

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.

Overview

In 2007, research and development amounted to 2.3% of GDP for the OECD as a whole. Finland, Japan, Korea and Sweden 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 Japan and only slightly in the United States, while it remained relatively stable (at 1.8% in 2007) in the EU. In China, R&D intensity increased from 0.9% in 2000 to 1.4% in 2007.

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 20% per year.

Comparability

The R&D data shown here have been compiled according to the guidelines of the *Frascati Manual*. It should, however, be noted that, over the period shown, several countries have improved the coverage of their surveys of R&D activities in the services sector (Japan, Netherlands, Norway and United States) and in higher education (Finland, Greece, Japan, Netherlands, Spain and the United States). Some of the changes shown in the table will hence reflect these methodological improvements as well as the underlying changes in R&D expenditures.

For Korea, prior to 2007, social sciences and the humanities are excluded from the R&D data. For the United States, capital expenditure is not covered.

Data for Brazil and India do not fully comply with the guidelines of the *Frascati Manual*, and were compiled from national sources. Data for Brazil and South Africa are likely to be underestimated as are the data for China before 2000.

Sources

- OECD (2009), *Main Science and Technology Indicators*, OECD, Paris.

Further information

Analytical publications

- OECD (2009), *OECD Science, Technology and Industry Scoreboard 2009*, OECD, Paris.
- OECD (2008), *OECD Science, Technology and Industry Outlook 2008*, OECD, Paris.

Statistical publications

- OECD (2009), *OECD Science, Technology and R&D Statistics on CD-ROM*, OECD, Paris.

Methodological publications

- OECD (2003), *Frascati Manual 2002: Proposed Standard Practice for Surveys on Research and Experimental Development*, OECD, Paris.

Web sites

- OECD Science, Technology and Industry, www.oecd.org/sti.



Gross domestic expenditure on R&D

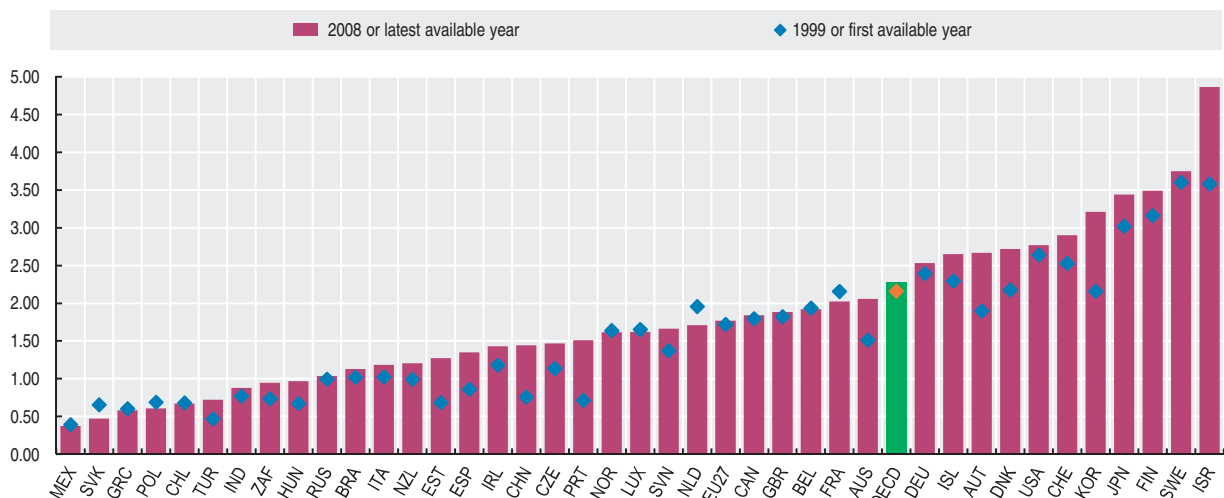
As a percentage of GDP

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Australia	..	1.61	..	1.47	..	1.51	..	1.69	..	1.78	..	2.06	..	..
Austria	1.55	1.60	1.70	1.78	1.90	1.94	2.07	2.14	2.26	2.26	2.45	2.47	2.54	2.67
Belgium	1.67	1.77	1.83	1.86	1.94	1.97	2.07	1.94	1.88	1.86	1.83	1.86	1.90	1.92
Canada	1.70	1.65	1.66	1.76	1.80	1.91	2.09	2.04	2.04	2.07	2.05	1.97	1.90	1.84
Czech Republic	0.95	0.97	1.08	1.15	1.14	1.21	1.20	1.20	1.25	1.25	1.41	1.55	1.54	1.47
Denmark	1.82	1.84	1.92	2.04	2.18	..	2.39	2.51	2.58	2.48	2.46	2.48	2.55	2.72
Finland	2.26	2.52	2.70	2.87	3.16	3.35	3.30	3.36	3.43	3.45	3.48	3.45	3.47	3.49
France	2.29	2.27	2.19	2.14	2.16	2.15	2.20	2.23	2.17	2.15	2.10	2.10	2.04	2.02
Germany	2.19	2.19	2.24	2.27	2.40	2.45	2.46	2.49	2.52	2.49	2.49	2.53	2.53	..
Greece	0.43	..	0.45	..	0.60	..	0.58	..	0.57	0.55	0.59	0.58	0.58	..
Hungary	0.72	0.63	0.70	0.66	0.67	0.79	0.92	1.00	0.93	0.87	0.94	1.00	0.97	..
Iceland	1.53	..	1.83	2.00	2.30	2.67	2.95	2.95	2.82	..	2.77	2.99	2.70	2.65
Ireland	1.26	1.30	1.27	1.24	1.18	1.12	1.10	1.10	1.17	1.23	1.25	1.25	1.28	1.43
Italy	0.97	0.99	1.03	1.05	1.02	1.05	1.09	1.13	1.11	1.10	1.09	1.13	1.18	1.18
Japan	2.92	2.81	2.87	3.00	3.02	3.04	3.12	3.17	3.20	3.17	3.32	3.40	3.44	..
Korea	2.27	2.33	2.38	2.25	2.16	2.30	2.47	2.40	2.49	2.68	2.79	3.01	3.21	..
Luxembourg	..	..	..	..	..	1.65	..	..	1.65	1.63	1.56	1.65	1.57	1.62
Mexico	0.28	0.28	0.31	0.34	0.39	0.34	0.36	0.40	0.40	0.40	0.41	0.39	0.37	..
Netherlands	1.97	1.98	1.99	1.90	1.96	1.82	1.80	1.72	1.76	1.81	1.79	1.78	1.71	..
New Zealand	0.95	..	1.09	..	1.00	..	1.14	..	1.19	..	1.16	..	1.21	..
Norway	1.69	..	1.63	..	1.64	..	1.59	1.66	1.71	1.59	1.52	1.52	1.64	1.62
Poland	0.63	0.65	0.65	0.67	0.69	0.64	0.62	0.56	0.54	0.56	0.57	0.56	0.57	0.61
Portugal	0.54	0.57	0.59	0.65	0.71	0.76	0.80	0.76	0.74	0.77	0.81	1.02	1.21	1.51
Slovak Republic	0.92	0.91	1.08	0.78	0.66	0.65	0.63	0.57	0.57	0.51	0.51	0.49	0.46	0.47
Spain	0.79	0.81	0.80	0.87	0.86	0.91	0.91	0.99	1.05	1.06	1.12	1.20	1.27	1.35
Sweden	3.26	..	3.48	..	3.61	..	4.17	..	3.85	3.62	3.60	3.74	3.61	3.75
Switzerland	..	2.65	..	..	..	2.53	..	..	..	2.90	..	..	..	..
Turkey	0.28	0.34	0.37	0.37	0.47	0.48	0.54	0.53	0.48	0.52	0.59	0.58	0.72	..
United Kingdom	1.91	1.83	1.77	1.76	1.82	1.81	1.79	1.79	1.75	1.69	1.73	1.76	1.82	1.88
United States	2.50	2.54	2.57	2.60	2.64	2.71	2.72	2.62	2.61	2.54	2.57	2.61	2.66	2.77
EU27 total	1.66	1.66	1.66	1.67	1.72	1.74	1.75	1.76	1.75	1.73	1.74	1.76	1.77	..
OECD total	2.05	2.08	2.10	2.12	2.16	2.19	2.23	2.20	2.20	2.17	2.21	2.24	2.28	..
Brazil	0.80	0.72	..	..	..	1.02	1.04	0.98	0.96	0.90	0.97	1.00	1.10	1.13
Chile	..	..	..	..	..	..	..	0.68	0.67	0.67	..	..	..	..
China	0.57	0.57	0.64	0.65	0.76	0.90	0.95	1.07	1.13	1.23	1.34	1.42	1.44	..
Estonia	..	..	..	0.57	0.68	0.60	0.70	0.72	0.77	0.85	0.93	1.14	1.11	1.27
India	..	0.69	0.71	0.76	0.77	0.81	0.84	0.81	0.80	0.79	0.84	0.88	0.87	0.88
Israel	2.57	2.74	3.00	3.14	3.58	4.32	4.60	4.59	4.32	4.26	4.37	4.40	4.76	4.86
Russian Federation	0.85	0.97	1.04	0.95	1.00	1.05	1.18	1.25	1.28	1.15	1.07	1.07	1.12	1.03
Slovenia	1.53	1.29	1.28	1.34	1.37	1.39	1.50	1.47	1.27	1.40	1.44	1.56	1.45	1.66
South Africa	0.60	0.73	..	0.80	0.86	0.92	0.95

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Gross domestic expenditure on R&D

As a percentage of GDP

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