HIGHLIGHTS

OECD Science, Technology and Industry Outlook

OECD

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OECD Science, Technology and Industry Outlook 2006 Highlights

A brighter outlook for science, technology and innovation

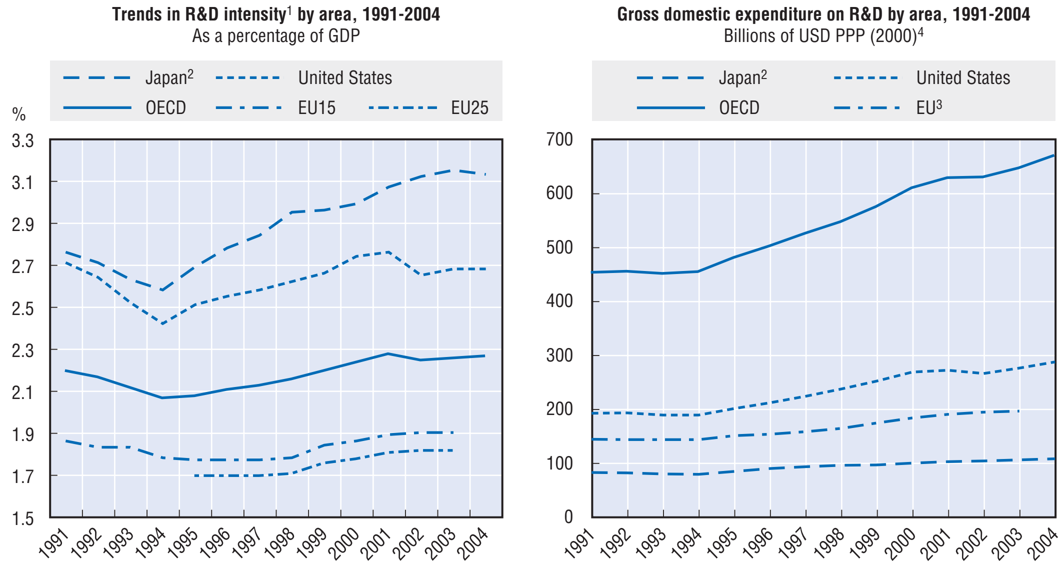
Investment in science, technology and innovation has benefited from stronger economic growth

Several years of economic growth have benefited investment in science, technology and innovation. Although the pace of growth has varied across the main OECD regions, business investment has increased and consumer spending has rebounded overall, most notably in the United States. This has increased demand for innovative products, processes and services, and with it demand for scientific and technical knowledge. Improved corporate profitability has paved the way for growing investment in intellectual assets, including research and development (R&D), human resources and intellectual property. Prospects for further expansion of investment in science, technology and innovation are bright, although a number of risks remain. Real economic growth is projected to average 3% across the OECD region in 2006-07, driven by gains in all major economic regions, but a number of concerns regarding trade imbalances, rising energy costs and other factors could undermine growth prospects and affect future investment in science, technology and innovation.

The pace of recovery has been weakest in Europe, where only a few countries are on track to meet R&D targets

Reflecting the improved economic conditions of recent years, OECD-wide investment in R&D has begun to recover from its slump earlier in the decade. Total R&D spending reached USD 729 billion in 2004, up almost 10% in real terms from 2000. Measured as a share of GDP, OECD-wide R&D stood at 2.26% of GDP in 2004, above its level of 2.25% in 2003, but still below its peak of 2.27% in 2001 (Figure 1). Recent rates of growth in R&D spending have been highest in the United States (4% a year between 2002 and 2004), followed by Japan (2.1% a year between 2000 and 2004) and the EU25 (2.3% a year between 2000 and 2003), exacerbating gaps among main OECD regions. R&D intensity reached 3.13% of GDP in Japan, and 2.68% in the United States in 2004, compared to 1.81% in the EU25 in 2003, where only a few countries are on track to meet R&D targets of 3% of GDP. Lower R&D intensity in Europe relative to the United States and Japan is partly linked to cyclical conditions, but is primarily due to

Figure 1. **R&D trends in major OECD regions, 1991-2004**



1. Gross domestic expenditure on R&D as a percentage of GDP.
2. Data are adjusted up to 1995.
3. Data are EU15 to 1994 and EU25 from 1995.
4. USD of 2000 in purchasing power parities (PPP).

Source: OECD, Main Science and Technology Indicators database, June 2006.

structural factors. These include the make-up of Europe's business sector, in particular the small size of its information technology manufacturing and services sectors, as well as a business climate which, in several EU countries, does not yet adequately encourage private investment in research and innovation.

Government spending drives recent R&D growth in the United States and the European Union but less in Japan

Trends in the financing of R&D vary significantly across the main OECD regions. In Europe and the United States, recent gains were driven primarily by government expenditure; whereas in Japan and other Asia-Pacific nations, industry has been the main engine of growth. Government R&D expenditure rose from 0.71% to 0.83% of GDP in the United States and from 0.62% to 0.63% of GDP in the EU25, while falling slightly in Japan where modest increases in government R&D expenditures failed to keep pace with GDP growth. Iceland and Ireland also saw significant growth in government-funded R&D. OECD-wide industry R&D funding, in contrast, declined between 2000 and 2004, from 1.43% to 1.40% of GDP, with the steepest declines in Sweden (3.0% to 2.6% of GDP) and the United States (1.91% to 1.7% of GDP). In contrast, industry-financed R&D climbed from 2.17% to 2.34% of GDP in Japan and from 1.73% to 2.14% of GDP in Korea. Industry funding as a percentage of GDP has remained relatively flat in the EU25 since 2000.

Business R&D expenditures are poised to grow

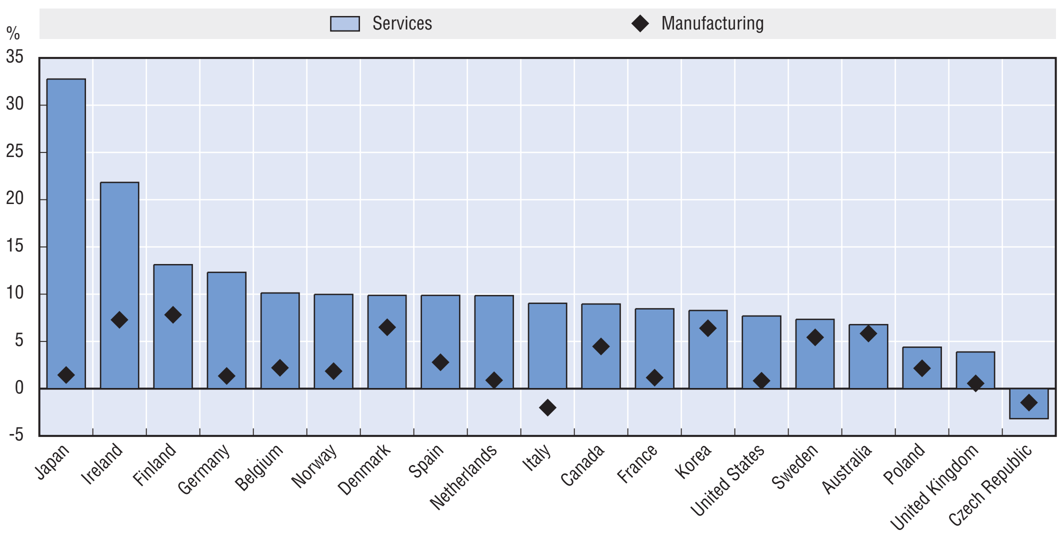
Prospects for future growth in R&D investments are brightening. Government deficits are expected to decline in coming years, and this may loosen constraints on government R&D expenditure. More generous government tax incentives for R&D could further boost business R&D spending. Moreover, recent industry surveys indicate that firms in the United States and Europe intend to increase their R&D spending moderately in the coming years, especially if corporate profits remain strong. Venture capital funding also appears to have stabilised after plunging in the earlier part of the decade, with support for innovation in small and start-up firms. US venture capital investments topped USD 22 billion in 2005, up from USD 19.6 billion in 2002, while European venture capital climbed to EUR 11.4 billion (approximately USD 14 billion), just short of its high of EUR 12.1 billion in 2002.

Public-sector research has seen a resurgence and services now comprise one-quarter of total business R&D in the OECD area

Important shifts are also under way in R&D performance. Benefiting from increased government funding, public-sector research has grown in importance, rising from 0.63% to 0.68% of GDP between 2000 and 2004 as countries aim to enhance knowledge creation. Business-performed R&D across the OECD also rebounded somewhat to USD 453 billion in 2004 or 1.5% of GDP, after declining in the early part of the decade. More importantly, its composition continues to evolve, with service industries accounting for a growing share (Figure 2). Between 1990 and 2003, services sector R&D grew at an annual rate of 12%, compared to 3% for manufacturing. Services now comprise one-quarter of total business R&D in the OECD, and more than one-third in Australia, Denmark, the United States,

Figure 2. **Business R&D expenditures in services and manufacturing, 1990-2003**[1]

Average annual growth rates (%)



1. Or nearest available period.

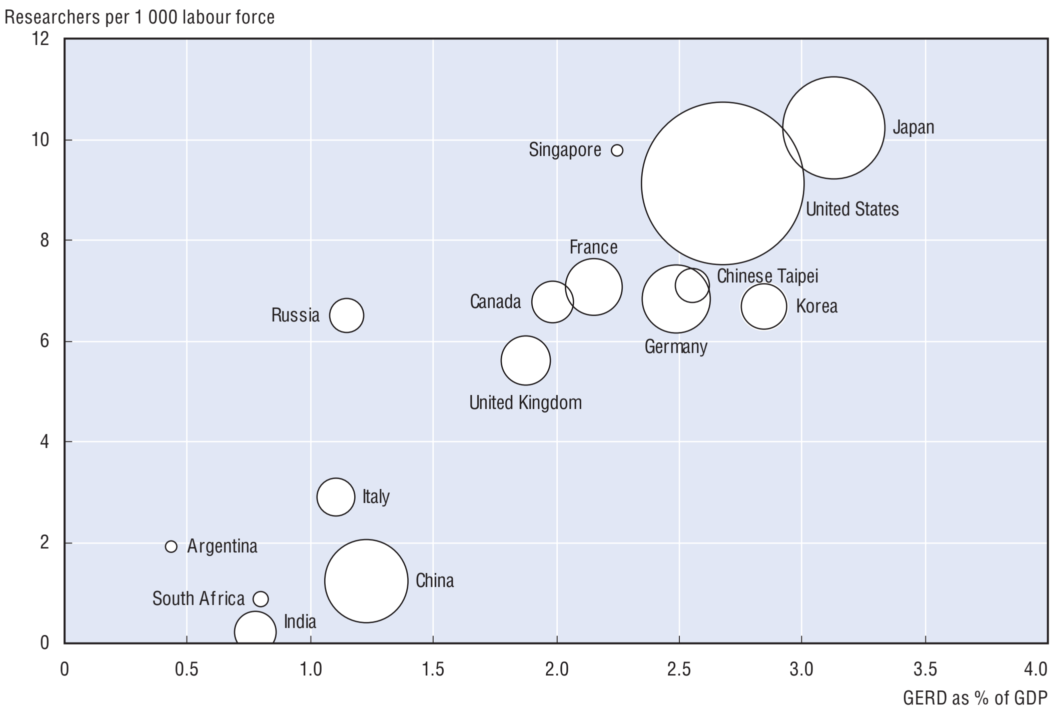
Source: OECD ANBERD database, 2005.

Canada, the Czech Republic and Norway. Recent innovation surveys indicate that the share of innovative firms in some service industries – financial intermediation and business services in particular – exceeds that of manufacturing.

Multinational enterprises are driving the globalisation of R&D, especially in Asia where an ample supply of talent and growing markets offer new opportunities

Accompanying these shifts in financing and performance of R&D is the rapid globalisation of science, technology and innovation. In most OECD countries, the share of R&D performed by foreign affiliates has increased as multinational enterprises have acquired foreign firms and establish new R&D facilities outside their home country. More than 16% of business R&D in the OECD area was performed in foreign affiliates in 2004, up from 12% in 1993. In Hungary, Ireland, the Czech Republic, the United Kingdom and Australia, the share exceeded 40%. Most R&D by foreign affiliates remains within OECD countries, but the regions of fastest growth lie outside the OECD area, in particular in Asia, where growing scientific and technical talent, rapidly expanding markets and lower wages offer fertile ground for new investment. Non-OECD economies make a sizeable contribution to global R&D expenditure (Figure 3). The combined R&D expenditure of China, Israel, Russia and South Africa was equivalent to almost 17% of that of OECD countries in 2004, up from 7%

Figure 3. **R&D expenditure in selected OECD and non-OECD areas, 2004**[1]



1. Or latest available year.
2. The size of the circles is proportional to the absolute volume of R&D expenditure.

Source: *OECD, Main Science and Technology Indicators*, June 2006.

in 1995, and these countries attract a growing share of investment by foreign affiliates. Recent policy initiatives aim to enhance the attractiveness of these countries to foreign investment by improving their domestic innovation capabilities.

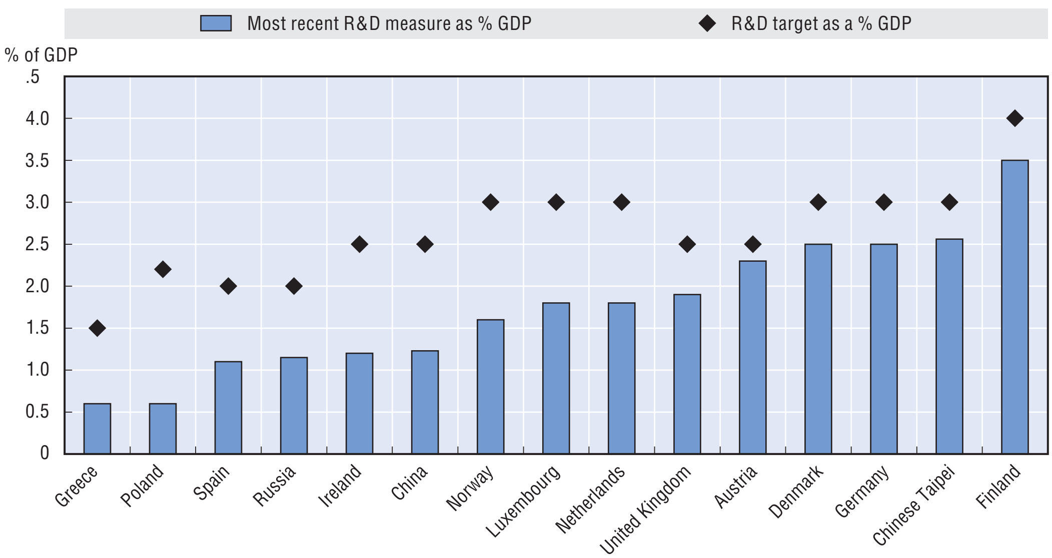
Policies to foster innovation have grown in importance

Many OECD countries have developed a national science and innovation strategy

As policy makers pay greater attention to innovation, more countries are developing formal plans and strategies for science, technology and innovation – and are backing them up with funding increases and changing institutional structures. The extended *Backing Australia's Ability* plan, for example, includes financing of AUD 5.3 billion for programmes to be implemented through 2011. The Finnish government has strengthened its Science and Technology Policy Council and boosted funding for its innovation agency (Tekes) and the Academy of Finland by a total of EUR 50 million. France not only boosted funding for public sector research by EUR 1 billion, but also established a new National Research Agency to provide selective funding to public research and public/private partnerships. The German government, which intends to publish a comprehensive High-Tech Strategy in late 2006, announced its intention to invest an additional EUR 6 billion in R&D through 2009. The Slovak Republic published an Action Plan for Science, Research and Innovation to increase R&D funding and established a new Government Council for Science and Technology to facilitate implementation. In the United States, the American Competitiveness Initiative promises to strengthen investments in science, technology and education. A growing number of economies have established quantitative targets for R&D spending (Figure 4).

Figure 4. **Targets for R&D spending**

As a percentage of GDP



Note: R&D target dates range between 2005 and 2014.

Source: OECD, Country responses to STI policy questionnaire, 2006; Main Science and Technology Indicators database, June 2006.

Reform of universities and public research institutions remain a priority…

Central to many of these efforts to boost innovative capacity are reforms of public research organisations. Most reforms aim to improve the responsiveness of universities and government research institutions to social and economic needs. Some entail new institutional and legislative structures; in Japan, national universities were given a new administrative status in April 2004 which separates them from the government and gives them greater autonomy. In Finland, a new university law added technology transfer to the basic mission of universities.

… but funding mechanisms and quality assurance are also increasingly important

Funding models are also evolving. Many countries, including Finland, Iceland and Ireland, are moving to more competitive funding models for public research, but Germany and New Zealand are strengthening institutional funding for non-university research institutes as a way to foster long-term fundamental research and diversify research portfolios. In addition, many countries are establishing evaluation systems to ensure the quality of public research. Australia's Research Quality Framework seeks to measure quality and impact, while the Austrian Quality Assurance Agency was established to help universities develop evaluation standards for education and research. Norway also introduced an evaluation system that is linked to a results-oriented funding system.

Public support to business R&D is being streamlined and increasingly recognises the role of small firms in innovation

Support to business R&D is being streamlined and consolidated. Countries continue to boost support for business R&D either directly (through grants or loans) or indirectly (through tax incentives for R&D and early-stage capital funds). Austria, Finland, Germany and the Netherlands have streamlined and consolidated their innovation support programmes to make them simpler to use. Since 2004, new R&D tax incentives have been introduced in Belgium, Ireland and Poland, and existing schemes in many other countries have been extended and/or made more generous. Support to small firms has also increased and is channelled through a broadening array of programmes. Some aim at fostering spin-offs from public research – as in Austria's Academy plus Business (AplusB) programme and Germany's EXIST programme. Others stimulate seed capital, such as programmes that have been established in Austria, the Netherlands, Norway and New Zealand. Guarantee schemes and voucher programmes have also been introduced in the Netherlands to stimulate high-technology start-ups and encourage R&D in small firms. Programmes similar to the US Small Business Innovative Research programme were established in the Netherlands and United Kingdom to channel more government R&D funding to small firms.

Innovation policies focus on collaboration and take on a more regional dimension

In keeping with the growing interest in better links between science and industry, a number of countries have introduced or expanded public/private partnership programmes for innovation. In Sweden, up to EUR 110 million (SEK 1 billion) has been set aside to implement public/private partnerships for research and innovation in sectors related to ICT, pharmaceuticals and biotechnology, wood and forestry, metals and automobiles. Ireland is considering the development of competence centres and other mechanisms to foster greater collaborative activity. Co-operation is also increasingly viewed as a way to strengthen regional economies and is being implemented at that level. Some of these programmes, as in Iceland and Japan, use universities as seeds of regional clusters in less developed regions, while others (as in the Netherlands) aim to reinforce existing leaders and improve their global competitiveness. France uses a mixed model, providing additional funding to 15 new and existing clusters (*pôles de compétivité*) in areas such as microelectronics and aeronautics.

Innovation policy addresses new challenges, notably the growing role of services and rapid globalisation

Policy makers still require a better understanding of some of the major forces that are changing OECD economies and call for policy attention. The services sector is an area of particular interest. Countries such as Finland and the United States have put in place special programmes for R&D in the services sector; and many others are considering ways to better design generic innovation programmes to suit the needs of this sector. In addition, countries are grappling with the challenges of globalisation, both to attract foreign investment in R&D and innovation and to foster greater international linkages, especially within their public research sectors.

Ensuring the supply of human resources for science and technology

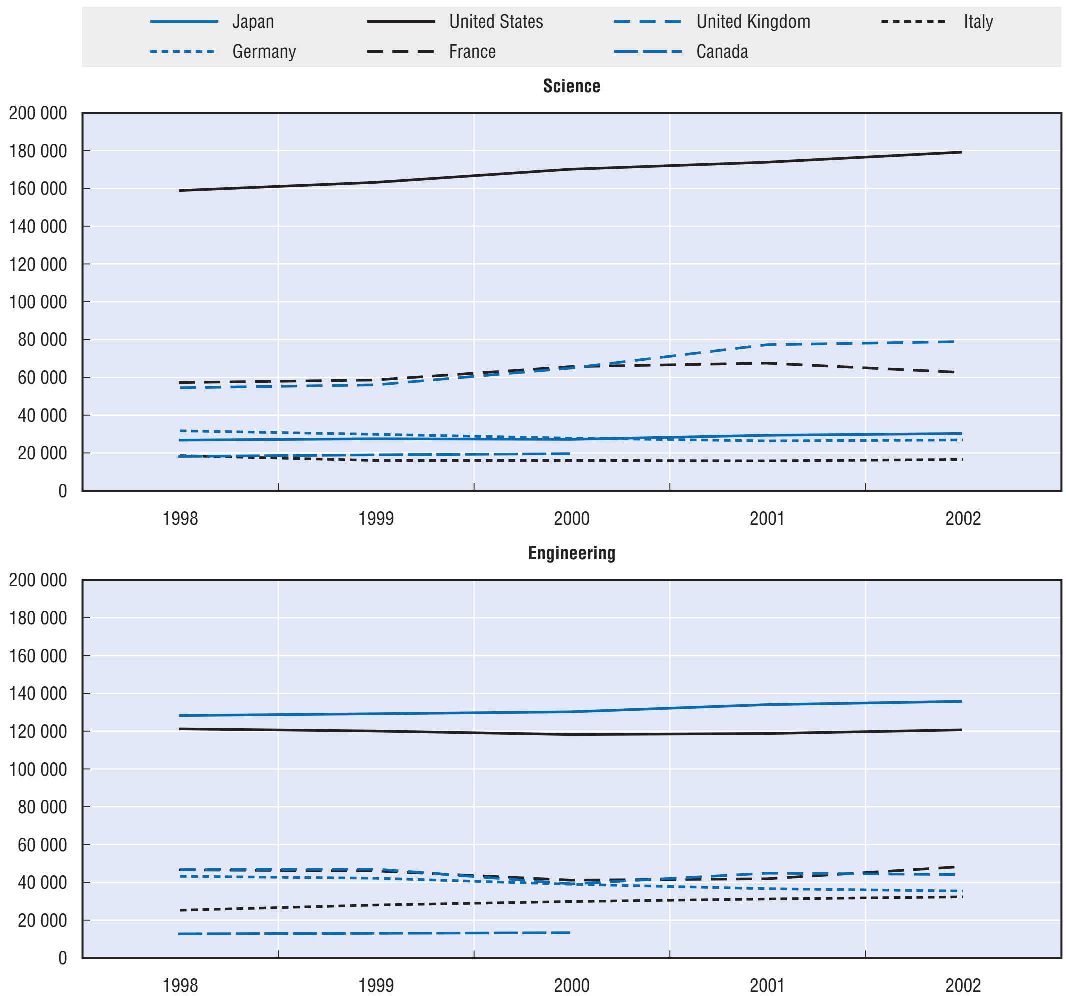
Demand for human resources in S&T has grown…

Issues of human resources are also taking on greater urgency on the policy agenda, as demand for human resources in science and technology has increased in OECD countries. Workers in professional occupations related to S&T represent between 25% and 35% of total employment in OECD countries, and growth in employment in these occupations continues to outpace overall employment growth. The number of researchers – an important subset of science and technology professionals – expanded from 2.3 million in 1990 to 3.6 million in 2002. Smaller OECD economies such as Finland, New Zealand, Spain and Ireland have made the largest gains in employment of researchers, whereas demand has increased more slowly in Germany, Italy and Central and Eastern European countries. Overall employment of researchers is greater in Japan (10.3 researchers per 1 000 labour force) and the United States (9.3 per 1 000 labour force) than in the EU25 (5.8 per 1 000 labour force).

… while there is a relative decline in S&T graduates in some countries

The supply of S&T graduates continues to expand in absolute terms (Figure 5), but in the EU between 1998 and 2004, Denmark, Italy, Germany, Hungary and Finland experienced a drop in the share of university graduates with science and engineering degrees, as did Korea and the United States. Further exacerbating the situation in the United States is a decline in first-time, full-time enrolments of foreign PhD students, which fell for the second consecutive year in 2003. Irrespective of their own recent declines, EU countries still produce a greater share of S&T graduates than Japan or the United States, despite the smaller share of researchers in the workforce: 27% of EU university graduates obtain a science or engineering degree compared to 24% in Japan and just 16% in the United States. The EU also produces more PhD graduates than the United States, which for its part offers more post-doctoral positions (46 716 in 2003), more than half of which go to foreign PhD graduates.

Figure 5. **Supply of science and engineering graduates in G7 economies, 1998-2002**



Source: OECD, Education database, June 2006.

Most policy measures focus on boosting supplies of new S&T graduates and researchers

Countries have taken a number of actions to boost supplies of scientists and engineers by raising interest and enrolments in S&T. Measures include the reform of school curricula to make science more accessible and attractive to young students; improvements in the quality of teaching in mathematics and science in the schools; and increased flexibility so that students have a chance to enter S&T studies at later points in their education. Public/private partnerships between industry, tertiary institutions and secondary schools are also being developed to improve student performance, enhance the relevance of instruction and raise enrolments. At the graduate level, countries are shortening the duration of PhD studies while providing more supervision in order to reduce dropout rates. Improvements in international mobility are also seen as a way of matching supply and demand, especially for specific skills that are in short supply.

The share of women among OECD researchers has increased as policies have helped to close the gender gap, but more remains to be done

To further boost supplies, OECD countries are giving greater attention to increasing the participation of women in science and technology. Women account for some 30% of science and engineering graduates in OECD countries and for 25% to 35% of researchers in most OECD countries, except Japan and Korea where they comprise only 12%. In most OECD countries, the share of women researchers has increased over the past decade. While most researchers work in business, less than 18% of women researchers in the EU and 6% in Japan work in the business sector, and they tend to be concentrated in biology, health, agriculture, and pharmaceuticals. Just over one-third of US university faculty are women. Policies to improve the participation of women in S&T range from the use of quantitative targets for the share of women on scientific boards and in senior positions to mentoring and networking initiatives as well as programmes to help women re-enter the research workforce after taking parental leave.

Policies to develop human capital in S&T should focus on the demand side as well

Policies to promote human resources in S&T should focus not only on increasing supplies of graduates, but also on the demand side, especially in Europe where industry employs fewer researchers than in the United States or Japan. Ensuring that framework conditions foster mobility and academic entrepreneurship is a longstanding focus of policies in OECD countries. Government incentives for business R&D also provide direct and indirect support for job creation in research-intensive occupations. In addition, some countries are reducing labour taxes to encourage firms to hire young PhDs. Furthermore, to enhance the attractiveness of research careers, several countries have increased the amount of stipends/fellowships for PhDs and post-doctoral researchers, expanded access to social welfare benefits, limited the number of post-doctorate renewals, and improved conditions for the recruitment, employment and mobility of early-stage researchers.

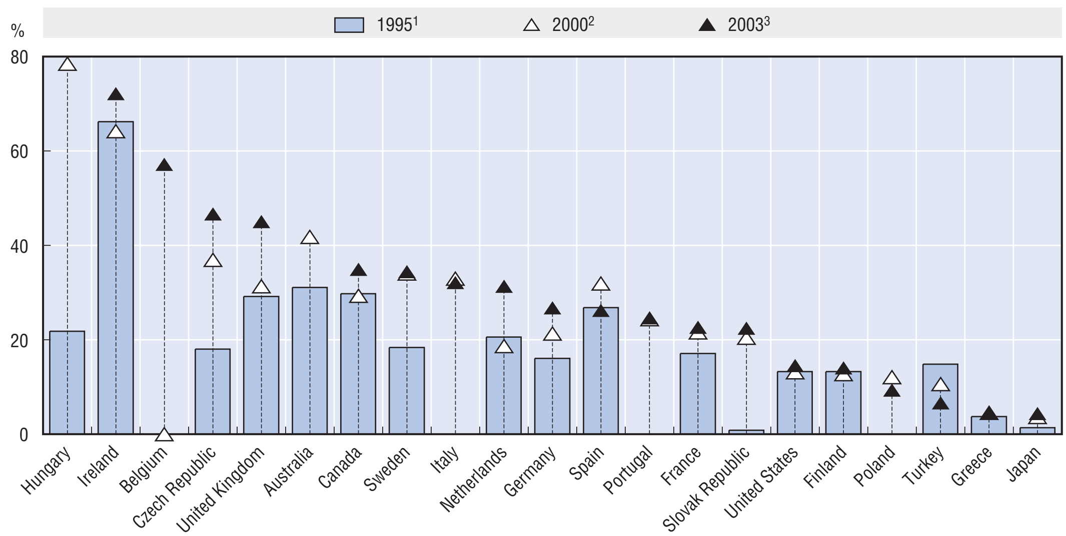
Policies still need to adjust to the rapid globalisation of R&D

Globalisation of R&D is expanding through many channels…

Globalisation dominates recent discussions of innovation policy. Until recently, R&D was one of the least internationalised of the activities of multinational enterprises (MNEs), lagging foreign-based production and marketing by a wide margin. Fuelled by growing competition and interest in foreign markets, and enabled by improved management techniques and information technology, innovation networks have become more global. Firms increasingly collaborate across national boundaries via strategic alliances and use other channels to exploit their inventions abroad. Moreover, foreign affiliates of MNEs account for a growing share of all R&D in the OECD area, an indication that more of MNEs' R&D is taking place outside the home country and away from the headquarters' R&D laboratories (Figure 6). In addition, half or more of all patent applications to the US and European patent offices are of foreign origin, and some 14% of all domestic patent applications were owned or co-owned by a foreign resident in 2000, up from 11% in 1992.

Figure 6. **R&D expenditure of foreign affiliates, 1995, 2000 and 2003**

As a percentage of R&D expenditures of enterprises



1. 1996 instead of 1995 for the Czech Republic; 1997 for the Netherlands, Finland and Turkey.
2. 1999 instead of 2000 for Ireland, Spain, Germany, Greece; 1998 for Hungary and France.
3. 2002 for Sweden, Italy, the United States, Turkey, Japan; 2001 for Germany, the Netherlands, Finland; 2003 for other countries.

Source: OECD AFA database, June 2006.

… and has become an integral part of business R&D strategy

While globalisation of business R&D has long been associated with the customisation of products and services for local markets and the exploitation of knowledge generated in the home country, MNEs' strategies appear to be changing. While the R&D intensity of foreign affiliates remains below that of domestic firms in most countries, there is greater interest in establishing research and development capabilities abroad. Firms increasingly set up foreign R&D facilities to tap into local sources of knowledge and pools of local expertise that they can exploit globally. Recent surveys suggest that location decisions are determined more by the quality and availability of skilled human resources than by costs. This appears to be true in developing, as well as in developed, countries.

The most dynamic elements of global innovation networks are in non-OECD countries

Indeed, while most internationalisation of R&D still takes place within the OECD area and more specifically in its main regions, non-OECD economies have become a dynamic element of the globalisation of R&D. China, Israel, Singapore and Chinese Taipei, for example, have seen sizeable increases in their R&D intensity over the past few years, partly owing to a series of policy reforms that have strengthened domestic capabilities and expanded opportunities for foreign investment. China's R&D intensity has more than doubled from 0.6 to 1.3% of GDP since 1995. At 4.7% of GDP, Israel's R&D intensity exceeds that of all OECD countries.

Policy has yet to catch up with the globalisation of innovation

Most OECD governments recognise that the best way to benefit from global innovation networks is to strengthen domestic innovation capabilities and develop local talent. At the same time, countries have put in place targeted policies to respond to specific challenges posed by globalisation. Several countries use R&D tax incentives to attract and retain foreign R&D investment, while others are helping firms to identify foreign partners or, as in the European Commission's Framework programmes, fostering international collaboration in research. Still others, such as Australia, offer fellowships to encourage greater international mobility of researchers, or, like Ireland, provide incentives to encourage expatriate researchers to return. As yet, few countries have determined how best to adapt national policy frameworks to a more global innovation system, but small, open economies, such as Finland and Ireland, appear to be leading the way.

Technology licensing markets are of growing importance

Licensing markets improve the efficiency of innovation systems…

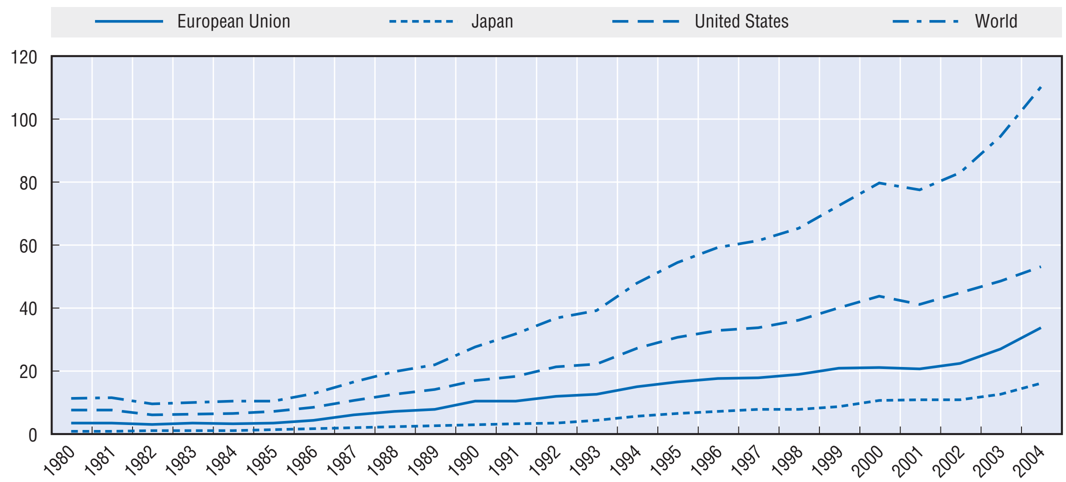
Well-functioning technology licensing markets are an increasingly important part of an effective innovation system. As IPR regimes have strengthened and patenting has increased across the OECD area, licensing has become an increasingly important channel for diffusing inventions – and the knowledge embedded in them – and facilitating follow-on innovation. Licensing can increase the efficiency of innovation processes by putting inventions in the hands of those best capable of commercialising them. It can also facilitate the entry and commercial success of small firms which often lack the assets needed to commercialise an invention themselves, but can use licensing to transfer technology to larger firms for further exploitation, while at the same time generating a stream of revenue. In a more open innovation system in which firms source technological inputs from a broad range of public and private sources, licensing has become a key mechanism for exchanging patented inventions.

… and are growing, more quickly in the United States than in Europe or Asia

Recent surveys suggest that firms in all OECD regions now license more frequently than a decade ago, and revenues from outward licensing of inventions have climbed, especially for large firms with large patent portfolios. Royalty receipts from outward licensing have been estimated at 6.0%, 5.7% and 3.1% of total R&D spending for US, Japanese and European firms, respectively, suggesting that technology licensing markets are better developed in the United States than elsewhere. Nevertheless, international licensing accounts for a significant and growing share of total patent licensing, with world-wide receipts topping USD 100 billion in 2004 (Figure 7). While much international licensing occurs between affiliated firms, a growing share appears to link unaffiliated firms. High-technology sectors, including information technology, chemicals (including pharmaceuticals) and machinery account for the vast majority of all domestic and international transactions, which shows the importance of knowledge transfers in these fields.

Figure 7. **Receipts from international licensing in major OECD regions**

Billions of USD



Source: OECD based on World Bank, World Development Indicators database, June 2006.

Regulatory, legal and information obstacles can limit the growth of licensing markets…

Expansion of licensing markets can be limited by a number of factors. Most notable is a lack of information about licensable technologies and potential licensing partners. While a number of private-sector intermediaries aim to fill this need, gaps remain, especially because expertise is limited and often sector-specific. In addition, considerable difficulties remain for estimating the value of patented inventions owing to uncertainties about the development and profitability of anticipated markets and of competing technological approaches. In recent surveys, the inability to reach mutually acceptable financial terms was the most frequently reported reason for not concluding successful licensing agreements (reported by 26% of respondents for outward licensing, and 32% for inward licensing). This suggests a need for improved methods of identifying and estimating the returns from valuable patents.

… but governments can help improve their operation

The private sector plays a leading role in developing technology licensing markets, but governments can take several steps to improve their efficiency. The basic requirement is a patent administration that ensures patent quality and the timeliness of grants, both of which give greater certainty to buyers and sellers of patents. Governments can also take steps to improve the availability of information about licensable patents, especially those held by government organisations. In Japan and Europe, governments have aimed to more actively match buyers and sellers of technology through various forums. Financial incentives can also play a role: licences of right, used in several European countries, offer reduced patent maintenance fees to patent owners willing to license a patent to all potential buyers at reasonable rates. The US tax code offers deductions for the donation of patents to non-profit organisations. In several countries, governments have worked with industry to develop tools for identifying valuable patents and estimating their value.

Demand for improved evaluation practices has risen

The growing importance of innovation policy has increased demand for better evaluation of policies

Broader recognition of innovation's importance to economic prosperity and social well-being has heightened interest in – and need for – effective evaluation of policies and practices. Whether undertaken at the level of individual policy instruments, specific public institutions or overall national innovation performance, evaluation is central to the effective management and governance of publicly funded research. It can inform decision making regarding the continuation of innovation policy instruments and the allocation of resources across agencies, fields of science and technology and policy instruments. It can also aid in better understanding the effectiveness of different types of policy instruments and tuning them to specific national needs.

New evaluation tools are needed to match the complexity of research and innovation

Evaluation now seeks to address a more complex set of questions in an increasingly complex innovation system. Public research organisations, for example, are increasingly evaluated not only on the quality of their research, but also on the relevance of their results and their ability to promote effective technology transfer. Scientific research is increasingly multidisciplinary, making it harder to use traditional peer review to evaluate research proposals or outcomes. Business R&D funding programmes may also have an important influence not on overall levels of R&D spending, but on the behaviour of the firms that receive funds: the types of R&D they choose to perform, the level or type of collaboration they pursue, or their capabilities to manage R&D.

Countries are shifting their approach to institutional evaluation from one-off reviews to periodic evaluations…

Evaluation tools are evolving to keep pace with changing demand for evaluation. Countries are increasingly shifting their approaches to institutional evaluation from one-off reviews to periodic evaluations. In Germany, Japan, Norway and Spain, such efforts have highlighted the importance of peer review mechanisms that involve foreign experts, the crucial role of site visits, and strong links between evaluation and decision making. A few countries are also beginning to evaluate funding agencies and research councils, developing new approaches and criteria for doing so. Austria and Norway appear to be among the leaders in this area. At the national level, system evaluations, such as those in Finland and Japan, increasingly seek to answer particular policy questions. Countries are also faced with growing reporting requirements, which often entail new developments in indicators, as in the United Kingdom and United States.

… but further efforts are needed to improve evaluation practices and share them more widely

Continued international co-operation is needed to improve evaluation practices and share them more widely. It is important to encourage wider and more in-depth exchanges between officials in charge of evaluation to share information on methodologies for conducting evaluations, as well as for ensuring their impact on policy making. More systematic comparative analysis of innovative approaches to evaluation should be conducted in international forums that can foster greater commonality and exchanges of countries' experiences. Another important task is to improve practices and methodologies for reviews that more explicitly consider the relationship between innovation and economic performance.

In summary, OECD countries need to improve the efficiency of their research and innovation systems and be ready to meet the challenges and opportunities from new global players

In summary, the outlook for public and business investment in R&D and innovation remains bright, but changing macroeconomic conditions, including fiscal and inflationary pressures could restrain investments in the medium-term. Furthermore, the emergence of non-member economies, especially in Asia, and with it, the structural shifts in global centres of production but also in research and innovation, present additional challenges to OECD countries. In light of these risks and challenges, OECD countries must step-up policy reforms to improve the efficiency of their research systems while improving incentives for investments in research, human capital and innovation. Several of the smaller OECD economies are moving ahead to tackle these challenges, but some of the larger economies are having greater difficulty. In the not-too-distant future, some non-member economies may become global leaders in R&D and innovation performance.

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