

## EXPENDITURE ON R&D

Expenditure on research and development (R&D) is a key indicator of government and private sector efforts to obtain competitive advantage in science and technology.

### Definition

Research and development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge (including knowledge of man, culture and society) and the use of this knowledge to devise new applications. R&D covers three activities: basic research, applied research, and experimental development. Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view. Applied research is also original investigation undertaken in order to acquire new knowledge; it is, however, directed primarily towards a specific practical aim or objective. Experimental development is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

The main aggregate used for international comparisons is gross domestic expenditure on R&D (GERD). This consists of the total expenditure (current and capital) on R&D by all resident companies, research institutes, university and government laboratories, etc. It excludes R&D expenditures financed by domestic firms but performed abroad. GERD is here expressed as a share of GDP.

### Comparability

The R&D data shown here have been compiled according to the guidelines of the OECD *Frascati Manual*. Estimates of the resources allocated to R&D are affected by national characteristics such as the periodicity and coverage of national R&D surveys across institutional sectors and industries (and the inclusion of firms and organisations of different sizes); and the use of different sampling and estimation methods. R&D typically involves a few large performers, hence R&D surveys use various techniques to maintain up-to-date registers of known performers, while attempting to identify new or occasional performers.

Data for Israel exclude defence. Those for Korea, prior to 2007, exclude social sciences and the humanities. Those for the United States, exclude capital expenditure.

### Overview

In 2008, research and development amounted to 2.3% of GDP for the OECD as a whole. Denmark (since 2009), Finland, Israel, Japan, Korea, Sweden and Switzerland were the only OECD countries in which the R&D-to-GDP ratio exceeded 3%, well above the OECD average. Since 2000, R&D expenditure relative to GDP has increased significantly in the EU and Japan and only slightly in the United States. In China, R&D intensity increased from 0.9% in 2000 to 1.7% in 2009.

Since the mid-1990s, R&D expenditure in real terms has been growing the fastest (among OECD countries) in Turkey and Portugal, both with average annual growth rates above 10%. In China, growth in real R&D spending since 2000 has exceeded 18% per year.

### Sources

- OECD (2011), *Main Science and Technology Indicators*, OECD Publishing.

### Further information

#### Analytical publications

- OECD (2010), *OECD Science, Technology and Industry Outlook 2010*, OECD Publishing.
- OECD (2011), *OECD Science, Technology and Industry Scoreboard 2011*, OECD Publishing.

#### Statistical publications

- OECD (2011), *OECD Science, Technology and R&D Statistics*, OECD Publishing.

#### Methodological publications

- OECD (2002), *Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development, The Measurement of Scientific and Technological Activities*, OECD Publishing.

#### Websites

- OECD Science, Technology and Industry, [www.oecd.org/sti](http://www.oecd.org/sti).



## Gross domestic expenditure on R&amp;D

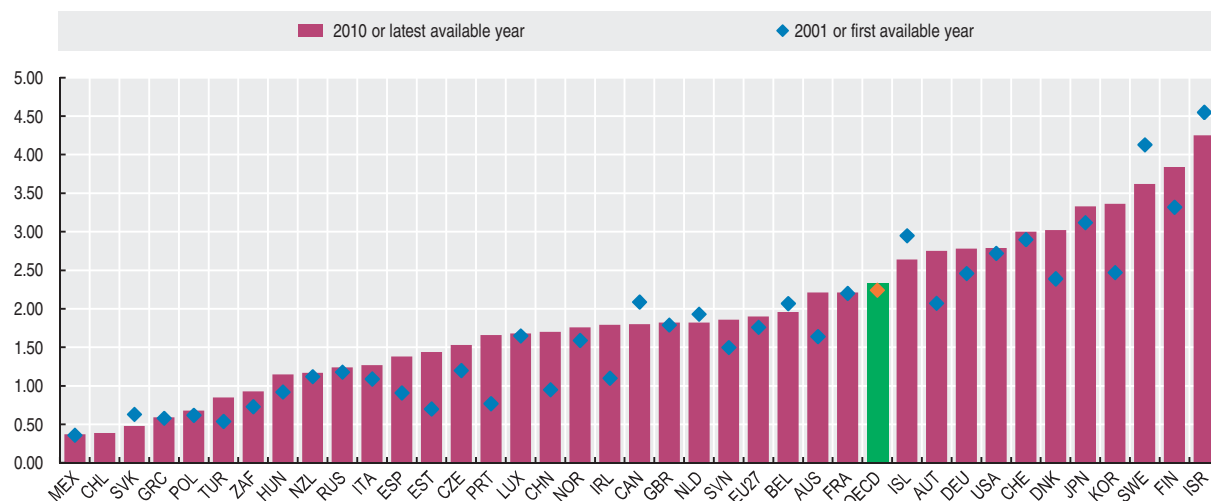
As a percentage of GDP

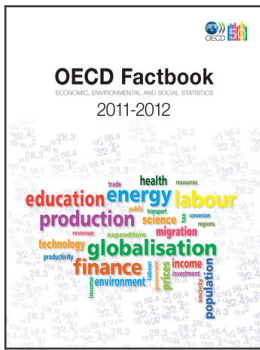
	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Australia	..	1.43	..	1.47	..	1.64	..	1.72	..	2.00	..	2.21	..	..
Austria	1.70	1.78	1.90	1.94	2.07	2.14	2.26	2.26	2.48	2.46	2.52	2.67	2.75	2.75
Belgium	1.83	1.86	1.94	1.97	2.07	1.94	1.88	1.86	1.83	1.86	1.90	1.96	1.96	..
Canada	1.66	1.76	1.80	1.91	2.09	2.04	2.04	2.07	2.04	2.00	1.96	1.87	1.92	1.80
Chile	..	..	..	..	..	..	..	..	..	..	0.33	0.39	..	..
Czech Republic	1.08	1.15	1.14	1.21	1.20	1.20	1.25	1.25	1.41	1.55	1.54	1.47	1.53	..
Denmark	1.92	2.04	2.18	..	2.39	2.51	2.58	2.48	2.46	2.48	2.58	2.87	3.02	..
Estonia	..	0.57	0.68	0.60	0.70	0.72	0.77	0.85	0.93	1.13	1.10	1.29	1.42	1.44
Finland	2.71	2.88	3.17	3.35	3.32	3.37	3.44	3.45	3.48	3.48	3.47	3.72	3.96	3.84
France	2.19	2.14	2.16	2.15	2.20	2.23	2.17	2.15	2.10	2.10	2.07	2.11	2.21	..
Germany	2.24	2.27	2.40	2.45	2.46	2.49	2.52	2.49	2.49	2.53	2.53	2.68	2.78	..
Greece	0.45	..	0.60	..	0.58	..	0.57	0.55	0.59	0.58	0.59	..	..	..
Hungary	0.70	0.66	0.67	0.79	0.92	1.00	0.93	0.87	0.95	1.00	0.97	1.00	1.15	..
Iceland	1.83	2.00	2.30	2.67	2.95	2.95	2.82	..	2.77	2.99	2.68	2.64	..	..
Ireland	1.27	1.24	1.18	1.12	1.10	1.10	1.17	1.23	1.25	1.25	1.29	1.45	1.79	..
Israel	2.97	3.08	3.52	4.27	4.55	4.56	4.28	4.28	4.41	4.43	4.76	4.68	4.28	4.25
Italy	1.03	1.05	1.02	1.05	1.09	1.13	1.11	1.10	1.09	1.13	1.18	1.23	1.27	..
Japan	2.87	3.00	3.02	3.04	3.12	3.17	3.20	3.17	3.32	3.40	3.44	3.44	3.33	..
Korea	2.41	2.26	2.17	2.30	2.47	2.40	2.49	2.68	2.79	3.01	3.21	3.36	..	..
Luxembourg	..	..	..	1.65	..	..	1.65	1.63	1.56	1.66	1.58	1.56	1.68	..
Mexico	0.31	0.34	0.39	0.34	0.36	0.40	0.40	0.40	0.41	0.39	0.37	..	..	..
Netherlands	1.99	1.90	1.98	1.94	1.93	1.88	1.92	1.93	1.90	1.88	1.81	1.76	1.82	..
New Zealand	1.08	..	0.98	..	1.12	..	1.17	..	1.14	..	1.17	..	..	..
Norway	1.63	..	1.64	..	1.59	1.66	1.71	1.59	1.52	1.52	1.62	1.61	1.76	..
Poland	0.65	0.67	0.69	0.64	0.62	0.56	0.54	0.56	0.57	0.56	0.57	0.60	0.68	..
Portugal	0.57	0.63	0.69	0.73	0.77	0.73	0.71	0.75	0.78	0.99	1.17	1.50	1.66	..
Slovak Republic	1.08	0.78	0.66	0.65	0.63	0.57	0.57	0.51	0.51	0.49	0.46	0.47	0.48	..
Slovenia	1.28	1.34	1.37	1.39	1.50	1.47	1.27	1.40	1.44	1.56	1.45	1.65	1.86	..
Spain	0.80	0.87	0.86	0.91	0.91	0.99	1.05	1.06	1.12	1.20	1.27	1.35	1.38	..
Sweden	3.47	..	3.58	..	4.13	..	3.80	3.58	3.56	3.68	3.40	3.70	3.62	..
Switzerland	..	..	..	2.53	..	..	..	2.90	..	..	..	3.00	..	..
Turkey	0.37	0.37	0.47	0.48	0.54	0.53	0.48	0.52	0.59	0.58	0.72	0.73	0.85	..
United Kingdom	1.77	1.76	1.82	1.81	1.79	1.79	1.75	1.68	1.73	1.75	1.78	1.77	1.85	1.82
United States	2.57	2.60	2.64	2.71	2.72	2.62	2.61	2.54	2.57	2.61	2.67	2.79	..	..
EU27 total	1.66	1.67	1.72	1.74	1.76	1.77	1.76	1.73	1.74	1.77	1.77	1.84	1.90	..
OECD total	2.10	2.12	2.16	2.20	2.24	2.21	2.21	2.18	2.21	2.24	2.27	2.33	..	..
China	0.64	0.65	0.76	0.90	0.95	1.07	1.13	1.23	1.32	1.39	1.40	1.47	1.70	..
Russian Federation	1.04	0.95	1.00	1.05	1.18	1.25	1.29	1.15	1.07	1.07	1.12	1.04	1.24	..
South Africa	0.60	..	..	..	0.73	..	0.79	0.85	0.90	0.93	0.92	0.93	..	..

StatLink <http://dx.doi.org/10.1787/888932505830>

## Gross domestic expenditure on R&amp;D

As a percentage of GDP

StatLink <http://dx.doi.org/10.1787/888932505849>



**From:**  
**OECD Factbook 2011-2012**  
Economic, Environmental and Social Statistics

**Access the complete publication at:**  
<https://doi.org/10.1787/factbook-2011-en>

**Please cite this chapter as:**

OECD (2011), "Expenditure on R&D", in *OECD Factbook 2011-2012: Economic, Environmental and Social Statistics*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/factbook-2011-68-en>

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