.3 [a]	-	-
France	-	0.48 [i]	0.51 [i]	0.52 [i]	-	-	- [a]	20.3 [i]	22.1 [i]	23.3 [i]	- [n]	-
Germany	0.46 [s]	0.47 [a]	-	-	-	-	18.9 [s]	18.7 [a]	-	-	-	-
Hungary[1]	-	0.23 [q]	0.18 [a]	0.24	0.25	-	-	22.1 [c,q]	24.7 [a,c]	25.3 [c]	24.5 [c]	-
Iceland	0.16	0.29 [i]	0.38 [i]	0.47 [i]	0.49 [b,i]	-	25.0	24.8 [i]	24.2 [i]	15.4 [i]	15.9 [i,b]	-
Ireland[3]	0.07	0.08	-	0.14 [i]	-	-	10.3	8.6 [b]	-	12.2 [i,b]	-	-
Italy	0.11 [r]	0.25 [a,i]	0.22 [i]	-	-	-	12.5 [r]	20.3 [a,i,a]	22.0 [i]	-	-	-
Japan	0.28 [e,i,j]	0.36 [i,j]	0.41 [i,j]	0.37 [i,k]	0.39 [i,k]	-	12.1 [e,i,j]	12.2 [i,j]	14.1 [i,j]	12.1 [i,k]	12.5 [i,k]	-
Korea	-	-	0.31	0.37 [e,i]	0.40 [e,i]	-	-	-	12.4 [e]	12.7 [e,i]	13.7 [e,i]	-
Mexico	-	-	0.09	0.12	-	-	-	-	29.0	30.8	-	-
Netherlands[4]	0.48 [a]	0.27 [i]	0.19 [a,i]	-	-	-	25.0 [a]	13.7 [i]	9.5 [a,i]	-	-	-
New Zealand	-	-	-	0.53 [i]	-	-	-	-	-	44.9 [a,i]	-	-
Norway	0.19	0.22	0.25	0.24	-	-	16.1	13.4	14.7 [a]	15.0	-	-
Poland	-	-	0.20 [a,m]	0.19 [m]	0.19 [b,m]	-	-	-	30.8 [a,m]	29.7 [m]	32.2 [b,m]	-
Portugal[5, 1]	0.05 [i]	0.15 [i]	0.14 [a,i,p]	0.19	-	-	16.7 [i]	24.6 [i]	24.6 [a,i,p,a]	22.4	- [b]	-
Slovak Republic	-	-	0.20 [c]	0.15	0.15	-	-	- [c,q]	21.5 [c]	23.4 [k]	25.9 [k]	-
Spain	0.06	0.13	0.17 [a]	0.15	0.16	-	14.6	15.5	21.0 [a]	15.8	15.5	-
Sweden	0.50 [a,k]	0.50 [k,p]	-	-	-	-	22.5 [a,k]	18.4 [k,p]	- [a,k]	- [k]	-	-
Switzerland[2, 3]	-	-	0.80 [i]	0.72 [i]	-	-	-	-	30.0 [i]	28.0 [i]	-	-
United States	0.32	0.46	0.40	0.47	0.49 [n]	0.50 [b,n]	13.7 [h]	16.9 [h]	15.9 [h]	17.2 [h]	18.4 [h,n]	19.1 [b,h,n]
China	-	0.03 [i,k]	0.03 [i,k]	0.06 [i]	0.07 [i]	-	-	4.1 [i,k]	5.0 [i,k]	5.6 [i]	5.7 [i]	-
Israel	-	-	-	0.89 [c,i,n]	0.89 [c,i,n]	-	-	-	-	17.7 [c,i,n]	18.9 [c,i,n]	-
Russian Federation[1]	-	0.07	0.13	0.15	0.17	-	-	9.5	15.3	12.9	13.7	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 2000 instead of 2001.
4. 1998 instead of 2001.
5. 1983 instead of 1981.
6. 1982 instead of 1981.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/345101246407

Table 18. Basic research by performer, 1991-2003

As a percentage of GDP

	Business enterprise					Government					Higher education					Private non-profit				
	1991	1995	2001	2002	2003	1991	1995	2001	2002	2003	1991	1995	2001	2002	2003	1991	1995	2001	2002	2003
Australia[1, 2, 3]	0.04	0.04	0.05 -	-	-	0.12	0.11	0.10 -	-	-	0.25	0.25 i	0.23 -	-	-	0.02	0.02	0.03 -	-	-
Austria[4]	-	-	0.04 a	-	-	-	-	0.02 a,k	-	-	-	-	0.21 a	-	-	-	-	0.00	-	-
Czech Republic	-	0.01 i	0.22 i	0.19 i	-	-	0.13 i	0.20 i	0.19 i	-	-	0.04 i	0.10 i	0.11 i	-	-	0.00	0.00	0.00	-
Denmark	-	-	0.08	-	-	0.05	0.08	0.07 a	0.03	-	0.20	0.25	0.28 a	0.34	-	0.01	0.01	0.01	0.01	-
France	0.06 i	0.06 i	0.05 a,i	-	-	0.09 i	0.11 i	0.09 i	-	-	0.32 i	0.33 i	0.37 i	-	-	0.01	0.01	0.01	-	-
Germany	0.09 a	0.07	0.08	-	-	0.12 a	-	-	-	-	0.26 a	-	-	-	-	-	-	-	-	-
Hungary[1]	0.02 c,q	0.01 a	0.01	0.02	-	0.13 c,q	0.10 a	0.11	0.13	-	0.09 c,q	0.07 a	0.11	0.10	-	-	-	-	-	-
Iceland	-	-	0.00	0.00	-	0.10 i	0.12 i,p	0.15 i	0.19 b,i	-	0.16 i	0.24 i,p	0.27 i	0.23 b,i	-	0.03	0.02	0.05	0.05 b	-
Ireland	0.02	-	0.04 i	-	-	0.00	0.00 b	-	-	-	0.06 b	0.08 b	0.10 b	-	-	0.00 b	0.00 b	-	-	-
Italy	0.02 a,i	0.02 i	0.03 i	0.03 i,n	0.03 i,n	0.09 a,i	0.08 i	0.06 i	0.09 i,n	0.08 i,n	0.14 i	0.13 i	-	-	-	-	-	-	-	-
Japan	0.14 i,j	0.13 i,j	0.13 i,k	0.14 i,k	-	0.04 j	0.05 a	0.09	0.09 i,k	-	0.18 j	0.14 a	0.16	0.16 i,k	-	0.02 j	0.02 a	0.01	0.01	-
Korea[2]	-	0.15 e	0.16 i	0.20 i	-	-	0.07 e	0.08 e,i	0.09 e,i	-	-	0.10 ei	0.12 ei	0.11 ei	-	-	0.01 e	0.00 e	0.00 e	-
Mexico	-	0.00	0.01	-	-	-	0.04	0.06	-	-	-	0.05	0.06	-	-	-	0.00	0.00	-	-
Netherlands	0.13 i	-	-	-	-	0.13 i	-	-	-	-	0.01 i	-	-	-	-	0.01	-	-	-	-
New Zealand	-	-	0.09 i	-	-	-	-	0.20 i	-	-	-	-	0.24 i	-	-	-	-	-	-	-
Norway	0.01	0.02 a	0.03	-	-	0.03	0.04	0.04	-	-	0.17	0.19	0.18	-	-	-	-	-	-	-
Poland	-	0.01 a,m	0.01 m	0.01 b,m	-	-	0.10 a,m	0.09 m	0.09 b,m	-	-	0.09 m	0.10 m	0.10 b,m	-	-	0.00	0.00	0.00	-
Portugal[1]	0.00	0.00 a,i,p	0.01	-	-	0.01	0.01 a,i,p	0.01	-	-	0.11	0.10 aip	0.14	-	-	0.02	0.03	0.03	-	-
Slovak Republic	-	0.03 c	0.03	0.03	-	-	0.13 c	0.08 c	0.09 c	-	-	0.04	0.04	0.03	-	-	-	0.00 k	0.00 k	-
Spain	0.02	0.02 a	0.02	0.02 a	-	0.03	0.03 a	0.03	0.03	-	0.08	0.11 a	0.10	0.11	-	0.00	0.00	0.00	0.00	-
Sweden	0.03 p	-	-	-	-	0.01 e,f	0.08 f	0.09 f	-	-	0.46	-	-	-	-	0.00 k	-	-	-	-
Switzerland[1, 2, 3]	0.16	0.19	0.20 -	-	-	0.00	0.00	0.00	0.00 f,i	-	-	0.55	0.47 -	-	-	0.00	0.06	0.04 -	-	-
Turkey	0.01	0.01 i	-	-	-	0.01	0.00 i	-	-	-	-	-	-	-	-	-	-	-	-	-
United Kingdom	0.04 p	0.05 p	0.05 a	0.08	-	0.03 s	0.04	0.03 a	0.03	-	-	-	-	-	-	-	-	-	-	-
United States	0.13	0.08	0.08	0.08 n	0.08 b,n	0.04 f	0.04 f	0.04 f	0.04 f,n	0.04 b,f,n	0.25	0.24	0.28	0.30 n	0.31 b,n	0.04 h	0.04 h	0.06 h	0.07 h,n	0.07 b,h,n
China	0.00 i,k	0.00 i,k	0.00 i	0.00 i	-	0.02 i	0.02 i	0.04 i	0.04 i	-	0.01 i	0.01 i	0.02 i	0.03 i	-	-	-	-	-	-
Israel	-	-	0.19 c,i,n	0.17 c,i,n	0.17 c,i,n	-	-	0.05 c,i,n	0.05 c,i,n	-	-	-	0.61 e,i,n	0.62 e,i,n	-	-	-	0.04 c,n	0.05 c,n	-
Russian Federation[1]	0.01	0.02	0.02	0.02	-	0.05	0.09	0.11	0.13	-	0.02	0.02	0.02	0.02	-	0.00	0.00	0.00	0.00	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 2000 instead of 2001.
4. 1998 instead of 2001.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/377412476274

Table 19. Government budget appropriations and outlays for R&D by socio-economic objectives, 1991-2003

As a percentage of total R&D budget

	Defense			Civil														
				Economic development			Health			Space			Non-oriented programs			General university funds		
	1991	2001	2003	1991	2001	2003	1991	2001	2003	1991	2001	2003	1991	2001	2003	1991	2001	2003
Australia	10.3 f	5.8 f	5.7 f,n	25.8 f	36.8 f	34.3 f,n	14.6 f	16.4 f	19.9 f,n	-	0.0 f	0.0 f,n	15.0 f	3.1 f	3.7 f,n	34.4 f	37.9 f	36.4 f,n
Austria	0.0 f	0.0 f	0.0 f,n	14.6 f	15.8 f	12.7 f,n	8.6 f	8.8 f	8.5 f,n	0.4 f	0.1 f	0.1 f,n	12.4 f	13.7 f	13.1 f,n	64.0 f	61.5 f	65.5 f,n
Belgium	0.2	0.2	0.4 n	25.6	32.9	36.9 n	10.1	9.7	9.6 n	12.4	11.2	8.9 n	22.7	23.3	22.9 n	23.9	18.6	18.2 n
Canada	5.1 f	4.3 f	-	33.8 f	32.0 f	-	13.8 f	23.5 f	-	7.2 f	6.2 f	-	12.5 f	7.2 f	-	27.6 b,f	25.7 b,f	-
Czech Republic[1]	-	-	3.3 c	-	-	19.8 c	-	-	16.7 c	-	-	0.9 c	-	-	25.7 c	-	-	27.6 c
Denmark	0.6	0.5 a	1.1	26.3	21.1 a	16.5	14.1	19.8 a	16.7	2.7	2.4 a	2.2	23.3	18.0 a	20.6	33.0	37.4 a	42.1
Finland	1.4 a	1.6	2.9 n	40.4 a	41.1	39.1 n	16.3 a	15.4	15.2 n	3.1 a	1.9	1.9 n	10.5 a	14.2	13.7 n	28.3 a	25.9	27.2 n
France[1]	36.1	22.8 a	24.3 n	21.0	12.7	12.3 n	6.3	10.1	10.2 n	8.6	9.6	8.9 n	15.3	19.3	19.7 n	12.4	23.2	23.0 n
Germany	11.0 a	7.4	6.7 n	22.7 a	18.8 s	19.1 n,s	11.6 a	13.4 s	13.7 n,s	5.4 a	4.9 s	4.9 n,s	15.2 a	17.2 s	16.6 n,s	33.2 a	38.4 s	39.3 n,s
Greece[1]	1.5	0.8	0.9 n	29.7	20.8	18.0 n	17.5	19.8	19.0 n	0.3	0.2	0.1 n	3.4	12.5	10.9 n	46.1	45.6	50.7 n
Iceland	0.0	0.0	0.0 n	51.4	36.7	33.0 n	7.2	10.6	10.0 n	-	-	-	16.6	17.5	- n	24.9	35.2	38.4 n
Ireland	0.0	0.0	-	48.5	41.4	-	12.7	12.8	-	3.8	0.0	-	5.1	27.6	-	29.9	18.3	-
Italy	7.9	4.0 n	-	21.8	16.1 n	-	18.2	15.5 n	-	7.0	7.3 n	-	10.6	13.3 n	-	31.3	43.7 n	-
Japan	5.7 e,f,k	4.3 f,k	4.5	31.6 e,f	32.8 f	31.9 f,n	5.4 e,f	7.5 f	7.3 f,n	6.8 e,f	6.7 f	6.7	8.0 e,f	13.8 f	15.3 f,n	42.5 e,f	34.8 f	34.4 f,n
Korea	-	15.8	14.2	-	46.7	44.7	-	15.7	16.7	-	3.2	2.8	-	18.5 m	21.6	-	- l	-
Mexico	0.0 f	0.0	-	32.6 f	33.5	-	14.2 f	12.5	-	0.0 f	0.0	-	20.4 f	- l	-	32.8 f	53.9 m	-
Netherlands	3.0	1.9	-	28.1	25.3	-	8.7	8.7	-	2.6	2.6	-	10.6	10.7	-	43.0	46.3	-
New Zealand	1.5	-	-	46.7	-	-	25.3	-	-	-	-	-	1.2	-	-	24.1	-	-
Norway	6.2	7.5	6.9 n	31.5	26.1	21.2 n	18.3	18.8	18.8 n	2.7	2.2	1.9 n	10.5	8.9	12.2 n	30.8	36.4	39.0 n
Portugal	0.7	2.1	2.0 n	38.5	31.4	35.4 n	18.0	17.8	16.7 n	0.2	0.5	0.5 n	8.4	10.5	9.9 n	30.3	35.6	33.5 n
Slovak Republic[2]	-	9.3 m	7.2 m	-	29.2	21.3	-	10.9	10.2	-	- l	- l	-	32.4 m	- a,m	-	16.6	- l
Spain	16.8	37.3 b	-	27.5	22.7 b	-	15.1	9.7 b	-	7.0	2.4 b	-	10.8	2.1 b	-	20.0	25.8 b	-
Sweden	27.3	14.6	22.2	17.8	12.2	13.6	8.3	10.8	8.9	1.7	2.7	0.6	14.6	16.7	16.7	30.4	43.1	38.0
Switzerland[3, 4]	4.6 f	0.7 f	-	3.7 f,k	4.6 f,k	-	3.5 f,k	2.4 f,k	-	-	-	-	- l	- l	-	59.3 f,m	61.1 f,m	-
United Kingdom[1]	43.9	30.5	34.1 c	16.2	9.4	9.8 c	12.5	22.4	20.1 c	2.7	2.1	1.9 c	5.1	13.6	13.3 c	18.9	21.8	20.2 c
United States	59.7 f,g,h	50.5 f,g	53.7 b,f,g	8.9 f,g,h	6.5 f,g,l	5.6 b,f,g	17.5 f,g,h	26.2 f,g,l	26.3 b,f,g	9.9 f,g,h	9.8 f,g	8.4 b,f,g	4.0 f,g,h	6.9 f,g	6.0 b,f,g	-	-	-
Total OECD	**36.4 a**	**28.8 n**	**-**	**17.9 a**	**15.9 n**	**-**	**13.8 a**	**18.8 n**	**-**	**7.5 a**	**7.2 n**	**-**	**8.2 a**	**10.7 n**	**-**	**15.5 a**	**17.4 n**	**-**
EU-25	**-**	**14.9 a,n**	**-**	**-**	**16.8 a,n**	**-**	**-**	**13.5 a,n**	**-**	**-**	**5.2 a,n**	**-**	**-**	**14.8 a,n**	**-**	**-**	**31.6 a,n**	**-**
EU-15	**20.6 a**	**15.4 a,n**	**-**	**23.8 a**	**17.2 a,n**	**-**	**11.3 a**	**13.8 a,n**	**-**	**5.6 a**	**5.3 a,n**	**-**	**12.4 a**	**15.0 a,n**	**-**	**24.9 a**	**32.5 a,n**	**-**
Russian Federation	-	43.5	-	-	24.4	-	-	7.0	-	-	10.1	-	-	14.0	-	-	0.0	-

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 2002 instead of 2003. 2. 2002 instead of 2001. 3. 1992 instead of 1991. 4. 2000 instead of 2001.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/147403505165

Table 20. Tax treatment of R&D, 1990-2004

Rate of tax subsidies for 1 USD of R&D[1], large firms and SMEs

	SMEs			Large firms				
	1999	2001	2004	1990	1995	1999	2001	2004
Australia[2]	0.11	0.20	0.12	0.28	0.21	0.11	0.20	0.12
Austria	0.12	0.12	0.11	0.02	0.07	0.12	0.12	0.11
Belgium	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01	-0.01
Canada	0.32	0.32	0.32	0.17	0.17	0.17	0.17	0.17
Denmark[3]	-	0.11	0.18	0.00	0.13	-0.02 [4]	0.11	0.18
Finland	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01	-0.01
France	0.09	0.06	0.13	0.09	0.08	0.09	0.06	0.13
Germany	-0.04	-0.02	-0.02	-0.05	-0.05	-0.04	-0.02	-0.02
Greece	-0.01	-0.01	-0.01	-	-	-0.01	-0.01	-0.01
Hungary[5]	-	-	0.16	-	-	-	-	0.16
Iceland	-0.03	-0.01	-0.01	-0.03	-	-0.03	-0.01	-0.01
Ireland	0.06	-	0.05	0.00	-	0.06	-	0.05
Italy	0.45	0.44	0.45	-0.04	-0.05	-0.03	-0.03	-0.03
Japan[6]	0.06	0.12	0.19	-0.02	-0.01	0.02	0.01	0.14
Mexico	0.03	0.03	0.39	-0.02	-0.02	0.03	0.03	0.39
Netherlands[7]	-	0.35	0.11	-0.02	0.10	0.10	0.10	0.02
New Zealand	-0.13	-0.02	-0.02	-	-	-0.13	-0.02	-0.02
Norway	-0.02	0.23	0.23	-0.04	-0.02	-0.02	-0.02	0.21
Portugal	0.15	0.34	0.28	-0.02	-0.02	0.15	0.34	0.28
Spain	0.31	0.44	0.44	0.25	0.28	0.31	0.44	0.44
Sweden	-0.01	-0.01	-0.01	-0.02	-0.02	-0.01	-0.01	-0.01
Switzerland	-0.01	-0.01	-0.01	-0.01	-0.02	-0.01	-0.01	-0.01
United Kingdom	0.11	0.11	0.11	0.00	0.00	0.00	0.10	0.10
United States	0.07	0.07	0.07	0.09	-0.02	0.07	0.07	0.07

1. Tax subsidies are calculated as 1 minus the B-index. For example, in Australia in 2001, 1 dollar of R&D expenditure by large firms results in 20 cents of tax relief.

2. Calculation of Australia's B-index was adjusted to show the correct weights of the volume-based, 125% tax concession and the 175% incremental tax concession for R&D.

3. The 2004 calculation for Denmark applies to the 150% allowance on collaborative research at universities or public research institutions. Without this incentive, the B-index is 1.015.

4. 1998 instead of 1999.

5. The B-index for Hungary is based on the 100% R&D tax allowance for research and technology development (which also applies to subcontracted R&D if the partner is a public or non-profit research organization). A 300% allowance is available if the company's R&D laboratory is located at a university or public research site; the B-index in this situation equals 0.666.

6. The 2004 B-index for large firms in Japan applies to firms with a ratio of R&D to sales of less than 10%. The B-index for large firms with a R&D-to-sales ratio above 10% is 0.831. The B-index for research conducted in collaboration with universities is 0.782.

7. Calculations for the Netherlands were revised to reflect the taxability of the savings from the tax credit.

Source: OECD, 2004.

StatLink: http://dx.doi.org/10.1787/486405683434

Table 21. Total researchers per thousand employment, 1981-2002

	1981	1985	1991	1995	2001	2002
Australia[1, 2, 3]	3.6 [b]	4.3	6.8	7.2	7.3 [-]	-
Austria[4]	1.8	2.0 [k]	-	-	4.7 [k]	-
Belgium	3.5 [b,r]	4.1 [b,r]	4.8 [b,r]	6.1	7.8	-
Canada[3]	3.5	4.4	5.1	6.4	7.1 [b,n]	-
Czech Republic[1]	-	-	3.8 [b,c,j,q,r]	2.2 [b]	2.9 [b]	2.9 [b]
Denmark	2.8 [b,r]	3.4 [b,r]	4.6 [r]	6.1 [r]	7.0 [r]	-
Finland[5]	3.9 [r]	-	6.0 [r]	8.2 [r]	15.8 [r]	16.4 [r]
France	3.9 [a]	4.7	5.7	6.7	7.2	-
Germany	4.6	5.2	6.3 [a]	6.2	6.8	6.8 [b]
Greece	-	-	1.8 [b]	2.6 [a]	-	-
Hungary	-	-	3.2 [b,c]	2.9 [c]	3.8 [c]	3.9 [c]
Iceland	-	-	-	-	-	-
Ireland[3]	1.8 [b]	2.5 [b]	4.4 [b]	4.5 [b]	5.0 [a,b]	-
Italy	2.4	2.9	3.3	3.4	2.8	-
Japan	5.3 [j]	6.2 [j]	7.5 [j]	8.3 [j]	10.2	9.9 [b]
Korea	-	-	-	4.9 [e]	6.3 [e]	6.4 [e]
Luxembourg[3]	-	-	-	-	6.2 [-]	-
Mexico	-	-	-	0.6	-	-
Netherlands	3.4	4.3	-	4.8	5.5	-
New Zealand	-	-	4.0	4.7	6.9 [a]	-
Norway	3.8 [r]	4.8 [r]	6.6 [r]	7.5 [a,r]	8.7 [r]	-
Poland	-	-	-	3.4	3.8	3.9 [b]
Portugal[6, 7, 1]	0.8 [b]	1.1 [b]	2.1 [a,b,r]	2.6 [r]	3.5 [b,r]	-
Slovak Republic	-	-	-	4.6 [c]	4.7	4.6
Spain	1.6 [b]	1.8	2.9	3.5	5.0	5.1
Sweden	4.2 [a,k]	5.0 [k,r]	5.9 [k,r]	8.2	10.6	-
Switzerland[7, 1, 2, 3]	-	4.2 [a,b,r]	4.4	5.5	6.3 [-]	-
Turkey[3]	-	-	0.6	0.8 [b]	1.1 [b]	-
United Kingdom	4.9	5.0	4.6 [a]	5.4	-	-
United States	6.3	7.0 [a]	7.7	7.6	-	-
Total OECD[3]	**4.5 [b]**	**5.2 [a,b]**	**5.6 [a,b]**	**5.8 [a,b]**	**6.5 [b,n]**	**-**
EU-25	**-**	**-**	**-**	**4.9 [b]**	**5.6 [b]**	**-**
EU-15	**3.5 [b]**	**4.0 [b]**	**4.7 [a,b]**	**5.2 [b]**	**5.9 [b]**	**-**
China	-	-	0.7 [k]	0.8 [k]	1.0	1.1
Israel	-	-	-	-	-	-
Russian Federation	-	-	-	9.2	7.9	7.5

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991.
2. 1996 instead of 1995.
3. 2000 instead of 2001.
4. 1998 instead of 2001.
5. 1983 instead of 1981.
6. 1982 instead of 1981.
7. 1986 instead of 1985.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/730776281328

Table 22. Researchers by sector of performance, 1991-2002

Per thousand labour force

	Business sector				Government				Higher education				Private non-profit			
	1991	1995	2001	2002	1991	1995	2001	2002	1991	1995	2001	2002	1991	1995	2001	2002
Australia[1, 2, 3]	1.62	1.67	1.66	-	1.12	0.99	0.92 [-]	-	3.25	3.88	4.07	-	0.08	0.14	0.15	-
Austria[4]	-	-	3.01	-	-	-	0.25	-	-	-	1.53	-	-	-	0.02	-
Belgium	2.08 [b,r]	2.82	4.06 [b]	4.08 [b]	0.19 [b]	0.23	0.44	-	2.00 [b,r]	2.32 [r]	2.72 [b]	-	0.04 [b,r]	0.06 [r]	0.06 [b]	-
Canada	2.09	3.30	3.99	-	0.58	0.52	0.44	- [n]	1.99	2.08	2.12 [b,n]	-	0.04	0.03	0.02	-
Czech Republic	-	0.95	1.11	1.20	- [c,q]	0.83 [a]	0.94	0.86	-	0.52	0.82	0.83	-	0.00	0.03	0.01
Denmark	1.77	2.39	3.37	-	0.88	1.28	1.26	0.77	1.42	1.97	2.10	2.75 [a,r]	0.06	0.07	0.06	0.05
Finland	-	-	-	-	- [a]	-	-	-	-	-	-	-	-	-	-	-
France	2.37	2.61	3.28 [a]	-	1.03	1.07	0.85	- [n]	1.68	2.11	2.31	-	0.08	0.15	0.13	-
Germany	3.56 [a]	3.29	3.98	-	0.94 [a]	0.95 [b]	0.97	0.99 [b]	1.57 [a]	1.64	1.71	1.76 [b]	0.03 [a]	-	-	-
Greece	0.26	0.37	-	-	0.49	0.47 [a]	0.45 [b]	-	0.83	1.43 [a]	1.96	-	-	0.02	0.01	-
Hungary[1]	0.82	0.71	0.99	1.06	0.85 [c,q]	0.86 [c]	1.14 [c]	1.12 [c]	1.05	0.99	1.45	1.46	-	-	-	-
Iceland	1.19 [a]	2.41	5.24	-	2.06	2.17	2.61	-	1.53 [a]	2.55	3.16	-	0.11 [a]	0.09	0.42	-
Ireland	1.57	2.32	3.35	-	0.26 [b]	0.19 [b]	0.28	0.31	1.83 [b]	1.32 [b]	1.23	-	0.15 [b]	0.12 [b]	-	-
Italy	1.20	1.19	1.11	-	0.51 [a]	0.61	0.54	-	1.34	1.51	1.14	-	-	-	-	-
Japan	5.24	5.76	6.38	6.45	0.46 [b,j]	0.46 [b,j]	0.50	0.51	1.65	1.82	2.97	2.55	0.21	0.24	0.16	0.16
Korea	-	3.23	4.47	4.55	- [e]	0.61 [e]	0.54 [e]	0.50 [e]	-	0.93 [e]	1.03 [e]	1.09 [e]	-	0.05 [e]	0.05 [e]	0.06
Luxembourg[3]	-	-	5.24	-	-	-	0.76 [-]	-	-	-	0.08	-	-	-	-	-
Mexico	-	0.06	-	-	-	0.17	-	-	-	0.32	-	-	-	0.01	-	-
Netherlands	-	1.79	2.75	-	-	1.06	0.83	0.82	1.78	1.68	1.93	-	-	0.06	0.04	0.03
New Zealand	0.83	0.88	1.30 [a]	-	0.93	0.84	1.02 [a]	-	1.14	1.69	2.89 [a]	-	-	-	-	-
Norway	-	-	4.78	-	-	-	1.31	-	1.95	2.28	2.40	-	-	-	-	-
Poland	-	0.65	0.55	0.27	-	0.65 [a]	0.61	0.85	-	1.63	2.10	2.16	-	0.00	0.00	0.00
Portugal[1]	0.21 [a]	0.23 [a]	0.51	-	0.42	0.58	0.68	-	1.13 [a]	1.23 [a]	1.68	-	0.24 [a]	0.41 [a]	0.45	-
Slovak Republic	-	0.85 [c]	0.85	0.83	- [b,c,q]	1.48 [c]	0.92 [k]	0.91 [k]	-	1.60	1.84	1.76	-	-	0.00	0.00
Spain	0.73	0.66	1.06	1.34 [a]	0.51	0.51	0.75	0.69	1.31	1.69	2.63	2.49	0.01	0.03	0.05	0.02
Sweden	2.93 [k]	4.34 [a]	6.25	-	0.38 [k]	0.62 [a,k]	0.51 [k]	-	2.52	2.70	3.55	-	0.01 [e]	-	-	-
Switzerland[1, 2, 3]	2.37	3.04	3.86	-	0.15	0.14	-	0.11	1.76 [a]	2.09	2.18	-	-	-	-	-
Turkey[3]	0.06	0.10	0.16 [a]	-	0.09	0.08	0.11 [-]	-	0.41	0.54	0.75 [a]	-	-	-	-	-
United Kingdom	2.78	2.88	3.16 [a]	3.50	0.52	0.48	0.34	0.31	1.01	1.65	-	-	0.10	0.11	0.13	0.14
United States[3]	6.04	5.89	7.20 [n]	-	0.45 [h]	0.40 [h]	-	-	1.08	1.35	-	-	0.07	0.08 [k]	-	-
Total OECD	**3.51**	**3.44**	**-**	**-**	**0.54** [a,b]	**0.43** [a,b]	**-**	**-**	**1.24**	**1.14**	**-**	**-**	**0.07**	**0.06**	**-**	**-**
EU-25	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
EU-15	**2.22**	**2.32**	**-**	**-**	**0.71** [a,b]	**0.74**	**-**	**-**	**1.45**	**1.75**	**-**	**-**	**0.05**	**0.08**	**-**	**-**
China	0.19 [k,s]	0.28 [k,s]	0.53	0.59	0.31 [k]	0.27 [k]	0.25	0.25	0.20 [s]	0.19 [s]	0.23	0.24	-	-	-	-
Israel	-	5.05	4.02	3.81	-	2.16	2.05	2.01	-	1.15	1.06	0.96	-	0.00	0.03	0.02

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1992 instead of 1991. 2. 1996 instead of 1995. 3. 2000 instead of 2001. 4. 1998 instead of 2001.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/178788378577

Table 23. Human resources in science and technology, 1995-2002

	HRST	
	Average annual growth rate, 1995-2002	As a percentage of total employment, 2002
Australia	3.07 [1]	35.6 [2]
Austria	2.08 [3]	24.7 [2]
Belgium	2.23 [3]	30.1 [2]
Canada	3.00	29.0
Czech Republic	1.69	29.7
Denmark	3.46	35.3
Finland	2.32 [4]	32.5
France	2.11	29.2
Germany	2.04 [3]	33.5 [2]
Greece	2.65	19.7
Hungary	-1.03 [5]	23.9 [2]
Iceland	5.60 [5]	29.0 [2]
Ireland	7.05	22.4
Italy	4.26	28.4
Japan[6]	-	15.7
Korea	3.40	16.2
Luxembourg	5.43 [3]	31.6 [2]
Netherlands	3.90	34.3
New Zealand	3.06 [1]	26.0 [2]
Norway	7.64 [5]	34.7 [2]
Poland	-1.14 [5]	23.5 [2]
Portugal	-0.64	14.8
Slovak Republic	1.03 [7]	28.8
Spain	8.36	23.1
Sweden	3.37 [4]	37.7
Switzerland	1.04 [7]	36.1
United Kingdom	2.49	25.3
United States	2.00	32.7

1. 1996-2001 instead of 1995-2002.
2. 2001 instead of 2002.
3. 1995-2001 instead of 1995-2002.
4. 1997-2001 instead of 1995-2002.
5. 1999-2001 instead of 1995-2002.
6. Data for Japan are national estimates.
7. 1999-2002 instead of 1995-2002.

Source: OECD, *Science, Technology and Industry Scoreboard 2003* .

StatLink: http://dx.doi.org/10.1787/053853630826

Table 24. University graduates in science and engineering, 1988-2001

Tertiary A level and advanced research programmes

	Thousand of graduates						As a percentage of total graduates						Share of women					
	Science			Engineering			Science			Engineering			Science			Engineering		
	1998	2000	2001	1998	2000	2001	1998	2000	2001	1998	2000	2001	1998	2000	2001	1998	2000	2001
Australia	17.2	17.5	19.7	11.8	11.8	12.4	11.5	11.8	11.9	7.9	7.9	7.5	8.4	8.6	8.5	2.9	3.0	2.9
Austria	2.2	1.7	1.7	2.4	3.0	3.5	13.7	9.9	9.1	14.7	17.3	18.7	9.3	7.0	7.4	5.0	6.7	6.7
Belgium[1]	1.5	3.2	3.7	2.6	4.0	4.3	8.3	9.9	10.9	14.6	12.5	12.5	6.9	7.5	8.2	6.3	5.3	5.1
Canada	17.5	18.9	-	12.0	12.6	-	11.7	12.2	-	8.0	8.2	-	8.9	9.6	-	3.1	3.2	-
Czech Republic	1.3	3.8	4.2	5.0	4.6	4.5	5.9	12.7	11.9	22.3	15.5	12.8	3.2	6.3	5.3	9.9	8.3	7.5
Denmark[2]	1.6	1.9	2.2	1.2	1.4	3.0	12.9	12.6	6.7	9.8	8.9	9.0	10.9	10.7	4.5	5.8	4.7	3.4
Finland	1.8	2.2	2.2	5.5	6.7	6.4	8.0	7.9	7.2	24.2	24.0	20.8	6.5	6.2	5.3	7.9	7.7	6.5
France	56.8	65.2	67.0	46.1	40.6	41.3	15.9	18.0	18.2	12.9	11.2	11.2	13.8	13.8	14.2	5.0	4.8	4.7
Germany	31.5	27.6	26.2	43.0	38.8	36.4	14.7	13.5	13.2	20.1	19.0	18.4	10.6	9.5	9.5	7.6	8.3	8.2
Hungary	2.0	1.4	1.4	5.9	5.8	4.2	4.5	2.3	2.5	13.5	9.8	7.4	3.6	1.3	1.3	5.5	3.6	3.3
Iceland	0.1	0.2	0.2	0.1	0.1	0.1	13.1	10.7	11.0	5.9	7.1	6.5	8.1	7.8	8.2	2.3	2.6	2.1
Ireland	3.9	5.4	5.5	2.3	2.5	2.2	16.9	19.7	19.4	10.0	9.3	7.9	14.9	16.8	15.9	3.9	3.9	3.5
Italy	18.3	15.8	15.6	25.1	29.7	31.0	11.1	8.5	8.0	15.2	16.0	15.9	11.6	8.4	7.8	7.6	7.9	7.8
Japan	26.3	26.7	28.8	127.7	129.7	133.5	4.4	4.4	4.6	21.6	21.3	21.2	3.0	3.0	3.1	4.9	5.3	5.8
Korea	24.4	27.2	33.3	62.7	67.4	74.3	11.0	11.1	12.2	28.2	27.4	27.2	11.6	11.7	12.3	14.4	14.3	13.6
Luxembourg	-	0.1	-	-	-	-	-	31.5	-	-	-	-	-	-	-	-	-	-
Mexico	6.5	25.8	29.0	51.8	40.4	41.1	2.8	9.0	9.7	22.0	14.0	13.8	2.8	8.0	8.4	14.5	6.0	6.2
Netherlands	4.8	3.6	4.1	10.1	7.8	8.3	5.7	4.8	5.2	12.1	10.4	10.5	3.0	2.5	2.7	2.8	2.4	2.4
New Zealand	3.6	4.1	4.5	1.8	1.8	1.8	13.3	13.0	14.1	6.9	5.6	5.5	10.2	9.7	10.4	3.7	3.0	2.9
Norway	1.3	1.6	1.9	3.1	1.8	2.4	3.8	6.3	6.8	9.0	6.8	8.3	1.9	2.9	3.2	3.7	2.9	3.0
Poland	3.4	11.7	15.0	23.5	27.6	29.8	1.5	3.4	3.5	10.4	8.0	7.0	0.3	3.4	3.1	0.8	3.0	2.6
Portugal	-	3.0	-	-	6.6	-	-	5.7	-	-	12.4	-	-	4.1	-	-	6.6	-
Slovak Republic[2]	1.6	1.4	2.3	2.8	3.2	4.3	8.5	6.8	9.4	14.8	15.4	17.8	4.8	4.0	6.2	7.6	8.8	10.8
Spain	20.1	21.7	22.8	24.0	27.6	30.8	9.4	10.2	10.4	11.2	12.9	14.2	7.3	8.1	8.1	4.9	6.0	6.9
Sweden	3.0	3.2	3.6	5.4	7.8	8.3	9.0	8.5	9.4	16.2	20.5	21.5	5.4	6.7	7.5	6.2	8.6	10.1
Switzerland	2.6	3.9	4.0	3.8	4.2	3.7	11.4	14.5	15.0	17.0	15.7	14.1	8.2	9.3	9.0	5.1	4.6	4.3
Turkey	13.5	14.3	16.3	14.3	17.5	18.1	10.5	10.9	10.4	11.1	13.3	11.6	12.2	12.5	12.1	6.6	7.8	6.7
United Kingdom	54.2	64.7	77.0	46.5	39.0	44.7	14.5	16.5	18.1	12.4	9.9	10.5	11.4	13.3	14.6	4.3	3.6	3.7
United States	158.3	169.7	173.4	120.6	117.7	118.3	9.2	9.3	9.4	7.0	6.5	6.4	7.2	7.3	7.3	2.4	2.4	2.4
Total OECD[1, 2, 3]	**510.9**	**544.3**	**565.5**	**657.4**	**654.9**	**668.6**	**9.6**	**9.8**	**10.0**	**12.4**	**11.8**	**11.8**	**7.7**	**8.0**	**8.0**	**4.2**	**4.4**	**4.5**
EU-25[1, 2, 3]	**211.6**	**234.4**	**254.5**	**258.2**	**250.0**	**263.0**	**11.1**	**11.6**	**11.6**	**13.6**	**12.3**	**12.0**	**9.4**	**9.0**	**8.9**	**5.4**	**5.0**	**4.9**
EU-15[1, 2, 3]	**198.6**	**216.2**	**231.7**	**220.1**	**208.8**	**220.2**	**12.9**	**13.7**	**14.1**	**14.3**	**13.3**	**13.4**	**10.4**	**10.8**	**11.1**	**5.6**	**5.5**	**5.6**
Israel	-	4.0	4.6	-	3.3	3.8	-	10.3	11.5	-	8.5	9.6	-	7.3	8.4	-	3.3	3.7

1. Flemish Community only instead of Belgium in 1998.

2. 1999 instead of 1998.

3. Do not include Greece, Luxembourg, Portugal and Spain.

Source: OECD, Education database, July 2004.

StatLink: http://dx.doi.org/10.1787/831562532438

Table 25. Triadic[1] patent families by priority year, 1991-2000

	Number of triadic patent families					Average annual growth rate 1991-2000	As a percentage of total world triadic patent families				
	1991	1995	1997	1999	2000		1991	1995	1997	1999	2000
Australia	156	226	299	304 b,n	321 b,n	8.0	0.5	0.6	0.7	0.7 b,n	0.7 b,n
Austria	174	217	248	262 b,n	274 b,n	5.0	0.6	0.6	0.6	0.6 b,n	0.6 b,n
Belgium	239	369	395	366 b,n	359 b,n	4.5	0.8	1.0	0.9	0.8 b,n	0.8 b,n
Canada	275	382	525	539 b,n	519 b,n	7.1	0.9	1.1	1.2	1.2 b,n	1.2 b,n
Czech Republic	9	3	10	9 b,n	9 b,n	-0.6	0.0	0.0	0.0	0.0 b,n	0.0 b,n
Denmark	105	188	221	250 b,n	254 b,n	9.8	0.4	0.5	0.5	0.6 b,n	0.6 b,n
Finland	161	312	416	419 b,n	489 b,n	12.4	0.5	0.9	1.0	1.0 b,n	1.1 b,n
France	1 783	1 905	2 200	2 081 b,n	2 127 b,n	2.0	6.0	5.4	5.2	4.8 b,n	4.9 b,n
Germany	3 676	4 815	5 634	5 867 b,n	5 777 b,n	5.0	12.3	13.6	13.4	13.4 b,n	13.2 b,n
Greece	5	1	9	4 b,n	6 b,n	2.0	0.0	0.0	0.0	0.0 b,n	0.0 b,n
Hungary	22	25	31	30 b,n	33 b,n	4.6	0.1	0.1	0.1	0.1 b,n	0.1 b,n
Iceland	3	6	4	5 b,n	4 b,n	3.7	0.0	0.0	0.0	0.0 b,n	0.0 b,n
Ireland	27	31	37	56 b,n	45 b,n	5.8	0.1	0.1	0.1	0.1 b,n	0.1 b,n
Italy	659	610	711	740 b,n	767 b,n	1.7	2.2	1.7	1.7	1.7 b,n	1.8 b,n
Japan	8 895	9 428	11 207	11 726 b,n	11 757 b,n	3.1	29.7	26.6	26.6	26.9 b,n	26.9 b,n
Korea	93	327	387	459 b,n	478 b,n	18.2	0.3	0.9	0.9	1.1 b,n	1.1 b,n
Luxembourg	9	13	16	19 b,n	17 b,n	6.4	0.0	0.0	0.0	0.0 b,n	0.0 b,n
Mexico	6	12	11	11 b,n	15 b,n	10.2	0.0	0.0	0.0	0.0 b,n	0.0 b,n
Netherlands	568	724	840	833 b,n	857 b,n	4.6	1.9	2.0	2.0	1.9 b,n	2.0 b,n
New Zealand	19	20	39	33 b,n	36 b,n	7.1	0.1	0.1	0.1	0.1 b,n	0.1 b,n
Norway	58	86	94	108 b,n	109 b,n	7.0	0.2	0.2	0.2	0.2 b,n	0.2 b,n
Poland	9	5	9	8 b,n	10 b,n	0.5	0.0	0.0	0.0	0.0 b,n	0.0 b,n
Portugal	3	2	6	5 b,n	8 b,n	10.2	0.0	0.0	0.0	0.0 b,n	0.0 b,n
Slovak Republic[2]	1	2	4	3 b,n	4 b,n	23.2	-	0.0	0.0	0.0 b,n	0.0 b,n
Spain	70	87	108	120 b,n	113 b,n	5.3	0.2	0.2	0.3	0.3 b,n	0.3 b,n
Sweden	391	700	853	838 b,n	811 b,n	8.1	1.3	2.0	2.0	1.9 b,n	1.9 b,n
Switzerland	723	746	790	792 b,n	753 b,n	0.5	2.4	2.1	1.9	1.8 b,n	1.7 b,n
Turkey	0	2	3	5 b,n	6 b,n	34.5	0.0	0.0	0.0	0.0 b,n	0.0 b,n
United Kingdom	1 250	1 516	1 589	1 767 b,n	1 794 b,n	4.0	4.2	4.3	3.8	4.0 b,n	4.1 b,n
United States	10 217	12 312	14 763	15 079 b,n	14 985 b,k,n	4.3	34.1	34.7	35.1	34.6 b,n	34.3 b,n
Total OECD	**29 607**	**35 070**	**41 459**	**42 738 b,n**	**42 739 b,k,n**	**4.1**	**98.9**	**98.8**	**98.5**	**97.9 b,n**	**97.9 b,n**
EU-25	**9 168**	**11 533**	**13 343**	**13 687 b,n**	**13 770 b,n**	**4.5**	**30.6**	**32.5**	**31.7**	**31.4 b,n**	**31.5 b,n**
EU-15	**9 122**	**11 489**	**13 283**	**13 627 b,n**	**13 699 b,n**	**4.5**	**30.5**	**32.4**	**31.6**	**31.2 b,n**	**31.4 b,n**
Total world	**29 923**	**35 501**	**42 097**	**43 635 b,n**	**43 664 b,n**	**4.2**	**100**	**100**	**100**	**100 b,n**	**100 b,n**
China	12	19	41	66 b,n	93 b,n	22.9	0.0	0.1	0.1	0.2 b,n	0.2 b,n
Israel	104	158	284	347 b,n	342 b,n	13.2	0.3	0.4	0.7	0.8 b,n	0.8 b,n
Russian Federation	37	62	65	71 b,n	76 b,n	7.9	0.1	0.2	0.2	0.2 b,n	0.2 b,n

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. Patent filed at the European Patent Office (EPO), the US Patent & Trademark Office (USPTO) and the Japanese Patent Office (JPO).

2. 1992 instead of 1991.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/482445177814

Table 26. Number of triadic[1] patent families by priority year, 1991-2000

Per million inhabitants

	1991	1993	1995	1997	1999	2000
Australia	9.0	10.8	12.4	16.0	16.0 b,n	16.7 b,n
Austria	22.3	21.7	27.3	31.1	32.7 b,n	34.2 b,n
Belgium	23.9	32.6	36.4	38.8	35.8 b,n	35.1 b,n
Canada	9.8	10.5	13.0	17.5	17.7 b,n	16.9 b,n
Czech Republic	0.9	0.7	0.3	0.9	0.9 b,n	0.9 b,n
Denmark	20.4	30.7	35.9	41.9	47.0 b,n	47.7 b,n
Finland	32.1	48.3	61.0	80.9	81.1 b,n	94.5 b,n
France	30.5	28.7	32.1	36.8	34.5 b,n	35.1 b,n
Germany	46.0 a	49.1	59.0	68.7	71.5 b,n	70.3 b,n
Greece	0.5	0.3	0.1	0.8	0.4 b,n	0.6 b,n
Hungary	2.1	2.2	2.4	3.0	2.9 b,n	3.3 b,n
Iceland	11.6	3.8	22.4	12.9	17.2 b,n	14.9 b,n
Ireland	7.6	5.2	8.6	10.1	14.8 b,n	11.9 b,n
Italy	11.6	11.0 a	10.6	12.4	12.8 b,n	13.3 b,n
Japan	71.8	67.8	75.1	88.8	92.6 b,n	92.6 b,n
Korea	2.1	3.8	7.2	8.4	9.8 b,n	10.2 b,n
Luxembourg	24.1	36.1	31.8	37.8	44.2 b,n	37.8 b,n
Mexico	0.1	0.1	0.1	0.1	0.1 b,n	0.1 b,n
Netherlands	37.7	39.0	46.8	53.9	52.7 b,n	53.8 b,n
New Zealand	5.3	3.1	5.5	10.2	8.5 b,n	9.2 b,n
Norway	13.6	16.3	19.7	21.4	24.2 b,n	24.2 b,n
Poland	0.2	0.3	0.1	0.2	0.2 b,n	0.3 b,n
Portugal	0.3	0.4	0.2	0.6	0.5 b,n	0.8 b,n
Slovak Republic[2]	0.1	0.2	0.4	0.8	0.6 b,n	0.8 b,n
Spain	1.8	1.9	2.2	2.8	3.0 b,n	2.8 b,n
Sweden	45.4	57.5	79.3	96.5	94.6 b,n	91.4 b,n
Switzerland	105.0	101.0	105.4	111.1	110.5 b,n	104.5 b,n
Turkey	0.0	0.0	0.0	0.1	0.1 b,n	0.1 b,n
United Kingdom	21.8	23.5	26.2	27.3	30.2 b,n	30.6 b,n
United States	40.3	40.5	46.2	54.1	54.0 b,n	53.1 b,k,n
Total OECD	**31.3** a	**31.4**	**32.2** a	**37.5**	**38.1** b,n	**37.8** b,k,n
EU-25	**-**	**-**	**25.8**	**29.7**	**30.4** b,n	**30.4** b,n
EU-15	**24.9** a	**26.4** a	**30.8**	**35.5**	**36.2** b,n	**36.2** b,n
China	0.0	0.0	0.0	0.0	0.1 b,n	0.1 b,n
Israel	21.1	23.3	28.5	48.8	56.7 b,n	54.5 b,n
Russian Federation	0.2	0.2	0.4	0.4	0.5 b,n	0.5 b,n

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. Patent filed at the EPO, the USPTO and the JPO.

2. 1992 instead of 1991.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/366528340153

Table 27. Science and engineering articles by country, 1988-2001

Per million inhabitants

	1988	1991	1995	1999	2000	2001
Australia	593	618	736	797	763	758
Austria	294	353	437	527	532	564
Belgium	362	416	519	580	560	582
Canada	798	817	836	768	743	727
Czech Republic[1]	265	279	193	231	239	256
Denmark	672	733	843	923	923	931
Finland	564	640	809	943	942	983
France	372	402	493	532	511	514
Germany[2]	477	412	467	531	529	530
Greece	121	153	194	249	265	304
Hungary	164	175	177	226	224	243
Iceland	276	403	591	491	548	610
Ireland	224	260	336	406	420	432
Italy	198	243	312	361	364	385
Japan	-	-	-	-	437	451
Korea	18	31	84	180	200	233
Mexico	11	13	21	30	30	32
Netherlands	581	671	798	800	783	786
New Zealand	620	598	665	760	784	742
Norway	521	564	678	701	711	721
Poland	106	102	117	134	138	147
Portugal	43	65	99	174	177	208
Slovak Republic	-	-	212	185	186	177
Spain	140	187	289	375	370	387
Sweden	898	945	1 052	1 143	1 106	1 159
Switzerland	797	886	1 040	1 158	1 173	1 117
Turkey	9	15	28	49	52	60
United Kingdom	641	696	794	837	844	807
United States	725	766	762	711	696	705
Total OECD	**468**	**454**	**447**	**466**	**461**	**468**
EU-25	**-**	**-**	**432**	**482**	**479**	**485**
EU-15	**389**	**416**	**499**	**555**	**550**	**556**
China[3]	-	5	8	13	14	16
Israel	-	985	1 068	994	1 004	1 007
Russian Federation[4]	-	-	135	118	126	110

1. Includes articles from the former Czechoslavakia before 1996.
2. Includes articles from the former East Germany before 1992.
3. Includes articles from the Hong Kong economy before 2000.
4. Includes articles from the former USSR.

Source: NSF, *Science and Engineering Indicators* 2004. Population from OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/871586367658

Table 28. Portfolio of S&E articles by field, 1988-2001

As a percentage of total publications

	All fields (total number)		Clinical medicine		Biomedical research		Biology		Chemistry		Physics		Earth & space sciences		Engineering & technology		Mathematics		Psychology		Social sciences		Other[1]	
	1988	2001	1988	2001	1988	2001	1988	2001	1988	2001	1988	2001	1988	2001	1988	2001	1988	2001	1988	2001	1988	2001	1988	2001
Australia	9 896	14 788	29.9	28.7	13.8	13.1	16.1	14.7	8.2	6.8	7.1	6.9	6.3	7.8	4.5	6.6	2.2	1.7	5.2	4.8	3.3	3.7	3.4	5.3
Austria	2 241	4 526	42.1	42.5	10.6	13.0	6.3	5.6	13.8	10.0	12.4	11.3	2.5	4.6	4.4	6.1	2.4	2.7	2.8	2.2	1.4	1.2	1.3	0.9
Belgium	3 586	5 984	38.4	32.9	17.1	14.6	5.4	8.0	10.4	11.0	11.9	12.5	3.0	4.5	5.5	7.8	2.3	2.1	2.8	2.7	1.7	2.0	1.6	2.0
Canada	21 391	22 626	25.9	29.3	14.3	15.2	14.6	10.3	8.1	7.8	8.0	6.6	5.8	7.3	8.1	7.9	2.3	1.9	4.6	4.7	4.4	4.4	3.9	4.6
Czech Republic[2]	2 746	2 622	16.5	14.5	13.9	16.0	4.6	7.7	29.0	22.9	14.5	16.2	3.6	4.5	5.3	8.2	1.5	3.9	7.9	3.1	2.9	1.5	0.4	1.3
Denmark	3 445	4 988	54.6	34.2	15.9	17.9	6.0	11.7	4.8	7.8	8.6	9.3	2.6	6.2	2.3	5.3	1.7	1.4	1.7	3.3	1.1	1.0	0.8	1.9
Finland	2 789	5 098	51.1	37.8	14.3	14.1	7.1	10.1	6.1	7.5	7.0	8.5	3.7	5.5	4.3	7.3	1.8	1.3	1.6	1.8	1.4	1.8	1.7	3.9
France	21 409	31 317	29.1	27.1	16.6	15.2	5.9	5.7	15.3	12.9	17.2	16.1	4.7	6.6	4.7	9.0	3.0	4.4	1.8	1.4	1.1	0.9	0.5	0.7
Germany[3]	25 666	43 623	29.0	30.9	15.4	14.1	6.2	5.2	15.7	12.7	16.5	16.3	3.3	5.0	6.7	8.5	2.2	2.2	1.8	1.8	2.3	2.0	1.0	1.3
Greece	1 239	3 329	20.4	31.3	8.1	8.1	9.3	9.2	14.7	12.5	16.3	14.1	7.9	6.3	14.7	11.4	4.3	3.0	2.4	2.1	0.6	0.5	1.1	1.5
Hungary	1 714	2 479	21.2	26.7	19.5	13.1	3.7	5.2	27.3	23.5	12.0	15.0	1.7	2.8	4.3	7.0	6.2	3.9	2.2	1.6	0.7	0.8	1.2	0.4
Iceland	69	174	45.0	31.9	12.3	10.2	6.2	16.2	0.0	3.3	3.4	4.6	17.6	16.2	2.2	2.9	2.2	2.1	1.5	5.8	3.6	3.9	6.1	3.0
Ireland	790	1 665	35.8	30.7	11.9	14.6	11.9	14.0	9.2	8.4	8.7	10.3	4.7	3.0	3.9	6.9	4.5	2.4	5.8	4.1	1.5	1.7	2.2	4.1
Italy	11 229	22 313	38.0	35.1	13.4	12.0	3.8	4.5	15.4	11.9	16.2	16.2	3.6	6.0	5.2	8.8	2.3	2.9	1.0	1.3	0.8	0.7	0.4	0.6
Japan	34 435	57 420	25.6	28.7	15.2	14.0	6.9	6.1	17.7	14.9	19.1	19.1	1.9	3.0	11.1	11.6	1.4	1.4	0.5	0.5	0.5	0.5	0.1	0.2
Korea	771	11 037	10.0	17.9	4.6	11.3	3.7	3.3	30.5	17.7	18.2	22.4	1.5	3.0	24.9	20.7	2.7	1.7	2.5	1.0	0.1	0.3	1.3	0.8
Mexico	884	3 209	24.5	18.7	14.9	12.0	15.7	14.8	11.1	10.5	15.7	21.2	6.5	7.6	4.0	7.7	3.4	2.1	2.7	1.7	1.2	1.5	0.5	2.3
Netherlands	8 581	12 602	36.6	37.5	15.5	14.2	8.2	6.0	10.8	8.6	11.9	8.8	4.1	5.5	4.3	6.4	1.5	1.4	2.7	3.9	2.7	3.6	1.6	4.0
New Zealand	2 075	2 903	28.4	25.9	10.1	10.5	28.6	23.6	6.1	5.7	4.6	4.2	6.1	9.3	3.8	5.2	1.5	1.8	3.2	4.4	4.6	4.4	2.9	5.0
Norway	2 192	3 252	40.3	33.4	13.8	12.7	12.8	12.9	8.0	6.3	4.9	5.0	6.4	10.1	4.4	6.2	2.1	2.3	3.9	4.4	2.2	3.1	1.2	3.7
Poland	4 030	5 686	12.4	13.2	9.3	8.6	5.3	4.8	27.1	26.7	28.4	26.5	1.9	4.1	9.1	11.0	4.4	3.9	1.0	0.5	0.6	0.3	0.7	0.5
Portugal	429	2 142	15.7	14.5	11.4	12.5	6.4	11.0	17.6	20.5	20.1	16.8	5.0	4.7	16.0	13.1	2.4	3.5	2.2	1.4	0.9	0.9	2.4	1.1
Slovak Republic	-	955	-	12.2	-	17.5	-	4.8	-	22.5	-	15.9	-	3.4	-	8.5	-	3.4	-	8.2	-	3.2	0.0	0.4
Spain	5 432	15 570	23.3	24.7	18.8	13.9	8.9	10.7	23.8	18.5	12.4	11.7	3.3	5.7	4.2	7.8	3.1	3.3	1.1	1.7	0.7	0.9	0.4	1.0
Sweden	7 573	10 314	48.2	36.7	17.2	15.5	6.9	7.4	7.5	8.3	7.5	10.5	3.2	4.4	3.9	8.1	1.2	1.2	1.8	1.9	1.2	1.7	1.4	4.2
Switzerland	5 316	8 107	36.3	32.7	18.5	16.1	4.1	5.8	11.9	12.8	16.5	13.4	2.7	6.4	4.2	6.6	1.6	1.4	1.7	2.1	1.7	1.4	0.9	1.3
Turkey	507	4 098	33.1	44.3	6.0	6.3	5.4	5.2	15.8	14.2	12.4	8.9	6.2	4.6	13.4	11.2	3.3	1.3	2.6	1.9	0.9	1.1	1.1	1.1
United Kingdom	36 509	47 660	36.6	32.8	14.8	14.2	7.4	6.2	9.9	8.5	9.1	9.0	4.0	5.9	6.3	7.4	1.5	1.6	4.5	5.7	2.4	3.0	3.7	5.7
United States	177 662	200 870	31.0	31.7	15.5	16.9	7.2	6.2	7.4	7.1	10.1	8.7	4.5	5.6	6.7	6.9	2.2	1.8	4.9	4.7	4.0	3.9	6.4	6.4
Total OECD	**398 238**	**551 402**	**31.1**	**30.7**	**15.2**	**15.0**	**7.7**	**6.8**	**10.8**	**10.3**	**12.0**	**11.9**	**4.1**	**5.4**	**6.7**	**8.2**	**2.1**	**2.0**	**3.7**	**3.3**	**2.8**	**2.6**	**3.8**	**3.8**
EU-25[4]	**143 034**	**138 116**	**21.2**	**10.6**	**14.2**	**7.0**	**5.2**	**3.3**	**24.2**	**26.7**	**16.9**	**32.6**	**2.8**	**4.9**	**6.2**	**8.9**	**3.6**	**3.8**	**3.4**	**0.9**	**1.4**	**0.5**	**0.9**	**0.7**
EU-15[4]	**134 544**	**137 368**	**34.8**	**28.2**	**14.3**	**12.7**	**7.2**	**7.6**	**13.4**	**14.3**	**12.7**	**12.6**	**3.8**	**5.1**	**6.2**	**10.0**	**2.4**	**2.9**	**2.3**	**3.0**	**1.4**	**1.3**	**1.4**	**2.4**
China	4 001	20 978	13.8	10.7	6.7	8.0	2.9	3.8	13.0	26.3	39.1	23.4	5.1	4.4	13.0	16.3	3.9	3.9	0.1	1.1	1.7	0.5	0.6	1.7
Israel	4 916	6 487	33.6	32.9	13.6	12.7	8.8	6.9	5.8	7.6	13.7	13.6	3.4	3.4	6.2	8.3	3.5	4.0	4.7	3.5	3.1	3.3	3.7	3.9
Russian Federation[5]	31 625	15 846	14.3	3.2	17.7	7.5	2.6	4.0	27.1	27.1	27.6	35.6	4.1	8.1	4.1	8.9	0.9	3.4	0.6	1.3	0.6	0.6	0.4	0.3

1. Other: Health sciences and professional fields.

2. Czechoslavakia instead of the Czech Republic in 1988.

3. Western Germany only in 1988.

4. Average for countries available.

5. Former USSR instead of Russian Federation in 1988.

Source: US National Science Foundation, *Science and Engineering Indicators* 2004.

StatLink: http://dx.doi.org/10.1787/581733703880

Table 29. Technology balance of payments, 1981-2002

Millions current USD

	Receipts						Payments						Balance					
	1981	1985	1991	1995	2001	2002	1981	1985	1991	1995	2001	2002	1981	1985	1991	1995	2001	2002
Australia[1,2,3]	14	68	200	128	-	-	142	188	370	344	-	-	- 129	- 120	- 170	- 215	-	-
Austria[4]	24 [k]	30 [k]	79 [k]	1 907	2 430 [-]	-	99 [k]	114 [k]	301 [k]	2 140	2 426 [-]	-	- 75	- 84	- 222	- 233	4	-
Belgium	622 [a]	694	1 945	3 758 [a]	5 709	-	727 [a]	800	2 380	3 080 [a]	4 641	-	- 105	- 106	- 435	677	1 068	-
Canada	157	399	929	1 283	2 034	-	416	550	928	1 008	1 051	-	- 259	- 151	1	275	983	-
Czech Republic	-	-	-	-	487	451	-	-	-	-	554	781	-	-	-	-	- 67	- 330
Denmark	107	184	-	-	-	-	71	161	-	-	-	-	36	23	-	-	-	-
Finland	5	4	54	58	1 303	1 468	87 [k]	107 [k]	311 [k]	390 [k]	1 060	1 231	- 82	- 102	- 257	- 332	243	237
France	906	894	1 742	2 170	3 196	-	991	1 064	2 451	2 988	2 695	-	- 85	- 170	- 709	- 818	501	-
Germany	934	1 171	6 282	10 633	14 306	15 756 [n]	1 479	1 650	7 979	13 170	20 942	21 295 [n]	- 545	- 479	-1 697	-2 537	-6 636	-5 539
Hungary[3]	-	-	-	181	-	-	-	-	-	215	-	-	-	-	-	- 35	-	-
Italy	198	144	1 410	3 051	2 684	2 978	570	546	2 366	3 437	3 440	2 993	- 372	- 402	- 956	- 386	- 756	- 15
Japan	794	982	2 751	5 976	10 259	-	1 177	1 229	2 930	4 165	4 512	-	- 383	- 247	- 179	1 811	5 747	-
Mexico	33	14	79	118	41	48 [n]	273	163	420	487	419	664 [n]	- 241	- 149	- 341	- 369	- 378	- 616
Netherlands	387	1 196	4 876	-	-	-	593	1 503	5 933	-	-	-	- 206	- 308	-1 057	-	-	-
New Zealand	-	-	21	20	-	-	-	-	15	8	-	-	-	-	5	12	-	-
Norway	44 [k]	28 [k]	348	496	1 382	1 379	76 [k]	77 [k]	438	928	1 246	1 189	- 33	- 48	- 90	- 431	136	190
Poland	-	-	-	231	177	-	-	-	-	234	795	-	-	-	-	- 3	- 618	-
Portugal	-	-	-	139	282	385	-	-	-	537	597	693	-	-	-	- 398	- 316	- 308
Slovak Republic	-	-	-	9 [q]	30 [n,q]	-	-	-	-	27 [q]	65 [n,q]	-	-	-	-	- 17	- 34	-
Spain	181	137	641	79	-	-	567	552	2 276	1 110	-	-	- 387	- 414	-1 635	-1 031	-	-
Sweden	68	87	217 [a]	-	-	-	64	49	116 [a]	-	-	-	4	38	102	-	-	-
Switzerland	-	870	1 941	2 778	3 233	4 334	-	233	745	1 262	3 251	4 250	-	637	1 196	1 516	- 18	84
United Kingdom	965	1 038	2 333	4 218	17 105 [n]	-	798	923	2 302	3 530	7 713 [n]	-	167	115	32	688	9 392	-
United States	7 284	6 678	17 819	30 289	41 098	44 142 [n]	650	1 170	4 035	6 919	16 713	19 258 [n]	6 634	5 508	13 784	23 370	24 385	24 884
Russian Federation	-	-	-	-	242	211	-	-	-	-	398	577	-	-	-	-	- 157	- 366

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1986 instead of 1985. 2. 1992 instead of 1991. 3. 1996 instead of 1995. 4. 2000 instead of 2001.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/525456707887

Table 30. Technology balance of payments, 1981-2002

Payments as a percentage of GERD

	1981	1985	1991	1995	2001	2002
Australia[1, 2, 3]	7.8	8.3	7.8	5.0	-	-
Austria[4]	12.8 [k]	13.7 [k]	12.1 [b,k]	58.5 [b]	68.5 [b]	-
Belgium[5]	53.2 [a]	59.5	72.5 [b]	64.9 [a]	94.0	-
Canada	11.3	10.9	9.9	10.1	7.4	-
Czech Republic	-	-	-	-	74.4	86.6
Denmark	11.4	22.2	-	-	-	-
Finland	14.4 [a,k]	12.6 [b,k]	12.4 [a,k]	13.2 [k]	25.6	27.1
France	8.6 [a]	9.0	8.5	8.3	9.2	-
Germany	8.8	9.7	17.9 [a]	23.9 [b]	45.0	42.5 [n]
Hungary[3]	-	-	-	73.3 [c]	-	-
Italy	16.0 [r]	11.4 [r]	16.6 [a]	31.3	28.3	-
Japan	4.3 [k]	3.3 [k]	2.9 [k]	2.7 [k]	3.5	-
Mexico	-	-	-	55.0	17.1	-
Netherlands	22.3	57.1	99.8	-	-	-
New Zealand	-	-	3.7	1.4	-	-
Norway	10.4 [k]	8.1 [k]	22.5	36.9 [a]	45.8	37.3
Poland	-	-	-	26.7 [a]	67.0	-
Portugal	-	-	-	88.1	64.3	61.2
Slovak Republic	-	-	-	14.8 [c,q]	48.5 [j,n,q]	-
Spain	71.9	60.4	49.3	23.4	-	-
Sweden	2.4 [a,j]	1.7 [j]	1.7 [a,j]	-	-	-
Switzerland[1, 2, 3, 4]	-	8.6 [a]	13.9	17.7	30.4 [-]	-
Turkey	-	-	-	-	-	-
United Kingdom	6.6 [a]	9.0 [a]	10.8	15.9	29.0 [n]	-
United States	0.9 [h]	1.0 [h]	2.5 [h]	3.8 [h]	6.1 [h]	7.0 [h,n]
Russian Federation	-	-	-	-	11.1	13.4

Times series notes:

(a) to (r): See standard statistical notes for science and technology indicators earlier in the Annex.

Year availability:

1. 1986 instead of 1985.
2. 1992 instead of 1991.
3. 1996 instead of 1995.
4. 2000 instead of 2001.
5. 1983 instead of 1981.

Source: OECD, MSTI database, May 2004.

StatLink: http://dx.doi.org/10.1787/507503146810

Table 31. Share of value added in total gross value added, 1991-2001

	(ISIC Rev.3)	Australia		Austria		Belgium		Canada		Czech Republic		Denmark		Finland		France		Germany		Greece		Iceland		Ireland	
		1991	2000	1991	2001	1992	2001	1991	2000	1992	2001	1991	1999	1991	2001	1991	2000	1991	2001	1991	2001	1991	2001	1991	1999
Total manufacturing	**(15-37)**	**13.5**	**12.0**	**21.6**	**20.6**	**20.1**	**18.7**	**15.8**	**19.9**	**29.1**	**27.5**	**17.0**	**16.3**	**19.6**	**24.5**	**19.9**	**18.1**	**27.4**	**22.4**	**14.8**	**11.9**	**15.9**	**-**	**26.6**	**33.7**
Food prod., beverages and tobacco	(15-16)	2.4	2.6 [1]	2.9	2.3	2.7	2.5	2.6	2.1	4.7	3.8 [1]	3.2	2.7	2.7	1.6	2.9	2.4	2.3	2.0	2.8	2.6	7.9	-	6.9	5.4
Textiles, textile prod., leather and footwear	(17-19)	0.8	0.6 [1]	1.4	0.8	1.4	1.0	0.8	0.8	3.6	1.6 [1]	0.8	0.5	0.8	0.4	1.3	0.8	1.0	0.5	4.1	1.9	0.6	-	1.2	0.5
Wood, pulp, paper, paper prod., printing & publishing	(20-22)	2.1	2.1 [1]	2.8	3.0	1.8	1.8	2.8	4.2	2.0	2.6 [1]	2.3	2.2	5.1	6.5	2.1	1.8	2.5	2.1	1.4	1.2	1.9	0.0	3.4	6.0
Chemical, rubber, plastics and fuel prod.	(23-25)	2.1	1.8 [1]	2.4	2.7	4.5	4.9	2.6	2.5	3.0	2.8 [1]	2.2	2.7	2.5	2.6	3.3	3.6	4.1	3.7	1.7	2.0	1.1	-	5.3	11.3
....Coke, refined petroleum prod. and nuclear fuel	(23)	0.4	0.2 [1]	0.3	0.8	0.5	0.6	0.4	0.3	0.5	0.2 [1]	0.0	0.0	0.6	0.4	0.6	0.8	0.2	0.4	0.5	0.9	-	-	0.0	0.0
....Chemicals and chemical prod.	(24)	1.1	1.0 [1]	1.3	1.1	3.3	3.6	1.5	1.4	1.6	1.4 [1]	1.4	1.8	1.3	1.4	1.8	2.0	2.7	2.2	0.8	0.7	0.6	-	4.5	10.7
........Chemicals excluding pharmaceuticals	(24ex2423)	-	-	0.9	0.8	2.6	-	1.2	1.1	-	1.2 [1]	0.7	0.7	1.0	1.1	1.3	1.3	2.2	1.7	0.6	-	-	-	3.7	8.4
........Pharmaceuticals	(2423)	-	-	0.5	0.4	0.7	-	0.4	0.3	-	0.2 [1]	0.7	1.1	0.3	0.3	0.5	0.7	0.5	0.5	0.2	-	-	-	0.8	2.3
....Rubber and plastics prod.	(25)	0.6	0.6 [1]	0.8	0.8	0.8	0.7	0.6	0.9	0.8	1.1 [1]	0.8	0.8	0.6	0.8	0.9	0.8	1.3	1.1	0.4	0.3	0.5	-	0.8	0.6
Other non-metallic mineral prod.	(26)	0.7	0.7 [1]	1.5	1.2	1.1	1.0	0.4	0.5	1.8	1.9 [1]	0.7	0.8	0.9	0.8	1.0	0.8	1.0	0.8	0.9	0.9	0.9	-	1.1	0.8
Basic metals and fabricated metal prod.	(27-28)	2.6	1.9 [1]	3.2	3.3	3.1	2.5	1.8	2.6	4.4	4.4 [1]	1.8	1.7	2.1	2.7	2.7	2.4	3.6	2.9	1.4	1.1	1.4	-	1.2	0.8
Machinery and equipment	(29-33)	1.4	1.3 [1]	5.1	4.9	2.9	2.7	2.1	2.9	5.4	5.7 [1]	4.1	4.1	4.0	8.5	3.9	3.5	8.4	6.3	0.9	0.9	0.8	-	5.9	7.8
....Machinery and equip., n.e.c.	(29)	0.7	0.6 [1]	2.5	2.3	1.3	1.2	0.9	1.3	3.6	2.7 [1]	2.5	2.3	2.4	2.8	1.6	1.3	4.0	3.4	0.3	0.4	-	-	1.1	0.8
....Electrical and optical equipment	(30-33)	0.7	0.7 [1]	2.6	2.5	1.6	1.5	1.2	1.6	1.9	3.0 [1]	1.6	1.8	1.6	5.7	2.3	2.2	4.4	3.0	0.5	0.5	-	-	4.8	7.0
........Office, accounting and computing machinery	(30)	-	-	0.0	0.1	-	-	0.1	0.1	0.0	0.1 [1]	0.1	0.1	0.1	0.0	0.3	0.2	0.6	0.2	0.0	0.0	-	-	2.3	3.0
........Electrical machinery and apparatus, nec	(31)	-	-	0.9	1.0	-	-	0.4	0.4	1.4	1.7 [1]	0.6	0.6	0.7	0.8	0.8	0.8	2.2	1.5	0.1	0.2	-	-	0.8	0.7
........Radio, television and communication equipment	(32)	-	-	1.2	1.1	-	-	0.7	1.1	0.2	0.6 [1]	0.4	0.5	0.5	4.3	0.5	0.6	0.7	0.4	0.3	0.2	-	-	0.6	2.1
........Medical, precision and optical instruments	(33)	-	-	0.4	0.4	-	-	-	-	0.2	0.6 [1]	0.5	0.6	0.3	0.6	0.7	0.6	0.9	0.9	0.1	0.0	-	-	1.1	1.2
Transport equipment	(34-35)	1.1	1.1 [1]	1.0	1.3	1.9	1.7	2.0	3.4	2.7	2.9 [1]	0.7	0.5	0.9	0.9	1.9	2.1	3.6	3.6	0.7	0.6	0.8	-	0.7	0.5
....Motor vehicles, trailers and semi-trailers	(34)	0.7	0.7 [1]	0.8	1.1	-	-	1.4	2.5	2.4	2.4 [1]	0.3	0.2	0.3	0.3	1.4	1.5	3.1	3.1	0.1	0.1	-	-	0.3	0.2
....Other transport equipment	(35)	0.3	0.4 [1]	0.2	0.2	-	-	0.6	0.9	0.3	0.5 [1]	0.4	0.2	0.6	0.6	0.5	0.6	0.5	0.5	0.6	0.5	-	-	0.4	0.3
........Building and repairing of ships and boats	(351)	-	-	0.0	0.0	-	-	0.1	0.1	-	0.0 [1]	0.4	0.2	0.4	0.4	0.1	0.1	0.1	0.1	-	-	-	-	0.1	0.0
........Aircraft and spacecraft	(353)	-	-	-	-	-	-	0.4	0.6	-	0.2 [1]	-	-	0.1	0.1	0.3	0.5	0.3	0.3	-	-	-	-	0.0	0.0
........Railroad equip. and transport equip. n.e.c.	(352+359)	-	-	0.2	0.2	-	-	0.1	0.2	-	0.3 [1]	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-	-	-	-	0.3	0.3
Manufacturing nec; recycling	(36-37)	0.5	0.4	1.2	1.1	0.7	0.6	0.6	0.9	1.3	1.3 [1]	1.2	1.0	0.7	0.6	0.9	0.7	0.8	0.6	1.0	0.8	0.7	-	1.0	0.7
Electricity, gas and water supply	(40-41)	3.6	2.5	2.8	2.2	2.9	2.6	3.3	2.8	6.3	4.0	2.3	2.2	2.3	1.8	2.4	2.0	2.3	1.9	2.6	1.8	3.5	-	2.4	1.3
Construction	(45)	6.1	5.7	7.3	7.4	5.5	4.9	6.3	5.0	6.9	7.1	4.8	5.3	7.5	5.7	6.0	4.6	5.9	4.8	7.5	8.3	8.8	-	5.4	6.6
Total services	**(50-99)**	**68.2**	**70.6**	**64.6**	**67.1**	**69.3**	**72.3**	**68.3**	**64.1**	**49.1**	**55.8**	**71.0**	**72.1**	**64.8**	**64.2**	**68.4**	**72.5**	**62.2**	**69.4**	**62.8**	**70.4**	**60.0**	**-**	**56.3**	**53.9**
Wholesale and retail trade; restaurants and hotels	**(50-55)**	13.6	13.3	17.7	16.6	14.9	13.4	14.0	13.3	14.2	17.0	14.6	14.5	12.3	11.4	13.7	12.8	11.9	12.0	18.5	20.7	14.8	-	14.7	12.2
Transport and storage and communication	**(60-64)**	9.0	8.4	7.8	7.1	6.9	6.9	7.3	6.8	6.1	8.2	7.5	7.6	9.4	10.5	6.4	6.3	5.8	6.2	6.6	8.4	7.2	-	5.9	5.5
Transport and storage	(60-63)	5.9	5.3	5.4	4.8	-	-	4.2	4.1	4.7	-	5.5	5.3	7.1	7.1	4.1	4.2	3.5	3.8	-	5.2	5.7	-	3.4	-
Post and telecommunications	(64)	3.0	3.2	2.5	2.2	-	-	3.1	2.7	1.5	-	2.1	2.3	2.3	3.4	2.3	2.1	2.4	2.4	-	3.2	1.5	-	2.5	-
Finance, insurance, real estate and business services	**(65-74)**	25.9	29.3	18.4	23.5	24.6	28.0	23.9	24.7	17.2	15.7	22.8	23.2	18.0	21.0	27.1	30.4	24.2	29.8	19.5	21.2	17.2	-	15.8	20.0
Financial intermediation	(65-67)	6.5	7.4	6.8	6.6	6.2	5.3	6.3	7.1	6.6	3.6	4.8	5.0	4.3	3.8	5.0	5.1	5.0	3.8	-	5.7	5.3	-	3.3	4.5
Real estate, renting and business activities	(70-74)	19.4	21.9	11.6	16.8	18.4	22.7	17.6	17.6	10.5	12.1	18.0	18.2	13.7	17.2	22.1	25.3	19.2	26.0	-	15.5	11.9	-	12.5	15.5
....Real estate activities	(70)	9.9	9.8	6.6	8.3	-	-	12.2	10.8	4.6	-	11.1	10.7	9.1	10.4	11.0	11.9	9.3	12.4	-	12.2	7.9	-	-	-
....Renting of m&eq and other business activities	(71-74)	9.6	12.1	5.0	8.5	-	-	5.4	6.8	5.9	-	6.9	7.5	4.6	6.8	11.1	13.4	9.9	13.6	-	3.3	4.0	-	-	-
........Other business activities	(74)	-	-	3.6	5.6	-	-	-	-	4.3	-	5.0	5.4	2.9	4.2	7.3	9.2	7.3	9.5	-	2.7	-	-	-	-
Community social and personal services	**(75-99)**	19.7	19.6	20.7	20.0	23.0	24.1	23.1	19.3	11.6	15.0	26.0	26.7	25.1	21.2	21.2	23.1	20.3	21.4	18.2	20.2	20.8	-	19.9	16.1
High technology manufactures		0.8	0.9 [1]	2.1	1.9	-	-	1.6	2.1	0.4	1.7 [1]	1.7	2.3	1.3	5.2	2.3	2.5	2.9	2.3	-	-	-	-	4.8	8.6
Medium-high technology manufactures		2.7	2.3 [1]	5.3	5.4	-	-	4.0	5.5	7.4	8.3 [1]	4.1	3.9	4.5	5.1	5.1	5.0	11.6	9.7	-	-	-	-	6.1	10.4
Medium-low technology manufactures		4.3	3.6 [1]	5.8	6.1	-	-	3.5	4.3	7.6	7.7 [1]	3.7	3.6	4.5	5.0	5.3	4.9	6.2	5.2	3.5	-	-	-	3.1	2.2
Low technology manufactures		5.7	5.6	8.3	7.2	6.6	5.9	6.8	8.0	11.7	9.2 [1]	7.6	6.5	9.3	9.2	7.1	5.7	6.6	5.2	9.3	6.4	11.0	-	12.5	12.5
High and medium-high technology manufactures		3.6	3.3 [1]	7.4	7.3	8.0	8.0	5.6	7.7	9.8	10.0 [1]	6.2	6.4	6.2	10.8	7.6	7.6	14.6	12.1	2.4	2.2	2.1	-	11.0	19.0

1. Intensity of the previous year.

2. 1998 instead of 1995.

3. EU includes the 15 EU Members before 1 May 2004 excluding Austria, Greece, Luxembourg, Portugal (for which no Anberd data are available).

4. OECD includes previous EU countries and Canada, Japan, and the United States.

Source: OECD, STAN Indicators 2004.

StatLink: http://dx.doi.org/10.1787/005860125823

Table 31. Share of value added in total gross value added, 1991-2001 (cont'd)

	(ISIC Rev.3)	Italy		Japan		Korea		Netherlands		Norway		Poland		Spain		Sweden		United Kingdom		Unites States		EU[3]		OECD[4]	
		1991	2001	1991	2001	1995	2001	1991	2000	1991	1998	1994	2001	1991	2001	1991	2001	1991	2001	1991	2000	1992	1999	1991	1999
Total manufacturing	**(15-37)**	**22.5**	**20.1**	**25.8**	**20.1**	**29.2**	**30.3**	**18.2**	**16.0**	**12.1**	**13.0**	**21.7**	**17.9**	**19.9**	**17.4**	**18.9**	**20.6**	**21.0**	**16.5**	**17.4**	**15.5**	**21.8**	**20.1**	**21.0**	**18.7**
Food prod., beverages and tobacco	(15-16)	2.4	2.0	2.5	2.4	3.0	3.4	3.2	3.0	2.1	1.9	3.5	3.8 [1]	3.4	2.5	1.8	1.7	3.1	2.3	1.9	1.5	2.7	2.4	2.4	2.1
Textiles, textile prod., leather and footwear	(17-19)	3.4	2.9	1.3	0.6	2.1	1.4	0.6	0.4	0.3	0.2	2.6	1.5 [1]	1.9	1.3	0.3	0.3	1.3	0.7	0.9	0.5	1.6	1.2	1.3	0.8
Wood, pulp, paper, paper prod., printing & publishing	(20-22)	2.1	2.0	2.3	1.9	1.7	1.4	2.5	2.3	2.5	2.5	2.3	2.5 [1]	2.1	1.9	4.0	4.4	2.8	2.5	2.5	2.1	2.4	2.3	2.4	2.3
Chemical, rubber, plastics and fuel prod.	(23-25)	2.9	2.7	3.4	3.3	5.7	7.5	3.6	3.2	1.5	1.5	3.4	3.1 [1]	3.1	3.0	2.4	3.2	3.8	2.8	3.0	2.7	3.3	3.2	3.2	3.1
….Coke, refined petroleum prod. and nuclear fuel	(23)	0.5	0.2	1.0	1.3	1.8	3.4	0.5	0.4	-	-	0.7	0.6 [1]	0.6	0.5	0.3	0.2	0.5	0.3	0.5	0.4	-	0.3	-	0.5
….Chemicals and chemical prod.	(24)	1.7	1.6	2.0	1.7	2.9	2.9	2.5	2.3	-	-	1.7	1.4 [1]	1.7	1.6	1.6	2.4	2.2	1.7	1.9	1.7	2.0	2.0	2.0	1.9
……..Chemicals excluding pharmaceuticals	(24ex2423)	1.0	0.9	1.4	1.0	2.0	1.9	2.2	1.9	-	-	-	1.1 [1]	1.1	1.1	0.9	0.9	1.6	1.0	1.4	1.1	1.4	1.3	1.4	1.2
……..Pharmaceuticals	(2423)	0.6	0.7	0.6	0.7	0.9	1.0	0.3	0.4	0.2	0.2	-	0.3 [1]	0.6	0.5	0.7	1.5	0.7	0.7	0.5	0.7	0.6	0.6	0.6	0.6
….Rubber and plastics prod.	(25)	0.8	0.8	0.3	0.2	1.0	1.1	0.6	0.5	0.3	0.3	1.0	1.0 [1]	0.8	0.8	0.5	0.6	1.0	0.9	0.6	0.6	-	0.9	-	0.7
Other non-metallic mineral prod.	(26)	1.4	1.4	0.9	0.7	1.3	1.0	0.7	0.7	0.5	0.5	1.4	1.4 [1]	1.5	1.4	0.6	0.5	0.7	0.5	0.4	0.4	1.1	1.0	0.8	0.7
Basic metals and fabricated metal prod.	(27-28)	3.1	2.7	3.6	2.3	3.8	3.4	2.3	1.8	1.5	1.9	2.6	2.2 [1]	2.2	2.3	2.5	2.8	2.4	1.7	1.8	1.6	2.7	2.5	2.6	2.2
Machinery and equipment	(29-33)	4.8	4.3	7.7	5.5	7.0	6.3	3.2	2.8	1.9	2.3	3.3	3.1 [1]	2.8	2.5	4.4	4.2	4.3	3.4	4.5	4.1	5.0	4.6	5.3	4.6
….Machinery and equip., n.e.c.	(29)	2.5	2.4	3.0	1.9	1.8	1.7	1.3	1.3	1.0	1.2	1.9	1.5 [1]	1.3	1.2	2.4	2.7	1.7	1.3	1.5	1.2	2.3	2.1	2.1	1.6
….Electrical and optical equipment	(30-33)	2.3	1.9	4.8	3.6	5.2	4.6	1.9	1.5	0.9	1.1	1.4	1.6 [1]	1.6	1.2	1.9	1.5	2.5	2.1	3.0	2.8	2.6	2.5	3.2	2.9
……..Office, accounting and computing machinery	(30)	0.1	0.1	0.7	0.5	0.3	0.8	0.1	0.1	0.0	0.0	0.1	0.1 [1]	0.2	0.1	0.2	0.2	0.5	0.3	0.5	0.3	0.3	0.2	0.5	0.4
……..Electrical machinery and apparatus, nec	(31)	1.0	0.9	1.3	1.0	0.7	0.4	0.4	0.2	0.5	0.5	0.7	0.7 [1]	0.7	0.6	0.5	0.8	0.8	0.6	0.6	0.4	1.2	1.0	0.9	0.7
……..Radio, television and communication equipment	(32)	0.6	0.5	2.3	1.8	3.9	2.8	0.9	0.8	0.2	0.2	0.4	0.3 [1]	0.4	0.2	0.7	-0.1	0.6	0.6	1.1	1.4	0.6	0.7	1.1	1.3
……..Medical, precision and optical instruments	(33)	0.5	0.4	0.5	0.3	0.3	0.6	-	-	0.2	0.3	0.3	0.4 [1]	0.3	0.2	0.5	0.7	0.7	0.6	0.9	0.6	0.6	0.6	0.7	0.5
Transport equipment	(34-35)	1.3	1.3	2.4	2.3	3.9	5.5	0.8	0.8	1.5	1.8	1.6	1.3 [1]	2.0	1.8	2.3	2.9	2.1	1.8	1.8	1.9	2.1	2.2	2.1	2.2
….Motor vehicles, trailers and semi-trailers	(34)	0.8	0.7	2.2	2.0	3.1	3.4	0.3	0.4	0.1	0.2	0.7	0.7 [1]	1.6	1.5	1.6	2.3	1.1	0.9	0.8	1.2	1.6	1.6	1.4	1.6
….Other transport equipment	(35)	0.5	0.6	0.2	0.3	0.8	2.2	0.5	0.4	1.4	1.6	0.9	0.6 [1]	0.4	0.3	0.7	0.6	1.0	0.9	1.0	0.7	0.5	0.6	0.7	0.6
……..Building and repairing of ships and boats	(351)	0.1	0.2	0.1	0.1	0.7	-	-	0.2	1.2	1.6	-	0.3 [1]	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
……..Aircraft and spacecraft	(353)	0.2	0.3	0.1	0.1	0.1	-	-	0.1	0.1	0.0	-	0.1 [1]	0.1	0.1	0.4	0.3	0.8	0.6	0.9	0.5	0.3	0.3	0.5	0.4
……..Railroad equip. and transport equip. n.e.c.	(352+359)	0.1	0.2	0.1	0.1	0.1	-	-	0.1	0.1	0.0	-	0.1 [1]	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Manufacturing nec; recycling	(36-37)	1.1	1.0	1.6	1.1	0.6	0.4	1.2	1.1	0.4	0.5	1.0	1.0 [1]	0.9	0.8	0.5	0.6	0.6	0.7	0.6	0.6	0.8	0.8	0.9	0.8
Electricity, gas and water supply	(40-41)	2.2	2.3	3.1	3.7	2.1	2.8	2.0	1.5	3.4	2.6	3.8	3.7	3.3	2.1	3.3	2.7	2.7	1.8	2.9	2.2	2.5	2.2	2.8	2.5
Construction	(45)	6.2	4.9	9.3	6.9	11.2	8.3	5.8	5.8	4.1	5.1	7.3	7.2	8.7	8.7	6.6	4.4	5.9	5.5	3.9	4.7	6.3	5.4	6.0	5.4
Total services	**(50-99)**	**65.2**	**69.5**	**59.3**	**67.9**	**51.0**	**53.9**	**66.1**	**71.4**	**63.7**	**64.6**	**56.1**	**65.0**	**62.4**	**67.9**	**68.0**	**70.2**	**66.0**	**72.8**	**72.1**	**76.2**	**66.0**	**69.4**	**66.6**	**70.8**
Wholesale and retail trade; restaurants and hotels	**(50-55)**	17.0	16.6	13.6	13.2	10.2 #	12.2	15.4	15.2	12.3	11.8 [1]	20.5	21.8	18.0	19.0	12.0	12.1	14.0	15.1	17.3	18.3	14.3	14.5	15.4	15.8
Transport and storage and communication	**(60-64)**	7.1	7.4	6.5	6.2	7.0 #	6.6	7.0	7.3	11.4	9.6 [1]	7.5	7.3	7.2	8.7	8.7	8.2	8.1	7.9	6.5	6.7	6.9	7.0	6.7	6.8
Transport and storage	(60-63)	5.3	5.0	5.0	4.5	4.6 #	4.3	5.0	4.8	9.1	7.4 [1]	-	-	5.2	-	6.4	5.6	5.0	4.7	3.1	3.2	4.5	-	4.0	-
Post and telecommunications	(64)	1.8	2.3	1.5	1.7	2.4 #	2.3	2.0	2.6	2.3	2.2 [1]	-	-	2.0	-	2.3	2.6	3.1	3.1	3.4	3.5	2.4	-	2.6	-
Finance, insurance, real estate and business services	**(65-74)**	21.2	26.0	21.2	26.9	19.3 #	19.0	20.3	26.4	18.3	17.5 [1]	9.1	15.3	18.1	20.0	21.8	25.0	22.2	27.9	25.3	30.0	23.5	26.4	23.4	27.2
Financial intermediation	(65-67)	6.1	5.9	5.1	6.3	6.8 #	6.9	4.8	6.3	5.1	4.0 [1]	1.1	2.2	6.3	5.8	4.9	3.6	5.4	5.3	6.4	8.7	5.5	5.1	5.8	6.6
Real estate, renting and business activities	(70-74)	15.1	20.1	16.1	20.6	12.5 #	12.2	15.5	20.0	13.2	13.5 [1]	8.0	13.1	11.8	14.2	17.0	21.4	16.8	22.7	18.9	21.3	18.0	21.3	17.6	20.5
….Real estate activities	(70)	-	10.8	10.3	12.8	8.5 #	8.5	7.3	8.0	8.7	7.7 [1]	-	-	7.4	-	11.0	10.7	-	9.5	11.5	11.4	-	-	-	-
….Renting of m&eq and other business activities	(71-74)	-	9.4	5.8	7.7	4.0 #	3.7	8.2	12.0	4.5	5.8 [1]	-	-	4.4	-	6.0	10.6	-	13.1	7.4	9.9	-	-	-	-
……..Other business activities	(74)	-	7.5	-	-	- #	-	6.2	8.7	3.3	4.1 [1]	-	-	-	-	-	7.4	-	9.1	-	-	-	-	-	-
Community social and personal services	**(75-99)**	19.8	19.5	18.0	21.6	15.3 #	16.1	23.4	22.5	21.7	21.5 [1]	19.0	20.6	19.1	20.2	25.5	24.9	21.7	21.8	23.0	21.3	21.3	21.6	21.1	21.1
High technology manufactures		2.1	2.0	4.2	3.4	5.4	-	2.1	1.8	0.8	0.9	-	1.4 [1]	1.6	1.2	2.5	2.5	3.2	2.8	3.8	3.6	2.3	2.4	3.3	3.2
Medium-high technology manufactures		5.6	5.1	7.9	6.0	7.7	-	4.3	3.9	-	-	-	4.1 [1]	4.8	4.5	5.7	6.9	5.3	3.9	4.3	4.0	6.6	6.2	5.9	5.3
Medium-low technology manufactures		5.9	5.3	6.0	4.7	8.6	-	4.2	3.6	-	-	-	5.6 [1]	5.3	5.2	4.0	4.2	4.7	3.5	3.4	3.1	5.2	4.8	4.7	4.2
Low technology manufactures		8.9	7.8	7.7	6.0	7.5	6.6	7.6	6.7	5.2	5.1	9.4	8.8 [1]	8.3	6.5	6.6	7.0	7.8	6.2	5.9	4.8	7.6	6.7	7.0	6.0
High and medium-high technology manufactures		7.8	7.2	12.2	9.5	13.8	14.8	6.6	5.9	-	-	6.6	5.8 [1]	6.5	5.9	8.3	9.5	8.6	6.9	8.2	7.7	9.1	8.7	9.4	8.7

1. Intensity of the previous year.

2. 1998 instead of 1995.

3. EU includes the 15 EU Members before 1 May 2004 excluding Austria, Greece, Luxembourg, Portugal (for which no Anberd data are available).

4. OECD includes previous EU countries and Canada, Japan, and the United States.

Source: OECD, STAN Indicators 2004.

Table 32. Trade-to-GDP ratio for goods and services, 1991-2003[1]

Average imports and exports, as a percentage of nominal GDP, and average annual growth rates (%)

	Goods							Services							Goods and services						
	Trade-to-GDP ratio				Average growth			Trade-to-GDP ratio				Average growth			Trade-to-GDP ratio				Average growth		
	1991	1995	2001	2003	1991-2003	1991-2001	2001-03	1991	1995	2001	2003	1991-2003	1991-2001	2001-03	1991	1995	2001	2003	1991-2003	1991-2001	2001-03
Australia[2]	13.1	15.3	17.0	16.6	2.1	2.6	-2.4	4.0	4.6	4.5	4.3	0.8	1.3	-4.5	17.1	19.9	21.6	20.9	1.8	2.3	-2.9
Austria	26.7	25.8	35.4	34.7	2.2	2.8	-1.0	12.1	11.4	17.0	16.3	2.5	3.4	-1.9	38.8	37.2	52.4	51.0	2.3	3.0	-1.3
Belgium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	68.2	66.9	84.2	80.9	1.4	2.1	-2.0
Canada	21.4	31.0	35.3	30.9	3.1	5.0	-6.7	4.3	5.1	5.9	5.5	2.0	3.1	-3.9	25.7	36.1	41.2	36.4	2.9	4.7	-6.3
Czech Republic	41.3	44.0	61.0	58.4	2.9	3.9	-2.3	8.0	12.0	11.1	8.8	0.8	3.3	-11.3	49.3	56.0	72.1	67.2	2.6	3.8	-3.5
Denmark	26.6	26.4	29.4	28.3	0.5	1.0	-1.8	7.7	7.0	12.1	11.7	3.5	4.5	-1.5	34.3	33.4	41.4	40.0	1.3	1.9	-1.7
Finland	17.7	26.4	30.2	28.7	4.0	5.4	-2.6	4.7	6.4	5.5	5.3	0.9	1.6	-2.4	22.4	32.8	35.7	34.0	3.5	4.7	-2.6
France	18.0	18.1	22.5	20.8	1.2	2.2	-4.0	3.7	3.7	4.6	4.4	1.5	2.3	-2.5	21.7	21.8	27.1	25.2	1.2	2.2	-3.7
Germany	22.3	20.0	28.3	28.0	1.9	2.4	-0.5	4.1	4.1	5.9	5.9	3.0	3.6	0.1	26.4	24.2	34.2	34.0	2.1	2.6	-0.4
Greece	17.8	16.5	17.9	16.7	-0.5	0.1	-3.5	4.3	4.7	10.1	7.7	4.8	8.5	-13.9	22.1	21.3	28.0	24.4	0.8	2.4	-7.0
Hungary	-	34.5	62.1	54.3	5.7	9.8	-6.7	-	10.1	11.4	9.7	-0.5	2.0	-7.9	41.8	44.6	73.5	64.1	3.6	5.6	-6.9
Iceland	23.6	24.8	26.8	23.5	0.0	1.3	-6.6	8.9	9.7	14.2	13.5	3.5	4.7	-2.7	32.5	34.5	41.0	37.0	1.1	2.3	-5.2
Ireland	45.0	57.9	63.4	47.2	0.4	3.4	-14.7	10.4	12.9	27.6	28.7	8.4	9.7	2.1	55.4	70.8	90.9	75.9	2.6	5.0	-9.0
Italy	14.7	19.4	21.6	19.5	2.3	3.9	-5.2	3.9	5.6	6.1	5.7	3.2	4.5	-3.4	18.6	25.0	27.7	25.1	2.5	4.0	-4.8
Japan[3]	7.5	6.9	8.4	8.8	1.4	1.1	4.6	1.7	1.5	1.7	1.8	0.6	0.2	5.5	9.2	8.4	10.1	11.0	1.5	1.0	4.4
Korea	23.7	24.5	29.9	30.7	2.2	2.3	1.3	3.7	4.9	6.7	6.2	4.3	6.0	-4.4	27.4	29.4	36.7	36.9	2.5	2.9	0.3
Luxembourg	62.4	53.3	53.5	46.8	-2.4	-1.5	-6.7	40.3	49.6	90.9	81.3	5.8	8.1	-5.6	102.7	103.0	144.4	128.1	1.8	3.4	-6.0
Mexico[2]	14.7	25.7	26.3	25.5	5.0	5.8	-3.1	3.1	3.4	2.4	2.3	-2.7	-2.7	-3.4	17.8	29.1	28.6	27.8	4.0	4.7	-3.2
Netherlands	43.5	44.9	51.1	48.4	0.7	1.6	-3.7	9.2	9.5	11.5	11.8	1.9	2.2	0.4	52.7	54.5	62.6	59.0	0.9	1.7	-2.9
New Zealand[2]	20.8	21.3	25.4	23.4	1.1	2.0	-8.3	7.2	7.6	8.4	8.2	1.2	1.5	-2.2	27.9	28.9	33.7	31.5	1.1	1.9	-6.7
Norway	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36.0	34.9	37.2	34.5	-0.3	0.3	-3.7
Poland[3]	19.8	19.5	24.5	26.3	2.6	2.1	7.1	3.1	3.1	5.0	5.0	4.3	4.8	-0.5	22.9	22.6	29.5	35.7	3.7	2.5	9.5
Portugal[3]	-	27.4	29.6	28.0	0.3	1.3	-5.7	-	5.9	6.1	5.9	0.1	0.6	-2.5	33.6	33.3	35.7	33.4	0.0	0.6	-3.2
Slovak Republic	-	45.4	66.2	68.6	4.3	4.9	1.8	-	11.6	11.3	10.2	-3.3	-2.8	-5.2	46.1	57.0	77.5	78.8	4.5	5.2	0.9
Spain	13.8	17.5	23.1	21.7	3.8	5.2	-3.0	4.2	5.2	7.7	7.1	4.4	6.0	-3.8	18.0	22.7	30.7	28.8	4.0	5.4	-3.2
Sweden	20.8	29.1	32.1	30.5	3.2	4.3	-2.6	5.8	6.8	10.6	9.9	4.5	6.0	-3.3	26.6	35.9	42.7	40.4	3.5	4.7	-2.8
Switzerland[2]	27.1	26.0	33.7	31.4	1.2	2.2	-4.0	6.5	6.8	9.3	9.3	3.1	3.5	1.1	33.6	32.9	43.0	40.6	1.6	2.5	-2.9
Turkey	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15.2	22.1	32.5	29.0	5.4	7.6	-5.7
United Kingdom	18.6	22.2	21.2	19.2	0.3	1.3	-4.9	5.1	6.4	7.6	7.4	3.1	3.9	-1.1	23.7	28.5	28.7	26.6	1.0	1.9	-3.9
United States[2]	7.8	9.1	9.5	9.1	1.4	2.0	-4.3	2.5	2.6	2.7	2.6	0.5	0.7	-1.0	10.3	11.7	12.1	11.7	1.2	1.7	-3.6
Total OECD[2, 4]	**13.4**	**14.7**	**16.8**	**16.5**	**1.9**	**2.3**	**-1.7**	**3.3**	**3.6**	**4.3**	**4.4**	**2.5**	**2.6**	**1.4**	**18.0**	**19.4**	**22.3**	**22.1**	**1.9**	**2.1**	**-0.9**
EU-15[2, 4]	**19.4**	**21.3**	**25.7**	**24.7**	**1.6**	**2.7**	**-3.9**	**4.6**	**5.3**	**7.3**	**7.3**	**4.1**	**4.6**	**-0.4**	**26.3**	**28.8**	**35.5**	**34.3**	**1.9**	**2.8**	**-2.7**
EU-25[2, 4]	**19.4**	**21.6**	**26.3**	**25.3**	**1.8**	**3.1**	**-4.7**	**4.6**	**5.3**	**7.3**	**7.3**	**4.2**	**4.6**	**-0.6**	**26.4**	**29.0**	**35.9**	**34.9**	**2.2**	**3.1**	**-2.4**

1. Or nearest years available. 2. 2002 instead of 2003. 3. 2002 instead of 2003 for Goods and for Services. 4. Aggregates of countries for which data are available.

Source: OECD, National Accounts database, November 2004.

StatLink: http://dx.doi.org/10.1787/534761537201

Table 33. Export ratio by industry and technology level, 1992-2002

Exports as a percentage of production

	(ISIC Rev.3)	Australia		Austria		Belgium		Canada		Czech Rep.		Denmark		Finland		France		Germany		Greece	
		1992	1999	1992	2002	1992	2002	1992	2000	1993	2001	1992	2002	1992	2002	1992	2002	1992	2001	1995	2002
Total manufacturing	**(15-37)**	**17**	**21**	**45**	**67**	**46**	**115**	**42**	**53**	**33**	**53**	**57**	**70**	**38**	**48**	**29**	**38**	**32**	**47**	**20**	**22**
High technology manufactures		**31**	**41**	**56**	**107** [1]	**-**	**155** [2]	**57**	**84**	**76**	**68** [1]	**101**	**130**	**59**	**-**	**42**	**62** [1]	**54**	**101**	**26**	**-**
Pharmaceuticals	(2423)	16	26	58	111 [1]	59	135 [2]	10	25	-	67 [1]	85	101	36	-	24	53 [1]	46	90	11	-
Office, accounting and computing machinery	(30)	99	116	1,044	208	-	2,804 [2]	117	120	180	114 [1]	206	406	69	310	62	102 [1]	46	117	156	895
Radio, television and communication equip.	(32)	16	25	32	90	-	110 [2]	40	69	72	73 [1]	95	185	62	58	39	66 [1]	51	108	20	38
Medical, precision and optical instruments	(33)	42	67	71	102	-	232 [2]	-	-	29	42 [1]	102	96	71	62	29	45 [1]	47	74	50	68
Aircraft and spacecraft	(353)	42	40	-	- [1]	-	78 [2]	74	87	-	38 [1]	-	-	9	-	68	66 [1]	100	142	-	-
Medium-high technology manufactures		**14**	**20**	**73**	**92** [1]	**-**	**129** [2]	**62**	**72**	**63**	**69** [1]	**75**	**86**	**50**	**-**	**41**	**51** [1]	**42**	**54**	**24**	**-**
Chemicals excluding pharmaceuticals	(24ex2423)	13	18	54	79 [1]	56	118 [2]	38	53	-	59 [1]	63	90	38	-	47	61 [1]	46	60	21	-
Machinery and equipment, nec	(29)	19	26	71	81	-	160 [2]	47	67	43	80 [1]	76	77	46	48	39	55 [1]	43	57	23	38
Electrical machinery and apparatus, nec	(31)	14	25	81	90	-	97 [2]	41	66	31	71 [1]	58	77	49	77	37	53 [1]	24	38	29	42
Motor vehicles, trailers and semi-trailers	(34)	11	17	96	123	-	141 [2]	81	81	56	66 [1]	113	156	137	165	40	44	48	55	36	33
Railroad equip. and transport equip. nec	(352+359)	5	5	32	68 [1]	-	89 [2]	32	34	-	60 [1]	118	165	9	-	39	36 [1]	42	38	-	-
Medium-low technology manufactures		**21**	**23**	**40**	**44** [1]	**-**	**66** [2]	**33**	**35**	**31**	**46** [1]	**43**	**41**	**34**	**41**	**21**	**24** [1]	**22**	**31**	**23**	**-**
Coke, refined petroleum prod. and nuclear fuel	(23)	17	26	6	13	34	55	21	25	12	23 [1]	42	28	30	38	14	15	15	21	22	18
Rubber and plastics prod.	(25)	5	7	68	66	46	102	27	40	31	58 [1]	54	58	34	38	26	31 [1]	26	39	18	31
Other non-metallic mineral prod.	(26)	3	4	26	28	30	52	18	28	48	50 [1]	32	28	18	26	16	19	15	23	22	11
Basic metals	(27)	47	46	56	65	47	90 [2]	60	53	32	44 [1]	54	67	47	58	42	45 [1]	36	47	37	35
Fabricated metal prod., except mach. & equip.	(28)	5	4	37	40	21	42 [2]	15	24	34	48 [1]	35	34	22	19	12	14 [1]	15	22	12	16
Building and repairing of ships and boats	(351)	19	49	58	394 [1]	-	38 [2]	15	51	-	90 [1]	54	60	44	75	24	49 [1]	46	66	-	-
Low technology manufactures		**14**	**16**	**29**	**48**	**39**	**83**	**29**	**38**	**24**	**34** [1]	**48**	**59**	**32**	**41**	**20**	**26** [1]	**20**	**27**	**18**	**18**
Food prod., beverages and tobacco	(15-16)	19	22	8	27	30	56	14	21	14	13 [1]	51	59	5	10	20	23	13	18	15	13
Textiles, textile prod., leather and footwear	(17-19)	20	26	64	95	58	153	13	35	42	71 [1]	82	193	38	54	31	52	49	77	32	38
Wood and prod. of wood and cork	(20)	8	10	35	47	30	65	60	58	27	38 [1]	42	43	48	45	12	18 [1]	9	18	6	5
Pulp, paper, paper prod., printing & publishing	(21-22)	3	4	41	50	24	49	45	44	21	37 [1]	18	22	51	54	13	17 [1]	16	23	7	6
Manufacturing nec; recycling	(36-37)	9	12	32	60	70	186	25	51	37	53 [1]	61	59	23	26	19	26 [1]	25	37	6	8

1. Intensity of the previous year.

2. 2000 instead of 2002.

3. EU includes the 15 EU Members before 1 May 2004 excluding Belgium, Greece, Luxembourg, Netherlands.

4. OECD includes previous EU countries and Australia, Canada, Japan, Norway and the United States.

Source: OECD, STAN Indicators 2004.

StatLink: http://dx.doi.org/10.1787/442804674716

Table 33. Export ratio by industry and technology level, 1992-2002 (cont'd)

Exports as a percentage of production

	(ISIC Rev.3)	Hungary		Iceland		Ireland		Italy		Japan		Korea		Mexico		Netherlands		New Zealand		Norway	
		1992	2002	1992	2000	1992	1999	1992	2002	1992	2002	1994	2001	1992	2001	1992	2002	1992	1998	1992	2002
Total manufacturing	**(15-37)**	**39**	**63**	**50**	**54**	**70**	**84**	**23**	**34**	**13**	**18**	**23**	**31**	**19**	**42**	**64**	**82**	**36**	**40**	**37**	**40**
High technology manufactures		**-**	**94** [1]	**-**	**36** [1]	**123**	**120**	**31**	**56** [1]	**27**	**30** [1]	**39**	**-**	**-**	**84**	**93**	**223** [1]	**-**	**-**	**67**	**78** [1]
Pharmaceuticals	(2423)	-	48 [1]	-	15 [1]	248	168	15	50 [1]	4	6 [1]	4	6	8	15	61	101 [1]	-	-	64	62 [1]
Office, accounting and computing machinery	(30)	35	108 [1]	-	187 [1]	106	106	76	83 [1]	34	33 [1]	59	53	89	141	392	1,625 [1]	-	-	179	259 [1]
Radio, television and communication equip.	(32)	67	98 [1]	-	8 [1]	103	124	26	51 [1]	27	28 [1]	44	58	76	68	46	84 [1]	-	-	57	64 [1]
Medical, precision and optical instruments	(33)	24	91 [1]	-	49 [1]	95	92	32	55 [1]	43	86	33	20	-	-	-	- [1]	-	-	55	54 [1]
Aircraft and spacecraft	(353)	229	5 [1]	-	47 [1]	-	-	48	70 [1]	13	31 [1]	96	-	-	140	-	76 [1]	-	-	55	237 [1]
Medium-high technology manufactures		**-**	**77** [1]	**-**	**22** [1]	**77**	**99**	**33**	**50** [1]	**20**	**25** [1]	**24**	**-**	**34**	**69**	**82**	**95** [1]	**-**	**-**	**-**	**-**
Chemicals excluding pharmaceuticals	(24ex2423)	-	69 [1]	-	4 [1]	79	101	22	37 [1]	14	21 [1]	27	36	21	31	76	90 [1]	-	-	-	-
Machinery and equipment, nec	(29)	40	85 [1]	-	47	96	96	42	59	19	29	28	45	42	94	82	74	-	-	40	47 [1]
Electrical machinery and apparatus, nec	(31)	76	56 [1]	-	4 [1]	70	115	19	31 [1]	16	24 [1]	39	45	89	159	102	160 [1]	-	-	26	52 [1]
Motor vehicles, trailers and semi-trailers	(34)	78	94 [1]	-	42 [1]	60	87	39	53 [1]	23	26 [1]	16	31	26	55	99	122 [1]	-	-	96	82 [1]
Railroad equip. and transport equip. nec	(352+359)	36	77 [1]	-	0 [1]	2	8	35	50 [1]	74	95 [1]	8	-	-	61	-	130 [1]	-	-	11	23 [1]
Medium-low technology manufactures		**28**	**36** [1]	**-**	**54** [1]	**61**	**46**	**17**	**24** [1]	**6**	**8** [1]	**16**	**-**	**12**	**20**	**56**	**60** [1]	**-**	**-**	**-**	**-**
Coke, refined petroleum prod. and nuclear fuel	(23)	15	22 [1]	-	-	-	-	14	17	2	1	8	17	8	1	76	78	-	-	-	-
Rubber and plastics prod.	(25)	32	45 [1]	4	9	72	53	23	32	15	21 [1]	18	26	17	30	76	79	-	-	30	34 [1]
Other non-metallic mineral prod.	(26)	27	30 [1]	1	1	31	26	17	21	5	8	4	7	8	15	31	20	6	4	13	13 [1]
Basic metals	(27)	53	53 [1]	94	98 [1]	94	94	22	30 [1]	6	11	16	19	16	20	94	105	76	85	75	75
Fabricated metal prod., except mach. & equip.	(28)	26	34 [1]	9	5 [1]	54	33	12	17 [1]	4	6	17	19	14	39	32	25	10	12	26	21 [1]
Building and repairing of ships and boats	(351)	29	50 [1]	-	99 [1]	63	9	11	56 [1]	54	53 [1]	49	-	-	9	-	34 [1]	-	-	51	20
Low technology manufactures		**37**	**42** [1]	**59**	**59**	**51**	**43**	**19**	**28**	**3**	**3** [1]	**21**	**23**	**6**	**16**	**50**	**53**	**-**	**-**	**18**	**21**
Food prod., beverages and tobacco	(15-16)	25	24 [1]	72	73	50	41	9	16	1	1	4	4	2	5	52	58	51	52	16	20
Textiles, textile prod., leather and footwear	(17-19)	111	76 [1]	30	35	85	85	30	44	6	10 [1]	48	58	13	44	121	158	56	58	32	44
Wood and prod. of wood and cork	(20)	26	42 [1]	0	3	33	23	5	8	0	0 [1]	4	3	6	5	33	21	37	36	19	13
Pulp, paper, paper prod., printing & publishing	(21-22)	10	21 [1]	1	2	52	44	9	14	2	2 [1]	6	12	7	11	31	31	16	18	21	22
Manufacturing nec; recycling	(36-37)	33	151 [1]	0	1	31	34	33	44	5	7 [1]	26	43	24	53	33	28	14	12	23	28

1. Intensity of the previous year.
2. 2000 instead of 2002.
3. EU includes the 15 EU Members before 1 May 2004 excluding Belgium, Greece, Luxembourg, Netherlands.
4. OECD includes previous EU countries and Australia, Canada, Japan, Norway and the United States.

Source: OECD, STAN Indicators 2004.

Table 33. Export ratio by industry and technology level, 1992-2002 (cont'd)

Exports as a percentage of production

	(ISIC Rev.3)	Poland		Portugal		Slovak Rep.		Spain		Sweden		Switzerland		UK		Unites States		EU[3]		OECD[4]	
		1994	2001	1992	1999	1997	1999	1992	2001	1992	2001	1997	2000	1992	2001	1992	2001	1992	1999	1992	1999
Total manufacturing	**(15-37)**	**1**	**1**	**29**	**38**	**54**	**63**	**19**	**31**	**41**	**51**	**54**	**66**	**31**	**43**	**13**	**17**	**30**	**39**	**21**	**26**
High technology manufactures		**-**	**4** [1]	**42**	**62**	**-**	**-**	**28**	**49**	**66**	**67**	**-**	**-**	**57**	**100**	**26**	**35**	**49**	**71**	**34**	**43**
Pharmaceuticals	(2423)	-	4 [1]	11	23	-	-	10	32	67	79	-	-	40	76	10	15	33	56	19	28
Office, accounting and computing machinery	(30)	0	1 [1]	175	128	78	461	52	50	97	136	-	-	69	101	47	58	65	104	48	57
Radio, television and communication equip.	(32)	5	5 [1]	52	75	77	140	33	66	65	55	40	52	52	123	24	37	45	74	31	40
Medical, precision and optical instruments	(33)	1	1 [1]	61	60	34	30	24	47	65	72	76	88	51	63	16	26	44	56	30	41
Aircraft and spacecraft	(353)	-	9 [1]	-	-	-	-	121	86	46	103	-	-	70	123	35	44	73	77	47	57
Medium-high technology manufactures		**-**	**2** [1]	**39**	**66**	**-**	**-**	**36**	**51**	**50**	**58**	**-**	**-**	**45**	**53**	**20**	**24**	**42**	**51**	**-**	**-**
Chemicals excluding pharmaceuticals	(24ex2423)	-	2 [1]	20	34	-	-	22	38	43	66	-	-	46	60	17	22	41	54	-	-
Machinery and equipment, nec	(29)	3	3 [1]	36	51	58	81	34	42	52	64	70	82	51	55	24	27	45	54	32	38
Electrical machinery and apparatus, nec	(31)	3	2 [1]	57	94	64	82	25	36	49	66	44	51	36	52	24	38	29	41	24	34
Motor vehicles, trailers and semi-trailers	(34)	3	3 [1]	57	85	112	103	49	67	54	50	104	126	45	48	18	19	47	52	33	35
Railroad equip. and transport equip. nec	(352+359)	-	5 [1]	28	27	-	-	15	45	18	23	-	-	17	20	11	11	33	38	33	32
Medium-low technology manufactures		**-**	**1** [1]	**19**	**24**	**-**	**-**	**17**	**21**	**39**	**44**	**-**	**-**	**21**	**24**	**7**	**8**	**22**	**25**	**-**	**-**
Coke, refined petroleum prod. and nuclear fuel	(23)	1	1 [1]	24	18	34	45	24	20	48	49	-	-	24	29	5	5	18	20	-	-
Rubber and plastics prod.	(25)	1	1 [1]	14	33	67	75	18	29	45	56	48	53	21	22	8	11	26	32	18	21
Other non-metallic mineral prod.	(26)	0	0 [1]	18	19	47	45	11	18	17	26	21	27	16	17	6	7	16	20	11	13
Basic metals	(27)	1	1 [1]	17	47	62	54	27	29	52	61	94	174	33	44	10	13	35	39	19	22
Fabricated metal prod., except mach. & equip.	(28)	0	0 [1]	18	26	34	47	10	13	25	27	27	31	13	15	5	6	15	18	9	11
Building and repairing of ships and boats	(351)	-	2 [1]	29	10	-	-	47	26	71	57	-	-	15	15	10	9	31	39	33	34
Low technology manufactures		**0**	**0** [1]	**29**	**31**	**39**	**45**	**9**	**19**	**28**	**39**	**-**	**-**	**16**	**17**	**6**	**7**	**20**	**25**	**12**	**15**
Food prod., beverages and tobacco	(15-16)	0	0 [1]	9	12	14	13	7	16	6	15	12	13	14	15	6	6	15	19	9	11
Textiles, textile prod., leather and footwear	(17-19)	1	0 [1]	49	53	96	125	15	36	58	107	72	78	30	43	7	13	35	46	21	29
Wood and prod. of wood and cork	(20)	0	0 [1]	38	39	45	53	7	11	36	42	8	10	3	5	6	4	14	19	11	14
Pulp, paper, paper prod., printing & publishing	(21-22)	0	0 [1]	20	24	43	52	9	16	40	50	21	26	11	12	5	6	17	21	11	12
Manufacturing nec; recycling	(36-37)	0	0 [1]	19	21	45	53	10	21	34	41	88	95	26	24	12	15	26	32	14	19

1. Intensity of the previous year.

2. 2000 instead of 2002.

3. EU includes the 15 EU Members before 1 May 2004 excluding Belgium, Greece, Luxembourg, Netherlands.

4. OECD includes previous EU countries and Australia, Canada, Japan, Norway and the United States.

Source: OECD, STAN Indicators 2004.

Table 34. Import penetration by industry and technology level, 1992-2002

Imports as a percentage of domestic demand

	(ISIC Rev.3)	Australia		Austria		Belgium		Canada		Czech Republic		Denmark		Finland		France		Germany		Greece	
		1992	1999	1992	2002	1995	2002	1992	2000	1993	2001	1992	2002	1992	2002	1992	2002	1992	2001	1995	2002
Total manufacturing	**(15-37)**	**26**	**34**	**49**	**66**	**76**	**117**	**43**	**53**	**32**	**53**	**53**	**68**	**31**	**37**	**29**	**37**	**29**	**40**	**40**	**46**
High technology manufactures		**65**	**75**	**68**	**106** [1]	**129**	**152**	**72**	**88**	**92**	**81** [1]	**101**	**137**	**67**	**52** [1]	**42**	**59** [1]	**56**	**101**	**72**	**-**
Pharmaceuticals	(2423)	36	49	65	109 [1]	91	145 [2]	32	53	-	86 [1]	73	103	58	74 [1]	19	47 [1]	36	84	58	-
Office, accounting and computing machinery	(30)	100	103	152	146	253	474 [2]	107	108	106	106 [1]	126	155	78	119	72	101 [1]	62	109	102	109
Radio, television and communication equipment	(32)	50	70	42	90	119	110 [2]	56	74	83	82 [1]	95	172	63	37	45	64 [1]	57	107	71	73
Medical, precision and optical instruments	(33)	75	85	79	102	151	169 [2]	-	-	66	62 [1]	103	94	75	54	33	48 [1]	38	65	91	95
Aircraft and spacecraft	(353)	71	76	-	-	86	78 [2]	73	83	-	71 [1]	-	-	50	84 [1]	55	49 [1]	100	156	-	-
Medium-high technology manufactures		**39**	**49**	**76**	**92** [1]	**102**	**135** [2]	**66**	**73**	**66**	**67** [1]	**77**	**88**	**54**	**56** [1]	**38**	**48** [1]	**29**	**39**	**71**	**-**
Chemicals excluding pharmaceuticals	(24ex2423)	32	40	66	84 [1]	109	125 [2]	42	59	-	69 [1]	76	93	50	54 [1]	44	57 [1]	36	53	65	-
Machinery and equipment, nec	(29)	51	63	71	77	100	161 [2]	69	79	55	81 [1]	68	72	45	39	41	56 [1]	26	37	70	75
Electrical machinery and apparatus, nec	(31)	39	54	76	88	64	97 [2]	65	82	33	68 [1]	62	71	49	74	30	48 [1]	17	32	48	65
Motor vehicles, trailers and semi-trailers	(34)	37	46	97	123	111	150 [2]	79	76	42	53 [1]	106	120	128	130	35	38	34	35	92	93
Railroad equip. and transport equip. nec	(352+359)	32	44	37	60 [1]	80	94 [2]	31	38	-	45 [1]	111	111	25	50 [1]	40	43 [1]	39	42	-	-
Medium-low technology manufactures		**15**	**20**	**38**	**45** [1]	**53**	**60** [2]	**28**	**33**	**22**	**47** [1]	**45**	**46**	**28**	**27**	**22**	**25** [1]	**22**	**27**	**34**	**-**
Coke, refined petroleum prod. and nuclear fuel	(23)	16	15	23	39	39	48	11	11	18	45 [1]	47	35	31	26	22	20	28	27	16	16
Rubber and plastics prod.	(25)	24	29	64	67	81	102	36	43	38	64 [1]	52	57	40	38	27	32 [1]	22	29	41	51
Other non-metallic mineral prod.	(26)	10	12	21	27	36	42	30	37	20	30 [1]	26	30	19	20	15	19	16	20	25	17
Basic metals	(27)	18	23	53	58	76	87 [2]	39	45	19	53 [1]	78	82	31	42	42	47 [1]	37	45	46	42
Fabricated metal prod., except mach.&equip.	(28)	11	13	35	39	34	43 [2]	27	33	21	37 [1]	31	35	21	16	12	15 [1]	12	15	33	35
Building and repairing of ships and boats	(351)	3	50	71	239 [1]	36	29 [2]	16	59	-	82 [1]	25	48	25	17	14	29 [1]	16	50	-	-
Low technology manufactures		**15**	**19**	**31**	**44**	**59**	**81**	**22**	**27**	**17**	**32** [1]	**38**	**52**	**14**	**20**	**22**	**28** [1]	**27**	**31**	**26**	**29**
Food prod., beverages and tobacco	(15-16)	7	9	11	27	42	50	13	17	10	15 [1]	29	40	7	17	16	19	17	20	22	24
Textiles, textile prod., leather and footwear	(17-19)	35	48	71	96	91	180	41	54	25	69 [1]	85	169	59	73	39	61	64	85	31	41
Wood and prod. of wood and cork	(20)	13	12	20	24	55	62	17	16	10	22 [1]	50	54	8	9	16	23 [1]	20	19	27	36
Pulp, paper, paper prod., printing & publishing	(21-22)	15	16	33	36	45	51	23	23	27	41 [1]	28	31	9	10	17	21 [1]	16	21	32	25
Manufacturing nec; recycling	(36-37)	28	36	38	60	119	189	39	48	27	38 [1]	38	46	30	36	27	35 [1]	30	40	29	36

1. For comparison: intensity of the previous year.

2. 2000 instead of 2002.

3. EU includes the 15 EU Members before 1 May 2004 excluding Belgium, Greece, Luxembourg, Netherlands.

4. OECD includes previous EU countries and Australia, Canada, Japan, Norway and the United States.

Source: OECD, STAN Indicators 2004.

StatLink: http://dx.doi.org/10.1787/707487145841

Table 34. Import penetration by industry and technology level, 1992-2002 (cont'd)

Imports as a percentage of domestic demand

	(ISIC Rev.3)	Hungary		Iceland		Ireland		Italy		Korea		Mexico		Netherlands		New Zealand		Norway	
		1992	2001	1992	2000	1992	1999	1992	2001	1994	2001	1992	2001	1992	2002	1992	1998	1992	2002
Total manufacturing	**(15-37)**	**38**	**63**	**55**	**63**	**64**	**76**	**21**	**31**	**21**	**24**	**25**	**45**	**63**	**80**	**38**	**43**	**44**	**47**
High technology manufactures		**-**	**94**	**-**	**81** [1]	**147**	**140**	**40**	**63**	**33**	**-**	**-**	**84**	**93**	**211** [1]	**-**	**-**	**84**	**177** [1]
Pharmaceuticals	(2423)	-	55	-	62 [1]	-125	-139	20	49	7	11	17	23	62	101 [1]	-	-	70	84 [1]
Office, accounting and computing machinery	(30)	88	110	-	100 [1]	112	111	83	93	51	32	91	192	296	-	-	-	114	693 [1]
Radio, television and communication equipment	(32)	78	98	-	97 [1]	102	135	41	61	27	48	77	72	52	90 [1]	-	-	77	90 [1]
Medical, precision and optical instruments	(33)	47	94	-	80 [1]	91	87	43	61	63	43	-	-	-	- [1]	-	-	75	- [1]
Aircraft and spacecraft	(353)	200	32	-	66 [1]	184	152	46	74	99	-	-	205	-	82 [1]	-	-	80	79 [1]
Medium-high technology manufactures		**-**	**77**	**-**	**82** [1]	**78**	**98**	**32**	**45**	**28**	**-**	**37**	**69**	**83**	**94** [1]	**-**	**-**	**-**	**96** [1]
Chemicals excluding pharmaceuticals	(24ex2423)	-	80	-	64 [1]	69	104	36	48	33	35	32	52	70	85 [1]	-	-	-	95 [1]
Machinery and equipment, nec	(29)	54	91	-	82	98	98	23	38	48	45	72	96	85	72	-	-	64	76 [1]
Electrical machinery and apparatus, nec	(31)	69	51	-	82 [1]	77	116	16	27	32	54	87	192	102	148 [1]	-	-	50	128 [1]
Motor vehicles, trailers and semi-trailers	(34)	80	92	-	98 [1]	90	98	52	62	6	6	10	45	99	114 [1]	-	-	99	110 [1]
Railroad equip. and transport equip. nec	(352+359)	51	74	-	84 [1]	11	13	25	41	10	-	-	56	-	123 [1]	-	-	37	123 [1]
Medium-low technology manufactures		**25**	**46**	**-**	**60** [1]	**71**	**63**	**16**	**20**	**15**	**-**	**24**	**37**	**52**	**53** [1]	**-**	**-**	**-**	**53** [1]
Coke, refined petroleum prod. and nuclear fuel	(23)	11	19	-	- [1]	121	121	18	16	17	14	18	11	47	63	-	-	-	61 [1]
Rubber and plastics prod.	(25)	36	59	49	53	76	66	16	22	8	12	42	60	80	80	-	-	60	81 [1]
Other non-metallic mineral prod.	(26)	21	36	21	20	36	34	7	9	6	11	7	13	39	27	20	21	25	33 [1]
Basic metals	(27)	48	65	89	94 [1]	96	97	36	44	20	21	27	40	94	104	69	80	70	68
Fabricated metal prod., except mach.&equip.	(28)	24	45	47	41 [1]	60	50	5	7	10	10	32	54	34	26	19	18	42	29 [1]
Building and repairing of ships and boats	(351)	21	55	-	99 [1]	65	62	11	34	22	-	-	42	-	14 [1]	-	-	37	19
Low technology manufactures		**27**	**37**	**37**	**42**	**37**	**32**	**14**	**21**	**13**	**18**	**12**	**18**	**46**	**47**	**-**	**-**	**24**	**27**
Food prod., beverages and tobacco	(15-16)	9	13	24	33	23	24	15	20	9	12	7	8	34	40	11	15	10	14
Textiles, textile prod., leather and footwear	(17-19)	118	75	71	75	90	94	14	27	18	32	18	42	112	138	52	60	79	85
Wood and prod. of wood and cork	(20)	20	41	61	54	47	42	15	17	27	28	9	11	58	47	6	7	20	24
Pulp, paper, paper prod., printing & publishing	(21-22)	25	36	30	30	45	24	11	16	11	14	21	31	33	31	20	23	21	22
Manufacturing nec; recycling	(36-37)	40	346	45	56	32	41	11	18	15	29	25	39	45	39	30	34	48	52

1. For comparison: intensity of the previous year.

2. 2000 instead of 2002.

3. EU includes the 15 EU Members before 1 May 2004 excluding Belgium, Greece, Luxembourg, Netherlands.

4. OECD includes previous EU countries and Australia, Canada, Japan, Norway and the United States.

Source: OECD, STAN Indicators 2004.

Table 34. Import penetration by industry and technology level, 1992-2002 (cont'd)

Imports as a percentage of domestic demand

	(ISIC Rev.3)	Poland		Portugal		Spain		Slovak Rep.		Sweden		Switzerland		United Kingdom		United States		EU[3]		OECD[4]	
		1992	2001	1992	1999	1992	2001	1997	1999	1992	2001	1997	2000	1992	2001	1992	2001	1992	1999	1992	1999
Total manufacturing	**(15-37)**	**21**	**38**	**38**	**47**	**25**	**35**	**55**	**63**	**37**	**45**	**53**	**65**	**34**	**48**	**15**	**23**	**30**	**37**	**20**	**26**
High technology manufactures		**-**	**70** [1]	**69**	**74** [1]	**51**	**68**	**-**	**-**	**65**	**62**	**-**	**-**	**57**	**100**	**23**	**36**	**52**	**71**	**31**	**43**
Pharmaceuticals	(2423)	-	65 [1]	36	53 [1]	19	46	-	-	48	57	-	-	29	72	8	19	28	48	17	27
Office, accounting and computing machinery	(30)	88	83 [1]	104	108 [1]	76	74	97	157	98	109	139	142	75	101	51	68	74	103	50	65
Radio, television and communication equipment	(32)	50	74 [1]	66	64 [1]	58	80	89	117	58	45	57	69	59	126	32	42	53	73	29	38
Medical, precision and optical instruments	(33)	50	49 [1]	89	87 [1]	58	71	59	64	64	70	49	71	50	64	12	23	44	55	27	38
Aircraft and spacecraft	(353)	-	93 [1]	-	- [1]	114	90	-	-	50	103	-	-	60	124	14	30	69	74	36	49
Medium-high technology manufactures		**-**	**59** [1]	**66**	**73** [1]	**43**	**55**	**-**	**-**	**46**	**52**	**-**	**-**	**47**	**58**	**21**	**31**	**38**	**46**	**-**	**-**
Chemicals excluding pharmaceuticals	(24ex2423)	-	55 [1]	47	59 [1]	37	47	-	-	55	73	-	-	43	58	11	20	41	51	-	-
Machinery and equipment, nec	(29)	44	63 [1]	70	69 [1]	52	56	71	87	45	54	50	68	49	56	19	26	36	44	24	31
Electrical machinery and apparatus, nec	(31)	28	56 [1]	60	80 [1]	33	41	70	83	54	66	35	43	39	53	27	47	25	38	21	34
Motor vehicles, trailers and semi-trailers	(34)	35	61 [1]	83	87 [1]	45	66	110	105	41	40	101	103	52	62	29	36	43	48	29	34
Railroad equip. and transport equip. nec	(352+359)	-	39 [1]	65	40 [1]	36	42	-	-	23	27	-	-	31	41	17	21	36	43	28	32
Medium-low technology manufactures		**-**	**28** [1]	**29**	**34** [1]	**17**	**22**	**-**	**-**	**37**	**39**	**-**	**-**	**24**	**26**	**9**	**13**	**22**	**24**	**-**	**-**
Coke, refined petroleum prod. and nuclear fuel	(23)	11	14 [1]	30	26 [1]	23	23	18	26	50	42	109	113	18	26	9	13	24	22	-	-
Rubber and plastics prod.	(25)	24	37 [1]	35	47 [1]	22	30	64	78	50	57	52	56	25	26	9	12	25	29	18	20
Other non-metallic mineral prod.	(26)	11	19 [1]	10	13 [1]	8	10	31	33	27	30	34	40	18	19	9	14	14	15	10	13
Basic metals	(27)	16	43 [1]	63	76 [1]	27	36	39	35	42	53	95	155	43	50	14	22	39	43	20	24
Fabricated metal prod., except mach.&equip.	(28)	16	33 [1]	24	31 [1]	13	14	36	48	22	22	22	26	14	18	6	9	12	14	9	11
Building and repairing of ships and boats	(351)	-	19 [1]	17	10 [1]	18	26	-	-	69	24	-	-	13	8	2	6	17	20	12	15
Low technology manufactures		**11**	**21** [1]	**22**	**27** [1]	**14**	**21**	**36**	**44**	**23**	**30**	**-**	**-**	**25**	**30**	**11**	**16**	**22**	**26**	**15**	**19**
Food prod., beverages and tobacco	(15-16)	8	9 [1]	16	22 [1]	10	17	22	23	14	25	18	19	19	22	5	6	16	19	11	13
Textiles, textile prod., leather and footwear	(17-19)	12	59 [1]	31	36 [1]	22	39	96	128	84	103	86	90	45	67	27	44	39	50	31	42
Wood and prod. of wood and cork	(20)	4	12 [1]	11	16 [1]	14	19	20	31	9	15	17	19	29	31	8	13	19	21	14	17
Pulp, paper, paper prod., printing & publishing	(21-22)	22	26 [2]	19	23 [2]	14	17	35	43	13	16	31	37	18	18	4	6	16	18	9	10
Manufacturing nec; recycling	(36-37)	17	29 [1]	30	29 [1]	18	22	39	51	39	41	91	96	37	39	27	39	26	31	19	26

1. For comparison: intensity of the previous year.

2. 2000 instead of 2002.

3. EU includes the 15 EU Members before 1 May 2004 excluding Belgium, Greece, Luxembourg, Netherlands.

4. OECD includes previous EU countries and Australia, Canada, Japan, Norway and the United States.

Source: OECD, STAN Indicators 2004.

Table 35. Outward and inward foreign direct investment flows, 1990-2001

Billion USD

	Outward flows						Inward flows						Cumulative
	1990	1995	1998	1999	2000	2001	1990	1995	1998	1999	2000	2001	net outflow
Australia	2	2	5	2	1	6	6	5	6	7	7	6	- 39
Austria	2	1	3	3	6	3	-	-	-	3	9	6	10
Belgium-Luxembourg	6	12	28	133	218	86	8	11	23	149	226	77	- 38
Canada	5	11	34	16	48	35	8	9	23	24	67	27	10
Czech Republic	-	0	0	0	0	0	-	3	4	6	5	5	- 26
Denmark	2	3	4	13	24	9	1	4	6	11	32	7	- 4
Finland	3	1	19	7	24	8	1	1	12	5	9	3	40
France	36	16	43	127	176	83	16	24	29	47	43	53	326
Germany[1]	24	39	89	110	50	43	2	14	25	55	195	32	171
Greece	-	-	-	-	-	1	2	-	-	-	-	2	- 7
Hungary	-	-	-	0	1	0	-	-	-	2	2	2	- 5
Iceland	0	0	0	0	0	0	0	0	0	0	0	0	0
Ireland	-	-	4	5	5	6	0	0	9	19	26	16	- 53
Italy	7	6	12	7	12	21	6	5	3	7	13	15	40
Japan	57	53	40	65	50	33	3	4	10	21	29	18	441
Korea	1	3	3	2	3	2	1	1	5	11	10	3	- 13
Mexico	-	-	-	-	-	-	3	10	12	12	15	24	- 132
Netherlands	13	19	39	41	72	40	9	11	38	32	54	51	92
New Zealand	2	2	0	1	1	1	2	3	2	1	1	3	- 19
Norway	1	3	3	6	8	2	1	2	4	8	6	3	3
Poland	-	0	0	0	0	0	0	4	6	7	9	6	- 46
Portugal	0	1	4	3	8	8	2	1	3	1	6	6	- 3
Slovak Republic	-	-	-	-	0	0	-	-	-	-	2	1	- 4
Spain	3	4	19	42	55	28	14	6	12	16	38	22	18
Sweden	15	11	24	22	41	-	2	14	20	61	23	13	- 20
Switzerland	7	12	19	33	43	11	5	2	9	12	19	8	119
Turkey	-	-	-	1	1	0	1	1	1	1	1	3	- 11
United Kingdom	18	44	122	201	254	39	30	20	71	88	117	53	372
United States	31	92	131	175	165	114	48	59	174	283	301	124	- 201
Total OECD[2]	**236**	**335**	**645**	**1 015**	**1 263**	**580**	**171**	**214**	**506**	**888**	**1 267**	**590**	**1 020**
EU-25[2]	**129**	**157**	**410**	**715**	**944**	**375**	**93**	**118**	**259**	**508**	**811**	**370**	**862**
EU-15[2]	**129**	**157**	**410**	**715**	**943**	**375**	**93**	**111**	**249**	**493**	**793**	**355**	**943**

1. The statistics cover unified Germany as from 1990.

2. Excluding missing countries for respective years.

Source: OECD, FDI database, May 2004.

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TABLE OF CONTENTS

Chapter 5

Ensuring the Supply of Human Resources in Science and Technology

Chapter 6

Multinational Enterprises and Productivity Growth: Insight at the Firm Level

Statistical Annex

List of Tables

Chapter 1

Chapter 2

Chapter 3

Chapter 5

Chapter 6

Statistical Annex Tables

List of Figures

Chapter 1

List of Boxes