

The pharmaceutical industry devotes significant resources to research and development (R&D). In 2011, the industry spent USD 92 billion on R&D (OECD, 2015). This represents 10-15% of industry revenues.

While pharmaceutical and biotechnology companies are the greatest contributors to pharmaceutical R&D, pharmaceutical R&D financing is a complex mix of private and public funding. The industry receives R&D tax credits in many countries, and the development of medicines draws heavily on knowledge and innovation derived from other sectors including higher education and NGOs (Kezselheim et al., 2015).

Worldwide, most pharmaceutical R&D activity takes place in OECD countries. In 2011, the pharmaceutical industry spent close to USD 50 billion for R&D in the United States, 11.5 billion in Japan, 5.2 in Germany and 3.7 in France. As a share of GDP, pharmaceutical industry R&D spending is highest in Switzerland (0.63%), Belgium (0.45%), Slovenia (0.45%) and Denmark (0.36%) (Figure 10.14). In the United States and Japan, the percentages were 0.30 and 0.26 respectively.

In some countries, pharmaceutical R&D accounts for one-fourth to one-third of total private R&D expenditure, reflecting a high degree of specialisation. This is the case in Belgium (31%), Switzerland (30%), the United Kingdom (28%), Hungary (26%) and Slovenia (25%). Sixteen and ten per cent of private R&D was spent on pharmaceuticals in the United States and Japan respectively.

Expenditure on R&D in the pharmaceutical industry in OECD countries doubled in real terms between 2000 and 2011 (Figure 10.15). Expenditure growth was the highest in the United States (+85%), followed by Japan (+76%) and Europe (+38%). Outside the OECD, China has seen pharmaceutical R&D spending increase by 3.4-fold during that time.

Is this increase in R&D spending associated with a higher output or productivity? In the United States, the world's largest developer of pharmaceuticals, the annual number of approved new drugs, formulations or indications has more than doubled since 1970 (Figure 10.16). However, when compared with R&D spending over that period (adjusted for inflation), the number of approvals per billion USD spent on R&D has reduced by a factor of 15 (Figure 10.16).

The reasons for this observation are likely to be complex. Growing requirements to obtain regulatory approval have increased development costs. Higher failure rates and an ever-increasing "back catalogue" of effective drugs may also be a factor. More fundamental problems with the current R&D model and development pipeline have also been suggested (Scannell et al., 2012). Risk-benefit decisions made by industry regarding early R&D targets may also be a function of the regulator, payer and the community response to the eventual product. Of course, the downward

trend may reverse in the coming years due to changes in the R&D model, or the emergence of new technology (e.g. precision medicine).

Definition and comparability

Business enterprise expenditure on R&D (BERD) covers R&D activities carried out in the private sector by performing firms and institutes, regardless of the origin of funding. This includes all firms, organisations and institutions whose primary activity is the production of goods and services for sale to the general public at an economically significant price, and the private and not-for-profit institutions serving them. BERD will register in the country where the R&D activity took place, not the country of origin of the organisations funding the activity.

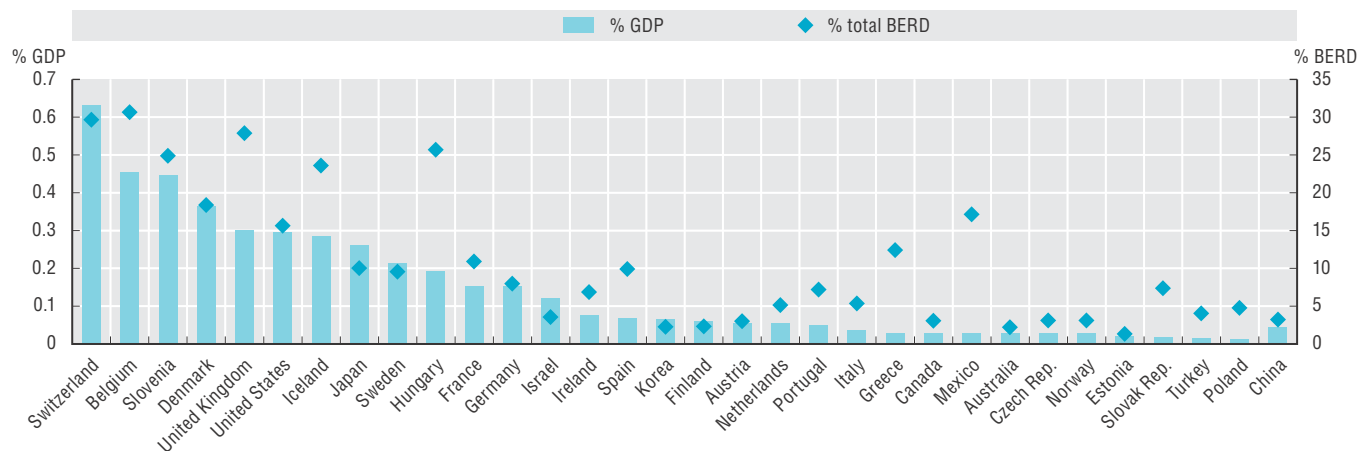
Data are provided by participating countries using a survey. When assessing changes in BERD over time, it is necessary to take account of changes in methods and breaks in series, notably in terms of the extension of survey coverage, particularly in the services sector, and the privatisation of publicly owned firms. Identifying new and occasional R&D performers is also a challenge and OECD countries take different approaches in their BERD surveys.

Gross domestic product (GDP) = final consumption + gross capital formation + net exports. Final consumption of households includes goods and services used by households or the community to satisfy their individual needs. It includes final consumption expenditure of households, general government and non-profit institutions serving households. In countries, such as Ireland and Luxembourg, where a significant proportion of GDP refers to profits exported and not available for national consumption, GNI may be a more meaningful measure than GDP.

References

- Kezselheim, A., Y. Tan and J. Avorn (2015), "The Roles of Academia, Rare Diseases, and Repurposing in the Development of the Most Transformative Drugs", *Health Affairs*, Vol. 34, pp. 286-293.
- OECD (2015), *Main Science and Technology Indicators Database*, online, available at: www.oecd.org/sti/msti.htm [accessed 8 July 2015].
- Scannell, J. et al. (2012), "Diagnosing the Decline in Pharmaceutical R&D Efficiency", *Nature Reviews Drug Discovery*, pp. 191-200.

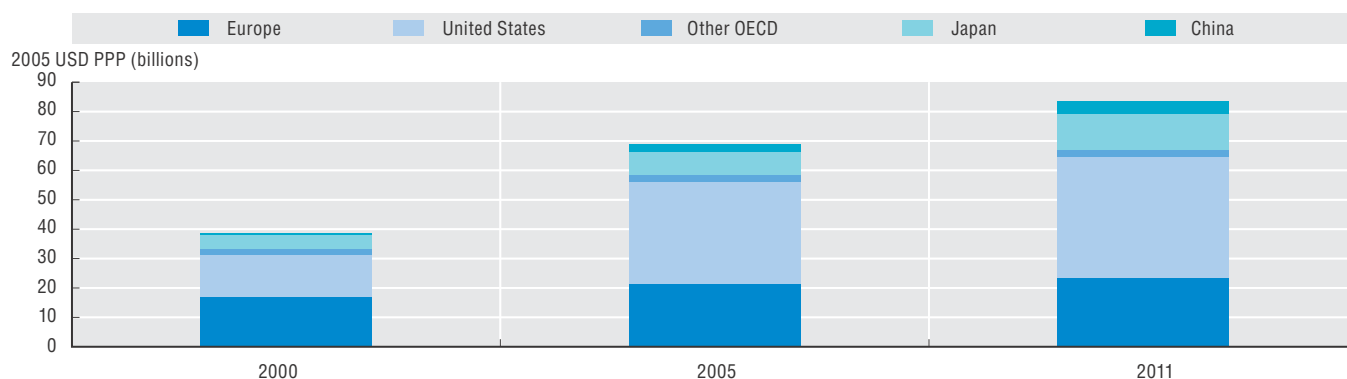
10.14. Business expenditure on R&D (BERD) in pharmaceutical industry as a proportion of GDP and of total BERD, 2011 (or nearest year)



Source: OECD Main Science and Technology Indicators Database.

StatLink <http://dx.doi.org/10.1787/888933281362>

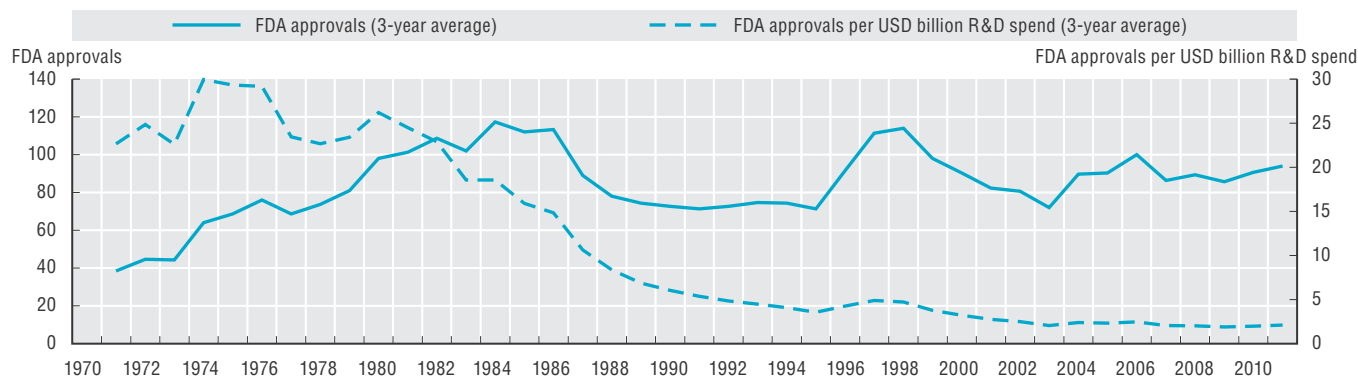
10.15. Business expenditure on R&D in the pharmaceutical sector by region in 2000, 2005 and 2011 (or nearest years) in 2005 USD PPP



Source: OECD Main Science and Technology Indicators Database.

StatLink <http://dx.doi.org/10.1787/888933281362>

10.16. Annual FDA pharmaceutical approvals, per USD billion R&D spend (indexed to 2008 USD)



Source: Pharmaceutical Research and Manufacturers of America (PhRMA); Food and Drug Administration (FDA); Scannell et al (2012).

StatLink <http://dx.doi.org/10.1787/888933281362>

Information on data for Israel: <http://oe.cd/israel-disclaimer>



From:
Health at a Glance 2015
OECD Indicators

Access the complete publication at:
https://doi.org/10.1787/health_glance-2015-en

Please cite this chapter as:

OECD (2015), "Research and development in the pharmaceutical sector", in *Health at a Glance 2015: OECD Indicators*, OECD Publishing, Paris.

DOI: https://doi.org/10.1787/health_glance-2015-70-en

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at info@copyright.com or the Centre français d'exploitation du droit de copie (CFC) at contact@cfcopies.com.