

EXPENDITURE ON R&D

Expenditure on research and development (R&D) is a key indicator of countries' innovative efforts. Research and development 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.

Definition

Research and development 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 carried out by all resident companies, research institutes, university and government laboratories, etc. It includes R&D funded from abroad but excludes domestic funds for R&D performed outside the domestic economy. GERD is expressed in

constant 2010 dollars (adjusted for purchasing power parity) and as a share of GDP (R&D intensity).

Comparability

R&D data have been compiled according to the 2002 guidelines of the *Frascati Manual* which have now been superseded by the 2015 edition. The revised definitions are in the course of being implemented and are not expected to revise significantly the major indicators. 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.

Data for Israel exclude defence. Those for Korea, prior to 2007, exclude social sciences and the humanities. For the United States, R&D capital expenditures are excluded (except for the government sector) and depreciation charges of the business enterprises are included.

The latest update to the *System of National Accounts (SNA)*, the 2008 SNA, recognised the role of R&D as an activity leading to the creation of an intellectual asset. One implication of this is that the level of GDP has been revised upwards and the R&D intensity ratio has been reduced, as the numerator has stayed constant and the denominator increased. Users should be careful when comparing the R&D intensity of countries that have and have not capitalised R&D in their national accounts. Likewise, they should avoid comparing previously published measures of R&D intensity and more recent ones.

Overview

Among OECD countries, the United States has the highest level of gross domestic expenditure on R&D (GERD), with 40% of the total OECD GERD in 2013, followed by Japan (14%) and Germany (9%). Since 2000, real R&D expenditure has been growing fastest in Estonia (average annual growth rate of 12.5%), Turkey (9.7%), Korea (9.4%) and Slovenia (7%). Outside the OECD area, China's average annual real growth in R&D spending has been 17.2%, making it the world's second largest R&D performer and ahead of Japan since 2009.

In 2013, R&D amounted to 2.4% of GDP for the OECD as a whole. Denmark, Finland, Israel, Japan, Korea and Sweden were the only OECD countries whose R&D-to-GDP ratio exceeded 3%.

Over the last decade, R&D intensity grew in the EU (from 1.7% to 1.9%), in Japan (from 3.1% to 3.5%) and in the United States (from 2.6% to 2.7%). Estonia, Portugal, Slovenia and Turkey were the fastest growing OECD countries. In the same period, R&D intensity in China increased from 1.1% to 2.1% and surpassed the EU for the first time in 2012.

Sources

- OECD (2015), *Main Science and Technology Indicators*, OECD Publishing.

Further information

Analytical publications

- OECD (2015), *Frascati Manual 2015: Guidelines for Collecting and Reporting Data on Research and Experimental Development*, OECD Publishing.
- OECD (2015), *OECD Science, Technology and Industry Scoreboard*, OECD Publishing.
- OECD (2014), *OECD Science, Technology and Industry Outlook*, OECD Publishing.

Methodological publications

Online databases

- *OECD Science, Technology and R&D Statistics*.

Websites

- Main Science and Technology Indicators (supplementary material), www.oecd.org/sti/msti.
- Research and Development Statistics, www.oecd.org/sti/rds.



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Gross domestic expenditure on R&D

Million US dollars, 2010 constant prices and PPPs

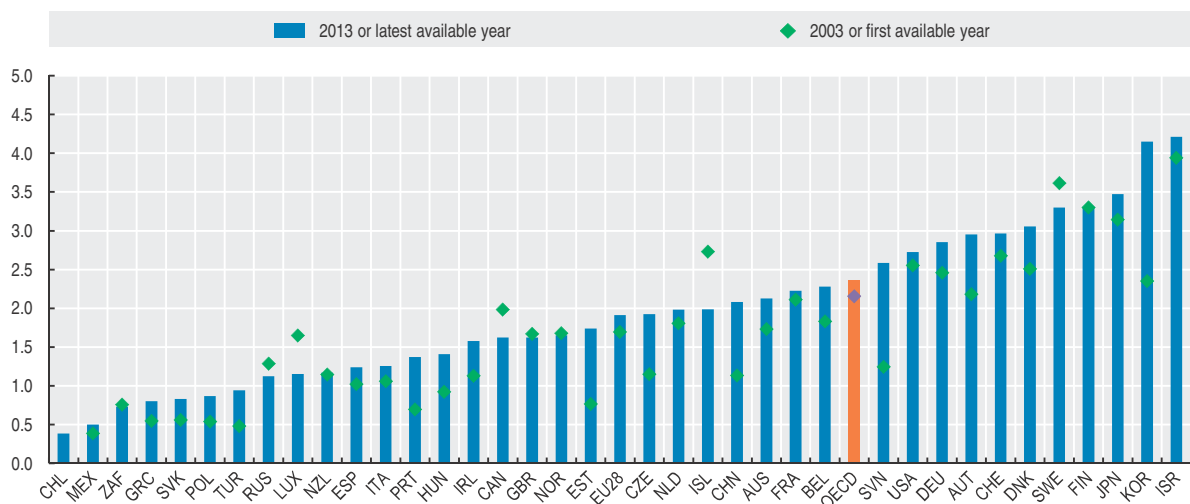
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Australia	..	12 206	..	13 773	..	17 031	..	20 174	..	20 546	20 653	..	..
Austria	6 093	6 424	6 825	6 981	7 818	8 039	8 545	9 223	8 969	9 586	9 662	10 485	10 754
Belgium	7 540	7 161	6 996	7 145	7 172	7 469	7 828	8 231	8 272	8 766	9 358	9 770	9 963
Canada	23 380	23 499	23 857	24 959	25 401	25 663	25 673	25 303	25 333	25 029	24 946	24 436	23 673
Chile	..	..	..	..	..	..	892	1 113	1 037	1 028	1 162	1 265	1 398
Czech Republic	2 362	2 399	2 589	2 709	2 942	3 313	3 699	3 615	3 593	3 796	4 507	5 129	5 474
Denmark	5 073	5 353	5 527	5 468	5 537	5 771	6 091	6 684	7 005	6 812	6 959	7 045	7 089
Estonia	150	163	188	222	263	351	363	405	382	444	712	687	562
Finland	5 693	5 897	6 097	6 361	6 567	6 849	7 222	7 712	7 476	7 653	7 666	7 101	6 781
France	44 884	46 165	45 371	46 088	45 888	46 997	47 513	48 490	50 530	50 730	52 155	53 196	53 493
Germany	71 846	72 750	73 457	73 239	73 809	77 602	79 820	85 650	84 767	87 822	93 726	96 756	96 069
Greece	1 572	..	1 691	1 715	1 894	1 942	2 064	2 359	2 134	1 927	1 967	1 890	2 119
Hungary	1 674	1 883	1 831	1 801	2 013	2 227	2 183	2 254	2 436	2 473	2 625	2 744	3 078
Iceland	280	281	275	..	311	351	338	338	338	..	314	..	263
Ireland	1 711	1 815	1 988	2 178	2 333	2 473	2 659	2 921	3 192	3 166	3 082	3 160	..
Israel	6 669	6 588	6 286	6 563	7 145	7 752	8 807	8 926	8 611	8 673	9 372	9 993	10 236
Italy	21 201	22 066	21 634	21 793	21 874	23 162	24 492	24 898	24 697	25 152	25 022	25 548	24 835
Japan	123 563	125 578	128 853	131 447	140 618	147 337	152 878	151 532	138 627	140 607	145 528	146 330	154 515
Korea	23 896	24 934	26 543	29 986	32 316	36 635	40 952	43 839	46 549	52 173	58 427	64 268	68 149
Luxembourg	..	..	578	596	606	678	702	707	698	641	618	506	515
Mexico	5 058	5 639	5 689	6 011	6 352	6 154	6 274	6 971	7 094	7 864	7 651	8 077	9 505
Netherlands	11 993	11 689	11 960	12 259	12 450	12 689	12 660	12 564	12 395	12 822	14 383	14 527	14 638
New Zealand	1 197	..	1 370	..	1 432	..	1 575	..	1 679	..	1 722	..	1 693
Norway	3 592	3 680	3 829	3 791	3 958	4 178	4 571	4 802	4 828	4 744	4 899	5 054	5 168
Poland	3 395	3 103	3 104	3 367	3 550	3 684	4 015	4 476	5 072	5 723	6 223	7 478	7 428
Portugal	2 061	1 960	1 877	1 997	2 090	2 676	3 231	4 161	4 413	4 363	4 071	3 695	3 617
Slovak Republic	531	500	526	494	519	542	566	616	597	816	903	1 114	1 157
Slovenia	656	668	595	682	732	840	834	984	1 013	1 163	1 378	1 426	1 417
Spain	11 201	12 428	13 654	14 311	15 663	17 454	19 075	20 578	20 359	20 336	19 756	18 608	17 960
Sweden	12 630	..	12 189	11 931	12 263	13 255	12 752	13 610	12 611	12 585	12 952	13 145	13 396
Switzerland	..	..	..	9 346	..	..	..	10 875	..	..	..	12 250	..
Turkey	4 053	4 208	4 069	4 774	5 901	6 192	8 070	8 154	9 086	9 853	10 921	11 964	12 774
United Kingdom	33 572	34 389	34 831	34 443	35 873	37 387	39 153	39 035	38 605	38 139	38 787	37 633	38 116
United States	338 685	333 151	342 931	347 142	361 066	377 207	395 494	415 342	411 369	410 093	420 072	419 722	433 380
EU 28	249 178	254 184	256 513	259 025	265 325	279 139	289 692	303 718	302 976	308 607	320 503	325 744	325 568
OECD	797 175	801 542	819 758	835 994	872 322	916 577	960 528	998 381	985 019	998 864	1 033 905	1 048 576	1 076 732
Brazil	..	..	..	..	..	..	..	..	..	..	..	..	..
China	46 018	56 499	65 854	78 656	94 305	111 357	127 816	147 563	186 611	213 010	243 035	282 481	317 848
India	..	..	..	..	..	..	..	..	..	..	..	..	..
Indonesia	..	..	..	..	..	..	..	..	..	..	..	..	..
Russian Federation	22 623	25 097	27 753	26 629	26 276	28 551	32 234	31 745	35 078	33 094	33 298	35 522	35 937
South Africa	3 126	..	3 545	3 964	4 429	4 867	5 040	5 232	4 847	4 405	4 529	4 614	..

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<http://dx.doi.org/10.1787/888933336203>
Gross domestic expenditure on R&D

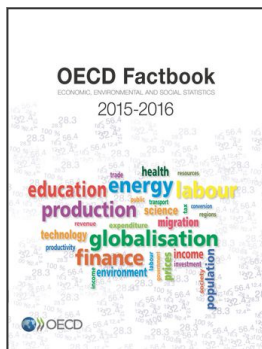
As a percentage of GDP



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<http://dx.doi.org/10.1787/888933335027>



From:
OECD Factbook 2015-2016
Economic, Environmental and Social Statistics

Access the complete publication at:
<https://doi.org/10.1787/factbook-2015-en>

Please cite this chapter as:

OECD (2016), "Expenditure on R&D", in *OECD Factbook 2015-2016: Economic, Environmental and Social Statistics*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/factbook-2015-64-en>

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