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Foreword

This publication is prepared by the Economic Analysis and Statistics (EAS) Division of the OECD Directorate for Science, Technology, and Innovation in collaboration with the Working Party of National Experts on Science and Technology Indicators (NESTI). It contains key data series selected from the OECD Scientific and Technological Indicators Database.

The first part of this publication presents a summary table and charts of key science and technology indicators.

The second part consists of 72 standard tables of data series regarding the resources devoted to research and experimental development (R&D) as well as some indicators of R&D output and the impact of scientific and technological activities. It is complemented by a description of the general methodology used. National specifications and background economic indicators are shown in annex.

R&D data

The OECD has been collecting R&D data on a regular basis since the early 1960s. During the 1990s, the collection was widened to include selected non-Member economies. This publication presents various indicators of the level and trends in total national R&D efforts. The flagship measure is Gross Domestic Expenditure on Research and Experimental Development (GERD), *which captures all spending on R&D carried out within each economy each year. The sources of financing and of performance of GERD is also presented.*

Further information is given on R&D performed in the Business Enterprise sector – the main R&D performing sector. This includes tables showing the most intensive industries carrying out Business enterprise Expenditure on R&D (BERD). Indicators are also provided for R&D carried out in the Higher Education and Government sectors. All such tables are mainly based on retrospective surveys of the units carrying out the R&D.

Two tables show data on the R&D expenditure of foreign-controlled affiliates. These data come from the OECD database on foreign affiliates and in some cases are not directly comparable with Business Enterprise R&D figures. They do, however, provide useful supplementary information.

Measures of the output and impact of science and technology

This publication contains no direct measures of the output of Scientific and Technological activities. However, three types of proxy indicators based on data originally collected for other purposes are presented: patent data, the technology balance of payments, and international trade in R&D-intensive industries. While each of these indicators has its shortcomings, together they may throw light on countries' technological performance.

Patent data can be considered as a proxy for the output of R&D in the form of inventions. The data presented show the total number and national percentages of triadic patent families, as well as the number of patent applications to the European Patent Office (EPO) in two specific sectors of interest: Information and Communications Technology (ICT) and biotechnology.

The Technology Balance of Payments (TBP) series comprise data extracted from national sources (balance of payments or survey results) with the aim of measuring the flow of technological know-

how and services into and out of the economy concerned. The OECD manual "Proposed Standard Method of Compiling and Interpreting Technology Balance of Payments Data" (TBP Manual, 1990), gives the methodology for the international standards for compiling such data. The series quoted comprise money paid or received for the acquisition or use of patents, licences, trademarks, designs, inventions, know-how and closely related technical services.

Indicators of trade performance in R&D intensive industries can be used as proxy measures of the industrial and economic impact of scientific and technological activity. The tables concerned give trade balances and export market shares for three selected groups of R&D intensive industries: "pharmaceuticals", "computer, electronic, and optical industry", and "aerospace".

Abbreviations

R&D terminology

BERD	Business enterprise Expenditure on R&D (intramural)
FTE	Full Time Equivalent (on R&D)
GBARD	Government Budget Allocations for R&D
GERD	Gross Domestic Expenditure on R&D (intramural)
GOVERD	Government Expenditure on R&D (intramural)
GUF	General University Funds
HERD	Higher Education Expenditure on R&D (intramural)
NSE	Natural Sciences and Engineering
PNP	Private Non Profit Institutions
R&D	Research and Experimental Development
SSH	Social Sciences and Humanities

For further explanations of the above terms, please see the OECD Frascati Manual 2015, *http://oe.cd/frascati*, which includes in particular a glossary of key terms (*www.oecd.org/sti/inno/Frascati-2015-Glossary.pdf*).

Other

GDP	Gross Domestic Product
ISIC	International Standard Industrial Classification
PCT	Patent Co-operation Treaty
PPP	Purchasing Power Parity
TBP	Technology Balance of Payments

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Standard footnotes

b) Time series break.

c) Confidential statistical information.

d) Definition differs.

e) Estimated value.

k) Data included in another category.

l) Overestimated or based on overestimated data.

m) Underestimated or based on underestimated data.

p) Provisional value.

s) Unrevised breakdown not adding to the revised total.

v) The sum of the breakdown does not add to the total.

w) Includes data from another category.

The latest data for European countries, as well as Iceland, Norway, the Russian Federation, Switzerland and Turkey, were collected by Eurostat. From 2017, Eurostat follows slightly different, but generally compatible, conventions with regard to footnotes:

- Countries only use flags 'b', 'c', 'd', 'e' and 'p'.
- Only one flag may be submitted per data item (cell).
- The flags follow a hierarchy: p > b > d > e. As an example, an estimated (e) and provisional (p) data will be annotated with a 'p'.
- Estimated (e), overestimated (l) and underestimated (m) data are all annotated with an 'e' flag.
- 'd', 'k', 's', 'v' and 'w' flags are grouped as 'd' (definition differs).

In this publication, flags for these countries are published as they were received by the OECD from Eurostat, except in the following cases:

- The single-flag rule is not applied when this would lead to supress 'b' flags indicating breaks in series.
- 's' flags are not replaced with 'd'.

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Key figures

Key Figures

2016 or latest year available

	Gross Domestic Expenditure on R&D						Total Researchers
	Million current PPP$	% financed by		% performed by			Full time equivalent
		Industry	Government	Industry	Higher Education	Government	
Australia	21 198.5[e]	61.9	34.6	53.4[e]	30.6[e]	12.7[e]	100 414[e]
Austria	13 625.5[p]	53.4[p]	30.7[d, p]	71.4[p]	23.5[p]	4.6[p]	44 933[d, p]
Belgium	13 087.9[p]	58.6	22.5	69.7[p]	20.2[p]	9.5[p]	53 771[p]
Canada	26 222.4[p]	40.6[p]	33.0[p]	51.0[p]	41.3[p]	7.2[p]	162 090
Chile	1 523.9[p]	35.8[p]	46.4[p]	38.5[p]	41.8[p]	13.2[p]	8 993[d, p]
Czech Republic	6 162.2	39.5	35.6	61.1	20.4	18.2	37 338
Denmark	8 063.6[e]	59.4[p]	29.4[p]	65.8[e]	31.6[e]	2.2[e]	42 923[e]
Estonia	501.5	48.2	37.6	51.5	35.5	11.4	4 338
Finland	6 546.9	54.8	28.9	65.8	25.1	8.2	35 908
France	62 162.7[p]	54.0	34.8	63.6[p]	22.0[p]	12.9[p]	277 631
Germany	118 158.5	65.2	28.5[d]	68.2	18.0	13.8[d]	400 821[e]
Greece	2 904.4	40.2	42.6	42.2	31.9	25.0	29 403[d]
Hungary	3 160.4	49.7	34.6	74.1[d]	11.1[d]	13.4[d]	25 804
Iceland	353.3	35.0	34.2	63.0[d]	32.1	4.9	2 206
Ireland	3 995.0[e]	48.4	25.9	70.7[e]	25.2[e]	4.1[e]	26 293[e]
Israel (1)	13 536.2[d, e]	34.3[d]	12.8[d]	85.6[d, e]	11.7[d, e]	1.7[d, e]	63 521[d, e]
Italy	29 915.9[p]	50.0	38.0	58.3[p]	25.5[p]	13.2[p]	126 674[p]
Japan	168 644.9	78.1	15.0[e]	78.8	12.3	7.5	665 566[d]
Korea	79 354.3	75.4	22.7	77.7	9.1	11.5	361 292
Latvia	222.1	20.0	32.7	24.5	43.8	31.8	3 152[d]
Luxembourg	741.1[p]	47.1	47.7	51.5[p]	18.6[p]	29.9[d, p]	2 505[p]
Mexico	11 025.9[e, p]	20.7[e, p]	67.4[e, p]	30.6[e, p]	26.8[e, p]	36.5[e, p]	29 921
Netherlands	17 493.3[p]	48.6	33.1	56.9[p]	31.5[p]	11.5[p]	82 264[p]
New Zealand	2 197.2	43.1	37.1	49.8	29.9	20.3	18 700
Norway	6 255.8	43.2[e]	45.7[e]	53.3	32.6	14.2	31 913
Poland	10 037.5[p]	39.0	41.8	65.7[p]	31.4[p]	2.5[p]	82 594
Portugal	4 006.6[p]	42.7	44.3	47.8[p]	45.1[p]	5.4[p]	40 746[p]
Slovak Republic	1 306.3	25.1	31.9	50.4	27.7	21.4	14 149
Slovenia	1 352.9[p]	69.2	19.9	75.6[p]	10.9[p]	13.5[p]	8 102[p]
Spain	20 006.5	45.8	40.9	53.7	27.5	18.5	126 633[d]
Sweden	15 795.5[p]	61.0[e]	28.3[e]	69.6[p]	26.8[p]	3.4[p]	70 372[p]
Switzerland	17 788.0	63.5	24.4	71.0	26.7	0.9[d]	43 740
Turkey	18 963.4	50.1	27.6	54.2	36.3	9.5[d]	100 158
United Kingdom	47 244.5[p]	49.0	27.7	67.0[p]	24.6[p]	6.3[p]	291 416[p]
United States	511 089.0[d, p]	62.3[d, p]	25.1[d, p]	71.2[d, e, p]	13.2[d, p]	11.5[d, p]	1 379 977[e]
EU28 (OECD estimates)	**391 952.5[e]**	**54.7[e]**	**31.7[e]**	**64.2[e]**	**22.9[e]**	**11.9[e]**	**1 889 183[e]**
OECD (2)	**1 266 135.4[e]**	**61.4[e]**	**26.7[e]**	**69.2[e]**	**17.5[e]**	**10.9[e]**	**4 770 739[e]**
Non-Member Economies							
Argentina	4 733.3	18.2	73.1	23.9	25.8	49.5	54 046
China	451 201.4	76.1	20.0	77.5	6.8	15.7	1 692 176
Romania	2 189.3	37.3	41.7	55.2	11.3	33.3	18 046
Russian Federation	39 881.9	28.1	68.2	58.7	9.1	32.0	428 884
Singapore	10 066.7	54.1	37.1	61.2	27.4	11.4	36 666
South Africa	5 811.3	38.9	44.6	42.7	30.5	24.0	26 159
Chinese Taipei	35 756.9	77.7	21.3	77.6	9.0	13.1	147 710

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1. Information on data for Israel:http://dx.doi.org/10.1787/888932315602
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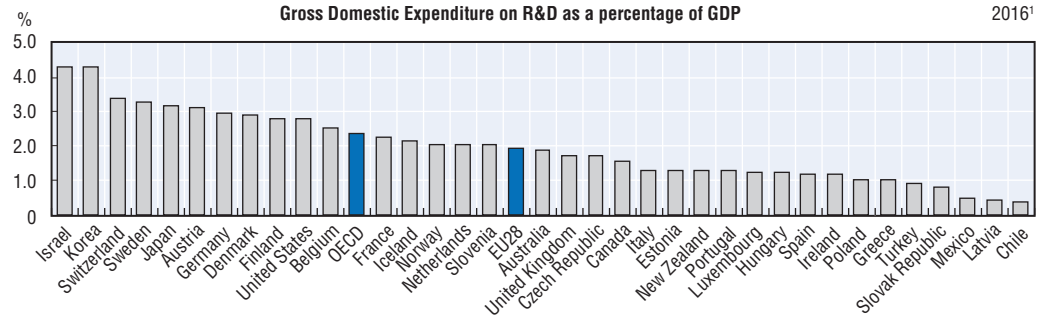
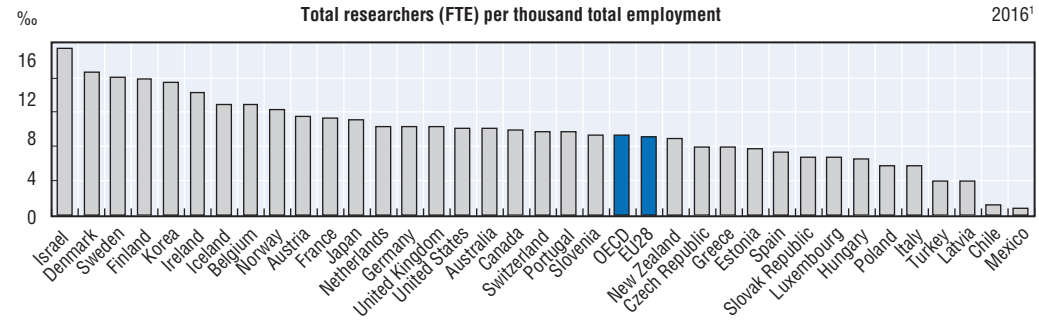
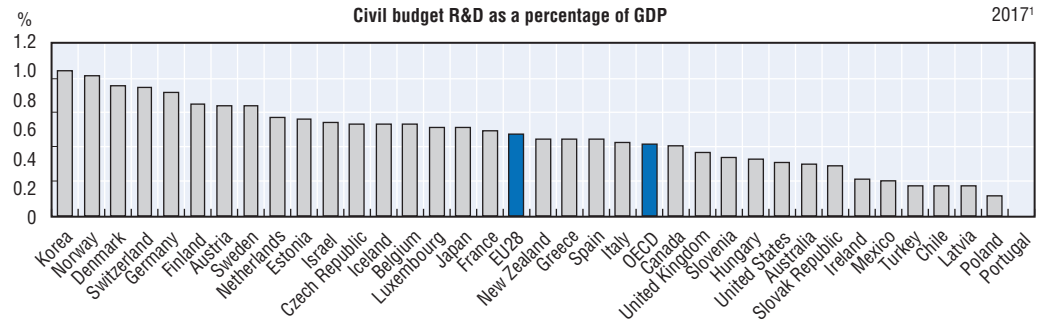
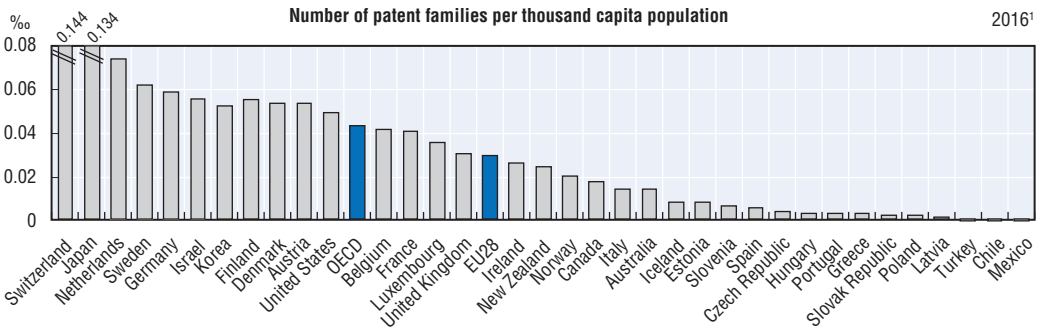
Note: See tables 1, 7, 13, 14, 17, 18 and 19 for details on reference years.

Source: OECD, Main Science and Technology Indicators database, July 2018.









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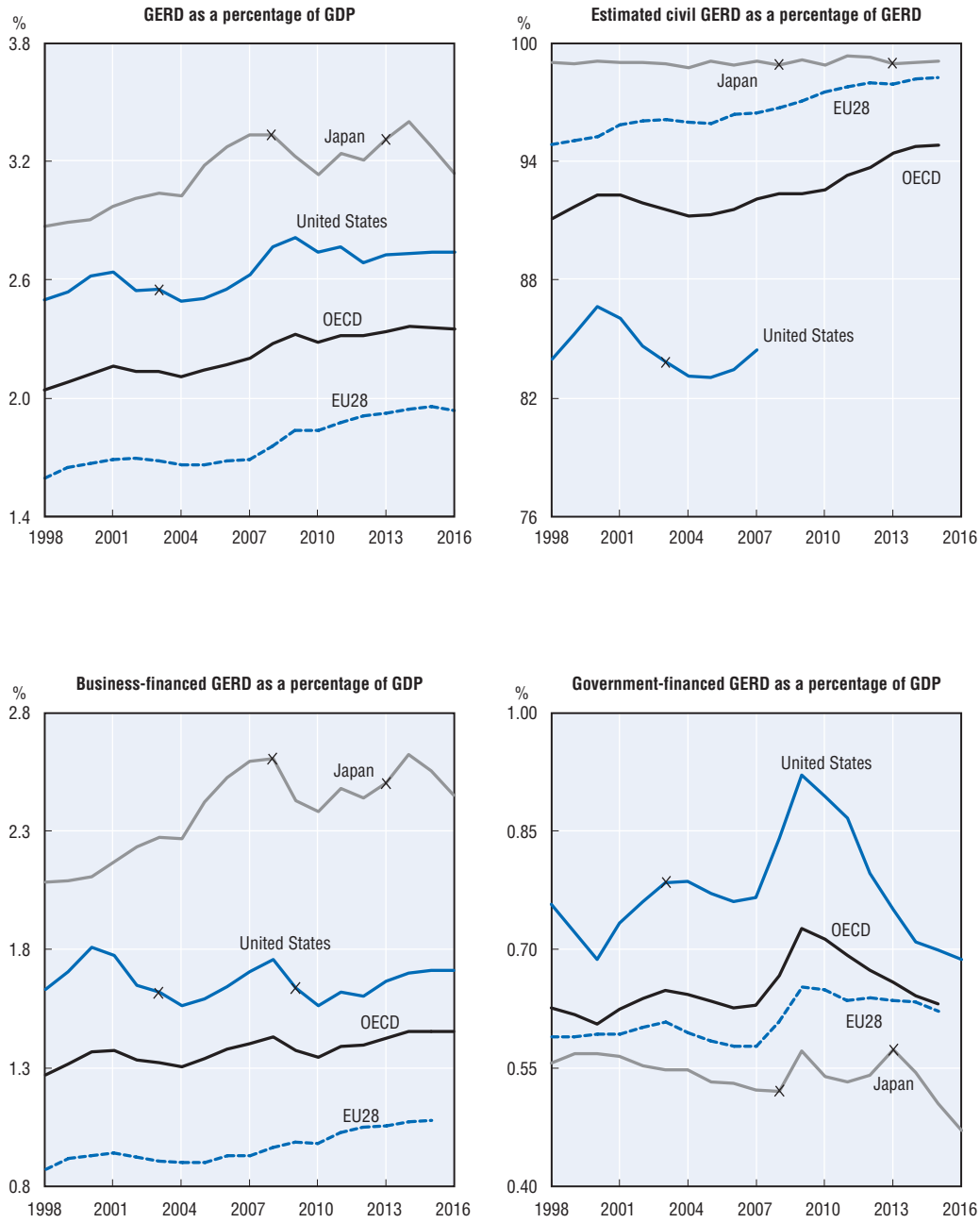

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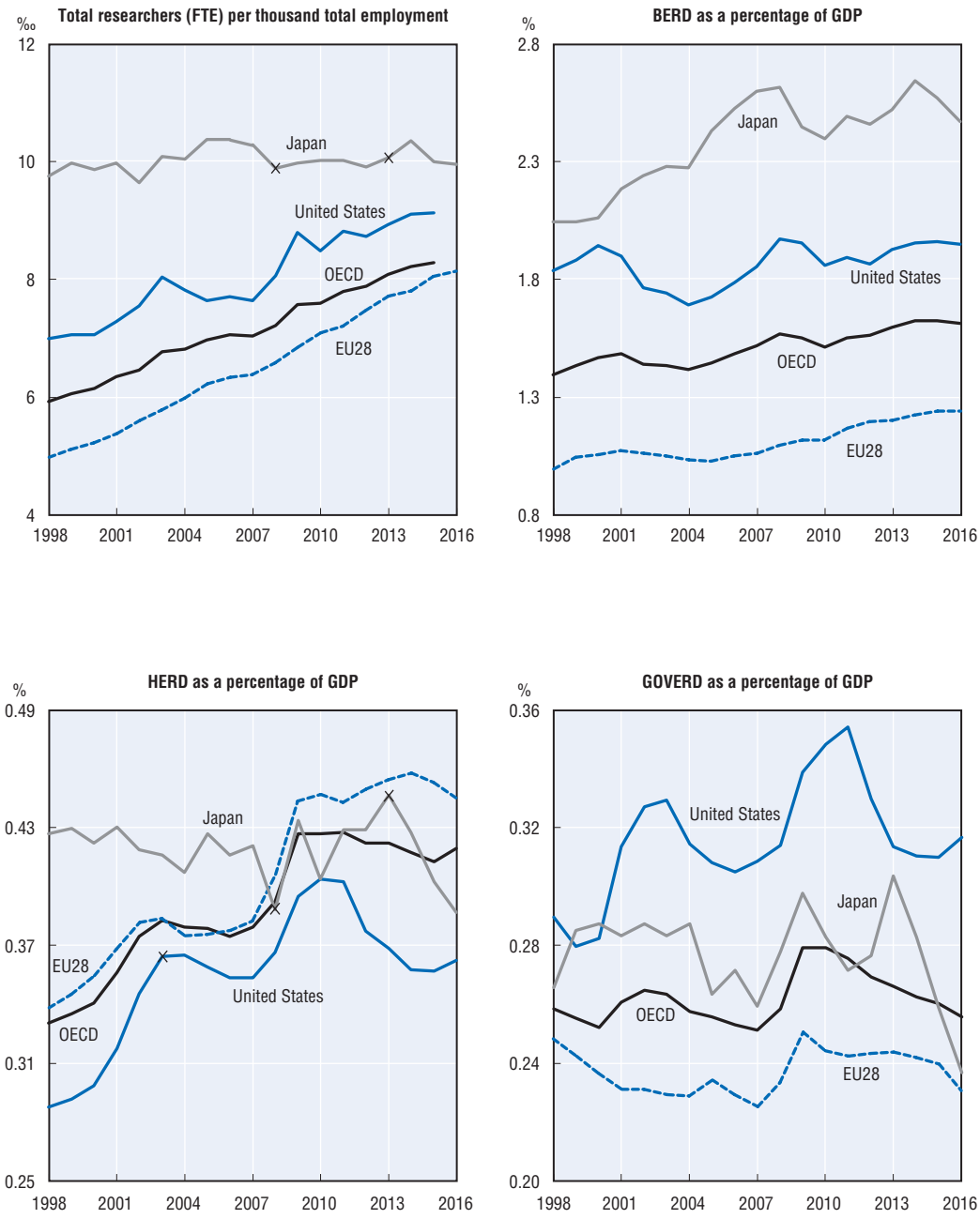

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International comparisons

Table 1. Gross domestic expenditure on R&D (GERD) at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	..	20 978.1[e]	..	23 129.7[e]	..	21 198.5[e]	..
Austria	6 837.0[e]	9 955.0	11 415.1[e]	12 007.9	12 797.2[e]	13 139.4	13 625.5[p]
Belgium	6 225.2	9 822.0	10 715.0	11 358.6	11 935.9	12 626.9	13 087.9[p]
Canada	23 090.0	25 570.5	26 019.5[b]	26 506.5	27 793.5[b]	26 385.9	26 072.0[p]
Chile	..	1 232.1	1 355.5	1 532.6	1 517.6[b]	1 540.4	1 523.9[b,p]
Czech Republic	2 619.5	4 702.3	5 441.6	6 089.3	6 699.4	6 809.5	6 162.2
Denmark	4 429.5	7 283.7	7 468.8	7 793.6	7 877.6	8 181.5[p]	8 063.6[e]
Estonia	206.7	751.5	730.6	624.1	544.2	561.6	501.5
Finland	5 588.7	7 976.8	7 520.0	7 382.8	7 178.2	6 677.0	6 546.9
France	39 530.1	53 617.3	55 097.7	58 353.3	60 585.6[b]	61 239.8	62 162.7[p]
Germany	63 868.1	95 810.0	100 490.1	102 905.5	109 562.7	113 921.8	118 158.5
Greece	1 627.0	1 950.7	1 953.7	2 321.7	2 436.0	2 791.7	2 904.4
Hungary	1 586.8	2 708.1	2 895.0	3 361.4	3 408.4	3 512.1	3 160.4
Iceland	296.8	313.9[b,e]	..	243.3[b]	291.6	341.0	353.3
Ireland	2 006.5	3 206.1[e]	3 351.0[e]	3 512.2[e]	3 625.3[e]	3 855.3	3 995.0[e]
Israel[1]	6 966.3[d]	9 523.0[d]	10 437.4[d]	11 420.3[d]	11 760.9[d]	12 839.0[d]	13 536.2[d,e]
Italy	18 241.2	26 111.7	27 419.6	28 459.4	29 448.3[e]	29 833.3	29 915.9[p]
Japan	128 694.6	148 389.2	152 325.6	164 655.8[b]	169 554.1	169 673.1	168 644.9
Korea	30 618.3[d]	58 379.7	64 862.5	68 234.1	73 099.8	75 734.1	79 354.3
Latvia	164.2	283.7	287.2	279.4	327.2	303.3	222.1
Luxembourg	498.8	697.6	619.1[b]	676.6	712.3	742.3	741.1[p]
Mexico	5 346.2	9 775.3	9 799.0	10 292.5	11 519.2[e,p]	11 376.3[e,p]	11 025.9[e,p]
Netherlands	10 892.4	14 634.4[b]	15 177.7[b]	15 969.2	16 404.4	16 812.6	17 493.3[p]
New Zealand	1 189.3	1 766.6	..	1 856.9	..	2 197.2	..
Norway	3 275.8	5 002.9	5 316.3	5 620.4	5 805.6	6 185.9	6 255.8
Poland	2 984.9	6 487.5	7 990.8	8 185.8	9 149.3	10 139.9	10 037.5[p]
Portugal	1 808.2	4 119.0	3 832.4	3 869.8	3 856.2	3 801.2	4 006.6[p]
Slovak Republic	441.0	925.0	1 159.9	1 243.8	1 379.5	1 881.9	1 306.3
Slovenia	676.5	1 433.1[b]	1 529.9	1 583.7	1 505.7	1 426.4	1 352.9[p]
Spain	13 251.1	19 862.4	19 269.2	19 282.4	19 356.2	19 722.9	20 006.5
Sweden	10 388.2[b]	13 433.8	13 970.4[e]	14 496.4[e]	14 191.1[e]	15 324.8	15 795.5[p]
Switzerland	..	..	14 744.9	..	..	17 788.0	..
Turkey	4 595.6	11 544.6	12 807.9	13 834.8	15 933.0	17 142.1	18 963.4
United Kingdom	30 639.7	38 778.6	38 490.2[e]	41 532.1	43 811.1[e]	45 345.0	47 244.5[p]
United States	328 128.0[d]	429 792.0[d]	434 348.0[d]	454 821.0[d]	476 460.0[d]	496 585.0[d,p]	511 089.0[d,p]
EU28 (OECD estimates)	226 753.2[e]	328 461.8[e]	340 937.7[e]	355 322.0[e]	371 185.5[e]	383 906.2[e]	391 952.5[e]
OECD-Total[2]	**778 141.6[e]**	**1 060 275.5[e]**	**1 092 218.2[e]**	**1 149 156.4[e]**	**1 201 372.2[e]**	**1 237 636.6[e]**	**1 266 135.4[e]**
Argentina	2 275.8	4 655.5[p]	5 265.7[p]	5 337.6[p]	5 042.6[p]	5 555.6	4 733.3
China	86 836.1	247 808.3	292 196.4	334 116.6	370 589.8	407 415.1	451 201.4
Romania	844.7	1 797.9[b]	1 837.3	1 534.5	1 569.5	2 084.9	2 189.3
Russian Federation	18 120.5	35 192.1	37 911.5	38 607.0	40 330.2	39 726.7	39 881.9
Singapore	5 085.7	8 359.7	8 232.7	8 756.7	10 066.7	..	..
South Africa	4 045.9	4 652.2	4 836.9	4 977.5	5 478.1	5 811.3	..
Chinese Taipei	15 298.9	27 422.7	29 055.1	30 718.3	32 484.0	33 575.2	35 756.9

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 2. Gross domestic expenditure on R&D (GERD) as a percentage of GDP

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	2.12[e]	..	2.10[e]	..	1.88[e]	..
Austria	2.37[e]	2.67	2.91[e]	2.95	3.07[e]	3.05	3.09[p]
Belgium	1.78	2.16	2.27	2.33	2.39	2.47	2.49[p]
Canada	1.98	1.79	1.78[b]	1.71	1.72[b]	1.65	1.60[p]
Chile	..	0.35	0.36	0.39	0.37[b]	0.38	0.36[b,p]
Czech Republic	1.17	1.56	1.78	1.90	1.97	1.93	1.68
Denmark	2.39	2.94	2.98	2.97	2.91	2.96[p]	2.87[e]
Estonia	0.92	2.31	2.12	1.72	1.45	1.49	1.28
Finland	3.33	3.64	3.42	3.29	3.17	2.90	2.75
France	2.05	2.19	2.23	2.24	2.28[b]	2.27	2.25[p]
Germany	2.42	2.80	2.87	2.82	2.87	2.92	2.93
Greece	0.58	0.67	0.70	0.81	0.83	0.97	1.01
Hungary	0.92	1.19	1.26	1.39	1.35	1.36	1.21
Iceland	2.71	2.48[b,e]	..	1.76[b]	2.00	2.17	2.08
Ireland	1.19	1.55[e]	1.57[e]	1.58[e]	1.53[e]	1.20	1.18[e]
Israel[1]	4.05[d]	4.01[d]	4.16[d]	4.15[d]	4.20[d]	4.27[d]	4.25[d,e]
Italy	1.05	1.21	1.27	1.31	1.34[e]	1.34	1.29[p]
Japan	3.18	3.24	3.21	3.31[b]	3.40	3.28	3.14
Korea	2.63[d]	3.74	4.03	4.15	4.29	4.22	4.23
Latvia	0.53	0.70	0.66	0.61	0.69	0.63	0.44
Luxembourg	1.57	1.46	1.27[b]	1.30	1.26	1.27	1.24[p]
Mexico	0.40	0.51	0.49	0.50	0.53[e,p]	0.52[e,p]	0.49[e,p]
Netherlands	1.79	1.90[b]	1.94[b]	1.95	2.00	2.00	2.03[p]
New Zealand	1.12	1.23	..	1.15	..	1.26	..
Norway	1.48	1.63	1.62	1.65	1.71	1.93	2.03
Poland	0.56	0.75	0.88	0.87	0.94	1.00	0.97[p]
Portugal	0.76	1.46	1.38	1.33	1.29	1.24	1.27[p]
Slovak Republic	0.49	0.66	0.80	0.82	0.88	1.18	0.79
Slovenia	1.41	2.42[b]	2.57	2.58	2.37	2.20	2.00[p]
Spain	1.10	1.33	1.29	1.27	1.24	1.22	1.19
Sweden	3.39[b]	3.25	3.28[e]	3.31[e]	3.15[e]	3.27	3.25[p]
Switzerland	..	..	3.19	..	..	3.37	..
Turkey	0.57	0.80	0.83	0.82	0.86	0.88	0.94
United Kingdom	1.56	1.67	1.60[e]	1.65	1.67[e]	1.67	1.69[p]
United States	2.51[d]	2.77[d]	2.69[d]	2.72[d]	2.73[d]	2.74[d,p]	2.74[d,p]
EU28 (OECD estimates)	1.66[e]	1.88[e]	1.91[e]	1.92[e]	1.95[e]	1.96[e]	1.93[e]
OECD-Total[2]	**2.14[e]**	**2.32[e]**	**2.31[e]**	**2.34[e]**	**2.36[e]**	**2.36[e]**	**2.34[e]**
Argentina	0.42	0.57[p]	0.64[p]	0.62[p]	0.59[p]	0.62	0.53
China	1.31	1.78	1.91	1.99	2.02	2.06	2.11
Romania	0.41	0.50[b]	0.48	0.39	0.38	0.49	0.48
Russian Federation	0.99	1.01	1.03	1.03	1.07	1.10	1.10
Singapore	2.16	2.15	1.99	1.99	2.16	..	..
South Africa	0.86	0.73	0.73	0.72	0.77	0.80	..
Chinese Taipei	2.32	2.90	2.95	3.00	3.00	3.04	3.16

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 3. Gross domestic expenditure on R&D (GERD) at 2010 prices and PPP

Million 2010 USD

	2005	2011	2012	2013	2014	2015	2016
Australia	..	20 725.6[e]	..	21 608.0[e]	..	20 369.0[e]	..
Austria	7 821.3[e]	9 658.9	10 621.2[e]	10 770.4	11 279.7[e]	11 322.9	11 635.1[p]
Belgium	7 253.6	9 584.1	10 132.6	10 423.6	10 800.5	11 315.5	11 578.8[p]
Canada	25 434.0	25 148.2	25 376.9[b]	25 027.2	25 868.9[b]	25 079.5	24 736.8[p]
Chile	..	1 157.5	1 256.4	1 402.8	1 377.2[b]	1 430.1	1 379.1[b,p]
Czech Republic	3 004.3	4 593.1	5 220.0	5 537.0	5 906.2	6 082.3	5 428.4
Denmark	5 655.1	7 125.3	7 230.1	7 271.3	7 248.6	7 474.7[p]	7 399.5[e]
Estonia	271.1	713.8	685.2	566.7	491.2	512.3	450.2
Finland	6 648.9	7 762.0	7 190.1	6 859.5	6 571.8	6 013.9	5 824.4
France	46 134.1	52 277.7	53 220.4	53 766.5	55 219.6[b]	55 591.1	55 780.4[p]
Germany	73 085.1	92 958.8	95 838.8	94 727.1	98 329.7	101 578.0	104 075.2
Greece	1 844.3	1 913.3	1 846.5	2 072.0	2 143.9	2 479.1	2 577.0
Hungary	2 006.8	2 605.5	2 723.6	3 056.4	3 104.1	3 235.3	2 922.7
Iceland	314.9	310.3[b,e]	..	231.8[b]	269.8	305.6	314.1
Ireland	2 274.5	3 152.8[e]	3 195.7[e]	3 267.2[e]	3 418.5[e]	3 362.3	3 479.5[e]
Israel[1]	7 196.7[d]	9 279.4[d]	9 833.6[d]	10 224.1[d]	10 701.4[d]	11 163.8[d]	11 557.9[d,e]
Italy	22 094.9	25 275.7	25 802.4	26 091.0	26 826.2[e]	27 035.4	26 147.7[p]
Japan	141 892.6	145 278.5	145 829.0	153 653.5[b]	158 196.0	154 552.8	149 494.5
Korea	32 315.5[d]	58 427.3	64 267.7	68 149.3	72 806.8	73 586.7	75 929.5
Latvia	200.1	273.2	271.0	255.9	293.4	274.3	198.4
Luxembourg	605.1	651.6	564.9[b]	599.4	613.1	636.4	641.8[p]
Mexico	6 452.7	9 242.0	9 117.9	9 463.6	10 355.4[e,p]	10 568.0[e,p]	10 094.0[e,p]
Netherlands	12 442.6	14 318.8[b]	14 438.3[b]	14 509.1	15 080.5	15 442.5	16 008.9[p]
New Zealand	1 413.6	1 719.6	..	1 685.9	..	1 994.5	..
Norway	3 889.4	4 823.5	4 975.0	5 119.1	5 291.6	5 794.9	5 960.9
Poland	3 574.1	6 278.4	7 533.7	7 549.0	8 420.3	9 335.3	9 246.3[p]
Portugal	2 122.1	4 133.5	3 751.7	3 571.1	3 503.3	3 436.9	3 557.2[p]
Slovak Republic	527.8	918.7	1 133.4	1 177.0	1 292.3	1 792.2	1 244.2
Slovenia	737.3	1 387.5[b]	1 433.9	1 421.4	1 342.7	1 274.3	1 198.0[p]
Spain	15 470.6	19 524.6	18 420.9	17 835.4	17 607.9	17 980.4	18 049.4
Sweden	12 222.6[b]	13 022.5	13 113.8[e]	13 376.5[e]	13 059.9[e]	14 169.5	14 580.5[p]
Switzerland	..	..	13 608.0	..	..	15 216.9	..
Turkey	6 123.7	11 212.7	12 224.0	13 039.7	14 426.6	15 673.2	17 330.6
United Kingdom	34 626.5	38 254.5	37 151.5[e]	38 980.6	40 612.0[e]	41 783.6	42 949.1[p]
United States	361 066.0[d]	421 097.9[d]	417 864.5[d]	430 606.2[d]	443 140.2[d]	456 903.0[d,p]	464 324.1[d,p]
EU28 (OECD estimates)	263 760.7[e]	320 165.5[e]	325 424.5[e]	327 440.3[e]	337 210.4[e]	346 959.7[e]	349 987.6[e]
OECD-Total[2]	**873 036.5[e]**	**1 037 602.8[e]**	**1 049 374.0[e]**	**1 077 889.6[e]**	**1 112 792.9[e]**	**1 134 750.9[e]**	**1 144 508.7[e]**
Argentina	2 504.3	4 561.3[p]	5 065.9[p]	5 053.4[p]	4 690.2[p]	5 030.1	4 253.4
China	95 556.3	242 801.5	281 115.7	316 339.7	344 691.9	374 910.0	410 188.1
Romania	1 228.8	1 744.0[b]	1 718.2	1 425.5	1 453.6	1 927.7	1 996.6
Russian Federation	26 276.0	33 298.4	34 997.7	35 570.2	37 401.4	37 322.2	37 169.6
Singapore	5 594.5	8 183.2	7 916.2	8 285.7	9 361.5	..	..
South Africa	4 452.1	4 558.1	4 653.3	4 712.1	5 105.5	5 351.9	..
Chinese Taipei	16 835.0	26 867.9	27 953.8	29 083.4	30 213.9	30 892.0	32 486.5

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 4. Gross domestic expenditure on R&D (GERD) per capita at current prices and PPP

USD

	2005	2011	2012	2013	2014	2015	2016
Australia	..	923.0[e]	..	985.9[e]	..	878.5[e]	..
Austria	831.2[e]	1 186.7	1 354.7[e]	1 416.5	1 497.8[e]	1 522.6	1 559.0[p]
Belgium	594.1	893.4	968.1	1 021.0	1 067.6	1 123.6	1 158.7[p]
Canada	716.1	744.6	748.7[b]	754.0	782.1[b]	736.4	718.9[p]
Chile	..	71.4	77.7	86.9	85.1[b]	85.4	83.4[b,p]
Czech Republic	256.0	448.0	517.8	579.3	636.5	645.9	583.3
Denmark	817.4	1 307.7	1 335.9	1 388.5	1 396.0	1 439.9[p]	1 407.5[e]
Estonia	152.1	565.1	551.3	472.7	413.6	427.6	381.1
Finland	1 065.3	1 480.4	1 389.0	1 357.4	1 314.1	1 218.3	1 191.4
France	625.8	820.7	839.3	884.3	913.7[b]	919.6	929.7[p]
Germany	785.2	1 193.5	1 249.5	1 276.0	1 352.9	1 394.6	1 434.9
Greece	148.1	175.7	176.9	211.7	223.6	258.0	269.5
Hungary	157.3	271.6	291.8	339.8	345.4	356.8	322.0
Iceland	1 003.0	984.0[b,e]	..	751.5[b]	890.5	1 030.9	1 053.3
Ireland	482.3	700.5[e]	730.0[e]	763.2[e]	785.6[e]	830.5	853.0[e]
Israel[1]	1 000.7[d]	1 226.7[d]	1 320.0[d]	1 417.6[d]	1 432.1[d]	1 532.6[d]	1 584.4[d,e]
Italy	313.5	434.8	454.4	469.3	484.4[e]	491.2	493.4[p]
Japan	1 007.4	1 160.8	1 194.2	1 293.1[b]	1 332.3	1 334.9	1 328.3
Korea	635.4[d]	1 169.1	1 292.1	1 353.1	1 440.5	1 484.5	1 548.5
Latvia	73.3	137.8	141.2	138.8	164.1	153.4	113.3
Luxembourg	1 071.0	1 343.0	1 164.8[b]	1 240.7	1 275.8	1 303.6	1 268.8[p]
Mexico	49.9	84.5	83.7	86.9	96.2[e,p]	94.0[e,p]	90.2[e,p]
Netherlands	667.5	876.7[b]	906.0[b]	950.5	972.8	992.9	1 027.4[p]
New Zealand	286.7	402.1	..	416.3	..	475.3	..
Norway	708.6	1 010.1	1 059.2	1 106.4	1 130.2	1 191.6	1 194.8
Poland	78.2	168.4	207.4	212.6	237.7	263.7	261.2[p]
Portugal	172.2	390.1	364.5	370.1	370.8	367.0	388.0[p]
Slovak Republic	81.9	171.4	214.6	229.8	254.6	347.1	240.5
Slovenia	338.1	698.1[b]	743.8	768.9	730.3	691.3	655.3[p]
Spain	303.5	425.0	412.0	413.8	416.7	425.0	430.7
Sweden	1 150.5[b]	1 421.7	1 467.6[e]	1 510.0[e]	1 463.6[e]	1 563.9	1 590.1[p]
Switzerland	..	..	1 843.8	..	..	2 147.7	..
Turkey	67.0	156.1	171.0	182.6	208.0	221.4	242.4
United Kingdom	507.2	612.8	604.2[e]	647.9	678.2[e]	696.4	719.7[p]
United States	1 108.6[d]	1 377.0[d]	1 381.6[d]	1 436.7[d]	1 494.1[d]	1 546.2[d,p]	1 580.4[d,p]
EU28 (OECD estimates)	458.2[e]	650.6[e]	673.7[e]	700.7[e]	730.3[e]	753.2[e]	766.6[e]
OECD-Total[2]	**658.9[e]**	**849.6[e]**	**870.2[e]**	**910.5[e]**	**946.4[e]**	**969.3[e]**	**985.7[e]**
Argentina	59.0	112.8[p]	126.2[p]	126.5[p]	118.2[p]	128.8	108.6
China	66.4	183.9	215.8	245.5	270.9	296.4	326.3
Romania	39.6	89.2[b]	91.6	76.8	78.8	105.2	111.1
Russian Federation	126.3	246.2	265.1	269.4	280.7	276.1	277.0
Singapore	1 192.1	1 612.6	1 549.8	1 621.9	1 840.3	..	..
South Africa	85.0	89.9	92.4	93.7	101.6	106.1	..
Chinese Taipei	671.9	1 180.7	1 246.1	1 314.2	1 386.2	1 429.2	1 519.0

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 5. Estimated civil GERD (Gross domestic expenditure on R&D) as a percentage of GDP

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	..	2.66	..	2.95	..	..	..
Belgium	1.78	..	..	..	..	..	..
Canada	..	..	..	..	..	..	..
Chile	..	0.35	0.36	0.39	0.37[b]	0.38	0.36[b,p]
Czech Republic	1.16	1.55	1.78	1.89	1.97	..	..
Denmark	..	..	..	..	..	..	..
Estonia	0.92[e]	2.30[e]	2.12[e]	1.72[e]	1.44	..	..
Finland	3.31	3.62	3.40	3.27	3.15	..	..
France	1.88	2.12	2.16	2.16	2.21[b]	..	..
Germany	2.39[e]	2.77	2.84	2.80	2.85	..	..
Greece	..	..	..	..	..	..	..
Hungary	0.91	1.19	1.26	1.38	1.35	1.36	..
Iceland	2.71	2.48[b,e]	..	1.76[b]	2.00	2.17	2.08
Ireland	1.19	1.55[e]	1.57[e]	1.58[e]	1.53[e]	1.20	1.18[e]
Israel[1]	4.05	4.01	4.16	4.15	4.20	4.27	4.25[e]
Italy	..	..	..	..	..	..	..
Japan	3.15[e]	3.23[e]	3.19[e]	3.28[b,e]	3.37[e]	3.25[e]	..
Korea	2.56[d]	3.60	3.87	3.97	4.13	4.07	4.09
Latvia	..	..	..	..	..	..	..
Luxembourg	1.57	1.46	1.27[b]	1.30	1.26	1.27	1.24[p]
Mexico	..	..	..	..	..	..	..
Netherlands	..	..	..	..	..	..	..
New Zealand	..	1.22	..	1.14	..	1.25	..
Norway	..	..	..	..	..	..	..
Poland	..	..	..	..	..	..	..
Portugal	0.75	1.45	1.37	1.32	1.28	..	..
Slovak Republic	0.49	0.66	0.79	0.82	0.88	1.17	..
Slovenia	1.41	2.42[b]	2.57	2.58	2.37	2.20	..
Spain	..	1.28	1.25	1.23	1.20	1.19	..
Sweden	3.26[b]	3.15	..	3.18[e]	..	..	..
Switzerland	..	..	3.15	..	..	..	..
Turkey	..	..	0.82	0.80	0.84	0.86	0.93
United Kingdom	1.37	1.55	1.50[e]	1.54	1.57[e]	..	..
United States	2.08[d]	..	..	..	..	..	..
EU28 (OECD estimates)	1.60[e]	1.84[e]	1.88[e]	1.88[e]	1.91[e]	1.93[e]	..
OECD-Total[2]	**1.95[e]**	**2.16[e]**	**2.17[e]**	**2.21[e]**	**2.24[e]**	**2.24[e]**	**..**
Argentina	0.42	0.57[p]	0.63[p]	0.62[p]	0.59[p]	..	..
China	..	..	..	..	..	..	..
Romania	0.40	0.49[b]	0.48	0.38	0.38	..	..
Russian Federation	..	..	..	..	..	..	..
Singapore	..	..	..	..	..	..	..
South Africa	0.81	0.70	0.69	0.69	0.72	0.75	..
Chinese Taipei	2.25	2.84	2.92	2.97	2.98	3.03	3.12

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 6. Basic research expenditure as a percentage of GDP

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	..	0.51[d]	..	0.56[d]	..	0.54[d]	..
Belgium	..	..	..	0.46	..	0.39	..
Canada	..	..	..	..	..	..	..
Chile	..	0.08[m]	0.09[m]	0.11[m]	0.11[b,m]	0.13[m]	0.10[m,p]
Czech Republic	0.36	0.45	0.53	0.62	0.61	0.61	0.48
Denmark	0.45[e]	0.55	0.55[e]	0.57	0.59	0.57[p]	..
Estonia	0.27	0.44	0.45	0.47	0.44	0.40	0.35
Finland	..	..	..	..	..	..	..
France	0.49	0.53	0.54	0.54	0.54	0.54	..
Germany	..	..	..	..	..	..	..
Greece	..	0.20	..	0.28	..	0.35	..
Hungary	0.25	0.25[e]	0.25[e]	0.27[e]	0.25[e]	0.25[e]	..
Iceland	0.51	0.62[b,e]	..	0.46[b]	0.46	0.45	0.46
Ireland	0.28	0.27[e]	..	0.30[e]	..	0.20	..
Israel[1]	0.65[d,e]	0.50[d,e]	0.51[d,e]	0.51[d,e]	0.51[d,e]	0.51[d,e]	0.49[d,e]
Italy	0.29	0.29	0.32	0.33	0.32[e]	0.33	..
Japan	0.38	0.40	0.40	0.42[b]	0.42	0.39	0.39
Korea	0.40[d]	0.68	0.74	0.75	0.76	0.73	0.68
Latvia	0.11	0.20	0.21	0.15	0.20	0.22	..
Luxembourg	..	..	..	..	..	0.48	..
Mexico	..	0.15	0.14	0.14	0.15	0.15	0.14[e,p]
Netherlands	..	0.57[b]	0.54[b]	0.55	0.55	0.54	..
New Zealand	0.34	0.32	..	0.29	..	0.30	..
Norway	0.29	0.29[m]	..	0.29[m]	..	0.33[d]	..
Poland	0.17	0.20	0.23	0.30[b]	0.32	0.32	..
Portugal	0.19	0.30	0.29	0.30	0.30	0.29	..
Slovak Republic	0.23	0.32	0.38	0.36	0.40	0.50	..
Slovenia	0.20	0.32[b]	0.34	0.35	0.43[b]	0.39	..
Spain	0.19[m]	0.27[m]	0.27[m]	0.29[e]	0.28[e]	0.27[e]	..
Sweden	..	..	..	..	..	..	..
Switzerland	..	..	0.94	..	..	1.29	..
Turkey	..	..	..	..	..	..	..
United Kingdom	..	0.27[e]	0.27[e]	0.28[e]	0.28[e]	0.28[e]	..
United States	0.47[d]	0.48[d]	0.45[d]	0.47[d]	0.47[d]	0.46[d,p]	0.46[d,p]
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	0.11	..	..	..	..	0.21[b]	0.15
China	0.07	0.08	0.09	0.09	0.10	0.10	0.11
Romania	0.09[m]	0.21[b]	0.20	0.15	0.13	0.15	..
Russian Federation	0.13[m]	0.18[m]	0.16[m]	0.16[m]	0.16[m]	0.16[m]	0.15[d]
Singapore	0.45	0.41	0.39	0.41	0.42	..	..
South Africa	0.16	0.18	0.19	0.17	0.19	0.20	..
Chinese Taipei	0.24	0.28	0.28	0.28	0.27	0.26	0.26

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 7. Total researchers in full-time equivalent

FTE

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	28 470[d,e]	37 114[d]	39 701[d,e]	40 426[d]	42 627[d,e]	43 562[d]	44 933[d,p]
Belgium	33 146	42 686	45 597	46 355	50 820	53 178[b]	53 771[p]
Canada	136 700	165 100	161 600	163 180	162 090	..	..
Chile	..	6 078[d]	6 798[d]	5 893[d]	7 585[d]	8 175[d]	8 993[d,p]
Czech Republic	24 169[b]	30 682	33 217	34 271	36 040	38 081	37 338
Denmark	28 179	39 181	40 080	39 868	41 409	42 425[p]	42 923[e]
Estonia	3 331	4 511	4 582	4 407	4 324	4 187	4 338
Finland	39 582	40 003[b]	40 468	39 196	38 281	37 516	35 908
France	202 507	249 247	258 913[e]	265 466[e]	271 772[b]	277 631	..
Germany	272 148	338 689	352 419	354 463	351 923	387 982	400 821[e]
Greece	19 593[d]	24 674[b,d]	24 800[d]	29 228[d]	29 877[d]	34 708[d]	29 403[d]
Hungary	15 878	23 019	23 837	25 038	26 213	25 316	25 804
Iceland	2 155	2 258[b]	..	1 848[b]	..	1 944[b]	2 206
Ireland	11 587	15 269[e]	16 253[e]	16 844[e]	20 727[b,e]	25 481	26 293[e]
Israel[1]	..	55 184[d]	63 521[d,e]	..	..	..	..
Italy	82 489	106 151	110 695	116 163	118 183	125 875	126 674[p]
Japan	680 631[d]	656 651[d]	646 347[d]	660 489[b,d]	682 935[d]	662 071[d]	665 566[d]
Korea	179 812[d]	288 901	315 589	321 842	345 463	356 447	361 292
Latvia	3 282[d]	3 947[d]	3 904[d]	3 625[d]	3 748[d]	3 613[d]	3 152[d]
Luxembourg	2 227	2 831	2 310[b]	2 503	2 629	2 539	2 505[p]
Mexico	43 922	39 826	29 094	29 921	..	..	..
Netherlands	47 854	61 335[b]	73 235[b]	76 670	76 229	79 155	82 264[p]
New Zealand	12 986	16 300	..	17 900	..	18 700	..
Norway	21 200	27 228	27 841	28 312	29 237	30 632	31 913
Poland	62 162	64 133	67 001	71 472	78 622	82 594	..
Portugal	21 126	44 056	42 498	37 813[b]	38 155	38 672	40 746[p]
Slovak Republic	10 921	15 326	15 271	14 727	14 742	14 406	14 149
Slovenia	5 253	8 774[b]	8 884	8 707	8 574	7 900	8 102[p]
Spain	109 720	130 235[d]	126 778[d]	123 225[d]	122 235[d]	122 437[d]	126 633[d]
Sweden	55 001[b,e]	48 702[e]	49 280[e]	64 194[b,e]	66 643[e]	66 734[e]	70 372[p]
Switzerland	..	..	35 785	..	..	43 740	..
Turkey	39 139	72 109	82 122	89 075	89 657	95 161	100 158
United Kingdom	248 599[b,e]	251 358	256 156[e]	267 699	276 584[e]	284 483	291 416[p]
United States	1 101 105[e]	1 253 100[e]	1 264 199[e]	1 305 862[e]	1 351 903[e]	1 379 977[e]	..
EU28 (OECD estimates)	1 374 762[e]	1 626 804[e]	1 681 626[e]	1 729 991[e]	1 768 549[e]	1 846 385[e]	1 889 183[e]
OECD-Total[2]	**3 697 002[e]**	**4 305 514[e]**	**4 401 490[e]**	**4 525 863[e]**	**4 666 310[e]**	**4 770 739[e]**	**..**
Argentina	31 868	49 029[p]	50 490	50 785	51 665	52 970	54 046
China	1 118 698[d]	1 318 086	1 404 017	1 484 040	1 524 280	1 619 028	1 692 176
Romania	22 958	16 080[b]	18 016	18 576	18 109	17 459	18 046
Russian Federation	464 577	447 579	443 269	440 581	444 865	449 180	428 884
Singapore	23 789	33 719	34 141	36 025	36 666	..	..
South Africa	17 303	20 115	21 382	23 346	23 572	26 159	..
Chinese Taipei	88 859	134 762	140 102	141 159	142 983	145 381	147 710

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 8. Total researchers in full-time equivalent per thousand total employment

Per thousand

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	7.4[d,e]	8.9[d]	9.4[d,e]	9.6[d]	10.0[d,e]	10.2[d]	10.4[d,p]
Belgium	7.8	9.4	10.0	10.2	11.1	11.6[b]	11.5[p]
Canada	8.3	9.4	9.1	9.1	9.0	..	..
Chile	..	0.8[d]	0.9[d]	0.8[d]	1.0[d]	1.0[d]	1.1[d,p]
Czech Republic	4.9[b]	6.1	6.6	6.7	7.1	7.3	7.1
Denmark	10.1	14.1	14.5	14.4	14.8	15.0[p]	14.9[e]
Estonia	5.4	7.7	7.7	7.3	7.1	6.7	6.9
Finland	16.4	15.9[b]	15.9	15.6	15.3	15.0	14.3
France	7.7	9.2	9.5[e]	9.7[e]	9.9[b]	10.1	..
Germany	6.9	8.1	8.4	8.4	8.2	9.0	9.2[e]
Greece	4.2[d]	5.6[b,d]	6.0[d]	7.3[d]	7.4[d]	8.5[d]	7.2[d]
Hungary	3.8	5.8	6.0	6.2	6.2	5.9	5.8
Iceland	13.3	13.5[b]	..	10.6[b]	..	10.6[b]	11.6
Ireland	5.9	8.2[e]	8.7[e]	8.8[e]	10.7[b,e]	12.8	12.9[e]
Israel[1]	..	15.7[d]	17.4[d,e]	..	..	..	..
Italy	3.4	4.3	4.5	4.8	4.9	5.1	5.1[p]
Japan	10.4[d]	10.0[d]	9.9[d]	10.1[b,d]	10.4[d]	10.0[d]	10.0[d]
Korea	7.9[d]	11.9	12.8	12.8	13.5	13.7	13.8
Latvia	3.4[d]	4.6[d]	4.5[d]	4.1[d]	4.3[d]	4.1[d]	3.6[d]
Luxembourg	7.2	7.6	6.1[b]	6.5	6.6	6.3	6.0[p]
Mexico	1.3	1.1	0.8	0.8	..	..	..
Netherlands	5.7	6.9[b]	8.3[b]	8.8	8.7	9.0	9.2[p]
New Zealand	6.3	7.5	..	8.0	..	7.9	..
Norway	9.0	10.4	10.4	10.4	10.6	11.1	11.5
Poland	4.4	4.1	4.3	4.6	5.0	5.2	..
Portugal	4.2	9.2	9.3	8.5[b]	8.5	8.5	8.8[p]
Slovak Republic	5.2	6.9	6.9	6.7	6.6	6.4	6.1
Slovenia	5.7	9.3[b]	9.5	9.4	9.2	8.4	8.4[p]
Spain	5.5	6.8[d]	6.9[d]	6.9[d]	6.8[d]	6.6[d]	6.7[d]
Sweden	12.6[b,e]	10.6[e]	10.7[e]	13.7[b,e]	14.1[e]	13.9[e]	14.4[p]
Switzerland	..	..	7.7	..	..	8.9	..
Turkey	2.0	3.1	3.4	3.6	3.5	3.6	3.7
United Kingdom	8.6[b,e]	8.6	8.6[e]	8.9	9.0[e]	9.1	9.2[p]
United States	7.6[e]	8.8[e]	8.7[e]	8.9[e]	9.1[e]	9.1[e]	..
EU28 (OECD estimates)	6.2[e]	7.2[e]	7.5[e]	7.7[e]	7.8[e]	8.1[e]	8.1[e]
OECD-Total[2]	**7.0[e]**	**7.8[e]**	**7.9[e]**	**8.1[e]**	**8.3[e]**	**8.3[e]**	**..**
Argentina	2.0	2.8[p]	2.9	2.8	2.9	2.9	3.0
China	1.5[d]	1.7	1.8	1.9	2.0	2.1	2.2
Romania	2.5	1.8[b]	2.1	2.2	2.1	2.0	2.1
Russian Federation	6.8	6.3	6.2	6.2	6.2	6.2	5.9
Singapore	10.3	10.4	10.2	10.3	10.1	..	..
South Africa	1.4	1.4	1.5	1.6	1.6	1.7	..
Chinese Taipei	8.9	12.6	12.9	12.9	12.9	13.0	13.1

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 9. Total R&D personnel in full-time equivalent

FTE

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	47 625[d,e]	61 171[d]	65 088[d,e]	66 186[d]	69 842[d,e]	71 396[d]	73 643[d,p]
Belgium	53 517	62 895	67 005	67 899	72 794	77 520[b]	79 766[p]
Canada	218 590	239 920	231 230	232 910	237 280	..	..
Chile	..	13 052[d]	14 631[d]	13 228[d]	15 887[d]	15 261[d]	16 633[d,p]
Czech Republic	43 370[b]	55 697	60 329	61 976	64 444	66 433	65 783
Denmark	43 499	57 585	57 734	57 744	58 361	59 532[p]	60 290[e]
Estonia	4 362	5 724	5 855	5 858	5 790	5 636	5 772
Finland	57 471	54 526[b]	54 047	52 972	52 130	50 367	47 429
France	349 681	402 492	411 780[m]	416 687[m]	423 903[b]	428 643	..
Germany	475 278	575 099	591 261	588 615	605 252	640 516	656 727[e]
Greece	33 603[d]	36 913[b,d]	37 361[d]	42 188[d]	43 316[d]	49 658[d]	41 790[d]
Hungary	23 239	33 960	35 732	38 163	37 329	36 847	35 757
Iceland	3 226	3 244[b]	..	2 736[b]	..	2 941	3 247
Ireland	16 690	21 591[e]	23 169[e]	24 129[e]	28 379[b,e]	35 170	36 087[e]
Israel[1]	..	70 401[d]	77 143[d,e]	..	..	..	..
Italy	175 248	228 094	240 179	246 764	249 467	259 167	258 585[p]
Japan	896 855[d]	869 825[d]	851 132[d]	865 523[b,d]	895 285[d]	875 005[d]	872 340[d]
Korea	215 345[d]	361 374	395 990	401 444	430 868	442 027	447 408
Latvia	5 483[d]	5 432[d]	5 593[d]	5 396[d]	5 739[d]	5 570[d]	5 120[d]
Luxembourg	4 392	5 191	4 743[b]	4 975	5 243	5 227	5 196[p]
Mexico	83 685	73 436	58 849	59 073	..	..	..
Netherlands	93 599	117 436[b]	122 215[b]	123 214	124 066	129 060	133 214[p]
New Zealand	18 929	23 600	..	24 900	..	26 400	..
Norway	29 966	36 950	37 707	38 536	40 297	42 409	43 918
Poland	76 761	85 219	90 716	93 751	104 359	109 249	..
Portugal	25 728	49 599	47 554	46 711	46 878	47 999	50 912[p]
Slovak Republic	14 404	18 112	18 127	17 166	17 594	17 591	17 768
Slovenia	8 994	15 269[b]	14 974	15 229	14 866	14 225	14 357[p]
Spain	174 773	215 079[d]	208 831[d]	203 302[d]	200 233[d]	200 866[d]	205 873[d]
Sweden	77 557[b,e]	78 445[e]	81 272[e]	80 957[e]	83 473[e]	83 551[e]	90 690[p]
Switzerland	..	..	75 476	..	..	81 451	..
Turkey	49 251[e]	92 801[e]	105 122[e]	112 969[e]	115 444[e]	122 288[e]	136 953
United Kingdom	324 917[b,e]	356 258[e]	356 484[e]	377 343[e]	396 281[e]	413 860	419 898[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	2 201 520[e]	2 612 979[e]	2 671 404[e]	2 711 410[e]	2 785 011[e]	2 885 830[e]	2 940 956[e]
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	45 361	69 568[p]	72 323	74 866	76 904	78 713	79 333
China	1 364 799[d]	2 882 903	3 246 840	3 532 817	3 710 580	3 758 848	3 878 057
Romania	33 222	29 749[b]	31 135	32 507	31 391	31 331	32 232
Russian Federation	919 716	839 183	828 401	826 733	829 190	833 654	802 317
Singapore	28 586	38 996	39 459	41 582	42 543	..	..
South Africa	28 798	30 978	35 050	37 956	38 465	41 055	..
Chinese Taipei	149 154	222 269	229 167	234 248	240 528	245 941	251 042

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Table 10. Total R&D personnel in full-time equivalent per thousand total employment

Per thousand

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	12.3[d,e]	14.7[d]	15.5[d,e]	15.7[d]	16.4[d,e]	16.7[d]	17.0[d,p]
Belgium	12.6	13.9	14.7	15.0	16.0	16.9[b]	17.1[p]
Canada	13.3	13.7	13.0	12.9	13.1	..	..
Chile	..	1.7[d]	1.9[d]	1.7[d]	2.0[d]	1.9[d]	2.0[d,p]
Czech Republic	8.8[b]	11.0	11.9	12.2	12.6	12.8	12.5
Denmark	15.6	20.7	20.9	20.9	20.9	21.0[p]	21.0[e]
Estonia	7.1	9.8	9.9	9.7	9.6	9.0	9.2
Finland	23.8	21.7[b]	21.3	21.0	20.8	20.1	18.8
France	13.3	14.9	15.1[m]	15.3[m]	15.5[b]	15.6	..
Germany	12.1	13.8	14.1	13.9	14.2	14.9	15.0[e]
Greece	7.2[d]	8.4[b,d]	9.1[d]	10.6[d]	10.7[d]	12.2[d]	10.2[d]
Hungary	5.6	8.6	9.0	9.5	8.9	8.6	8.1
Iceland	20.0	19.4[b]	..	15.6[b]	..	16.0	17.0
Ireland	8.5	11.5[e]	12.4[e]	12.6[e]	14.6[b,e]	17.7	17.6[e]
Israel[1]	..	20.1[d]	21.2[d,e]	..	..	..	..
Italy	7.2	9.2	9.7	10.1	10.2	10.6	10.4[p]
Japan	13.7[d]	13.3[d]	13.1[d]	13.2[b,d]	13.6[d]	13.2[d]	13.0[d]
Korea	9.4[d]	14.9	16.0	16.0	16.8	17.0	17.1
Latvia	5.7[d]	6.3[d]	6.4[d]	6.1[d]	6.5[d]	6.3[d]	5.8[d]
Luxembourg	14.3	14.0	12.5[b]	12.9	13.2	12.9	12.4[p]
Mexico	2.6	2.1	1.6	1.6	..	..	..
Netherlands	11.2	13.3[b]	13.8[b]	14.1	14.2	14.7	15.0[p]
New Zealand	9.2	10.8	..	11.1	..	11.2	..
Norway	12.7	14.0	14.0	14.2	14.7	15.4	15.9
Poland	5.5	5.5	5.9	6.1	6.6	6.8	..
Portugal	5.1	10.4	10.4	10.5	10.4	10.5	10.9[p]
Slovak Republic	6.9	8.2	8.2	7.8	7.9	7.8	7.7
Slovenia	9.7	16.1[b]	16.0	16.4	16.0	15.1	15.0[p]
Spain	8.8	11.3[d]	11.4[d]	11.4[d]	11.1[d]	10.8[d]	10.8[d]
Sweden	17.8[b,e]	17.1[e]	17.6[e]	17.3[e]	17.6[e]	17.4[e]	18.5[p]
Switzerland	..	..	16.1	..	..	16.6	..
Turkey	2.5[e]	4.0[e]	4.4[e]	4.6[e]	4.5[e]	4.6[e]	5.1
United Kingdom	11.3[b,e]	12.1[e]	12.0[e]	12.6[e]	12.9[e]	13.2	13.2[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	10.0[e]	11.6[e]	11.9[e]	12.1[e]	12.3[e]	12.6[e]	12.7[e]
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	2.9	4.0[p]	4.1	4.2	4.3	4.3	4.4
China	1.8[d]	3.8	4.2	4.6	4.8	4.9	5.0
Romania	3.6	3.3[b]	3.6	3.8	3.6	3.7	3.8
Russian Federation	13.5	11.8	11.6	11.6	11.6	11.5	11.1
Singapore	12.3	12.1	11.8	11.9	11.7	..	..
South Africa	2.3	2.2	2.4	2.6	2.5	2.6	..
Chinese Taipei	15.0	20.8	21.1	21.4	21.7	22.0	22.3

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 11. Business-financed GERD (Gross domestic expenditure on R&D) as a percentage of GDP

As a percentage of GDP

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	1.08[e]	1.23	1.33[e]	1.44	1.47[e]	1.52	1.65[b,p]
Belgium	1.06	1.30	1.38	1.41	..	1.45	..
Canada	0.98	0.88	0.84[b]	0.80	0.79[b]	0.69	0.65[p]
Chile	..	0.12	0.13	0.13	0.12[b]	0.12	0.13[b,p]
Czech Republic	0.56	0.59	0.65	0.71	0.71	0.67	0.66
Denmark	1.42	1.80	1.79[e]	1.75	..	1.76[p]	..
Estonia	0.36	1.27	1.09	0.72	0.54	0.61	0.62
Finland	2.23	2.44	2.16	2.00	1.70	1.59	..
France	1.07	1.21	1.23	1.23	1.24	1.23	..
Germany	1.64	1.83	1.90	1.85	1.90	1.91	1.91
Greece	0.18	0.22	0.22	0.25	0.25	0.30	0.41
Hungary	0.36[d]	0.56	0.59	0.65	0.65	0.68	..
Iceland	1.30	1.24[b,e]	..	0.65[b]	0.71	0.72	0.73
Ireland	0.69	0.76[e]	0.78[e]	0.82[e]	0.80[e]	0.58	..
Israel[1]	2.28[d]	1.50[d]	1.64[d]	1.53[d]	1.47[d]	1.46[d]	..
Italy	0.42	0.55	0.56	0.59	0.63[e]	0.67	..
Japan	2.42	2.48	2.44	2.50[b]	2.63	2.56	2.45
Korea	1.97[d]	2.76	3.01	3.14	3.23	3.14	3.19
Latvia	0.18	0.17	0.16	0.13	0.19	0.13	..
Luxembourg	1.25	0.66	0.23[b]	0.22	..	0.60	..
Mexico	0.17	0.17	0.12	0.10	0.10[e,p]	0.10[e,p]	0.10[e,p]
Netherlands	0.83	0.97[b]	1.00[b]	1.00	1.02	0.97	..
New Zealand	0.46	0.49	..	0.46	..	0.54	..
Norway	0.69	0.72	..	0.71	..	0.85	0.88[e]
Poland	0.19	0.21	0.28	0.32	0.37	0.39	..
Portugal	0.27	0.65	0.63	0.56	0.54	0.53	..
Slovak Republic	0.18	0.22	0.30	0.33	0.28	0.29	..
Slovenia	0.77	1.48[b]	1.60	1.65	1.62	1.52	..
Spain	0.51	0.59	0.59	0.59	0.57	0.56	..
Sweden	2.16[b]	1.87	..	2.02[e]	..	1.87	..
Switzerland	..	..	2.03	..	..	2.14	..
Turkey	0.25[d]	0.37	0.39	0.40	0.44	0.44	..
United Kingdom	0.66	0.77	0.73[e]	0.76	0.80[e]	0.82	..
United States	1.59[d]	1.62[d]	1.60[d]	1.67[d]	1.70[d]	1.71[d]	1.71[d]
EU28 (OECD estimates)	0.89[e]	1.02[e]	1.04[e]	1.05[e]	1.06[e]	1.07[e]	..
OECD-Total[2]	**1.33[e]**	**1.39[e]**	**1.39[e]**	**1.42[e]**	**1.45[e]**	**1.45[e]**	**1.44[e]**
Argentina	0.13	..	..	..	..	0.11	0.10
China	0.88	1.31	1.41	1.48	1.52	1.54	1.60
Romania	0.15	0.19[b]	0.17	0.12	0.13	0.18	..
Russian Federation	0.30	0.28	0.28	0.29	0.29	0.29	0.31
Singapore	1.27	1.19	1.06	1.05	1.17	..	..
South Africa	0.38	0.29	0.28	0.30	0.31	0.31	..
Chinese Taipei	1.55	2.10	2.19	2.27	2.32	2.37	2.45

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 12. Government-financed GERD (Gross domestic expenditure on R&D) as a percentage of GDP

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	0.85[e]	0.95	1.10[d,e]	0.99	1.10[d,e]	0.99	0.95[b,d,p]
Belgium	0.44	0.50	0.56	0.57	..	0.56	..
Canada	0.63[e]	0.60[e]	0.61[b,e]	0.58[e]	0.55[b,e]	0.53[e]	0.53[p]
Chile	..	0.12	0.13	0.15	0.17[b]	0.16	0.17[b,p]
Czech Republic	0.53	0.65	0.66	0.66	0.65	0.62	0.60
Denmark	0.66	0.83[d]	0.87[d,e]	0.89[d]	..	0.87[p]	..
Estonia	0.40	0.76	0.81	0.81	0.72	0.69	0.48
Finland	0.85	0.91[b]	0.91	0.86	0.87	0.84	..
France	0.79	0.77	0.79	0.79	0.78	0.79	..
Germany	0.69	0.84	0.84[d]	0.82[d]	0.82[d]	0.81[d]	0.84[d]
Greece	0.27	0.33	0.35	0.42	0.44	0.51	0.43
Hungary	0.46[d]	0.45	0.47	0.50	0.45	0.47	..
Iceland	1.10	0.99[b,e]	..	0.65[b]	0.68	0.69	0.71
Ireland	0.38	0.46[e]	0.44[e]	0.44[e]	0.42[e]	0.31	..
Israel[1]	0.59[d]	0.52[d]	0.53[d]	0.51[d]	0.57[d]	0.55[d]	..
Italy	0.53	0.51	0.54	0.54	0.53[e]	0.51	..
Japan	0.53[e]	0.53[e]	0.54[e]	0.57[b,e]	0.54[e]	0.51[e]	0.47[e]
Korea	0.60[d]	0.93	0.96	0.95	0.98	1.00	0.96
Latvia	0.24	0.16	0.16	0.15	0.18	0.20	..
Luxembourg	0.26	0.49	0.57[b]	0.63	..	0.61	..
Mexico	0.20	0.32	0.33	0.35	0.38[e,p]	0.37[e,p]	0.33[e,p]
Netherlands	0.70	0.65[b]	0.63[b]	0.65	0.66	0.66	..
New Zealand	0.48	0.51	..	0.46	..	0.47	..
Norway	0.65	0.76	..	0.76	..	0.87	0.93[e]
Poland	0.32	0.42	0.45	0.41	0.43	0.42	..
Portugal	0.42	0.61	0.59	0.62	0.61	0.55	..
Slovak Republic	0.28[e]	0.33[e]	0.33[e]	0.32[e]	0.36[e]	0.38	..
Slovenia	0.53	0.76[b]	0.74	0.69	0.52	0.44	..
Spain	0.47	0.59	0.56	0.53	0.51	0.50	..
Sweden	0.83[b]	0.89	..	0.93[e]	..	..[c]	..
Switzerland	..	..	0.75	..	..	0.82	..
Turkey	0.29[d]	0.23	0.23	0.22	0.23	0.24	..
United Kingdom	0.51	0.51	0.46[e]	0.48	0.47[e]	0.46	..
United States	0.77[d]	0.87[d]	0.80[d]	0.75[d]	0.71[d]	0.70[d,p]	0.69[d,p]
EU28 (OECD estimates)	0.59[e]	0.64[e]	0.64[e]	0.64[e]	0.63[e]	0.62[e]	..
OECD-Total[2]	**0.63[e]**	**0.69[e]**	**0.67[e]**	**0.66[e]**	**0.64[e]**	**0.63[e]**	**..**
Argentina	0.27	..	..	..	..	0.47	0.39
China	0.34	0.38	0.41	0.42	0.41	0.44	0.42
Romania	0.22	0.24[b]	0.24	0.20	0.19	0.20	..
Russian Federation	0.61	0.68	0.70	0.69	0.74	0.76	0.75
Singapore	0.79	0.82	0.77	0.78	0.80	..	..
South Africa	0.33	0.32	0.33	0.31	0.34	0.36	..
Chinese Taipei	0.73	0.76	0.73	0.70	0.65	0.64	0.67

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 13. Percentage of Gross domestic expenditure on R&D (GERD) financed by the business enterprise sector

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	45.6[e]	46.2	45.7[e]	48.7	47.9[e]	49.7	53.4[b,p]
Belgium	59.7	60.2	60.6	60.6	..	58.6	..
Canada	49.3	49.1	47.4[b]	46.7	45.8[b]	41.6	40.6[p]
Chile	..	33.9	34.9	34.2	31.9[b]	32.8	35.8[b,p]
Czech Republic	48.2	37.7	36.4	37.6	35.9	34.5	39.5
Denmark	59.5	61.2	59.9[e]	59.0	..	59.4[p]	..
Estonia	38.5	55.0	51.3	42.1	37.1	41.0	48.2
Finland	66.9	67.0	63.1	60.8	53.5	54.8	..
France	51.9	55.0	55.3	55.1	54.5[b]	54.0	..
Germany	67.6	65.6	66.1	65.4	66.0	65.6	65.2
Greece	31.1	32.7	31.0	30.3	29.8	31.4	40.2
Hungary	39.4[d]	47.5	46.9	46.8	48.3	49.7	..
Iceland	48.0	49.8[b,e]	..	36.9[b]	35.7	33.3	35.0
Ireland	57.4	48.9[e]	49.7[e]	52.0[e]	52.1[e]	48.4	..
Israel[1]	56.2[d]	37.3[d]	39.4[d]	36.8[d]	35.0[d]	34.3[d]	..
Italy	39.7	45.1	44.3	45.2	47.3[e]	50.0	..
Japan	76.1	76.5	76.1	75.5[b]	77.3	78.0	78.1
Korea	75.0[d]	73.7	74.7	75.7	75.3	74.5	75.4
Latvia	34.3	24.8	23.7	21.8	27.8	20.0	..
Luxembourg	79.7	45.3	18.1[b]	16.5	..	47.1	..
Mexico	41.5	32.3	24.5	21.0	19.5[e,p]	19.7[e,p]	20.7[e,p]
Netherlands	46.3	51.1[b]	51.6[b]	51.1	51.1	48.6	..
New Zealand	41.1	40.0	..	39.8	..	43.1	..
Norway	46.8	44.2	..	43.1	..	44.2	43.2[e]
Poland	33.4	28.1	32.3	37.3	39.0	39.0	..
Portugal	36.3	44.7	46.0	42.3	41.8	42.7	..
Slovak Republic	36.6	33.9	37.7	40.2	32.2	25.1	..
Slovenia	54.8	61.2[b]	62.2	63.8	68.4	69.2	..
Spain	46.3	44.3	45.6	46.3	46.4	45.8	..
Sweden	63.9[b]	57.6	..	61.0[e]	..	57.3	..
Switzerland	..	..	63.6	..	..	63.5	..
Turkey	43.3[d]	45.8	46.8	48.9	50.9	50.1	..
United Kingdom	42.1	45.9	45.6[e]	46.2	48.0[e]	49.0	..
United States	63.3[d]	58.4[d]	59.5[d]	61.1[d]	62.0[d]	62.4[d,p]	62.3[d,p]
EU28 (OECD estimates)	53.7[e]	54.3[e]	54.4[e]	54.5[e]	54.6[e]	54.7[e]	..
OECD-Total[2]	**62.3[e]**	**59.8[e]**	**60.2[e]**	**60.8[e]**	**61.3[e]**	**61.4[e]**	**61.6[e]**
Argentina	31.0	..	..	..	..	17.2	18.2
China	67.0	73.9	74.0	74.6	75.4	74.7	76.1
Romania	37.2	37.4[b]	34.4	31.0	32.9	37.3	..
Russian Federation	30.0	27.7	27.2	28.2	27.1	26.5	28.1
Singapore	58.8	55.3	53.4	52.7	54.1	..	..
South Africa	43.9	39.0	38.3	41.4	40.8	38.9	..
Chinese Taipei	66.9	72.6	74.1	75.5	77.2	77.9	77.7

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 14. Percentage of Gross domestic expenditure on R&D (GERD) financed by government

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	35.9[e]	35.8	37.8[d,e]	33.6	35.8[d,e]	32.6	30.7[b,d,p]
Belgium	24.7	23.4	24.5	24.3	..	22.5	..
Canada	31.8[e]	33.8[e]	34.1[b,e]	33.8[e]	32.1[b,e]	32.2[e]	33.1[p]
Chile	..	33.7	36.0	38.4	44.2[b]	42.6	46.4[b,p]
Czech Republic	45.2	41.7	36.8	34.7	32.9	32.2	35.6
Denmark	27.6	28.2[d]	29.2[d,e]	29.9[d]	..	29.4[p]	..
Estonia	43.5	32.8	38.3	47.2	49.5	46.4	37.6
Finland	25.7	25.0[b]	26.7	26.0	27.5	28.9	..
France	38.6	35.1	35.4	35.3	34.3[b]	34.8	..
Germany	28.4	29.9	29.2[d]	29.1[d]	28.7[d]	27.9[d]	28.5[d]
Greece	46.8	49.2	50.4	52.3	53.3	53.1	42.6
Hungary	49.4[d]	38.1	36.9	35.9	33.5	34.6	..
Iceland	40.5	40.0[b,e]	..	37.2[b]	34.1	32.0	34.2
Ireland	32.0	29.4[e]	28.2[e]	27.9[e]	27.5[e]	25.9	..
Israel[1]	14.5[d]	13.0[d]	12.7[d]	12.3[d]	13.5[d]	12.8[d]	..
Italy	50.7	41.9	42.5	41.4	39.7[e]	38.0	..
Japan	16.8[e]	16.4[e]	16.8[e]	17.3[b,e]	16.0[e]	15.4[e]	15.0[e]
Korea	23.0[d]	24.9	23.8	22.8	23.0	23.7	22.7
Latvia	46.0	22.5	23.9	23.9	25.6	32.7	..
Luxembourg	16.6	33.5	45.1[b]	48.4	..	47.7	..
Mexico	49.2	63.0	67.8	70.7	71.8[e,p]	70.3[e,p]	67.4[e,p]
Netherlands	38.8	33.9[b]	32.4[b]	33.4	33.2	33.1	..
New Zealand	43.2	41.4	..	39.8	..	37.1	..
Norway	43.6	46.5	..	45.8	..	44.9	45.7[e]
Poland	57.7	55.8	51.3	47.2	45.2	41.8	..
Portugal	55.2	41.8	43.1	46.4	47.1	44.3	..
Slovak Republic	57.0[e]	49.8[e]	41.6[e]	38.9[e]	41.4[e]	31.9	..
Slovenia	37.2	31.5[b]	28.7	26.9	21.8	19.9	..
Spain	43.0	44.5	43.1	41.6	41.4	40.9	..
Sweden	24.4[b]	27.5	..	28.3[e]	..	..[c]	..
Switzerland	..	..	23.6	..	..	24.4	..
Turkey	50.1[d]	29.2	28.2	26.6	26.3	27.6	..
United Kingdom	32.7	30.5	28.7[e]	29.1	28.4[e]	27.7	..
United States	30.8[d]	31.3[d]	29.6[d]	27.5[d]	25.9[d]	25.5[d,p]	25.1[d,p]
EU28 (OECD estimates)	35.2[e]	33.8[e]	33.4[e]	33.0[e]	32.5[e]	31.7[e]	..
OECD-Total[2]	**29.6[e]**	**29.9[e]**	**29.1[e]**	**28.1[e]**	**27.2[e]**	**26.7[e]**	**..**
Argentina	65.3	..	..	..	..	76.4	73.1
China	26.3	21.7	21.6	21.1	20.3	21.3	20.0
Romania	53.5	49.1[b]	49.9	52.3	48.5	41.7	..
Russian Federation	61.9	67.1	67.8	67.6	69.2	69.5	68.2
Singapore	36.4	38.1	38.5	39.3	37.1	..	..
South Africa	38.2	43.1	45.4	42.9	43.9	44.6	..
Chinese Taipei	31.5	26.2	24.6	23.3	21.7	21.1	21.3

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Table 15. Percentage of Gross domestic expenditure on R&D (GERD) financed by other national sources

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	0.4[e]	1.1	0.5[d,e]	1.1	0.5[d,e]	1.1	0.5[d,p]
Belgium	3.3	3.5	1.4	1.5	..	2.4	..
Canada	10.1[e]	11.1[e]	12.8[b,e]	13.7[e]	13.6[b,e,m]	14.4[e,m]	15.9[p]
Chile	..	11.2	11.6	12.5	10.2[b]	11.8	15.9[b,p]
Czech Republic	1.2	0.9	0.9	0.5	0.7	0.8	0.9
Denmark	2.8[d]	3.6[d]	3.8[d,e]	4.4[d]	..	4.7[p]	..
Estonia	1.0	0.4	0.4	0.4	1.0	0.5	0.6
Finland	1.2	1.4	1.4	1.6	1.7	1.8	..
France	1.9	2.1	1.7	1.7	3.5[b]	3.5	..
Germany	0.3	0.3	0.4[d]	0.3[d]	0.3[d]	0.4[d]	0.3[d]
Greece	3.1	3.3	2.9	3.5	3.7	2.9	2.7
Hungary	0.3[d]	1.0	0.9	0.8	0.7	0.7	..
Iceland	0.3	1.9[b,e]	..	5.9[b]	6.9	8.4	8.4
Ireland	1.9	1.3[e]	1.3[e]	1.5[e]	1.7[e]	1.9	..
Israel[1]	4.6[d]	2.0[d]	2.3[d]	1.7[d]	1.2[d]	1.3[d]	..
Italy	1.7	3.9	3.7	3.7	3.6[e]	3.7	..
Japan	6.8[e]	6.6[e]	6.6[e]	6.7[b,e]	6.3[e]	6.1[e]	6.2[e]
Korea	1.3[d]	1.2	1.1	1.2	1.0	1.0	1.0
Latvia	1.2	1.6	2.0	2.7	2.3	2.2	..
Luxembourg	0.1	1.7	2.3[b]	2.8	..	1.9	..
Mexico	8.2	4.1	7.3	8.0	8.4[e,p]	9.6[e,p]	11.4[e,p]
Netherlands	2.8	3.6[b]	3.5[b]	3.4	3.1	2.7	..
New Zealand	10.6	12.2	..	13.2	..	11.5	..
Norway	1.6	1.5	..	1.6	..	1.6	1.7[e]
Poland	3.2	2.7	3.0	2.3	2.4	2.4	..
Portugal	3.8	7.5	5.7	5.2	5.4	5.7	..
Slovak Republic	0.3	2.2	2.1	2.9	2.7	3.6	..
Slovenia	0.7	0.2[b]	0.5	0.4	0.6	0.3	..
Spain	5.0	4.5	4.6	4.7	4.8	5.2	..
Sweden	3.6[b]	3.9	..	4.1[e]	..	4.3	..
Switzerland	..	..	1.6	..	..	1.9	..
Turkey	5.8[d]	24.2	24.4	23.7	21.8	21.3	..
United Kingdom	5.9	5.9	5.9[e]	6.0	6.1[e]	6.3	..
United States	5.9[d]	6.6[d]	6.8[d]	6.9[d]	7.0[d]	7.1[d,p]	7.4[d,p]
EU28 (OECD estimates)	2.3[e]	2.5[e]	2.4[e]	2.4[e]	2.7[e]	2.7[e]	..
OECD-Total[2]	**4.9[e]**	**5.1[e]**	**5.2[e]**	**5.3[e]**	**5.4[e]**	**5.5[e]**	**5.5[e]**
Argentina	2.9	..	..	..	..	3.1	2.4
China	..	..	..	..	..	..	..
Romania	4.0	1.4[b]	1.2	1.2	1.5	1.8	..
Russian Federation	0.5	1.0	1.0	1.2	1.2	1.4	1.0
Singapore	0.5	1.6	2.2	2.2	2.0	..	..
South Africa	4.4	2.9	3.2	2.8	3.1	3.5	..
Chinese Taipei	1.5	1.2	1.1	1.0	1.0	0.9	0.8

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 16. Percentage of Gross domestic expenditure on R&D (GERD) financed by the rest of the world

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	18.0[e]	16.9	16.1[e]	16.6	15.8[e]	16.6	15.5[p]
Belgium	12.4	13.0	13.4	13.7	..	16.5	..
Canada	8.8	6.0	5.7[b]	5.9	8.1[b]	10.0	10.4[p]
Chile	..	21.3	17.5	15.0	13.8[b]	12.9	1.9[b,p]
Czech Republic	5.4	19.7	25.9	27.2	30.5	32.5	24.0
Denmark	10.1	7.1	7.2[e]	6.7	..	6.6[p]	..
Estonia	17.1	11.9	10.0	10.3	12.5	12.2	13.6
Finland	6.3[b]	6.5	8.8	11.5	17.3	14.5	..
France	7.5	7.7	7.6	7.9	7.6[b]	7.6	..
Germany	3.7	4.2	4.3	5.2	5.0	6.2	5.9
Greece	19.0	14.8	15.8	14.0	13.2	12.7	14.6
Hungary	10.7[d]	13.5	15.4	16.6	17.5	15.0	..
Iceland	11.2	8.2[b,e]	..	20.0[b]	23.3	26.4	22.4
Ireland	8.6	20.3[e]	20.8[e]	18.4[e]	18.3[e]	23.8	..
Israel[1]	24.7[d]	47.6[d]	45.6[d]	49.3[d]	50.2[d]	51.6[d]	..
Italy	8.0	9.1	9.5	9.7	9.4[e]	8.3	..
Japan	0.3	0.5	0.4	0.5[b]	0.4	0.5	0.7
Korea	0.7[d]	0.2	0.3	0.3	0.7	0.8	0.9
Latvia	18.5	51.0	50.4	51.6	44.2	45.0	..
Luxembourg	3.6	19.5	34.4[b]	32.3	..	3.4	..
Mexico	1.1	0.6	0.4	0.4	0.4[e,p]	0.5[e,p]	0.6[e,p]
Netherlands	12.0	11.3[b]	12.5[b]	12.2	12.7	15.5	..
New Zealand	5.2	6.3	..	7.2	..	8.2	..
Norway	8.1	7.8	..	9.5	..	9.2	9.5[e]
Poland	5.7	13.4	13.3	13.1	13.4	16.7	..
Portugal	4.7	6.0	5.2	6.1	5.6	7.4	..
Slovak Republic	6.0	14.2	18.7	18.0	23.7	39.4	..
Slovenia	7.3	7.0[b]	8.6	8.9	9.3	10.6	..
Spain	5.7	6.7	6.6	7.4	7.4	8.0	..
Sweden	8.1[b]	11.0	..	6.7[e]	..	..[c]	..
Switzerland	..	..	11.2	..	..	10.2	..
Turkey	0.8	0.7	0.6	0.8	1.1	1.1	..
United Kingdom	19.3	17.8	19.8[e]	18.7	17.5[e]	17.1	..
United States	..[k]	3.8[d]	4.1[d]	4.5[d]	5.0[d]	5.0[d,p]	5.2[d,p]
EU28 (OECD estimates)	8.7[e]	9.3[e]	9.8[e]	10.1[e]	10.2[e]	10.9[e]	..
OECD-Total[2]	**..**	**5.2[e]**	**5.5[e]**	**5.8[e]**	**6.1[e]**	**6.4[e]**	**..**
Argentina	0.8	..	..	..	..	3.3	6.3
China	0.9	1.3	1.0	0.9	0.8	0.7	0.7
Romania	5.3	12.1[b]	14.4	15.5	17.0	19.2	..
Russian Federation	7.6	4.3	4.0	3.0	2.5	2.6	2.7
Singapore	4.4	5.0	5.9	5.8	6.8	..	..
South Africa	13.6	15.0	13.1	12.9	12.2	13.0	..
Chinese Taipei	0.1	0.0	0.1	0.1	0.1	0.1	0.1

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 17. Percentage of Gross domestic expenditure on R&D (GERD) performed by the business enterprise sector

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	57.8[e]	..	56.3[e]	..	53.4[e]	..
Austria	69.8[e]	68.8	70.4[e]	70.8	71.3[e]	71.4	71.4[p]
Belgium	68.0	68.7	69.8	69.4	69.9	69.9	69.7[p]
Canada	55.8[d]	53.3[d]	51.6[b,d]	51.2[d]	53.2[b]	52.1	50.9[p]
Chile	..	34.0	34.4	35.0	33.4[b]	34.3	38.5[b,p]
Czech Republic	58.2[b]	54.4	52.8	53.3	55.2	54.3	61.1
Denmark	68.3	66.7	65.6	63.3	63.8	63.9[p]	65.8[e]
Estonia	45.1	63.2	57.5	47.7	43.5	46.1	51.5
Finland	70.8	70.5	68.7	68.9	67.7	66.7	65.8
France	62.1	64.0	64.6	64.6	63.6[b]	63.7	63.6[p]
Germany	69.3	67.6	68.0	67.2	67.7	68.7	68.2
Greece	31.0	34.9	34.3	33.3	33.9	33.0	42.2
Hungary	43.2[d]	62.4[d]	65.6[d]	69.4[d]	71.5[d]	73.4[d]	74.1[d]
Iceland	51.5	53.1[b,e]	..	55.8[b,d]	61.1[d]	64.7[d]	63.0[d]
Ireland	65.5	69.8[e]	71.1[e]	71.0[e]	71.0[e]	71.3	70.7[e]
Israel[1]	81.5[d]	83.8[d]	84.2[d]	84.4[d]	84.6[d]	85.1[d]	85.6[d,e]
Italy	50.4	54.6	54.2	54.7	56.7[e]	58.2	58.3[p]
Japan	76.4	77.0	76.6	76.1[b]	77.8	78.5	78.8
Korea	76.9[d]	76.5	77.9	78.5	78.2	77.5	77.7
Latvia	40.7	27.8	22.6	28.2	35.5	24.7	24.5
Luxembourg	86.4	65.9	55.3[b]	52.5	53.7	51.6	51.5[p]
Mexico	46.9	34.9	29.7	31.2	29.9[e,p]	30.0[e,p]	30.6[e,p]
Netherlands	52.9	56.6[b]	56.6[b]	55.7	56.0	56.0	56.9[p]
New Zealand	41.6	45.4	..	46.4	..	49.8	..
Norway	53.5	52.2	52.3	52.5	53.7	53.9	53.3
Poland	31.8	30.1	37.2	43.6	46.6	46.6	65.7[b,p]
Portugal	38.5	47.4	49.7	47.5	46.4	46.4	47.8[p]
Slovak Republic	49.8	37.2	41.3	46.3	36.8	28.0	50.4
Slovenia	58.8	73.9[b]	75.7	76.5	77.3	76.3	75.6[p]
Spain	53.8	52.1	53.0	53.1	52.9	52.5	53.7
Sweden	72.8[b]	69.1	67.8[e]	68.9[e]	67.0[e]	69.7	69.6[p]
Switzerland	..	..	71.5	..	..	71.0	..
Turkey	33.8	43.2	45.1	47.5	49.8	50.0	54.2
United Kingdom	61.4	63.6	63.3[e]	63.9	65.1[e]	66.0	67.0[p]
United States	68.9[d]	68.4[d]	69.6[d]	70.9[d]	71.5[d]	71.7[d,p]	71.2[d,e,p]
EU28 (OECD estimates)	62.2[e]	62.4[e]	62.7[e]	62.7[e]	63.1[e]	63.6[e]	64.2[e]
OECD-Total[2]	**67.7[e]**	**67.2[e]**	**67.7[e]**	**68.3[e]**	**68.8[e]**	**69.1[e]**	**69.2[e]**
Argentina	32.2	27.6[p]	25.3[p]	24.2[p]	20.1[p]	21.2[b]	23.9
China	68.3	75.7	76.2	76.6	77.3	76.8	77.5
Romania	49.7	36.0[b]	39.0	30.7	41.5	44.0	55.2
Russian Federation	68.0	61.0	58.3	60.6	59.6	59.2	58.7
Singapore	66.2	62.1	60.9	59.4	61.2	..	..
South Africa	58.3	47.1	44.3	45.9	45.3	42.7	..
Chinese Taipei	67.0	72.7	74.3	75.7	77.2	77.8	77.6

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 18. Percentage of Gross domestic expenditure on R&D (GERD) performed by the higher education sector

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	28.0[e]	..	29.6[e]	..	30.6[e]	..
Austria	24.7[e]	25.6	24.6[e]	24.3	23.7[e]	23.5	23.5[p]
Belgium	22.3	22.3	21.3	21.7	20.6	20.3	20.2[p]
Canada	34.0	37.3	39.4[b]	39.5	37.7[b]	40.3	41.0[p]
Chile	..	32.4	34.3	39.3	39.0[b]	38.5	41.8[b,p]
Czech Republic	18.6	24.4	27.5	27.2	25.4	24.9	20.4
Denmark	24.6	30.9	31.6	33.9	33.5	33.4[p]	31.6[e]
Estonia	41.4	27.8	32.1	42.3	44.3	41.4	35.5
Finland	19.0	20.0	21.6	21.5	22.9	24.4	25.1
France	18.8	20.9	20.8	20.9	22.1[b]	22.0	22.0[p]
Germany	16.5	17.9	17.7	17.9	17.7	17.3	18.0[b]
Greece	47.5	40.2	39.9	37.4	37.2	37.8	31.9
Hungary	25.1[d]	20.2[d]	18.4[d]	14.4[d]	13.5[d]	12.1[d]	11.1[d]
Iceland	22.0	26.4[b,e]	..	37.4[b]	32.8	30.5	32.1
Ireland	27.1	25.3[e]	24.1[e]	24.5[e]	24.7[e]	24.4[e]	25.2[e]
Israel[1]	14.9[d]	12.9[d]	12.8[d]	12.7[d]	12.5[d]	12.2[d]	11.7[d,e]
Italy	30.2[b]	28.6	28.0	28.3	26.7[e]	25.5[e]	25.5[p]
Japan	13.4	13.2	13.4	13.5[b]	12.6	12.3	12.3
Korea	9.9[d]	10.1	9.5	9.2	9.0	9.1	9.1
Latvia	40.6	48.9	50.3	42.9	40.5	49.7	43.8
Luxembourg	1.5	10.7	16.9[b]	18.6	16.4	18.6	18.6[p]
Mexico	28.7	30.8	27.5	26.1	26.6[e,p]	26.8[e,p]	26.8[e,p]
Netherlands	34.7	32.6[b]	31.6[b]	32.1	32.1	32.1	31.5[p]
New Zealand	32.5	31.8	..	30.4	..	29.9	..
Norway	30.8	31.4	31.3	31.5	31.0	31.1	32.6
Poland	31.6	35.1	34.4	29.3	29.2	28.9	31.4[p]
Portugal	35.4	36.4	36.5	44.6[b]	45.6	45.5	45.1[p]
Slovak Republic	20.4	34.9	34.0	33.1	34.4	43.8	27.7
Slovenia	16.7	11.8[b]	11.1	10.4	10.5	10.2	10.9[p]
Spain	29.0	28.2	27.7	28.0	28.1	28.1	27.5
Sweden	22.0[b]	26.3	27.1[e]	27.1[e]	29.0[e]	26.7	26.8[p]
Switzerland	..	..	26.1	..	..	26.7	..
Turkey	54.6	45.5	43.9	42.1	40.5	39.7	36.3
United Kingdom	25.7	26.0	26.7[e]	26.4	25.8[e]	25.3	24.6[p]
United States	14.3[d]	14.5[d]	14.0[d]	13.5[d]	13.1[d]	13.0[d,p]	13.2[d,p]
EU28 (OECD estimates)	22.6[e]	23.6[e]	23.5[e]	23.6[e]	23.5[e]	23.1[e]	22.9[e]
OECD-Total[2]	**17.7[e]**	**18.4[e]**	**18.2[e]**	**18.0[e]**	**17.7[e]**	**17.5[e]**	**17.5[e]**
Argentina	25.8	30.2[p]	29.6[p]	29.1[p]	30.5[p]	26.0	25.8
China	9.9	7.9	7.6	7.2	6.9	7.0	6.8
Romania	13.7	22.9[b]	19.7	19.7	15.2	17.4	11.3
Russian Federation	5.8	9.0	9.3	9.0	9.8	9.6	9.1
Singapore	24.2	27.7	29.0	29.2	27.4	..	..
South Africa	19.3	29.8	30.7	28.4	28.5	30.5	..
Chinese Taipei	11.4	11.8	11.3	10.7	10.0	9.4	9.0

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Table 19. Percentage of Gross domestic expenditure on R&D (GERD) performed by the government sector

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	11.2[e]	..	11.2[e]	..	12.7[e]	..
Austria	5.2[e]	5.1	4.6[e]	4.4	4.5[e]	4.6	4.6[p]
Belgium	8.4	8.1	8.5[b]	8.5	9.0	9.2	9.5[p]
Canada	9.7	9.0	8.6[b]	8.9	8.6[b]	7.1	7.5[p]
Chile	..	4.0	4.1	8.4[b]	8.1[b]	7.8	13.2[b,p]
Czech Republic	22.8[b]	20.7	19.2	19.1	19.0	20.4	18.2
Denmark	6.5	2.0	2.4	2.4	2.3	2.3[p]	2.2[e]
Estonia	11.3	8.1	9.3	8.9	11.0	10.8	11.4
Finland	9.6	8.8	9.0	8.9	8.6	8.2	8.2
France	17.8	13.9	13.2	13.1	12.7[b]	12.8	12.9[p]
Germany	14.1[d]	14.5[d]	14.3[d]	14.9[d]	14.6[d]	14.1[d]	13.8[d]
Greece	20.3	23.8	24.8	28.0	27.7	28.1	25.0
Hungary	28.0[d]	15.8[d]	14.4[d]	14.9[d]	13.7[d]	13.3[d]	13.4[d]
Iceland	23.5	17.7[b,e]	..	6.8[b]	6.1	4.8	4.9
Ireland	7.4	4.9[e]	4.8[e]	4.5[e]	4.4[e]	4.3	4.1[e]
Israel[1]	2.7[d]	2.1[d]	1.9[d]	1.8[d]	1.8[d]	1.7[d,e]	1.7[d,e]
Italy	17.3	13.4	14.8	14.0	13.6[e]	13.1	13.2[p]
Japan	8.3	8.4	8.6	9.2[b]	8.3	7.9	7.5
Korea	11.9[d]	11.7	11.3	10.9	11.2	11.7	11.5
Latvia	18.7	23.3	27.1	28.9	24.0	25.6	31.8
Luxembourg	12.1[d]	23.4[d]	27.8[b,d]	29.0[d]	29.9[d]	29.8[d]	29.9[d,p]
Mexico	23.2	32.2	38.0	38.0	38.5[e,p]	37.9[e,p]	36.5[e,p]
Netherlands	12.4[d]	10.8[b,d]	11.8[b,d]	12.2[d]	11.9[d]	11.9[d]	11.5[p]
New Zealand	25.9	22.7	..	23.2	..	20.3	..
Norway	15.7	16.4	16.4	16.0	15.2	15.0	14.2
Poland	36.4	34.5	28.0	26.8	24.0	24.4	2.5[b,p]
Portugal	14.6	7.4	5.4	6.5	6.3	6.5	5.4[p]
Slovak Republic	29.7[d]	27.7[d]	24.5[d]	20.5[d]	28.3[d]	27.9	21.4
Slovenia	24.2	14.3[b]	13.1	13.0	12.2	13.5	13.5[p]
Spain	17.0	19.5	19.1	18.7	18.8	19.1	18.5
Sweden	4.9[b]	4.3	4.8[e]	3.7[e]	3.7[e]	3.4	3.4[p]
Switzerland	..	..	0.7[d]	..	..	0.9[d]	..
Turkey	11.6	11.3	11.0	10.4	9.7	10.3	9.5[d]
United Kingdom	10.6	8.6	8.0[e]	7.9	7.3[e]	6.6	6.3[p]
United States	12.3[d]	12.8[d]	12.3[d]	11.5[d]	11.4[d]	11.3[d,p]	11.5[d,p]
EU28 (OECD estimates)	14.1[e]	12.9[e]	12.7[e]	12.7[e]	12.4[e]	12.2[e]	11.9[e]
OECD-Total[2]	**12.0[e]**	**11.9[e]**	**11.7[e]**	**11.4[e]**	**11.1[e]**	**11.0[e]**	**10.9[e]**
Argentina	39.7	40.6[p]	43.4[p]	45.0[p]	47.7[p]	51.2	49.5
China	21.8	16.3	16.3	16.2	15.8	16.2	15.7
Romania	34.2	40.7[b]	40.9	49.2	43.0	38.3	33.3
Russian Federation	26.1	29.8	32.2	30.3	30.5	31.1	32.0
Singapore	9.7	10.2	10.0	11.3	11.4	..	..
South Africa	20.8	22.4	22.9	23.4	23.5	24.0	..
Chinese Taipei	21.0	15.1	14.1	13.3	12.6	12.5	13.1

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 20. Percentage of Gross domestic expenditure on R&D (GERD) performed by the private non-profit sector

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	2.98[e]	..	2.84[e]	..	3.24[e]	..
Austria	0.30[e]	0.49	0.44[e]	0.42	0.47[e]	0.49	0.49[p]
Belgium	1.31	0.90	0.40[b]	0.37	0.46	0.55	0.62[p]
Canada	0.53	0.40	0.47[b]	0.49	0.45[b]	0.48	0.51[p]
Chile	..	29.57	27.23	17.28[b]	19.52[b]	19.35	6.49[b,p]
Czech Republic	0.51	0.55	0.51	0.34	0.41	0.39	0.25
Denmark	0.67	0.37	0.41	0.42	0.41	0.37[p]	0.35[e]
Estonia	2.20	0.91	1.05	1.06	1.19	1.80	1.54
Finland	0.58	0.71	0.68	0.71	0.77	0.77	0.86
France	1.29	1.25	1.44	1.47	1.51[b]	1.54	1.56[p]
Germany	..	..	..	..	..	..	..
Greece	1.26	1.01	0.96	1.25	1.24	1.12	0.89
Hungary	..	..	..	..	..	..	..
Iceland	2.99	2.75[b,e]	..	..	..	..	..
Ireland	..	..	..	..	..	..	..
Israel[1]	0.97[d]	1.20[d]	1.10[d]	1.16[d]	1.04[d]	1.00[d,e]	1.01[d,e]
Italy	2.12	3.34	2.96	2.99	3.04[e]	3.19	2.99[p]
Japan	1.86	1.45	1.40	1.28[b]	1.34	1.33	1.38
Korea	1.36[d]	1.65	1.28	1.33	1.52	1.64	1.59
Latvia	0.00	..	..	..	..	..	..
Luxembourg	..	..	..	..	..	..	..
Mexico	1.13	2.13	4.80	4.68	4.87[e,p]	5.41[e,p]	6.23[e,p]
Netherlands	..	..	..	..	..	..	..
New Zealand	..	..	..	..	..	..	..
Norway	..	..	..	..	..	..	..
Poland	0.31	0.23	0.40	0.29	0.30	0.16	0.44[b,p]
Portugal	11.52	8.84	8.47	1.33[b]	1.72	1.58	1.64[p]
Slovak Republic	0.08	0.21	0.10	0.15	0.41	0.40	0.49
Slovenia	0.22	0.05[b]	0.05	0.04	0.04	0.04	0.02[p]
Spain	0.14	0.17	0.19	0.17	0.17	0.20	0.24
Sweden	0.31[b]	0.32[b]	0.29[e]	0.22[e]	0.24[e]	0.19	0.19[p]
Switzerland	..	..	1.70	..	..	1.45	..
Turkey	..	..	..	..	..	..	..
United Kingdom	2.32	1.81	1.91[e]	1.79	1.81[e]	2.01	2.06[p]
United States	4.44[d,e]	4.26[d,e]	4.11[d,e]	4.04[d,e]	4.04[d,e]	4.01[d,e,p]	4.07[d,e,p]
EU28 (OECD estimates)	1.08[e]	1.06[e]	1.04[e]	0.96[e]	0.98[e]	1.00[e]	1.00[e]
OECD-Total[2]	**2.65[e]**	**2.50[e]**	**2.41[e]**	**2.33[e]**	**2.36[e]**	**2.38[e]**	**2.40[e]**
Argentina	2.23	1.60[p]	1.68[p]	1.67[p]	1.75[p]	1.61	0.77[b]
China	..	..	..	..	..	..	..
Romania	2.44	0.38[b]	0.40	0.40	0.37	0.30	0.23
Russian Federation	0.18	0.17	0.18	0.13	0.13	0.14	0.21
Singapore	..	..	..	..	..	..	..
South Africa	1.60	0.77	2.11	2.27	2.65	2.76	..
Chinese Taipei	0.48	0.34	0.30	0.32	0.33	0.31	0.30

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 21. Total researchers in headcount

Headcount

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	..	65 609[d]	..	71 448[d]	..	78 051[d]	..
Belgium	48 757	63 207	..	66 724	..	73 709[b]	..
Canada	..	..	..	..	..	..	..
Chile	..	9 388[d]	10 447[d]	9 795[d]	12 303[d]	13 015[d]	14 200[d,p]
Czech Republic	37 542	45 902	47 651	51 455	54 493	56 605	56 178
Denmark	43 460	56 845	57 520	57 876	58 735	59 985[p]	..
Estonia	5 734	7 646	7 634	7 515	7 721	7 181	6 845
Finland	50 773	57 549	56 704	56 720	55 515	55 728	..
France	251 599	338 470	356 445	365 737	379 048[b]	383 843	..
Germany	406 253	522 010	..	549 283	..	586 030	..
Greece	33 396[d]	45 239[b,d]	..	53 744[d]	..	60 736[d]	..
Hungary	31 407	36 945	37 019	37 803	39 190	38 418	..
Iceland	3 821	3 270[b]	..	3 356[b]	..	3 722[b]	3 935
Ireland	17 653	22 358	..	25 393	..	33 091	..
Israel[1]	..	..	..	..	..	..	..
Italy	125 534	151 597	157 960	163 925	168 074	174 327	..
Japan	861 901[d]	892 684[d]	887 067[d]	892 406[d]	926 671[d]	907 455[d]	917 725[d]
Korea	234 702[d]	375 176	401 724	410 333	437 447	453 262	460 769
Latvia	5 748[d]	7 377[d]	7 995[d]	7 448[d]	7 939[d]	7 827[d]	..
Luxembourg	2 443	3 114	..	2 713	..	3 134	..
Mexico	..	56 481	41 419	42 222	..	..	..
Netherlands	57 782	84 072[b]	107 184[b]	110 536	111 795	112 946	..
New Zealand	22 186	28 100	..	29 300	..	31 000	..
Norway	36 555	45 578	46 747	47 795	50 025	52 181	54 601
Poland	97 875	100 723	103 627	109 611	115 375	118 494	..
Portugal	37 769	82 354	81 750	78 290[b]	78 736	81 005	..
Slovak Republic	17 526	24 711	25 069	24 441	25 080	24 396	..
Slovenia	7 644	12 514[b]	12 362	12 111	12 155	11 308	..
Spain	181 023	220 254[d]	215 544[d]	208 767[d]	210 104[d]	214 227[d]	..
Sweden	82 459[d]	80 154[e]	..	101 820[b,e]	..	108 761[e]	..
Switzerland	..	..	60 279	..	..	70 834	..
Turkey	83 856	137 452	155 133	166 097	181 544	190 784	191 769
United Kingdom	364 807[e]	429 009	442 385[e]	466 689	489 181[e]	496 953[e]	..
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	49 050	77 354[p]	80 245[p]	81 964[p]	83 837[p]	82 407	83 947
China	..	1 905 899	2 069 650	..	..	..	..
Romania	29 608	25 489[b]	27 838	27 600	27 535	27 253	..
Russian Federation	391 121[e]	374 791[e]	372 620[e]	369 015[e]	373 905[e]	379 411[e]	370 379[e]
Singapore	27 969	38 013	38 432	40 385	40 730	..	..
South Africa	39 266	40 653	42 828	45 935	48 479	51 877	..
Chinese Taipei	115 954	174 600	179 830	180 353	182 119	183 571	185 472

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 22. Women researchers as a percentage of total researchers
Based on headcount

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	..	29.0[d]	..	29.6[d]	..	29.5[d]	..
Belgium	29.6	33.5	..	33.4	..	34.1[b]	..
Canada	..	..	..	..	..	..	..
Chile	..	30.8[d]	31.0[d]	34.3[d]	31.5[d]	33.0[d]	33.1[d,p]
Czech Republic	28.8	28.2	27.5	28.3	27.2	26.9	26.7
Denmark	29.7	33.1	35.4[e]	35.2	..	32.5[p]	..
Estonia	40.8	43.7	44.0	44.4	44.0	43.9	43.6
Finland	30.2	32.1	32.2	31.5	32.1	32.3	..
France	28.0	25.6[e]	25.5[e]	25.5[e]	26.7[b,e]	27.0[e]	..
Germany	21.3	26.8	..	27.9	..	28.0	..
Greece	36.4[d]	36.7[b,d]	..	39.4[d]	..	38.0[d]	..
Hungary	34.2	31.7	30.9	30.3	30.4	30.8	..
Iceland	39.3	37.3[b]	..	43.8[b]	..	45.6[b]	47.2
Ireland	30.3	32.6	..	32.3	..	35.9	..
Israel[1]	..	..	..	..	..	..	..
Italy	32.3	34.9	35.5	35.7	36.0	36.0	..
Japan	11.9[d]	14.0[d]	14.4[d]	14.6[d]	14.7[d]	15.3[d]	15.7[d]
Korea	12.9[d]	17.3	17.7	18.2	18.5	18.9	19.7
Latvia	51.5[d]	53.3[d]	52.8[d]	52.0[d]	52.1[d]	51.0[d]	..
Luxembourg	18.2	22.9	..	27.3	..	28.9	..
Mexico	..	..	32.8	33.0	..	..	..
Netherlands	21.0	24.2[b]	24.0[b]	23.6	23.4	25.4	..
New Zealand	..	..	..	..	..	..	..
Norway	31.6	36.2	36.2	36.9	37.4	37.4	37.6
Poland	39.3	38.6	38.3	37.8	37.2	37.0	..
Portugal	44.4	44.0	45.0	45.4[b]	44.3	44.1	..
Slovak Republic	41.5	42.6	42.3	42.7	42.5	42.2	..
Slovenia	34.8	36.4[b]	35.8	36.0	36.1	36.5	..
Spain	36.7	38.7[d]	38.8[d]	39.3[d]	39.6[d]	40.0[d]	..
Sweden	35.7[d]	37.2[e]	..	33.3[b,e]	..	33.7[e]	..
Switzerland	..	..	32.4	..	..	33.5	..
Turkey	36.1	35.6	36.2	36.2	36.9	37.3	36.7
United Kingdom	35.7[e]	37.7	37.8[e]	38.1	37.4[e]	38.6[e]	..
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	50.5	52.7[p]	52.6[p]	52.4[p]	52.9[p]	52.6	53.0
China	..	..	..	..	..	..	..
Romania	45.3	46.1[b]	45.1	45.7	46.0	46.2	..
Russian Federation	42.4[e]	41.4[e]	41.2[e]	40.9[e]	40.5[e]	40.3[e]	40.0[e]
Singapore	26.3	29.2	29.6	29.6	30.1	..	..
South Africa	39.7	42.3	43.7	44.0	44.3	45.0	..
Chinese Taipei	19.6	21.5	21.8	22.0	22.1	22.2	22.4

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 23. Business enterprise expenditure on R&D (BERD) at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	7 515.5	12 124.9	..	13 025.4	..	11 326.6	..
Austria	4 770.9[e]	6 847.5	8 038.4[e]	8 504.0	9 118.3[e]	9 384.2	9 731.3[p]
Belgium	4 233.8	6 747.6	7 479.2	7 885.3	8 342.7	8 830.9	9 123.0[p]
Canada	12 886.0[d]	13 625.3[d]	13 417.9[d]	13 560.5[d]	14 798.1[b]	13 759.9	13 271.9[p]
Chile	..	419.5	466.7	536.4	506.5	528.4	586.8[p]
Czech Republic	1 523.5[b]	2 558.8	2 874.8	3 246.9	3 698.3	3 697.8	3 767.7
Denmark	3 023.3	4 859.9	4 897.4	4 936.6	5 023.4	5 231.2[p]	5 307.4[e]
Estonia	93.2	474.7	420.3	297.8	236.9	258.6	258.2
Finland	3 958.3	5 620.3	5 167.9	5 083.5	4 860.5	4 451.4	4 310.4
France	24 554.5	34 290.4	35 581.4	37 688.6	38 551.3	39 020.6	39 538.8[p]
Germany	44 288.0	64 758.0	68 327.0	69 136.9	74 123.8	78 211.5	80 537.5
Greece	504.0	681.3	669.8	774.1	825.3	920.2	1 225.9
Hungary	685.1[d]	1 690.4[d]	1 899.9[d]	2 333.8[d]	2 437.9[d]	2 579.3[d]	2 343.0[d]
Iceland	152.9	166.8[b,e]	..	135.9[b,d]	178.1[d]	220.5[d]	222.7[d]
Ireland	1 314.6	2 236.4	2 383.4[e]	2 492.4	2 572.3[e]	2 747.8	2 824.6[e]
Israel[1]	5 677.4[d]	7 979.6[d]	8 788.5[d]	9 634.3[d]	9 953.2[d]	10 923.4[d]	11 584.5[d,e]
Italy	9 186.6	14 268.5	14 854.5	15 570.9	16 688.8	17 350.9	17 428.1[p]
Japan	98 384.0	114 204.6	116 716.3	125 287.5	131 839.8	133 178.2	132 812.4
Korea	23 531.2[d]	44 680.5	50 559.8	53 573.7	57 180.5	58 714.5	61 686.1
Latvia	66.9	78.8	64.9	78.9	116.2	74.9	54.3
Luxembourg	431.1	459.8	342.3[b]	355.1	382.7	383.1	381.5[p]
Mexico	2 510.0	3 410.3	2 909.8	3 214.3	3 449.3[e,p]	3 409.0[e,p]	3 368.9[e,p]
Netherlands	5 761.6	8 278.9[b]	8 585.1[b]	8 888.9	9 190.7	9 414.3	9 961.2[p]
New Zealand	495.1	802.9	..	861.7	..	1 094.5	..
Norway	1 752.6	2 610.4	2 779.1	2 949.9	3 118.9	3 333.4	3 332.5
Poland	947.8	1 954.9	2 973.6	3 570.4	4 262.3	4 722.4	6 591.3[b,p]
Portugal	695.5	1 952.1	1 905.1	1 838.4	1 789.6	1 763.4	1 916.9[p]
Slovak Republic	219.8	343.9	479.6	575.4	508.2	526.0	657.8
Slovenia	398.0	1 058.5[b]	1 158.7	1 211.9	1 164.5	1 087.8	1 023.0[p]
Spain	7 128.0	10 357.2	10 208.0	10 234.7	10 242.7	10 361.6	10 751.6
Sweden	7 564.0[b]	9 279.2	9 470.3[e]	9 995.0	9 514.1[e]	10 679.7	10 990.8[p]
Switzerland	..	..	10 542.8	..	..	12 628.0	..
Turkey	1 554.8	4 985.9	5 776.5	6 569.7	7 931.2	8 572.0	10 280.8
United Kingdom	18 809.0	24 655.7	24 381.2	26 534.1	28 541.9	29 944.9	31 673.1
United States	226 159.0[d]	294 092.0[d]	302 251.0[d]	322 528.0[d]	340 728.0[d]	355 821.0[d]	363 753.0[d,e]
EU28 (OECD estimates)	141 009.5[e]	204 972.2[e]	213 891.5[e]	222 834.6[e]	234 221.9[e]	244 244.4[e]	251 613.7[e]
OECD-Total[2]	**526 789.8[e]**	**712 289.4[e]**	**739 405.4[e]**	**784 336.6[e]**	**826 905.8[e]**	**855 180.8[e]**	**875 912.0[e]**
Argentina	733.6	1 284.9[p]	1 333.8[p]	1 292.9[p]	1 011.4[p]	1 180.3[b]	1 131.1
China	59 326.1	187 684.1	222 507.6	255 971.4	286 453.2	312 862.6	349 522.2
Romania	420.0	648.1[b]	715.9	470.5	650.6	917.4	1 208.3
Russian Federation	12 317.7	21 451.5	22 116.5	23 397.5	24 040.8	23 520.3	23 413.8
Singapore	3 364.4	5 194.4	5 017.3	5 203.8	6 157.8	..	..
South Africa	2 357.3	2 191.9	2 141.9	2 285.6	2 481.1	2 482.7	..
Chinese Taipei	10 257.5	19 949.5	21 589.2	23 238.4	25 061.8	26 124.0	27 740.4

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 24. Business enterprise expenditure on R&D (BERD) as a percentage of GDP

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	1.05	1.22	..	1.18	..	1.00	..
Austria	1.66[e]	1.84	2.05[e]	2.09	2.19[e]	2.18	2.20[p]
Belgium	1.21	1.48	1.59	1.62	1.67	1.72	1.73[p]
Canada	1.10[d]	0.95[d]	0.92[d]	0.87[d]	0.91[b]	0.86	0.82[p]
Chile	..	0.12	0.12	0.14	0.13	0.13	0.14[p]
Czech Republic	0.68[b]	0.85	0.94	1.01	1.09	1.05	1.03
Denmark	1.63	1.96	1.95	1.88	1.86	1.89[p]	1.89[e]
Estonia	0.42	1.46	1.22	0.82	0.63	0.69	0.66
Finland	2.36	2.56	2.35	2.26	2.15	1.93	1.81
France	1.27	1.40	1.44	1.44	1.45	1.44	1.43[p]
Germany	1.68	1.89	1.95	1.90	1.94	2.00	2.00
Greece	0.18	0.23	0.24	0.27	0.28	0.32	0.43
Hungary	0.40[d]	0.74[d]	0.83[d]	0.96[d]	0.97[d]	1.00[d]	0.89[d]
Iceland	1.39	1.32[b,e]	..	0.98[b,d]	1.22[d]	1.40[d]	1.31[d]
Ireland	0.78	1.08	1.12[e]	1.12	1.08[e]	0.85	0.83[e]
Israel[1]	3.30[d]	3.36[d]	3.50[d]	3.50[d]	3.55[d]	3.63[d]	3.64[d,e]
Italy	0.53	0.66	0.69	0.72	0.76	0.78	0.75[p]
Japan	2.43	2.50	2.46	2.52	2.64	2.57	2.47
Korea	2.02[d]	2.87	3.14	3.26	3.35	3.27	3.29
Latvia	0.22	0.19	0.15	0.17	0.24	0.15	0.11
Luxembourg	1.36	0.96	0.70[b]	0.68	0.68	0.66	0.64[p]
Mexico	0.19	0.18	0.14	0.16	0.16[e,p]	0.16[e,p]	0.15[e,p]
Netherlands	0.95	1.08[b]	1.10[b]	1.09	1.12	1.12	1.16[p]
New Zealand	0.47	0.56	..	0.54	..	0.63	..
Norway	0.79	0.85	0.85	0.87	0.92	1.04	1.08
Poland	0.18	0.22	0.33	0.38	0.44	0.47	0.63[b,p]
Portugal	0.29	0.69	0.68	0.63	0.60	0.58	0.61[p]
Slovak Republic	0.25	0.25	0.33	0.38	0.32	0.33	0.40
Slovenia	0.83	1.79[b]	1.95	1.97	1.83	1.68	1.51[p]
Spain	0.59	0.69	0.68	0.67	0.65	0.64	0.64
Sweden	2.47[b]	2.24	2.22[e]	2.28	2.11[e]	2.28	2.26[p]
Switzerland	..	..	2.28	..	..	2.40	..
Turkey	0.19	0.35	0.38	0.39	0.43	0.44	0.51
United Kingdom	0.96	1.06	1.02	1.05	1.09	1.11	1.13
United States	1.73[d]	1.90[d]	1.87[d]	1.93[d]	1.96[d]	1.96[d]	1.95[d,e]
EU28 (OECD estimates)	1.03[e]	1.17[e]	1.20[e]	1.21[e]	1.23[e]	1.25[e]	1.24[e]
OECD-Total[2]	**1.45[e]**	**1.56[e]**	**1.57[e]**	**1.60[e]**	**1.62[e]**	**1.63[e]**	**1.62[e]**
Argentina	0.14	0.16[p]	0.16[p]	0.15[p]	0.12[p]	0.13[b]	0.13
China	0.89	1.34	1.45	1.52	1.56	1.58	1.63
Romania	0.20	0.18[b]	0.19	0.12	0.16	0.21	0.27
Russian Federation	0.67	0.62	0.60	0.62	0.64	0.65	0.64
Singapore	1.43	1.33	1.22	1.18	1.32	..	..
South Africa	0.50	0.35	0.32	0.33	0.35	0.34	..
Chinese Taipei	1.56	2.11	2.19	2.27	2.32	2.37	2.45

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 25. Business enterprise expenditure on R&D (BERD) at 2010 prices and PPP

Million 2010 USD

	2005	2011	2012	2013	2014	2015	2016
Australia	8 610.9	11 978.9	..	12 168.5	..	10 883.4	..
Austria	5 457.8[e]	6 643.8	7 479.4[e]	7 627.6	8 037.0[e]	8 086.8	8 309.8[p]
Belgium	4 933.2	6 584.2	7 072.7	7 236.1	7 549.2	7 913.7	8 071.1[p]
Canada	14 194.1[d]	13 400.2[d]	13 086.5[d]	12 803.6[d]	13 773.4[b]	13 078.7	12 592.3[p]
Chile	..	394.1	432.6	491.0	459.7	490.6	531.1[p]
Czech Republic	1 747.3[b]	2 499.4	2 757.7	2 952.4	3 260.4	3 302.9	3 319.0
Denmark	3 859.8	4 754.2	4 740.9	4 605.7	4 622.4	4 779.3[p]	4 870.2[e]
Estonia	122.2	450.9	394.2	270.5	213.8	235.9	231.8
Finland	4 709.2	5 469.0	4 941.2	4 723.2	4 449.9	4 009.3	3 834.8
France	28 656.6	33 433.7	34 369.1	34 726.1	35 136.8	35 421.4	35 479.3[p]
Germany	50 679.3	62 830.9	65 164.4	63 642.3	66 524.2	69 737.1	70 938.3
Greece	571.4	668.2	633.1	690.9	726.3	817.1	1 087.7
Hungary	866.4[d]	1 626.4[d]	1 787.4[d]	2 122.1[d]	2 220.3[d]	2 376.0[d]	2 166.8[d]
Iceland	162.2	164.9[b,e]	..	129.4[b,d]	164.8[d]	197.6[d]	198.0[d]
Ireland	1 490.2	2 199.2	2 273.0[e]	2 318.6	2 425.6[e]	2 396.4	2 460.1[e]
Israel[1]	5 865.2[d]	7 775.4[d]	8 280.2[d]	8 625.2[d]	9 056.5[d]	9 498.2[d]	9 891.4[d,e]
Italy	11 127.3	13 811.7	13 978.4	14 275.1	15 202.8	15 723.7	15 232.8[p]
Japan	108 473.6	111 810.5	111 738.5	116 915.8	123 008.0	121 310.1	117 731.0
Korea	24 835.6[d]	44 716.9	50 096.2	53 507.2	56 951.4	57 049.7	59 023.9
Latvia	81.5	75.9	61.2	72.3	104.2	67.8	48.5
Luxembourg	523.1	429.5	312.4[b]	314.6	329.4	328.4	330.3[p]
Mexico	3 029.5	3 224.3	2 707.5	2 955.4	3 100.8[e,p]	3 166.8[e,p]	3 084.2[e,p]
Netherlands	6 581.7	8 100.4[b]	8 166.9[b]	8 076.2	8 449.0	8 647.1	9 115.9[p]
New Zealand	588.5	781.5	..	782.4	..	993.5	..
Norway	2 080.9	2 516.7	2 600.7	2 686.8	2 842.8	3 122.7	3 175.3
Poland	1 134.9	1 891.9	2 803.5	3 292.6	3 922.7	4 347.7	6 071.7[b,p]
Portugal	816.3	1 959.0	1 865.0	1 696.5	1 625.9	1 594.4	1 701.9[p]
Slovak Republic	263.1	341.5	468.6	544.5	476.0	501.0	626.6
Slovenia	433.8	1 024.9[b]	1 086.0	1 087.8	1 038.5	971.8	905.9[p]
Spain	8 321.9	10 181.0	9 758.6	9 466.7	9 317.5	9 446.1	9 699.9
Sweden	8 899.7[b]	8 995.2	8 889.6[e]	9 222.9	8 755.7[e]	9 874.6	10 145.4[p]
Switzerland	..	..	9 729.9	..	..	10 802.8	..
Turkey	2 071.7	4 842.6	5 513.2	6 192.1	7 181.3	7 837.5	9 395.6
United Kingdom	21 256.4	24 322.4	23 533.3	24 904.1	26 457.8	27 593.1	28 793.4
United States	248 861.2[d]	288 142.9[d]	290 780.5[d]	305 356.5[d]	316 900.2[d]	327 387.4[d]	330 469.5[d,e]
EU28 (OECD estimates)	163 805.0[e]	199 763.1[e]	204 184.2[e]	205 374.7[e]	212 726.4[e]	220 576.7[e]	224 521.8[e]
OECD-Total[2]	**589 074.1[e]**	**697 297.9[e]**	**710 555.8[e]**	**736 414.4[e]**	**766 907.3[e]**	**784 017.8[e]**	**791 422.9[e]**
Argentina	807.3	1 258.9[p]	1 283.2[p]	1 224.1[p]	940.7[p]	1 068.7[b]	1 016.4
China	65 283.7	183 892.1	214 069.7	242 352.3	266 435.1	287 901.2	317 751.3
Romania	611.0	628.7[b]	669.6	437.1	602.6	848.2	1 101.9
Russian Federation	17 861.5	20 297.2	20 416.6	21 557.1	22 294.9	22 096.8	21 821.5
Singapore	3 701.0	5 084.7	4 824.4	4 923.9	5 726.4	..	..
South Africa	2 593.9	2 147.6	2 060.6	2 163.7	2 312.4	2 286.5	..
Chinese Taipei	11 287.5	19 545.9	20 770.9	22 001.6	23 310.4	24 036.3	25 203.2

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 26. Business enterprise expenditure on R&D (BERD) as a percentage of value added in industry

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	1.55	1.80	..	1.78	..	1.56	..
Austria	2.52[e]	2.80	3.15[e]	3.22	3.36[e]	3.35	3.42[p]
Belgium	1.92	2.38	2.57	2.64	2.72	2.79	2.81[p]
Canada	1.67[d]	1.48[d]	1.43[d]	1.36[d]	1.42[b]	1.33[e]	1.27[e,p]
Chile	..	0.17	0.18	0.19	0.18	0.19[e]	0.21[e,p]
Czech Republic	0.98[b]	1.23	1.38	1.49	1.58	1.52	1.49
Denmark	2.83	3.45	3.41	3.26	3.20	3.24[p]	3.24[e]
Estonia	0.61	2.20	1.84	1.24	0.97	1.08	1.05
Finland	3.85	4.41	4.12	4.00	3.80	3.42	3.20
France	2.15	2.42	2.50	2.52	2.53	2.52	2.49[p]
Germany	2.61	2.99	3.07	3.00	3.06	3.14	3.14
Greece	0.29	0.44	0.46	0.51	0.53	0.59	0.80
Hungary	0.63[d]	1.18[d]	1.33[d]	1.54[d]	1.54[d]	1.60[d]	1.43[d]
Iceland	2.38	2.09[b,e]	..	1.58[b,d]	2.02[d]	2.30[d]	2.14[d,e]
Ireland	1.14	1.58	1.63[e]	1.61	1.54[e]	1.12	1.09[e]
Israel[1]	5.46[d,e]	5.70[d]	5.91[d]	5.87[d]	6.07[d,e]	6.18[d,e]	6.20[d,e]
Italy	0.83	1.08	1.13	1.18	1.25	1.28	1.23[p]
Japan	3.21	3.49	3.43	3.51	3.68	3.56	3.42[e]
Korea	2.95[d]	4.14	4.56	4.73	4.89	4.77	4.83[e]
Latvia	0.32	0.30	0.23	0.27	0.39	0.25	0.17
Luxembourg	2.04	1.41	1.05[b]	1.02	1.00	0.94	0.92[p]
Mexico	0.25	0.24	0.19	0.21	0.22[e,p]	0.22[e,p]	0.20[e,p]
Netherlands	1.45	1.65[b]	1.66[b]	1.66	1.73	1.72	1.78[p]
New Zealand	0.69	0.87	..	0.83	..	0.97	..
Norway	1.19	1.30	1.29	1.33	1.43	1.68	1.79[e]
Poland	0.26	0.32	0.46	0.54	0.62	0.66	0.89[b,p]
Portugal	0.49	1.17	1.16	1.08	1.03	0.98	1.03[p]
Slovak Republic	0.35	0.34	0.46	0.54	0.45	0.45	0.56
Slovenia	1.25	2.76[b]	3.02	3.07	2.80	2.56	2.32[p]
Spain	0.88	1.08	1.08	1.09	1.05	1.02	1.01
Sweden	3.98[b]	3.60	3.59[e]	3.70	3.42[e]	3.65	3.67[p]
Switzerland	..	..	3.19	..	..	3.38	..
Turkey	0.28	0.51	0.55	0.57	0.62	0.63	0.74
United Kingdom	1.57	1.77	1.70	1.74	1.79	1.84	1.87
United States	2.66[d]	3.02[d]	2.96[d]	3.05[d]	3.08[d]	3.10[d]	3.09[d,e]
EU28 (OECD estimates)	1.63[e]	1.88[e]	1.93[e]	1.94[e]	1.98[e]	1.99[e]	1.99[e]
OECD-Total[2]	**2.19[e]**	**2.41[e]**	**2.42[e]**	**2.47[e]**	**2.51[e]**	**2.52[e]**	**2.50[e]**
Argentina	0.20	0.24[p]	0.26[p]	0.24[e,p]	0.19[e,p]	0.21[b,e]	0.21[e]
China	1.12[e]	1.70[e]	1.85[e]	1.96[e]	2.03[e]	2.09[e]	2.16[e]
Romania	0.29	0.26[b]	0.27	0.17	0.23	0.31[e]	0.38[e]
Russian Federation	0.95[e]	0.90[e]	0.88[e]	0.93[e]	0.93[e]	0.91[e]	0.91[e]
Singapore	1.70[e]	1.64[e]	1.50[e]	1.46[e]	1.63[e]	..	..
South Africa	0.71[e]	0.50[e]	0.47[e]	0.48[e]	0.51[e]	0.50[e]	..
Chinese Taipei	2.09[e]	2.86	3.02	3.08	3.09	3.15	3.25

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 27. Business enterprise researchers in full-time equivalent

FTE

	2005	2011	2012	2013	2014	2015	2016
Australia	23 794	32 439	..	39 065	..	33 016	..
Austria	18 155[d,e]	23 138[d]	25 180[d,e]	25 752[d]	27 240[d,e]	27 872[d]	28 750[d,p]
Belgium	16 769	21 382	23 464	23 759	27 384	28 474[b]	28 123[p]
Canada	84 410	99 040	94 010	93 150	93 647	91 734[p]	..
Chile	..	1 752[d]	2 027[d]	1 430[d]	2 248[d]	2 237[d]	2 655[d,p]
Czech Republic	9 716[b]	13 582	15 057	16 367	17 892	19 161	19 185
Denmark	17 624	23 927	24 369	23 364	23 975	24 613[p]	25 282[e]
Estonia	883	1 504	1 421	1 383	1 268	1 152	1 318
Finland	21 967	22 949	23 269	22 253	21 369	21 296	20 257
France	106 837	148 439	156 392	161 460	161 744	165 845	..
Germany	166 874	190 693	199 623	198 585	198 076	230 823	235 758[e]
Greece	6 033[d]	4 021[b,d]	4 351[d]	4 197[d]	4 938[d]	5 035[d]	5 608[d]
Hungary	5 008	11 773	13 231	14 317	15 577	15 026	15 247
Iceland	1 012	1 060[b]	..	656[b]	..	813[b]	813
Ireland	6 768	8 996	9 756[e]	10 793	11 162[e]	11 296	11 185[e]
Israel[1]	..	46 452[d]	53 157[d]	52 067[d]	56 499[d]	57 570[d]	..
Italy	27 939	39 808	41 067	43 116	44 322	50 500	50 447[p]
Japan	481 496[d]	490 920[d]	481 425[d]	485 318[d]	506 134[d]	486 198[d]	488 828[d]
Korea	137 706[d]	223 513	247 041	253 447	274 638	284 136	287 869
Latvia	468[d]	553[d]	594[d]	570[d]	776[d]	604[d]	582[d]
Luxembourg	1 696	1 518	927[b]	1 001	1 015	977	946[p]
Mexico	19 888	11 652	7 194	7 323	..	..	..
Netherlands	22 898	33 609[b]	43 665[b]	46 838	45 684	47 860	50 513[p]
New Zealand	3 700	5 100	..	6 000	..	6 900	..
Norway	10 239[d]	12 867[d]	13 332[d]	13 553[d]	14 314[d]	14 921[d]	15 330
Poland	9 412	10 567	15 088	20 606	24 960	28 746	..
Portugal	4 014	12 198	11 931	10 025[b]	11 203	11 785	12 490[p]
Slovak Republic	1 947	2 058	2 482	2 436	2 645	2 789	2 846
Slovenia	1 936	4 510[b]	4 618	4 664	4 637	4 191	4 472[p]
Spain	35 034	44 915[d]	44 920[d]	44 714[d]	44 689[d]	45 151[d]	47 222[d]
Sweden	36 697[b,d]	29 310	30 497[e]	43 141[b]	44 433[e]	45 067	47 127[p]
Switzerland	..	..	16 595	..	..	21 893	..
Turkey	9 456	30 404	35 034	40 207	41 847	45 313	52 463
United Kingdom	93 717	89 043	90 422	98 469	102 221	105 774	110 149
United States	..	853 000	869 000	914 000	960 000	981 000	..
EU28 (OECD estimates)	625 655[e]	746 841[e]	792 590[e]	829 400[e]	849 992[e]	907 379[e]	931 593[e]
OECD-Total[2]	**2 194 717[e]**	**2 561 434[e]**	**2 643 104[e]**	**2 742 228[e]**	**2 856 805[e]**	**2 927 385[e]**	**..**
Argentina	3 763	3 118[p]	3 336	3 569	3 204	4 554[b]	4 362
China	696 413[d]	818 811	872 384	922 682	946 077	1 014 614	1 048 147
Romania	10 319	3 518[b]	4 956	5 333	5 244	4 234	4 857
Russian Federation	237 959	214 744	204 731	205 455	207 593	208 604	198 561
Singapore	14 238	17 432	17 289	18 329	18 521	..	..
South Africa	5 896	4 452	4 556	4 530	4 636	4 627	..
Chinese Taipei	51 202	87 419	92 279	94 236	97 019	100 106	102 721

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Table 28. Business enterprise researchers as a percentage of national total

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	63.8[d,e]	62.3[d]	63.4[d,e]	63.7[d]	63.9[d,e]	64.0[d]	64.0[d,p]
Belgium	50.6	50.1	51.5	51.3	53.9	53.5[b]	52.3[p]
Canada	61.7	60.0	58.2	57.1	57.8	..	..
Chile	..	28.8[d]	29.8[d]	24.3[d]	29.6[d]	27.4[d]	29.5[d,p]
Czech Republic	40.2[b]	44.3	45.3	47.8	49.6	50.3	51.4
Denmark	62.5	61.1	60.8	58.6	57.9	58.0[p]	58.9[e]
Estonia	26.5	33.3	31.0	31.4	29.3	27.5	30.4
Finland	55.5	57.4[b]	57.5	56.8	55.8	56.8	56.4
France	52.8	59.6	60.4[e]	60.8[e]	59.5[b]	59.7	..
Germany	61.3	56.3	56.6	56.0	56.3	59.5	58.8[e]
Greece	30.8[d]	16.3[b,d]	17.5[d]	14.4[d]	16.5[d]	14.5[d]	19.1[d]
Hungary	31.5	51.1	55.5	57.2	59.4	59.4	59.1
Iceland	46.9	46.9[b]	..	35.5[b]	..	41.8[b]	36.9
Ireland	58.4	58.9[e]	60.0[e]	64.1[e]	53.9[b,e]	44.3	42.5[e]
Israel[1]	..	84.2[d]	83.7[d,e]	..	..	..	..
Italy	33.9	37.5	37.1	37.1	37.5	40.1	39.8[p]
Japan	70.7[d]	74.8[d]	74.5[d]	73.5[b,d]	74.1[d]	73.4[d]	73.4[d]
Korea	76.6[d]	77.4	78.3	78.7	79.5	79.7	79.7
Latvia	14.3[d]	14.0[d]	15.2[d]	15.7[d]	20.7[d]	16.7[d]	18.5[d]
Luxembourg	76.1	53.6	40.1[b]	40.0	38.6	38.5	37.8[p]
Mexico	45.3	29.3	24.7	24.5	..	..	..
Netherlands	47.8	54.8[b]	59.6[b]	61.1	59.9	60.5	61.4[p]
New Zealand	28.5	31.3	..	33.5	..	36.9	..
Norway	48.3[d]	47.3[d]	47.9[d]	47.9[d]	49.0[d]	48.7[d]	48.0
Poland	15.1	16.5	22.5	28.8	31.7	34.8	..
Portugal	19.0	27.7	28.1	26.5[b]	29.4	30.5	30.7[p]
Slovak Republic	17.8	13.4	16.3	16.5	17.9	19.4	20.1
Slovenia	36.9	51.4[b]	52.0	53.6	54.1	53.1	55.2[p]
Spain	31.9	34.5[d]	35.4[d]	36.3[d]	36.6[d]	36.9[d]	37.3[d]
Sweden	66.7[b,d,e]	60.2[e]	61.9[e]	67.2[b,e]	66.7[e]	67.5[e]	67.0[p]
Switzerland	..	..	46.4	..	..	50.1	..
Turkey	24.2	42.2	42.7	45.1	46.7	47.6	52.4
United Kingdom	37.7[b,e]	35.4	35.3[e]	36.8	37.0[e]	37.2	37.8[p]
United States	..	68.1[e]	68.7[e]	70.0[e]	71.0[e]	71.1[e]	..
EU28 (OECD estimates)	45.5[e]	45.9[e]	47.1[e]	47.9[e]	48.1[e]	49.1[e]	49.3[e]
OECD-Total[2]	**59.4[e]**	**59.5[e]**	**60.1[e]**	**60.6[e]**	**61.2[e]**	**61.4[e]**	**..**
Argentina	11.8	6.4[p]	6.6	7.0	6.2	8.6[b]	8.1
China	62.3[d]	62.1	62.1	62.2	62.1	62.7	61.9
Romania	44.9	21.9[b]	27.5	28.7	29.0	24.3	26.9
Russian Federation	51.2	48.0	46.2	46.6	46.7	46.4	46.3
Singapore	59.8	51.7	50.6	50.9	50.5	..	..
South Africa	34.1	22.1	21.3	19.4	19.7	17.7	..
Chinese Taipei	57.6	64.9	65.9	66.8	67.9	68.9	69.5

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 29. Business enterprise researchers in full-time equivalent per thousand employment in industry

Per thousand

	2005	2011	2012	2013	2014	2015	2016
Australia	3.2	4.0	..	4.7	..	3.9	..
Austria	6.2[d,e]	7.4[d]	7.9[d,e]	8.1[d]	8.5[d,e]	8.7[d]	8.9[d,p]
Belgium	5.7	6.9	7.5	7.7	8.8	9.1[b]	8.9[p]
Canada	6.8	7.6	7.2	7.0	7.0	6.8[p]	..
Chile	..	0.3[d,e]	0.3[d,e]	0.2[d]	0.4[d]	0.4[d]	0.4[d,p]
Czech Republic	2.5[b]	3.3	3.7	4.0	4.4	4.6	4.5
Denmark	9.5	13.1	13.4	12.9	13.0	13.1[p]	13.2[e]
Estonia	1.9	3.4	3.2	3.1	2.8	2.5	2.8[e]
Finland	12.9	13.0	13.0	12.6	12.2	12.2	11.5
France	5.9	8.0	8.4	8.7	8.7	8.9	..
Germany	5.8	6.3	6.5	6.4	6.4	7.4	7.5[e]
Greece	1.7[d]	1.2[b,d]	1.4[d]	1.4[d]	1.6[d]	1.6[d]	1.8[d]
Hungary	1.5	3.9	4.3	4.7	4.9	4.6	4.6[e]
Iceland	8.7	8.8[b]	..	5.3[b]	..	6.2[b]	5.9
Ireland	4.4	6.6	7.2[e]	7.7	7.8[e]	7.7	7.4[e]
Israel[1]	..	20.5[d]	22.8[d]	21.7[d]	23.1[d]	23.1[d]	..
Italy	1.5	2.1	2.2	2.4	2.5	2.8	2.8[p]
Japan	8.9[d,e]	9.4[d,e]	9.3[d,e]	9.3[d,e]	9.7[d,e]	9.4[d,e]	9.4[d,e]
Korea	7.2[d]	11.4	12.4	12.6	13.4	13.7	13.8
Latvia	0.6[d]	0.8[d]	0.9[d]	0.8[d]	1.2[d]	0.9[d]	0.9[d]
Luxembourg	6.9	5.2	3.1[b]	3.4	3.3	3.1	2.9[p]
Mexico	0.8	0.4	0.3	0.3	..	..	..
Netherlands	3.8	5.3[b]	7.0[b]	7.6	7.3	7.6	7.9[p]
New Zealand	2.4[e]	3.2[e]	..	3.6[e]	..	4.0[e]	..
Norway	6.7[d]	7.6[d]	7.7[d]	7.8[d]	8.1[d]	8.5[d]	8.8[e]
Poland	0.8	0.9	1.2	1.7	2.0	2.3	..
Portugal	1.0	3.3	3.4	3.0[b]	3.3	3.4	3.5[p]
Slovak Republic	1.2	1.2	1.4	1.4	1.5	1.6	1.6
Slovenia	2.5	5.9[b]	6.1	6.3	6.2	5.5	5.8[p]
Spain	2.3	3.2[d]	3.3[d]	3.4[d]	3.4[d]	3.3[d]	3.4[d]
Sweden	12.9[b,d]	9.6	9.9[e]	13.9[b]	14.1[e]	14.2	14.7[p]
Switzerland	..	..	4.7	..	..	6.0	..
Turkey	0.6	1.5	1.7	1.9	1.9	2.1	2.4
United Kingdom	4.4	4.2	4.2	4.5	4.6	4.6	4.7
United States	..	8.7	8.7	9.0	9.3	9.4	..
EU28 (OECD estimates)	3.8[e]	4.5[e]	4.8[e]	5.0[e]	5.1[e]	5.4[e]	5.4[e]
OECD-Total[2]	**5.5[e]**	**6.3[e]**	**6.5[e]**	**6.7[e]**	**6.9[e]**	**6.9[e]**	**..**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	1.2	0.4[b]	0.7	0.7	0.7	0.6	0.7
Russian Federation	4.5	4.0	3.8	3.8	3.8	3.8	3.6
Singapore	7.0	6.2	5.9	6.0	5.9	..	..
South Africa	0.6[e]	0.4[e]	0.4[e]	0.4[e]	0.4[e]	0.4	..
Chinese Taipei	5.9	9.4	9.8	9.9	10.1	10.3	10.5

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 30. Total business enterprise R&D personnel in full-time equivalent

FTE

	2005	2011	2012	2013	2014	2015	2016
Australia	43 687	64 906	..	78 839	..	70 467	..
Austria	32 780[d,e]	42 098[d]	45 468[d,e]	46 412[d]	49 304[d,e]	50 534[d]	52 124[d,p]
Belgium	31 613	35 011	38 108	38 497	42 391	44 508[b]	45 159[p]
Canada	142 030	148 930	139 460	138 620	144 462	149 690[p]	..
Chile	..	4 141[d]	4 737[d]	3 905[d]	5 087[d]	4 398[d]	4 950[d,p]
Czech Republic	21 116[b]	29 014	31 705	33 188	35 256	36 365	37 263
Denmark	28 359	36 886	35 899	34 985	35 431	36 187[p]	37 171[e]
Estonia	1 398	2 121	1 988	2 069	1 798	1 694	1 855
Finland	32 109	31 180	30 995	30 381	29 634	29 770	27 634
France	194 991	239 111	246 438	249 991	248 145	251 444	..
Germany	304 502	357 129	367 478	360 375	371 706	404 767	413 027[e]
Greece	11 665[d]	6 324[b,d]	6 532[d]	6 832[d]	7 750[d]	8 131[d]	9 102[d]
Hungary	7 393	17 220	19 997	22 244	22 177	21 030	20 825
Iceland	1 530	1 491[b,d]	..	1 260[b,d]	..	1 604[d]	1 604
Ireland	10 338	14 120	15 313[e]	17 103	17 688[e]	18 383	18 203[e]
Israel[1]	43 049[d]	59 790[d]	64 596[d]	65 099[d]	69 854[d]	70 495[d]	..
Italy	70 725	112 478	120 162	124 736	129 271	136 725	135 085[p]
Japan	609 808[d]	602 252[d]	581 042[d]	583 855[d]	611 027[d]	592 175[d]	586 593[d]
Korea	153 400[d]	254 280	281 523	288 758	314 019	323 652	328 948
Latvia	1 370[d]	870[d]	885[d]	981[d]	1 382[d]	1 145[d]	896[d]
Luxembourg	3 662	3 387	2 843[b]	2 913	3 066	3 033	3 007[p]
Mexico	42 331	28 039	20 244	19 197	..	..	..
Netherlands	48 588	74 011[b]	76 767[b]	77 399	76 708	81 108	84 444[p]
New Zealand	6 100	8 800	..	10 100	..	11 000	..
Norway	15 399	18 111	18 624	19 041	20 597	21 637	22 171
Poland	13 966	19 530	25 750	30 250	37 253	42 054	..
Portugal	6 133	16 030	15 668	16 220	17 348	18 283	19 650[p]
Slovak Republic	3 524	3 251	3 790	3 618	4 133	4 405	4 643
Slovenia	4 347	9 622[b]	9 451	9 811	9 696	9 222	9 523[p]
Spain	75 345	89 841[d]	89 364[d]	88 635[d]	87 642[d]	87 432[d]	90 129[d]
Sweden	56 106[b]	54 787	55 839[e]	56 413	57 307[e]	57 691	64 276[p]
Switzerland	..	..	47 750	..	..	50 825	..
Turkey	14 992	45 408	52 233	58 391	61 945	66 667	72 579
United Kingdom	145 401	158 385	160 116	177 948	192 221	206 153	209 584
United States	..	1 231 000	1 251 000	1 318 000	1 366 000	1 399 000	..
EU28 (OECD estimates)	1 127 705[e]	1 370 740[e]	1 419 949[e]	1 451 412[e]	1 500 189[e]	1 576 273[e]	1 612 199[e]
OECD-Total[2]	**..**	**3 865 187[e]**	**3 944 095[e]**	**4 064 819[e]**	**4 225 522[e]**	**4 331 639[e]**	**..**
Argentina	7 155	8 669[p]	9 275	9 923	9 979	12 214[b]	11 860
China	883 130[d]	2 169 291	2 486 400	2 740 563	2 896 352	2 910 799	3 012 081
Romania	16 157	10 002[b]	10 887	10 514	10 437	10 128	10 785
Russian Federation	524 049	439 683	413 796	424 063	423 134	426 372	402 097
Singapore	17 076	20 406	20 204	21 349	21 641	..	..
South Africa	12 236	9 895	11 322	11 877	12 928	12 458	..
Chinese Taipei	96 714	159 730	166 683	173 329	180 435	186 804	192 127

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 31. Total business enterprise R&D personnel as a percentage of national total

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	68.8[d,e]	68.8[d]	69.9[d,e]	70.1[d]	70.6[d,e]	70.8[d]	70.8[d,p]
Belgium	59.1	55.7	56.9	56.7	58.2	57.4[b]	56.6[p]
Canada	65.0	62.1	60.3	59.5	60.9	..	..
Chile	..	31.7[d]	32.4[d]	29.5[d]	32.0[d]	28.8[d]	29.8[d,p]
Czech Republic	48.7[b]	52.1	52.6	53.5	54.7	54.7	56.6
Denmark	65.2	64.1	62.2	60.6	60.7	60.8[p]	61.7[e]
Estonia	32.0	37.1	34.0	35.3	31.1	30.1	32.1
Finland	55.9	57.2[b]	57.3	57.4	56.8	59.1	58.3
France	55.8	59.4	59.8[l]	60.0[l]	58.5[b]	58.7	..
Germany	64.1	62.1	62.2	61.2	61.4	63.2	62.9[e]
Greece	34.7[d]	17.1[b,d]	17.5[d]	16.2[d]	17.9[d]	16.4[d]	21.8[d]
Hungary	31.8	50.7	56.0	58.3	59.4	57.1	58.2
Iceland	47.4	46.0[b,d]	..	46.0[b,d]	..	54.5[d]	49.4
Ireland	61.9	65.4[e]	66.1[e]	70.9[e]	62.3[b,e]	52.3	50.4[e]
Israel[1]	..	84.9[d]	83.7[d,e]	..	..	..	..
Italy	40.4	49.3	50.0	50.5	51.8	52.8	52.2[p]
Japan	68.0[d]	69.2[d]	68.3[d]	67.5[b,d]	68.2[d]	67.7[d]	67.2[d]
Korea	71.2[d]	70.4	71.1	71.9	72.9	73.2	73.5
Latvia	25.0[d]	16.0[d]	15.8[d]	18.2[d]	24.1[d]	20.6[d]	17.5[d]
Luxembourg	83.4	65.2	59.9[b]	58.6	58.5	58.0	57.9[p]
Mexico	50.6	38.2	34.4	32.5	..	..	..
Netherlands	51.9	63.0[b]	62.8[b]	62.8	61.8	62.8	63.4[p]
New Zealand	32.2	37.3	..	40.6	..	41.7	..
Norway	51.4	49.0	49.4	49.4	51.1	51.0	50.5
Poland	18.2	22.9	28.4	32.3	35.7	38.5	..
Portugal	23.8	32.3	32.9	34.7	37.0	38.1	38.6[p]
Slovak Republic	24.5	18.0	20.9	21.1	23.5	25.0	26.1
Slovenia	48.3	63.0[b]	63.1	64.4	65.2	64.8	66.3[p]
Spain	43.1	41.8[d]	42.8[d]	43.6[d]	43.8[d]	43.5[d]	43.8[d]
Sweden	72.3[b,e]	69.8[e]	68.7[e]	69.7[e]	68.7[e]	69.0[e]	70.9[p]
Switzerland	..	..	63.3	..	..	62.4	..
Turkey	30.4[e]	48.9[e]	49.7[e]	51.7[e]	53.7[e]	54.5[e]	53.0
United Kingdom	44.8[b,e]	44.5[e]	44.9[e]	47.2[e]	48.5[e]	49.8	49.9[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	51.2[e]	52.5[e]	53.2[e]	53.5[e]	53.9[e]	54.6[e]	54.8[e]
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	15.8	12.5[p]	12.8	13.3	13.0	15.5[b]	14.9
China	64.7[d]	75.2	76.6	77.6	78.1	77.4	77.7
Romania	48.6	33.6[b]	35.0	32.3	33.2	32.3	33.5
Russian Federation	57.0	52.4	50.0	51.3	51.0	51.1	50.1
Singapore	59.7	52.3	51.2	51.3	50.9	..	..
South Africa	42.5	31.9	32.3	31.3	33.6	30.3	..
Chinese Taipei	64.8	71.9	72.7	74.0	75.0	76.0	76.5

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 32. Total business enterprise R&D personnel in full-time equivalent per thousand employment in industry

Per thousand

	2005	2011	2012	2013	2014	2015	2016
Australia	5.9	7.9	..	9.6	..	8.3	..
Austria	11.1[d,e]	13.4[d]	14.3[d,e]	14.6[d]	15.4[d,e]	15.7[d]	16.1[d,p]
Belgium	10.7	11.2	12.2	12.4	13.7	14.2[b]	14.2[p]
Canada	11.5	11.5	10.6	10.4	10.8	11.1[p]	..
Chile	..	0.7[d,e]	0.8[d,e]	0.7[d]	0.8[d]	0.7[d]	0.8[d,p]
Czech Republic	5.3[b]	7.2	7.8	8.1	8.6	8.7	8.8
Denmark	15.3	20.2	19.8	19.3	19.3	19.3[p]	19.4[e]
Estonia	3.0	4.8	4.5	4.6	4.0	3.6	3.9[e]
Finland	18.8	17.6	17.3	17.2	16.9	17.0	15.7
France	10.8	12.9	13.3	13.5	13.3	13.5	..
Germany	10.6	11.7	11.9	11.6	11.9	12.9	13.1[e]
Greece	3.2[d]	1.9[b,d]	2.1[d]	2.2[d]	2.5[d]	2.6[d]	2.9[d]
Hungary	2.3	5.6	6.5	7.3	6.9	6.5	6.2[e]
Iceland	13.2	12.4[b,d]	..	10.2[b,d]	..	12.3[d]	11.7
Ireland	6.7	10.3	11.3[e]	12.2	12.4[e]	12.5	12.0[e]
Israel[1]	22.9[d]	26.4[d]	27.7[d]	27.1[d]	28.5[d]	28.3[d]	..
Italy	3.9	6.1	6.5	6.9	7.2	7.6	7.4[p]
Japan	11.3[d,e]	11.5[d,e]	11.2[d,e]	11.2[d,e]	11.7[d,e]	11.4[d,e]	11.2[d,e]
Korea	8.0[d]	12.9	14.1	14.3	15.3	15.6	15.7
Latvia	1.8[d]	1.3[d]	1.3[d]	1.4[d]	2.1[d]	1.7[d]	1.3[d]
Luxembourg	15.0	11.7	9.6[b]	9.8	10.0	9.7	9.3[p]
Mexico	1.7	1.0	0.7	0.7	..	..	..
Netherlands	8.0	11.8[b]	12.2[b]	12.5	12.3	12.8	13.2[p]
New Zealand	3.9[e]	5.5[e]	..	6.1[e]	..	6.4[e]	..
Norway	10.1	10.8	10.8	11.0	11.7	12.3	12.7[e]
Poland	1.3	1.6	2.1	2.5	3.0	3.4	..
Portugal	1.6	4.4	4.5	4.8	5.1	5.3	5.6[p]
Slovak Republic	2.2	1.9	2.2	2.1	2.4	2.5	2.5
Slovenia	5.7	12.6[b]	12.5	13.2	13.0	12.2	12.4[p]
Spain	4.9	6.3[d]	6.6[d]	6.8[d]	6.6[d]	6.4[d]	6.4[d]
Sweden	19.7[b]	17.9	18.1[e]	18.2	18.2[e]	18.2	20.1[p]
Switzerland	..	..	13.6	..	..	14.0	..
Turkey	0.9	2.3	2.6	2.8	2.9	3.0	3.3
United Kingdom	6.8	7.5	7.5	8.2	8.6	9.0	9.0
United States	..	12.6	12.5	13.0	13.2	13.3	..
EU28 (OECD estimates)	6.8[e]	8.2[e]	8.5[e]	8.8[e]	9.0[e]	9.3[e]	9.4[e]
OECD-Total[2]	**..**	**9.5[e]**	**9.6[e]**	**9.9[e]**	**10.1[e]**	**10.3[e]**	**..**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	1.9	1.3[b]	1.5	1.4	1.4	1.4	1.5
Russian Federation	10.0	8.3	7.7	7.9	7.8	7.8	7.4
Singapore	8.4	7.2	6.9	7.0	6.8	..	..
South Africa	1.3[e]	0.9[e]	1.1[e]	1.1[e]	1.2[e]	1.1	..
Chinese Taipei	11.1	17.2	17.7	18.2	18.7	19.2	19.6

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 33. Business-financed BERD (Business enterprise expenditure on R&D) at 2010 prices and PPP

Million 2010 USD

	2005	2011	2012	2013	2014	2015	2016
Australia	8 095.9	11 602.2	..	11 706.5	..	10 469.7	..
Austria	..	4 303.6	..	5 090.4	..	5 448.8	..
Belgium	4 082.3	5 489.0	5 848.5	5 987.3	..	6 268.4	..
Canada	11 707.3[d,w]	11 524.3[d,w]	11 238.0[d,w]	10 926.8[d,w]	11 023.6[b]	9 627.2	9 224.7[p]
Chile	..	363.3	395.9	442.4	406.9	433.5	466.1[p]
Czech Republic	1 377.3[b]	1 675.0	1 834.0	2 007.3	2 035.1	1 997.4	2 052.4
Denmark	3 319.7	4 273.6	4 261.7[e]	4 222.0	..	4 365.9[p]	..
Estonia	98.2	384.4	342.8	227.0	171.4	197.0	203.3
Finland	4 281.9	5 039.0	4 388.6	4 036.5	3 409.4	3 194.2	..
France	23 117.8	27 838.5	28 490.3	28 601.4	29 107.5	29 039.1	..
Germany	46 658.5[e]	57 396.2	59 527.7[e]	58 167.3	60 801.4[e]	62 576.0	63 667.0[e]
Greece	489.5	526.5[b]	488.8	563.6	572.9	672.7	952.7
Hungary	674.4[d]	1 129.9	1 190.7	1 348.2	1 427.5	1 539.1	..
Iceland	137.8	143.6[b,e]	..	79.1[b]	90.9	97.4	106.2
Ireland	1 282.9	1 521.2	1 572.2[e]	1 679.4	1 756.8[e]	1 600.1	..
Israel[1]	3 942.2[d]	3 359.8[d]	3 765.0[d]	3 644.1[d]	3 594.0[d]	3 667.7[d]	..
Italy	8 543.3	11 086.3	11 119.8	11 508.7	12 405.9	13 237.0	..
Japan	106 644.2	109 881.5	109 760.5	114 686.7	120 974.0	119 227.6	115 466.1
Korea	23 455.1[d]	41 926.2	46 928.9	50 387.1	53 671.5	53 657.3	55 944.6
Latvia	50.3	55.2	46.7	38.5	62.2	32.4	..
Luxembourg	479.5	287.1	94.6[b]	94.5	..	295.9	..
Mexico	2 630.2	2 894.4	2 178.3	1 925.2	1 955.3[e,p]	2 017.4[e,p]	2 025.2[e,p]
Netherlands	5 202.7	6 660.7[b]	6 751.7[b]	6 768.7	7 045.5	6 873.5	..
New Zealand	473.9	596.8	..	582.1	..	757.9	..
Norway	1 698.7	1 995.6	2 057.8	2 069.2	2 213.8	2 442.6	2 447.8
Poland	942.2	1 548.1	2 272.2	2 659.9	3 113.1	3 468.2	..
Portugal	745.7	1 796.6	1 692.3	1 477.3	1 433.4	1 429.5	..
Slovak Republic	178.6	267.8	377.7	442.8	355.2	390.6	..
Slovenia	370.2	814.8[b]	858.1	876.4	887.4	852.9	..
Spain	6 653.1	7 937.0	7 842.7	7 720.2	7 671.7	7 738.5	..
Sweden	7 665.2[b]	7 335.5	..	7 997.6	..	7 942.1	..
Switzerland	..	..	8 257.1	..	..	9 227.2	..
Turkey	1 881.1	4 370.0	4 941.4	5 585.6	6 432.1	6 867.0	..
United Kingdom	13 712.5	16 706.4	16 048.9	17 212.0	18 690.5	19 909.1	..
United States	224 752.9[d,w]	241 562.6[d]	244 647.4[d]	258 804.3[d]	270 183.8[d]	280 155.5[d]	284 486.7[d,e]
EU28 (OECD estimates)	134 264.0[e]	165 009.8[e]	168 198.1[e]	169 626.7[e]	175 180.1[e]	180 619.8[e]	..
OECD-Total[2]	**525 989.0[e]**	**602 201.4[e]**	**613 675.8[e]**	**637 855.9[e]**	**665 020.3[e]**	**677 631.1[e]**	**685 610.1[e]**
Argentina	763.1	..	..	..	..	848.0[b]	760.3
China	59 565.4	170 999.1	199 136.7	225 934.4	249 711.8	269 815.0	300 838.0
Romania	351.5	467.5[b]	443.9	316.1	356.9	589.6	..
Russian Federation	6 656.0	7 312.0	7 159.9	7 642.6	7 816.1	7 550.3	8 396.9
Singapore	3 251.3	4 418.3	4 096.3	4 159.5	4 830.9	..	..
South Africa	1 771.8	1 653.5	1 637.9	1 754.2	1 880.8	1 884.2	..
Chinese Taipei	11 032.5	19 154.6	20 349.3	21 591.8	22 940.6	23 672.8	24 829.5

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 34. Business-financed BERD (Business enterprise expenditure on R&D) as a percentage of value added in industry

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	1.46	1.75	..	1.71	..	1.50	..
Austria	..	1.82	..	2.15	..	2.26	..
Belgium	1.59	1.99	2.13	2.18	..	2.21	..
Canada	1.38[d,w]	1.28[d,w]	1.23[d,w]	1.16[d,w]	1.14[b]	0.98[e]	0.93[e,p]
Chile	..	0.15	0.16	0.18	0.16	0.17[e]	0.18[e,p]
Czech Republic	0.77[b]	0.82	0.92	1.01	0.98	0.92	0.92
Denmark	2.43	3.10	3.06[e]	2.98	..	2.96[p]	..
Estonia	0.49	1.87	1.60	1.04	0.77	0.90	0.92
Finland	3.50	4.07	3.66	3.42	2.91	2.73	..
France	1.73	2.01	2.07	2.07	2.09	2.07	..
Germany	2.40[e]	2.73	2.81[e]	2.74	2.79[e]	2.82	2.82[e]
Greece	0.25	0.35[b]	0.35	0.41	0.42	0.49	0.70
Hungary	0.49[d]	0.82	0.89	0.98	0.99	1.03	..
Iceland	2.02	1.82[b,e]	..	0.97[b]	1.12	1.13	1.15[e]
Ireland	0.98	1.09	1.13[e]	1.17	1.12[e]	0.75	..
Israel[1]	3.67[d,e]	2.46[d]	2.69[d]	2.48[d]	2.41[d,e]	2.39[d,e]	..
Italy	0.64	0.87	0.90	0.95	1.02	1.08	..
Japan	3.16	3.43	3.37	3.45	3.62	3.49	3.36[e]
Korea	2.78[d]	3.88	4.27	4.45	4.61	4.49	4.57[e]
Latvia	0.20	0.22	0.18	0.15	0.23	0.12	..
Luxembourg	1.87	0.94	0.32[b]	0.31	..	0.85	..
Mexico	0.22	0.21	0.15	0.14	0.14[e,p]	0.14[e,p]	0.13[e,p]
Netherlands	1.15	1.35[b]	1.37[b]	1.39	1.44	1.36	..
New Zealand	0.56	0.66	..	0.61	..	0.74	..
Norway	0.97	1.03	1.02	1.02	1.12	1.31	1.38[e]
Poland	0.22	0.26	0.38	0.43	0.49	0.52	..
Portugal	0.45	1.07	1.05	0.94	0.90	0.88	..
Slovak Republic	0.24	0.27	0.37	0.44	0.33	0.35	..
Slovenia	1.07	2.19[b]	2.39	2.48	2.39	2.25	..
Spain	0.70	0.84	0.87	0.89	0.87	0.84	..
Sweden	3.43[b]	2.94	..	3.21	..	2.94	..
Switzerland	..	..	2.70	..	..	2.89	..
Turkey	0.26	0.46	0.49	0.51	0.55	0.56	..
United Kingdom	1.01	1.22	1.16	1.20	1.27	1.33	..
United States	2.40[d,w]	2.53[d]	2.49[d]	2.58[d]	2.62[d]	2.66[d]	2.66[d,e]
EU28 (OECD estimates)	1.33[e]	1.55[e]	1.59[e]	1.60[e]	1.63[e]	1.63[e]	..
OECD-Total[2]	**1.95[e]**	**2.08[e]**	**2.09[e]**	**2.14[e]**	**2.17[e]**	**2.17[e]**	**2.16[e]**
Argentina	0.19	..	..	..	..	0.17[b,e]	0.15[e]
China	1.02[e]	1.58[e]	1.72[e]	1.83[e]	1.90[e]	1.96[e]	2.04[e]
Romania	0.17	0.19[b]	0.18	0.12	0.14	0.21[e]	..
Russian Federation	0.35[e]	0.32[e]	0.31[e]	0.33[e]	0.33[e]	0.31[e]	0.35[e]
Singapore	1.50[e]	1.43[e]	1.27[e]	1.24[e]	1.38[e]	..	..
South Africa	0.49[e]	0.38[e]	0.37[e]	0.39[e]	0.41[e]	0.41[e]	..
Chinese Taipei	2.05[e]	2.80	2.96	3.02	3.04	3.10	3.20

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 35. Percentage of Business enterprise expenditure on R&D (BERD) financed by the business enterprise sector

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	94.0	96.9	..	96.2	..	96.2	..
Austria	..	64.8	..	66.7	..	67.4	..
Belgium	82.8	83.4	82.7	82.7	..	79.2	..
Canada	82.5[d,w]	86.0[d,w]	85.9[d,w]	85.3[d,w]	80.0[b]	73.6	73.3[p]
Chile	..	92.2	91.5	90.1	88.5	88.4	87.8[p]
Czech Republic	78.8[b]	67.0	66.5	68.0	62.4	60.5	61.8
Denmark	86.0	89.9	89.9[e]	91.7	..	91.3[p]	..
Estonia	80.3	85.3	87.0	83.9	80.2	83.5	87.7
Finland	90.9	92.1	88.8	85.5	76.6	79.7	..
France	80.7	83.3	82.9	82.4	82.8	82.0	..
Germany	92.1[e]	91.4	91.4[e]	91.4	91.4[e]	89.7	89.7[e]
Greece	85.7	78.8[b]	77.2	81.6	78.9	82.3	87.6
Hungary	77.8[d]	69.5[d]	66.6[d]	63.5[d]	64.3[d]	64.8[d]	..
Iceland	84.9	87.1[b,e]	..	61.1[b,d]	55.2[d]	49.3[d]	53.6[d]
Ireland	86.1	69.2	69.2[e]	72.4	72.4[e]	66.8	..
Israel[1]	67.2[d]	43.2[d]	45.5[d]	42.2[d]	39.7[d]	38.6[d]	..
Italy	76.8	80.3	79.6	80.6	81.6	84.2	..
Japan	98.3	98.3	98.2	98.1	98.3	98.3	98.1
Korea	94.4[d]	93.8	93.7	94.2	94.2	94.1	94.8
Latvia	61.7	72.8	76.3	53.3	59.7	47.9	..
Luxembourg	91.7	66.8	30.3[b]	30.0	..	90.1	..
Mexico	86.8	89.8	80.5	65.1	63.1[e,p]	63.7[e,p]	65.7[e,p]
Netherlands	79.0	82.2[b]	82.7[b]	83.8	83.4	79.5	..
New Zealand	80.5	76.4	..	74.4	..	76.3	..
Norway	81.6	79.3	79.1	77.0	77.9	78.2	77.1
Poland	83.0	81.8	81.0	80.8	79.4	79.8	..
Portugal	91.4	91.7	90.7	87.1	88.2	89.7	..
Slovak Republic	67.9	78.4	80.6	81.3	74.6	78.0	..
Slovenia	85.3	79.5[b]	79.0	80.6	85.5	87.8	..
Spain	79.9	78.0	80.4	81.6	82.3	81.9	..
Sweden	86.1[b]	81.5	..	86.7	..	80.4	..
Switzerland	..	..	84.9	..	..	85.4	..
Turkey	90.8	90.2	89.6	90.2	89.6	87.6	..
United Kingdom	64.5	68.7	68.2	69.1	70.6	72.2	..
United States	90.3[d,w]	83.8[d]	84.1[d]	84.8[d]	85.3[d]	85.6[d]	86.1[d,e]
EU28 (OECD estimates)	82.0[e]	82.6[e]	82.4[e]	82.6[e]	82.4[e]	81.9[e]	..
OECD-Total[2]	**89.3[e]**	**86.4[e]**	**86.3[e]**	**86.6[e]**	**86.6[e]**	**86.4[e]**	**86.6[e]**
Argentina	94.5	..	..	..	..	79.3[b]	74.8
China	91.2	93.0	93.0	93.2	93.7	93.7	94.7
Romania	57.5	74.4[b]	66.3	72.3	59.2	69.5	..
Russian Federation	37.3	36.0	35.1	35.5	35.1	34.2	38.5
Singapore	87.8	86.9	84.9	84.5	84.4	..	..
South Africa	68.3	77.0	79.5	81.1	81.3	82.4	..
Chinese Taipei	97.7	98.0	98.0	98.1	98.4	98.5	98.5

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 36. Percentage of Business enterprise expenditure on R&D (BERD) financed by government

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	4.0	1.9	..	2.1	..	2.2	..
Austria	..	13.3	..	12.5	..	12.0	..
Belgium	6.2	6.2	5.4	5.2	..	5.5	..
Canada	2.6[d]	3.6[d]	3.8[d]	4.1[d]	4.5[b]	4.6	4.5[p]
Chile	..	6.0	6.9	8.3[b]	9.3	9.7	11.7[p]
Czech Republic	15.6[b]	14.7	13.0	10.7	9.2	7.6	6.1
Denmark	2.4[d]	2.8[d]	2.8[d]	1.8[d]	..	2.8[p]	..
Estonia	6.9	6.8	9.2	10.2	10.3	8.4	4.7
Finland	3.8	2.8	3.0	2.8	3.0	3.6	..
France	10.1	7.5	7.9	8.1	7.8	8.8	..
Germany	4.5[e]	4.3	4.3[e]	3.4	3.4[e]	3.3	3.4[e]
Greece	5.6	8.0[b]	8.2	7.0	10.5	8.8	3.3
Hungary	3.9[d]	14.5[d]	15.7[d]	19.0[d]	16.5[d]	19.4[d]	..
Iceland	2.8	7.5[b,e]	..	9.7[b,d]	9.0[d]	8.3[d]	9.0[d]
Ireland	4.1	5.9	5.9[e]	6.0	6.0[e]	5.0	..
Israel[1]	4.8[d]	2.9[d]	3.3[d]	2.4[d]	3.9[d]	3.4[d]	..
Italy	11.0	6.9	7.1	6.4	5.7	5.5	..
Japan	1.2	1.0	1.1	1.1	1.0	1.0	0.9
Korea	4.6[d]	6.1	6.0	5.5	5.1	5.1	4.2
Latvia	12.7	4.3	4.6	1.5	1.4	1.6	..
Luxembourg	5.2	..[c]	..[c]	..[c]	..	7.2	..
Mexico	11.0	9.2	19.1	34.1	36.1[e,p]	35.3[e,p]	33.2[e,p]
Netherlands	3.4	3.8[b]	2.2[b]	2.0	1.8	1.9	..
New Zealand	11.4	12.2	..	11.2	..	11.0	..
Norway	7.9	9.7	10.1	9.3	8.5	8.6	9.4
Poland	13.7	12.7	11.2	10.0	11.5	10.0	..
Portugal	4.2	4.0	6.9	9.1	9.1	5.5	..
Slovak Republic	26.7	10.4	6.8	5.1	3.9	6.5	..
Slovenia	7.0	15.1[b]	13.8	12.6	7.7	4.3	..
Spain	13.6	14.4	12.6	10.7	9.7	9.4	..
Sweden	4.5[b]	5.0	..	6.1	..	..[c]	..
Switzerland	..	..	0.7	..	..	1.4	..
Turkey	6.9	8.9	9.4	8.6	8.9	10.6	..
United Kingdom	8.3	9.3	7.9	8.9	9.3	8.7	..
United States	9.7[d]	10.8[d]	10.2[d]	9.2[d]	7.8[d]	7.6[d]	6.8[d,e]
EU28 (OECD estimates)	7.4[e]	6.9[e]	6.8[e]	6.4[e]	6.4[e]	6.4[e]	..
OECD-Total[2]	**6.8[e]**	**7.3[e]**	**7.1[e]**	**6.5[e]**	**6.0[e]**	**6.0[e]**	**..**
Argentina	4.5	..	..	..	..	7.1[b]	2.0
China	4.6	4.4	4.6	4.5	4.2	4.3	3.7
Romania	36.8	18.1[b]	19.6	14.0	19.0	13.7	..
Russian Federation	53.6	58.7	60.4	61.5	62.7	63.4	59.0
Singapore	6.2	5.8	6.2	6.6	5.3	..	..
South Africa	16.2	4.8	6.5	5.8	5.2	3.8	..
Chinese Taipei	2.2	2.0	1.9	1.7	1.5	1.4	1.4

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 37. Percentage of Business enterprise expenditure on R&D (BERD) financed by other national sources

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	0.33	..[c]	..	0.07	..	0.05	..
Austria	..	0.10	..	0.06	..	0.06	..
Belgium	0.04	0.01	0.01	0.01	..	0.02	..
Canada	..[k]	..[k]	..[k]	..[k]	..[c]	..[c]	2.55[p]
Chile	..	1.58	1.39	0.05	0.23	0.08	0.08[p]
Czech Republic	0.10[b]	0.04	0.04	0.08	0.04	0.05	0.07
Denmark	0.16[d]	0.26[d]	0.26[d,e]	0.50[d]	..	0.32[p]	..
Estonia	0.01	0.01	0.03	0.11	0.06	0.03	0.07
Finland	0.01	0.05	0.06	0.06	0.06	0.02	..
France	0.05	0.06	0.06	0.09	0.09	0.08	..
Germany	0.17[d]	0.26[d]	0.26[d]	0.20[d]	0.20[d]	0.27[d]	0.19[d]
Greece	0.37	0.20[b]	0.15	0.06	0.04	0.01	0.02
Hungary	0.06[d]	0.12[d]	0.05[d]	0.06[d]	0.05[d]	0.04[d]	..
Iceland	0.00	0.01[b,e]	..	0.62[b,d]	3.58[d]	6.55[d]	7.13[d]
Ireland	0.00	0.07	0.07[e]	0.09	0.09[e]	0.00	..
Israel[1]	0.61[d]	0.65[d]	0.60[d]	0.60[d]	0.59[d]	0.58[d]	..
Italy	0.11	0.30	0.40	0.38	0.36	0.34	..
Japan	0.10	0.11	0.14	0.24	0.17	0.12	0.09
Korea	0.06[d]	0.06	0.06	0.06	0.05	0.06	0.04
Latvia	..	..	..	..	..	..	..
Luxembourg	0.02	..	..	..	..	..	..
Mexico	0.02	0.40	0.06	0.30	0.32[e,p]	0.37[e,p]	0.43[e,p]
Netherlands	0.33	0.76[b]	0.57[b]	0.69	0.49	0.22	..
New Zealand	1.05	..[c]	..	..[c]	..	..[c]	..
Norway	0.01	0.02	0.01	0.02	0.04	0.05	0.04
Poland	0.08	0.20	0.13	0.06	0.11	0.14	..
Portugal	0.00	0.01	0.01	0.01	0.02	0.02	..
Slovak Republic	0.03	0.15	0.00	0.00	0.00	0.01	..
Slovenia	0.48	0.01[b]	0.13	0.01	0.05	0.00	..
Spain	0.68	0.22	0.22	0.25	0.18	0.85	..
Sweden	0.20[b]	0.34	..	0.27	..	0.38	..
Switzerland	..	..	0.57	..	..	0.52	..
Turkey	2.02[d]	0.08	0.21	0.20	0.09	0.14	..
United Kingdom	0.02[d]	0.60[b,d]	0.22[d]	0.40[d]	0.68[d]	0.62	..
United States	..[k]	0.13[d]	0.11[d]	0.08[d]	0.15[d]	0.14[d]	0.14[d,e]
EU28 (OECD estimates)	0.14[e]	0.26[e]	0.21[e]	0.22[e]	0.25[e]	0.28[e]	..
OECD-Total[2]	**0.10[e]**	**0.19[e]**	**0.17[e]**	**0.17[e]**	**0.20[e]**	**0.24[e]**	**..**
Argentina	0.00	..	..	..	..	0.00[b]	0.03
China	..	..	..	..	..	..	..
Romania	0.16	0.08[b]	0.16	0.27	0.20	0.28	..
Russian Federation	0.04	0.32	0.10	0.13	0.16	0.18	0.05
Singapore	0.08	0.03	0.01	0.01	0.01	..	..
South Africa	1.02	3.31	2.79	2.69	2.79	2.71	..
Chinese Taipei	0.04	0.02	0.01	0.01	0.01	0.01	0.01

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 38. Percentage of Business enterprise expenditure on R&D (BERD) financed by the rest of the world

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	1.6	1.2	..	1.6	..	1.6	..
Austria	..	21.9	..	20.7	..	20.6	..
Belgium	11.0	10.4	11.9	12.0	..	15.3	..
Canada	14.9[d]	10.4[d]	10.3[d]	10.5[d]	14.7[b]	18.4	19.6[p]
Chile	..	0.2	0.1	1.5[b]	1.9	1.9	0.5[p]
Czech Republic	5.4[b]	18.3	20.5	21.2	28.3	31.9	32.0
Denmark	11.4	7.1	7.1[e]	6.1	..	5.5[p]	..
Estonia	12.7	7.9	3.8	5.7	9.4	8.1	7.5
Finland	5.3[b]	5.0	8.1	11.7	20.4	16.7	..
France	9.2	9.1	9.1	9.4	9.3	9.1	..
Germany	3.3	4.0	4.0[e]	5.0	5.0[e]	6.7	6.7[e]
Greece	8.3	13.0[b]	14.4	11.4	10.6	8.9	9.1
Hungary	18.1[d]	15.9[d]	17.7[d]	17.4[d]	19.2[d]	15.8[d]	..
Iceland	12.2	5.4[b,e]	..	28.5[b,d]	32.2[d]	35.9[d]	30.2[d]
Ireland	9.8	24.8	24.8[e]	21.5	21.5[e]	28.3	..
Israel[1]	27.4[d]	53.2[d]	50.6[d]	54.8[d]	55.8[d]	57.4[d]	..
Italy	12.1	12.5	13.0	12.6	12.3	10.0	..
Japan	0.4	0.6	0.5	0.6	0.5	0.6	0.9
Korea	0.9[d]	0.1	0.3	0.2	0.6	0.8	1.0
Latvia	25.6	22.8	19.2	45.2	38.9	50.5	..
Luxembourg	3.1	..[c]	..[c]	..[c]	..	2.7	..
Mexico	2.1	0.6	0.4	0.5	0.5[e,p]	0.6[e,p]	0.7[e,p]
Netherlands	17.2	13.2[b]	14.5[b]	13.5	14.4	18.4	..
New Zealand	7.0	8.9	..	11.6	..	10.5	..
Norway	10.5	10.9	10.7	13.7	13.6	13.1	13.5
Poland	3.2	5.3	7.6	9.2	9.0	10.1	..
Portugal	4.5	4.3	2.4	3.8	2.7	4.9	..
Slovak Republic	5.3	11.1	12.7	13.6	21.5	15.5	..
Slovenia	7.2	5.4[b]	7.0	6.8	6.8	8.0	..
Spain	5.8	7.4	6.8	7.5	7.8	7.9	..
Sweden	9.1[b]	13.1	..	6.9	..	..[c]	..
Switzerland	..	..	13.8	..	..	12.6	..
Turkey	0.3	0.8	0.8	1.0	1.4	1.6	..
United Kingdom	27.1	21.4	23.7	21.5	19.4	18.5	..
United States	..[k]	5.3[d]	5.6[d]	6.0[d]	6.8[d]	6.7[d]	6.9[d,e]
EU28 (OECD estimates)	10.5[e]	10.2[e]	10.6[e]	10.8[e]	10.9[e]	11.5[e]	..
OECD-Total[2]	**..**	**6.2[e]**	**6.4[e]**	**6.7[e]**	**7.1[e]**	**7.4[e]**	**..**
Argentina	1.0	..	..	..	..	13.6[b]	23.2
China	1.0	1.6	1.1	1.0	0.9	0.9	0.8
Romania	5.5	7.4[b]	14.0	13.4	21.6	16.5	..
Russian Federation	9.1	5.0	4.4	2.9	2.1	2.2	2.5
Singapore	5.8	7.3	8.8	8.9	10.3	..	..
South Africa	14.5	14.9	11.3	10.4	10.7	11.1	..
Chinese Taipei	0.0	0.0	0.1	0.1	0.1	0.1	0.1

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 39. Business enterprise expenditure on R&D (BERD) performed in the pharmaceutical industry at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	178.0[e]	267.2	301.6[e]	366.2	..	..	..
Austria	269.7[e]	204.8	291.6[e]	357.1	384.4[e]	367.9	..
Belgium	814.5[e]	1 716.4	1 856.0	1 929.4	1 948.5	1 986.0	..
Canada	848.2[d,e]	417.8[d]	364.0[d]	340.7[d]	375.5[d]	400.2[d]	..
Chile	..	..	18.5	33.7	28.0	28.6	..
Czech Republic	55.1	80.7	83.9	76.9	84.6	86.3	..
Denmark	..	892.2	1 065.8	1 127.2	1 162.6	1 234.9	..
Estonia	..	6.2	1.7	1.9	2.1	1.6	0.8
Finland	..	130.1	150.1	132.4	148.5	143.0	..
France	..	997.7	956.6	991.8	..	..	..
Germany	3 891.4[e]	5 159.8	5 197.9	5 259.4	5 247.0	5 076.2	..
Greece	..	84.6	85.0[e]	93.2	82.6[e]	69.1	..
Hungary	305.6	434.1	493.4	480.1	503.4	404.3	..
Iceland	..	..	..	0.4	0.2	1.0	1.4
Ireland	..	153.0	179.2[e]	203.0	186.9[e]	178.4	..
Israel[1]	..	283.2[d]	286.2[d]	383.2[d]	279.0[d]	354.3[d]	..
Italy	452.2[e]	762.4	771.5	738.2	691.7	725.5	..
Japan	8 087.5	11 446.1	12 526.0	14 185.8	14 510.5	14 185.4	13 478.1
Korea	444.0	1 010.1	1 221.9	1 245.9	1 287.1	1 551.9	..
Latvia	..	..	9.7	11.2	5.4	5.4	..
Luxembourg	..	..	..	..	..	..	..
Mexico	216.8	584.2	167.9	246.1	264.1	261.0	257.9
Netherlands	..	384.5	318.0	305.2	316.7	316.7	..
New Zealand	..	..	..	..	..	..	..
Norway	52.1[e]	79.3	43.4	42.5	36.8	33.9	35.2
Poland	71.0	92.9	144.1	122.8	150.7	214.0	..
Portugal	63.8[e]	140.4	147.8	144.9	129.7	126.8	..
Slovak Republic	..	25.3	18.6	4.2	8.7	6.3	..
Slovenia	124.1[e]	263.4	271.0	272.9	275.4	306.5	..
Spain	711.1[e]	890.0	844.5	841.8	873.0	888.4	..
Sweden	..	876.5	829.4[e]	809.6	764.4[e]	851.7[e]	..
Switzerland	2 294.2[e]	3 497.3[e]	3 692.0	3 937.4[e]	4 189.4[e]	4 465.1	..
Turkey	..	201.0	187.8	196.5	198.4	194.8	..
United Kingdom	..	748.7	718.6	658.5	572.6	556.3	..
United States	34 839.0[d]	45 949.0[d]	48 146.0[d]	52 426.0[d]	56 612.0[d]	58 675.0[d]	..
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	..	..
China	..	6 026.1	8 038.2	9 805.1	11 113.3	12 692.9	14 059.0
Romania	19.2[e]	24.9	26.8	25.1	38.8	27.8	..
Russian Federation	..	..	..	..	..	..	..
Singapore	72.4[e]	131.8	153.2	142.2	..	..	..
South Africa	..	..	..	..	..	..	..
Chinese Taipei	118.2	327.3	349.9	394.3	488.2	455.8	557.8

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Source: OECD, ANBERD database: Research and Development Expenditure in Industry, July 2018

Table 40. Business enterprise expenditure on R&D (BERD) performed in the computer, electronic and optical industry at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	182.7[e]	237.9	..	..	..	..	..
Austria	1 234.0[e]	630.1	713.6[e]	772.3	855.6[e]	909.3	..
Belgium	556.1[e]	511.4	555.7	593.4	550.1	577.6	..
Canada	2 398.6[d,e]	1 980.8[d]	2 012.7[d]	1 820.3[d]	838.8[d]	828.4[d]	..
Chile	..	..	0.5	1.2	1.7	1.0	..
Czech Republic	105.2	86.1	92.7	119.1	147.5	151.7	..
Denmark	..	325.7	373.3	406.2	412.4	459.4	..
Estonia	..	5.7	4.5	5.0	8.0	12.4	16.7
Finland	2 111.4[e]	2 794.6	2 097.5	1 966.8	1 916.4	1 504.1	..
France	..	3 795.6	4 007.9	4 520.0	..	..	..
Germany	6 607.9[e]	8 321.4	9 389.4	9 476.1	9 762.4	9 676.4	..
Greece	..	32.3	25.5[e]	23.2	20.3[e]	19.5	..
Hungary	71.2	149.2	129.4	129.7	50.9	37.6	..
Iceland	..	..	..	2.7	2.8	2.4	2.8
Ireland	..	183.8	219.1[e]	251.6[e]	289.2[e]	338.4	..
Israel[1]	1 486.5[d,e]	1 559.4[d]	1 497.9[d]	1 594.5[d]	1 518.8[d]	1 512.0[d]	..
Italy	1 518.7[e]	1 902.8	1 828.9	1 757.4	1 771.2	1 846.5	..
Japan	..	29 244.8	28 387.1	28 750.8	28 017.8	28 070.4	26 203.1
Korea	11 753.5	21 873.9	25 237.8	27 676.6	30 402.1	29 427.0	..
Latvia	..	2.6	3.8	6.4	5.8	6.6	..
Luxembourg	..	..	..	..	..	..	..
Mexico	73.0[e]	29.9[e]	80.8	94.4	101.3	100.1	98.9
Netherlands	..	697.1	742.5	818.2	848.5	756.4	..
New Zealand	..	..	..	..	..	..	..
Norway	178.9[e]	183.6	182.5	180.9	195.6	200.7	187.1
Poland	29.3	74.0	89.0	84.5	94.7	114.3	..
Portugal	121.8[e]	42.5	43.0	41.0	49.8	52.9	..
Slovak Republic	12.4	5.5	7.2	7.8	7.2	9.0	..
Slovenia	66.7[e]	61.1	62.8	67.8	69.1	66.2	..
Spain	319.2[e]	291.4	258.5	260.4	257.0	245.0	..
Sweden	..	2 149.1	2 059.7[e]	2 039.0	1 949.4[e]	2 196.7	..
Switzerland	797.7[e]	1 429.7[e]	1 526.1	1 619.5[e]	1 695.8[e]	1 770.5	..
Turkey	279.2[e]	153.7	196.5	263.9	237.1	283.0	..
United Kingdom	..	1 384.5	1 391.9	1 468.3	1 440.9	1 412.3	..
United States	49 725.0[d,e]	62 704.0[d]	65 068.0[d]	67 205.0[d]	73 891.0[d]	72 110.0[d]	..
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	..	..
China	..	30 292.6	33 719.0	39 535.5	44 461.4	51 541.3	57 467.6
Romania	8.3[e]	13.8	60.8	40.2	16.2	37.6	..
Russian Federation	..	..	..	..	..	..	..
Singapore	1 367.5[e]	1 644.2	2 056.8	1 797.2	..	..	..
South Africa	..	..	..	..	..	..	..
Chinese Taipei	7 237.5	14 473.2	15 594.4	16 820.8	18 215.7	19 197.8	20 254.0

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Source: OECD, ANBERD database: Research and Development Expenditure in Industry, July 2018

Table 41. Business enterprise expenditure on R&D (BERD) performed in the aerospace industry at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	39.3[e]	23.6	..	..	..	..	..
Austria	5.7[e]	44.7	44.2[e]	45.9	57.8[e]	73.1	..
Belgium	77.9[e]	142.9	138.6	156.3	..	..	..
Canada	708.6[d,e]	1 060.6[d,e]	1 168.2[d,e]	1 285.1[d,e]	1 317.5[d]	1 267.1[d]	..
Chile	..	..	..	..	..	..	..
Czech Republic	37.6	37.7	45.7	54.0	69.4	47.2	..
Denmark	..	..	..	..	..	..	..
Estonia	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Finland	..	5.3[e]	6.4[e]	5.9[e]	5.2[e]	8.4	..
France	..	3 159.5	3 441.3	3 842.2	..	..	..
Germany	2 285.8[e]	2 920.7	3 019.5	2 268.4	2 342.5	2 190.4	..
Greece	..	..	..	..	..	..	..
Hungary	..	..	..	..	..	..	..
Iceland	..	..	..	0.2	0.2	0.1	0.0
Ireland	..	..	..	..	..	..	..
Israel[1]	..	..	..	..	..	..	..
Italy	924.0[e]	1 242.8	1 215.7	1 121.4	1 049.6	985.7	..
Japan	12.4	238.0	310.3	481.4	477.7	661.7	771.7
Korea	165.5	91.2	185.7	142.6	86.6	270.8	..
Latvia	..	..	..	..	..	..	..
Luxembourg	..	..	..	..	..	..	..
Mexico	..	..	19.3	27.3	29.3	28.9	28.6
Netherlands	..	35.7	53.9	59.1	..	..	..
New Zealand	..	..	..	..	..	..	..
Norway	..	1.9[e]	1.8[e]	1.2[e]	1.1[e]	1.1	1.0[e]
Poland	30.4	74.5	75.3	92.1	92.4	103.8	..
Portugal	..	..	..	..	..	..	..
Slovak Republic	..	..	..	..	..	..	..
Slovenia	0.0[e]	2.2	1.0	3.9	2.0	1.8	..
Spain	386.8[e]	675.6	631.0	614.6	525.8	595.1	..
Sweden	..	..	..	..	..	..	..
Switzerland	..	..	..	..	..	..	..
Turkey	..	..	..	..	..	..	..
United Kingdom	..	1 588.4	1 920.4	2 011.5	2 137.3	2 095.1	..
United States	15 005.0[d]	26 054.0[d]	24 817.0[d]	27 114.0[d]	26 181.0[d]	27 464.0[d]	..
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	..	4.3	6.1	5.6	7.8	0.7	..
Russian Federation	..	..	..	..	..	..	..
Singapore	20.7[e]	63.3[e]	..	..	..	..	..
South Africa	..	..	..	..	..	..	..
Chinese Taipei	..	..	..	..	..	..	..

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Source: OECD, ANBERD database: Research and Development Expenditure in Industry, July 2018

Table 42. Business enterprise expenditure on R&D (BERD) performed in service industries at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	3 085.1[e]	5 512.0	5 823.1[e]	6 713.6	6 695.7[e]	6 685.1	..
Austria	1 306.3[e]	2 395.3	2 917.9[e]	3 146.5	3 382.5[e]	3 462.5	..
Belgium	1 253.5[e]	2 326.4	2 839.0	3 023.3	3 572.5	3 812.2	..
Canada	5 189.8[d,e]	6 128.7[d]	6 005.9[d]	6 167.5[d]	8 135.0[d]	7 595.1[d,e]	..
Chile	..	221.9[e]	219.1	218.1	220.9	200.9	241.3
Czech Republic	556.0	1 169.5	1 352.7	1 452.4	1 708.1	1 674.6	..
Denmark	..	2 280.4	2 116.1	2 033.2	2 073.6	2 317.7	..
Estonia	50.4	147.0	198.7	181.1	155.0	172.8	171.8
Finland	737.2[e]	1 174.5	1 307.7	1 340.9	1 277.3	1 299.7	..
France	..	16 241.2	16 690.9	17 499.0	..	..	..
Germany	4 682.3[e]	8 804.6	8 956.7	9 124.9	9 219.6	11 076.3	..
Greece	..	395.2	397.9[e]	479.5	544.9[e]	648.2	..
Hungary	128.2[e]	593.8	649.2	914.8	1 092.1	1 468.3	..
Iceland	..	..	..	95.0	132.5	174.0	172.9
Ireland	..	1 345.9[e]	1 399.9[e]	1 431.2	1 515.6[e]	1 657.5	..
Israel[1]	3 497.4[d,e]	5 506.0[d]	6 354.1[d]	6 980.2[d]	7 578.2[d]	8 418.8[d]	..
Italy	2 584.7[e]	3 609.7	3 645.4	4 155.2	4 533.3	4 839.7	..
Japan	9 828.6	12 264.2	12 445.6	12 482.7	16 299.8	16 152.1	15 671.1
Korea	1 611.2	3 955.3	4 418.3	4 531.4	4 722.2	4 727.5	..
Latvia	..	..	..	..	..	39.3	..
Luxembourg	239.9	..	..	..	..	..	..
Mexico	457.5[e]	1 357.6[e]	1 564.4	1 419.8	1 523.6	1 505.8	1 488.1
Netherlands	..	3 152.1	3 232.9	3 283.5	3 277.1	3 605.4	..
New Zealand	202.2	358.0	371.7[e]	437.1	..	..	..
Norway	886.3[e]	1 554.7	1 637.9	1 720.1	1 818.2	1 983.0	2 011.9
Poland	461.3	925.0	1 332.8	1 647.7	2 130.2	2 450.2	..
Portugal	314.5[e]	1 207.6	1 069.1	1 062.8	1 003.2	1 005.5	..
Slovak Republic	117.1[e]	129.9[e]	217.6	240.2	162.7	169.3	..
Slovenia	71.0[e]	319.4	429.0	408.1	380.9	309.0	..
Spain	2 975.2[e]	4 986.7	5 006.6	5 107.1	5 039.8	5 155.1	..
Sweden	..	2 616.6	2 681.6[e]	2 841.5	2 755.2[e]	3 143.7	..
Switzerland	1 233.9[e]	2 855.3[e]	3 164.1	3 476.7[e]	3 761.9[e]	4 051.0	..
Turkey	343.3[e]	2 245.6	2 612.1	3 089.0	3 717.1	4 133.8	..
United Kingdom	..	15 195.6	14 167.4	15 453.3	16 810.5	17 610.5	..
United States	65 828.5[d,e]	88 838.0[d,e]	89 912.0[d,e]	96 513.0[d,e]	102 696.0[d,e]	114 677.0[d,e]	..
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	326.7	326.4
China	..	12 049.6	14 114.5	..	..	..	..
Romania	47.1[e]	300.9	406.0	213.7	286.0	505.2	..
Russian Federation	..	..	..	..	..	..	..
Singapore	1 169.9[e]	2 710.4	1 983.7	2 190.7	..	..	..
South Africa	858.3	..	..	..	..	..	..
Chinese Taipei	734.4	1 455.0	1 768.1	1 957.4	2 075.2	2 125.8	2 262.2

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Source: OECD, ANBERD database: Research and Development Expenditure in Industry, July 2018

Table 43. Higher education expenditure on R&D (HERD) at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	..	5 880.0[e]	6 239.6	6 854.0[e]	6 984.6	6 492.3[e]	..
Austria	1 689.8[e]	2 547.1	2 804.2[e]	2 920.3	3 037.5[e]	3 088.9	3 203.2[p]
Belgium	1 389.2	2 194.3	2 284.2	2 469.4	2 464.7	2 566.8	2 639.4[p]
Canada	7 841.7	9 542.7	10 249.8[b]	10 462.4	10 478.3	10 625.9	10 700.8[p]
Chile	..	399.3	464.5	602.7	591.3[b]	593.6	637.6[p]
Czech Republic	486.2	1 145.6	1 494.9	1 658.0	1 702.5	1 696.0	1 260.2
Denmark	1 090.8	2 249.2	2 363.3	2 641.0	2 641.3	2 730.8[p]	2 551.1[e]
Estonia	85.6	209.2	234.8	264.0	241.0	232.2	178.2
Finland	1 064.0	1 594.4	1 623.2	1 588.4	1 641.9	1 628.3	1 645.9
France	7 442.5	11 231.1	11 476.0	12 184.1	13 402.3[b]	13 464.3	13 647.7[p]
Germany	10 565.9	17 138.2	17 757.8	18 459.0	19 416.8	19 689.2	21 314.0[b]
Greece	772.6	784.6	780.4	869.0	905.2	1 054.8	926.1
Hungary	399.0[d]	546.6[d]	533.0[d]	483.8[d]	460.0[d]	425.5[d]	352.2[d]
Iceland	65.2	82.8[b]	..	90.9[b]	95.8	104.0	113.5
Ireland	543.6	811.1[e]	807.2	860.8[e]	894.0	940.4[e]	1 005.9[e]
Israel[1]	1 035.2[d]	1 230.0[d]	1 335.5[d]	1 444.8[d]	1 468.4[d]	1 563.5[d]	1 584.9[d,e]
Italy	5 509.9[b]	7 472.4	7 687.0	8 054.0	7 863.1[e]	7 611.5[e]	7 639.8[p]
Japan	17 250.4	19 603.5	20 344.9	22 172.2[b]	21 326.7	20 832.6	20 773.0
Korea	3 040.0[d]	5 890.4	6 172.7	6 305.9	6 614.4	6 887.9	7 248.7
Latvia	66.6	138.7	144.5	119.8	132.6	150.7	97.2
Luxembourg	7.5	74.5	104.5	125.5	116.9	138.1	138.2
Mexico	1 536.9	3 013.7	2 696.2	2 689.4	3 069.7[e,p]	3 045.8[e,p]	2 950.4[e,p]
Netherlands	3 775.3	4 777.3	4 795.4	5 127.2	5 269.8	5 393.1	5 512.2[p]
New Zealand	386.3	562.6	..	565.0	..	655.9	..
Norway	1 010.1	1 569.9	1 664.1	1 772.1	1 802.0	1 922.1	2 038.0
Poland	942.5	2 277.3	2 751.5	2 395.1	2 668.0	2 928.0	3 149.7[p]
Portugal	640.1	1 498.7	1 397.4	1 727.6[b]	1 758.6	1 731.2	1 807.8[p]
Slovak Republic	90.1	323.3	394.7	411.7	474.8	824.1	362.0
Slovenia	113.3	169.0[b]	170.2	165.0	157.4	145.4	147.0[p]
Spain	3 846.5	5 604.1	5 346.3	5 405.2	5 444.4	5 546.1	5 505.6
Sweden	2 284.9	3 533.1	3 788.3[e]	3 934.9	4 111.2[e]	4 093.0	4 236.3[p]
Switzerland	..	..	3 847.7	..	4 415.2	4 745.2	..
Turkey	2 509.8	5 251.0	5 622.5	5 823.0	6 457.8	6 798.3	6 883.0
United Kingdom	7 885.7	10 093.6	10 278.2	10 972.1	11 294.4	11 483.5	11 600.9[p]
United States	47 006.0[d]	62 435.0[d]	60 896.0[d]	61 546.0[d]	62 354.0[d]	64 653.0[d]	67 520.0[d,p]
EU28 (OECD estimates)	51 292.3[e]	77 513.2[e]	80 079.6[e]	83 912.1[e]	87 164.0[e]	88 775.0[e]	89 575.4[e]
OECD-Total[2]	**137 689.0[e]**	**195 307.5[e]**	**199 193.1[e]**	**207 305.5[e]**	**212 365.5[e]**	**216 457.7[e]**	**221 527.9[e]**
Argentina	587.8	1 405.8	1 560.8	1 555.1	1 536.4	1 443.2	1 221.5
China	8 588.2	19 650.4	22 146.7	24 162.4	25 572.6	28 711.6	30 860.8
Romania	115.5	411.1[b]	362.4	302.5	238.9	363.7	247.8
Russian Federation	1 047.3	3 178.6	3 523.7	3 476.9	3 944.4	3 810.4	3 631.2
Singapore	1 229.8	2 314.3	2 391.6	2 560.4	2 761.2	..	..
South Africa	781.3	1 384.4	1 485.9	1 414.6	1 563.9	1 774.9	..
Chinese Taipei	1 747.4	3 241.0	3 277.3	3 288.2	3 233.8	3 164.4	3 217.1

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 44. Higher education expenditure on R&D (HERD) as a percentage of GDP

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	0.59[e]	0.63	0.62[e]	0.63	0.58[e]	..
Austria	0.59[e]	0.68	0.72[e]	0.72	0.73[e]	0.72	0.73[p]
Belgium	0.40	0.48	0.48	0.51	0.49	0.50	0.50[p]
Canada	0.67	0.67	0.70[b]	0.67	0.65	0.66	0.66[p]
Chile	..	0.11	0.12	0.15	0.15[b]	0.15	0.15[p]
Czech Republic	0.22	0.38	0.49	0.52	0.50	0.48	0.34
Denmark	0.59	0.91	0.94	1.01	0.98	0.99[p]	0.91[e]
Estonia	0.38	0.64	0.68	0.73	0.64	0.62	0.46
Finland	0.63	0.73	0.74	0.71	0.72	0.71	0.69
France	0.39	0.46	0.46	0.47	0.50[b]	0.50	0.49[p]
Germany	0.40	0.50	0.51	0.51	0.51	0.50	0.53[b]
Greece	0.27	0.27	0.28	0.30	0.31	0.37	0.32
Hungary	0.23[d]	0.24[d]	0.23[d]	0.20[d]	0.18[d]	0.17[d]	0.13[d]
Iceland	0.59	0.65[b]	..	0.66[b]	0.66	0.66	0.67
Ireland	0.32	0.39[e]	0.38	0.39[e]	0.38	0.29[e]	0.30[e]
Israel[1]	0.60[d]	0.52[d]	0.53[d]	0.53[d]	0.52[d]	0.52[d]	0.50[d,e]
Italy	0.32[b]	0.35	0.36	0.37	0.36[e]	0.34[e]	0.33[p]
Japan	0.43	0.43	0.43	0.45[b]	0.43	0.40	0.39
Korea	0.26[d]	0.38	0.38	0.38	0.39	0.38	0.39
Latvia	0.21	0.34	0.33	0.26	0.28	0.31	0.19
Luxembourg	0.02	0.16	0.21	0.24	0.21	0.24	0.23
Mexico	0.11	0.16	0.13	0.13	0.14[e,p]	0.14[e,p]	0.13[e,p]
Netherlands	0.62	0.62	0.61	0.63	0.64	0.64	0.64[p]
New Zealand	0.36	0.39	..	0.35	..	0.38	..
Norway	0.46	0.51	0.51	0.52	0.53	0.60	0.66
Poland	0.18	0.26	0.30	0.25	0.27	0.29	0.30[p]
Portugal	0.27	0.53	0.50	0.59[b]	0.59	0.57	0.57[p]
Slovak Republic	0.10	0.23	0.27	0.27	0.30	0.51	0.22
Slovenia	0.24	0.29[b]	0.29	0.27	0.25	0.22	0.22[p]
Spain	0.32	0.37	0.36	0.36	0.35	0.34	0.33
Sweden	0.74	0.85	0.89[e]	0.90	0.91[e]	0.87	0.87[p]
Switzerland	..	..	0.83	..	0.87	0.90	..
Turkey	0.31	0.36	0.37	0.34	0.35	0.35	0.34
United Kingdom	0.40	0.44	0.43	0.44	0.43	0.42	0.41[p]
United States	0.36[d]	0.40[d]	0.38[d]	0.37[d]	0.36[d]	0.36[d]	0.36[d,p]
EU28 (OECD estimates)	0.38[e]	0.44[e]	0.45[e]	0.45[e]	0.46[e]	0.45[e]	0.44[e]
OECD-Total[2]	**0.38[e]**	**0.43[e]**	**0.42[e]**	**0.42[e]**	**0.42[e]**	**0.41[e]**	**0.41[e]**
Argentina	0.11	0.17	0.19	0.18	0.18	0.16	0.14
China	0.13	0.14	0.14	0.14	0.14	0.14	0.14
Romania	0.06	0.11[b]	0.10	0.08	0.06	0.09	0.05
Russian Federation	0.06	0.09	0.10	0.09	0.10	0.11	0.10
Singapore	0.52	0.59	0.58	0.58	0.59	..	..
South Africa	0.17	0.22	0.23	0.21	0.22	0.24	..
Chinese Taipei	0.27	0.34	0.33	0.32	0.30	0.29	0.28

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 45. Higher education expenditure on R&D (HERD) at 2010 prices and PPP

Million 2010 USD

	2005	2011	2012	2013	2014	2015	2016
Australia	..	5 809.2[e]	6 293.0	6 403.1[e]	6 597.3	6 238.3[e]	..
Austria	1 933.1[e]	2 471.3	2 609.2[e]	2 619.4	2 677.3[e]	2 661.9	2 735.3[p]
Belgium	1 618.7	2 141.2	2 160.1	2 266.1	2 230.3	2 300.2	2 335.1[p]
Canada	8 637.7	9 385.1	9 996.7[b]	9 878.5	9 752.6	10 099.8	10 152.8[p]
Chile	..	375.1	430.5	551.6	536.5[b]	551.1	577.0[p]
Czech Republic	557.7	1 119.0	1 434.0	1 507.6	1 501.0	1 514.9	1 110.1
Denmark	1 392.6	2 200.3	2 287.8	2 464.0	2 430.4	2 494.9[p]	2 341.0[e]
Estonia	112.3	198.7	220.2	239.7	217.5	211.9	160.0
Finland	1 265.8	1 551.4	1 552.0	1 475.8	1 503.2	1 466.6	1 464.2
France	8 685.9	10 950.5	11 085.0	11 226.3	12 215.3[b]	12 222.4	12 246.4[p]
Germany	12 090.7	16 628.2	16 935.8	16 991.9	17 426.1	17 555.8	18 773.6[b]
Greece	875.7	769.5	737.6	775.6	796.7	936.7	821.7
Hungary	504.6[d]	525.9[d]	501.4[d]	439.9[d]	419.0[d]	391.9[d]	325.7[d]
Iceland	69.2	81.8[b]	..	86.6[b]	88.6	93.2	100.9
Ireland	616.2	797.6[e]	769.8	800.7[e]	843.0	820.2[e]	876.1[e]
Israel[1]	1 069.4[d]	1 198.6[d]	1 258.3[d]	1 293.5[d]	1 336.1[d]	1 359.5[d]	1 353.3[d,e]
Italy	6 673.9[b]	7 233.2	7 233.6	7 383.7	7 163.0[e]	6 897.7[e]	6 677.5[p]
Japan	19 019.4	19 192.5	19 477.2	20 690.7[b]	19 898.1	18 976.1	18 414.2
Korea	3 208.5[d]	5 895.2	6 116.1	6 298.0	6 587.9	6 692.6	6 935.8
Latvia	81.2	133.6	136.4	109.7	119.0	136.3	86.8
Luxembourg	9.1	69.6	95.4	111.2	100.6	118.4	119.7
Mexico	1 855.0	2 849.3	2 508.8	2 472.8	2 759.6[e,p]	2 829.4[e,p]	2 701.0[e,p]
Netherlands	4 312.6	4 674.3	4 561.8	4 658.4	4 844.5	4 953.6	5 044.5[p]
New Zealand	459.1	547.7	..	513.0	..	595.4	..
Norway	1 199.3	1 513.6	1 557.3	1 614.1	1 642.5	1 800.6	1 941.9
Poland	1 128.6	2 203.8	2 594.1	2 208.8	2 455.4	2 695.6	2 901.4[p]
Portugal	751.2	1 504.0	1 368.0	1 594.3[b]	1 597.7	1 565.3	1 605.0[p]
Slovak Republic	107.8	321.1	385.7	389.6	444.7	784.8	344.8
Slovenia	123.5	163.6[b]	159.5	148.1	140.4	129.9	130.2[p]
Spain	4 490.8	5 508.8	5 111.0	4 999.5	4 952.7	5 056.1	4 967.0
Sweden	2 688.4	3 425.0	3 556.0[e]	3 630.9	3 783.5[e]	3 784.4	3 910.4[p]
Switzerland	..	..	3 551.0	..	3 880.4	4 059.4	..
Turkey	3 344.4	5 100.0	5 366.1	5 488.3	5 847.2	6 215.8	6 290.4
United Kingdom	8 911.8	9 957.2	9 920.7	10 298.0	10 469.7	10 581.6	10 546.2[p]
United States	51 724.5[d]	61 172.0[d]	58 585.0[d]	58 269.3[d]	57 993.5[d]	59 486.6[d]	61 341.9[d,p]
EU28 (OECD estimates)	59 781.2[e]	75 607.8[e]	76 422.1[e]	77 322.2[e]	79 291.6[e]	80 371.9[e]	80 139.2[e]
OECD-Total[2]	**156 344.1[e]**	**190 932.5[e]**	**191 195.1[e]**	**193 609.9[e]**	**195 829.0[e]**	**198 309.1[e]**	**200 343.8[e]**
Argentina	646.9	1 377.4	1 501.6	1 472.3	1 429.0	1 306.7	1 097.7
China	9 450.6	19 253.4	21 306.8	22 876.8	23 785.5	26 420.9	28 055.6
Romania	168.0	398.8[b]	338.9	281.1	221.2	336.3	226.0
Russian Federation	1 518.6	3 007.6	3 252.9	3 203.4	3 658.0	3 579.8	3 384.2
Singapore	1 352.8	2 265.4	2 299.6	2 422.6	2 567.7	..	..
South Africa	859.7	1 356.4	1 429.5	1 339.2	1 457.5	1 634.6	..
Chinese Taipei	1 922.8	3 175.4	3 153.1	3 113.2	3 007.8	2 911.5	2 922.9

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 46. Percentage of Higher education expenditure on R&D (HERD) financed by the business sector

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	4.7	..	5.1	..	..
Austria	..	5.2	..	5.1	..	5.3	..
Belgium	10.9	10.7	11.3	12.1	11.7	12.9	..
Canada	8.4	8.2	7.5[b]	7.1	7.7	7.9	7.9[p]
Chile	..	5.5	5.4	4.3	3.3[b]	3.0	2.9[p]
Czech Republic	0.8	1.0	0.8	2.0	2.4	4.0	4.7
Denmark	2.4	3.4	2.7	2.5	1.9	2.6[p]	..
Estonia	5.2	3.5	3.5	4.4	4.4	5.4	7.4
Finland	6.5	5.5	5.1	5.0	4.0	3.7	..
France	1.6	2.6	2.6	2.8	2.5[b]	2.8	..
Germany	14.1	13.9	14.0	14.0	14.1	13.9	13.8[b]
Greece	8.9	9.0[b]	7.9	5.5	6.0	7.6	7.3
Hungary	11.8[d]	11.3[d]	9.5[d]	8.6[d]	9.1[d]	8.0[d]	..
Iceland	11.3	2.0[b]	..	4.7[b]	3.4	2.0	2.3
Ireland	2.7	2.2[e]	1.9	2.3[e]	2.7	3.2[e]	3.7[e]
Israel[1]	7.3[d]	6.8[d]	6.8[d]	6.8[d]	9.5[d]	9.6[d]	..
Italy	1.4[b]	1.3	1.1	1.3	1.3[e]	1.3[e]	..
Japan	2.8	2.7	2.7	2.6[b]	2.6	2.6	2.8
Korea	15.2[d]	11.0	11.0	12.3	11.2	12.3	12.6
Latvia	15.4	4.7	5.5	6.9	7.1	7.8	..
Luxembourg	1.4	0.7	0.8	1.0	..	1.1	..
Mexico	1.2[e]	1.4	0.5	0.8	0.7[e,p]	0.7[e,p]	0.8[e,p]
Netherlands	7.8	8.2	8.3	7.6	7.7	7.8	..
New Zealand	8.0	4.1	..	4.0	..	4.6	..
Norway	4.7	4.0	..	4.1	..	3.1	3.1[e]
Poland	5.4	2.6	2.1	3.2	2.8	2.6	..
Portugal	1.2	1.9	1.3	1.7[b]	1.6	1.9	..
Slovak Republic	0.7	3.5	3.3	2.6	2.4	1.6	..
Slovenia	9.0	12.5[b]	11.2	11.4	12.6	11.4	..
Spain	6.9	8.0	7.3	6.6	5.9	5.7	..
Sweden	5.1	4.0	..	3.8	..	4.0	..
Switzerland	..	..	10.9	..	10.0	9.8	..
Turkey	22.7[d]	14.6	13.9	13.9	14.9	15.1	..
United Kingdom	4.6	4.0	4.1	4.1	4.3	4.4	..
United States	5.0[d]	4.5[d]	4.5[d]	4.8[d]	5.1[d]	5.2[d]	5.3[d,p]
EU28 (OECD estimates)	6.5[e]	6.5[e]	6.5[e]	6.4[e]	6.4[e]	6.4[e]	..
OECD-Total[2]	**6.1[e]**	**5.8[e]**	**5.8[e]**	**5.9[e]**	**6.0[e]**	**6.2[e]**	**..**
Argentina	0.6	0.2	0.2	0.3	0.2	0.1	0.3
China	36.7	35.3	33.4	33.8	33.7	30.2	29.0
Romania	7.5	5.7[b]	7.5	4.8	6.9	5.1	..
Russian Federation	29.3	24.0	27.2	27.6	27.3	27.4	27.7
Singapore	1.7	3.7	4.3	6.1	7.3	..	..
South Africa	11.6	7.6	7.9	8.1	10.6	7.8	..
Chinese Taipei	5.8	7.5	8.0	7.8	8.7	9.8	10.2

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1. Information on data for Israel:http://dx.doi.org/10.1787/888932315602
2. Lithuania was not an OECD Member at the time of preparation of this publication. Accordingly, Lithuania does not appear in the list of OECD Members and is not included in the OECD zone aggregates.

Source: OECD, Main Science and Technology Indicators database, July 2018

Table 47. Higher education researchers in full-time equivalent

FTE

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	65 772	..	68 528	..	..
Austria	8 962[d,e]	12 199[d]	12 704[d,e]	12 846[d]	13 416[d,e]	13 658[d]	14 088[d,p]
Belgium	13 853	18 228	18 361	18 750	19 157	20 362[b]	21 080[p]
Canada	43 400	56 090	57 510	60 270	60 200	..	..
Chile	..	3 295[d]	3 561[d]	3 259[d]	3 600[d]	4 004[d]	4 360[d,p]
Czech Republic	7 762[b]	10 289	11 498	10 995	10 965	11 357	10 511
Denmark	8 242	13 881	14 305	15 057	15 854	16 190[p]	16 035[e]
Estonia	1 905	2 398	2 534	2 398	2 443	2 431	2 426
Finland	12 879	11 964[b]	12 368	12 056	12 381	12 240	11 987
France	66 290	71 170	71 890[e]	72 750[m]	78 409[b]	79 622	..
Germany	65 363	93 811	97 199	99 123	100 992	103 148	109 877[b]
Greece	11 356[d]	16 068[b,d]	15 723[d]	18 957[d]	18 801[d]	22 149[d]	17 241[d]
Hungary	5 911	5 975	5 932	5 939	5 860	5 610	5 592
Iceland	585	733[b]	..	1 011[b]	1 033	892[b]	1 151
Ireland	4 400	5 726[e]	6 002	5 614[e]	9 104[b]	13 691	14 604
Israel[1]	..	7 837[d]	9 433[d,e]	9 615[d,e]	9 639[d,e]	9 590[d,e]	..
Italy	37 073[b]	43 828	45 223	47 526	48 198	48 841[e]	49 906[p]
Japan	156 176[d]	126 133[d]	125 890[d]	136 593[b,d]	137 586[d]	137 078[d]	138 095[d]
Korea	27 416[d]	40 844	43 826	41 784	41 938	40 866	40 759
Latvia	2 224[d]	2 708[d]	2 607[d]	2 348[d]	2 291[d]	2 318[d]	1 944[d]
Luxembourg	157	566	651	769	906	945	943[p]
Mexico	16 691[e]	18 881	13 850	14 422	..	..	..
Netherlands	17 928	20 965	20 990	21 216	21 921	22 342	22 600[p]
New Zealand	7 481	9 300	..	9 800	..	9 900	..
Norway	7 512	9 760	9 855	10 054	10 296	10 976	11 795
Poland	40 449	39 677	38 152	37 167	39 695	40 126	..
Portugal	10 956	23 754	23 825	25 760[b]	24 978	25 043	26 432[p]
Slovak Republic	6 458	10 339	9 782	9 625	8 959	8 508	8 154
Slovenia	1 695	2 431[b]	2 398	2 201	2 180	2 069	1 951[p]
Spain	54 028	62 185	59 775[d]	57 641[d]	57 156[d]	57 107[d]	58 413[d]
Sweden	15 125[b]	17 101	16 561[e]	18 401	19 616[e]	18 215	19 726[p]
Switzerland	..	..	18 760	..	..	21 375	..
Turkey	25 434	35 644	40 801	42 574	41 269	43 293	40 996
United Kingdom	141 762[b,e]	150 650	153 755	158 445	163 838	167 463	170 230[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	551 645[e]	656 966[e]	662 253[e]	675 973[e]	697 454[e]	713 007[e]	730 558[e]
OECD-Total[2]	**..**	**..**	**1 359 909[e]**	**..**	**..**	**..**	**..**
Argentina	14 200	22 766	23 332	23 220	23 153	21 701	22 274
China	221 908[d]	249 025	262 052	272 683	282 304	298 728	307 923
Romania	5 386	6 563[b]	6 591	6 578	6 378	6 480	6 314
Russian Federation	70 494	89 938	87 259	89 085	91 501	92 503	83 024
Singapore	8 187	14 460	15 096	15 853	16 195	..	..
South Africa	9 235	12 828	13 744	15 772	15 804	18 367	..
Chinese Taipei	23 180	32 045	32 588	31 712	30 621	29 828	29 099

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 48. Higher education researchers as a percentage of national total

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	31.5[d,e]	32.9[d]	32.0[d,e]	31.8[d]	31.5[d,e]	31.4[d]	31.4[d,p]
Belgium	41.8	42.7	40.3	40.4	37.7	38.3[b]	39.2[p]
Canada	31.7	34.0	35.6	36.9	37.1	..	..
Chile	..	54.2[d]	52.4[d]	55.3[d]	47.5[d]	49.0[d]	48.5[d,p]
Czech Republic	32.1[b]	33.5	34.6	32.1	30.4	29.8	28.2
Denmark	29.2	35.4	35.7	37.8	38.3	38.2[p]	37.4[e]
Estonia	57.2	53.2	55.3	54.4	56.5	58.1	55.9
Finland	32.5	29.9[b]	30.6	30.8	32.3	32.6	33.4
France	32.7	28.6	27.8[e]	27.4[e,m]	28.9[b]	28.7	..
Germany	24.0	27.7	27.6	28.0	28.7	26.6	27.4[b,e]
Greece	58.0[d]	65.1[b,d]	63.4[d]	64.9[d]	62.9[d]	63.8[d]	58.6[d]
Hungary	37.2	26.0	24.9	23.7	22.4	22.2	21.7
Iceland	27.2	32.5[b]	..	54.7[b]	..	45.9[b]	52.2
Ireland	38.0	37.5[e]	36.9[e]	33.3[e]	43.9[b,e]	53.7	55.5[e]
Israel[1]	..	14.2[d]	14.9[d,e]	..	..	..	..
Italy	44.9[b]	41.3	40.9	40.9	40.8	38.8[e]	39.4[p]
Japan	22.9[d]	19.2[d]	19.5[d]	20.7[b,d]	20.1[d]	20.7[d]	20.7[d]
Korea	15.2[d]	14.1	13.9	13.0	12.1	11.5	11.3
Latvia	67.8[d]	68.6[d]	66.8[d]	64.8[d]	61.1[d]	64.2[d]	61.7[d]
Luxembourg	7.1	20.0	28.2[b]	30.7	34.5	37.2	37.6[p]
Mexico	38.0[e]	47.4	47.6	48.2	..	..	..
Netherlands	37.5	34.2[b]	28.7[b]	27.7	28.8	28.2	27.5[p]
New Zealand	57.6	57.1	..	54.7	..	52.9	..
Norway	35.4	35.8	35.4	35.5	35.2	35.8	37.0
Poland	65.1	61.9	56.9	52.0	50.5	48.6	..
Portugal	51.9	53.9	56.1	68.1[b]	65.5	64.8	64.9[p]
Slovak Republic	59.1	67.5	64.1	65.4	60.8	59.1	57.6
Slovenia	32.3	27.7[b]	27.0	25.3	25.4	26.2	24.1[p]
Spain	49.2	47.7[d]	47.1[d]	46.8[d]	46.8[d]	46.6[d]	46.1[d]
Sweden	27.5[b,e]	35.1[e]	33.6[e]	28.7[b,e]	29.4[e]	27.3[e]	28.0[p]
Switzerland	..	..	52.4	..	..	48.9	..
Turkey	65.0	49.4	49.7	47.8	46.0	45.5	40.9
United Kingdom	57.0[b,e]	59.9	60.0[e]	59.2	59.2[e]	58.9	58.4[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	40.1[e]	40.4[e]	39.4[e]	39.1[e]	39.4[e]	38.6[e]	38.7[e]
OECD-Total[2]	**..**	**..**	**30.9[e]**	**..**	**..**	**..**	**..**
Argentina	44.6	46.4[p]	46.2	45.7	44.8	41.0	41.2
China	19.8[d]	18.9	18.7	18.4	18.5	18.5	18.2
Romania	23.5	40.8[b]	36.6	35.4	35.2	37.1	35.0
Russian Federation	15.2	20.1	19.7	20.2	20.6	20.6	19.4
Singapore	34.4	42.9	44.2	44.0	44.2	..	..
South Africa	53.4	63.8	64.3	67.6	67.0	70.2	..
Chinese Taipei	26.1	23.8	23.3	22.5	21.4	20.5	19.7

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 49. Higher education Total R&D personnel in full-time equivalent

FTE

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	74 669	..	78 038	..	..
Austria	12 353[d,e]	16 096[d]	16 678[d,e]	16 840[d]	17 431[d,e]	17 682[d]	18 239[d,p]
Belgium	17 767	22 709	22 770	23 156	23 733	26 156[b]	27 461[p]
Canada	56 950	70 010	71 320	74 730	74 160	..	..
Chile	..	6 223[d]	6 819[d]	6 672[d]	7 361[d]	7 190[d]	8 061[d,p]
Czech Republic	10 972[b]	14 724	16 441	16 240	16 525	16 868	15 201
Denmark	11 561	18 916	19 991	20 925	20 956	21 257[p]	21 052[e]
Estonia	2 176	2 735	3 000	2 850	3 103	3 062	2 969
Finland	17 453	15 847[b]	16 146	15 726	16 034	15 515	15 157
France	98 743	107 891	108 794[e]	109 883[e]	119 081[b]	120 480	..
Germany	94 522	124 308	127 900	130 079	132 542	134 032	141 661[b]
Greece	17 401[d]	20 640[b,d]	20 508[d]	23 390[d]	23 924[d]	27 383[d]	20 404[d]
Hungary	8 194	8 260	8 130	8 154	7 937	7 706	7 476
Iceland	742	1 057[b]	..	1 211[b]	1 232	1 062	1 360
Ireland	5 220	6 437[e]	6 935	6 208[e]	9 866[b]	15 836	16 891
Israel[1]	9 011[d]	9 220[d]	11 098[d,e]	11 311[d,e]	11 340[d,e]	11 283[d,e]	..
Italy	66 976[b]	73 723	76 207	76 986	75 235	76 858[e]	77 997[p]
Japan	209 734[d]	192 265[d]	195 043[d]	207 766[b,d]	209 101[d]	208 579[d]	210 683[d]
Korea	42 157[d]	73 468	77 099	73 196	74 861	72 745	72 482
Latvia	2 856[d]	3 393[d]	3 538[d]	3 237[d]	3 177[d]	3 241[d]	3 147[d]
Luxembourg	169	631	723	866	989	1 057	1 055[p]
Mexico	25 218[e]	26 377	20 211	21 106	..	..	..
Netherlands	32 305	32 197	31 952	32 331	33 237	33 604	34 000[p]
New Zealand	9 660	11 500	..	11 600	..	11 900	..
Norway	9 420	12 283	12 413	12 715	13 010	13 952	14 937
Poland	44 763	44 154	42 917	41 441	44 304	44 961	..
Portugal	11 680	24 491	24 513	27 753[b]	26 870	27 001	28 539[p]
Slovak Republic	7 146	10 712	10 124	9 969	9 297	8 815	8 623
Slovenia	2 099	3 003[b]	2 926	2 805	2 667	2 555	2 321[p]
Spain	66 996	80 900	77 238[d]	74 923[d]	73 428[d]	73 327[d]	75 191[d]
Sweden	17 686[b]	20 010	21 781[e]	21 004	22 410[e]	21 435	21 918[p]
Switzerland	..	..	26 945	..	..	29 717	..
Turkey	25 434[e]	35 644[e]	40 801[e]	42 574[e]	41 269[e]	43 293[e]	52 576
United Kingdom	152 634[b,e]	175 185[e]	173 499[e]	177 767[e]	183 023[e]	186 724	189 809[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	723 258[e]	853 329[e]	857 662[e]	868 547[e]	891 294[e]	910 539[e]	928 230[e]
OECD-Total[2]	..	..	..	..	..	..	..
Argentina	15 507	26 270	27 178	27 737	27 896	26 015	26 619
China	227 163[d]	299 296	313 520	324 942	334 794	354 861	360 049
Romania	6 803	8 879[b]	8 710	9 523	8 966	9 008	8 627
Russian Federation	97 672	121 151	119 360	118 971	121 526	121 680	110 379
Singapore	9 337	15 551	16 252	17 099	17 405	..	..
South Africa	10 611	14 563	15 614	17 778	17 944	20 812	..
Chinese Taipei	25 752	35 818	36 115	35 088	34 135	33 177	32 349

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 50. Government intramural expenditure on R&D (GOVERD) at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	..	2 348.7	2 419.0	2 592.5[e]	2 292.1	2 691.7[e]	..
Austria	355.9[e]	511.5	522.5[e]	533.1	581.3[e]	602.1	624.4[p]
Belgium	520.6	791.7	908.7[b]	961.6	1 073.8	1 159.8	1 244.3[p]
Canada	2 238.7	2 300.2	2 230.4	2 354.6	2 392.8	1 872.6	1 967.5[p]
Chile	..	49.0	55.3	128.7[b]	123.6	120.3	200.6[p]
Czech Republic	596.5[b]	972.0	1 044.1	1 163.5	1 271.0	1 389.4	1 119.2
Denmark	285.7	147.7	177.3	183.6	180.7	189.4[p]	177.0[e]
Estonia	23.3	60.8	67.9	55.7	59.7	60.7	57.3
Finland	534.0	705.6	677.9	658.7	620.7	545.7	534.0
France	7 024.1	7 427.2	7 248.2	7 620.6	7 717.1	7 811.3	8 007.9[p]
Germany	9 014.2[d]	13 913.7[d]	14 405.3[d]	15 309.6[d]	16 022.1[d]	16 021.1[d]	16 307.0[d]
Greece	329.9	465.1	484.8	649.7	675.3	785.4	726.5
Hungary	444.3[d]	426.8[d]	418.1[d]	500.7[d]	468.3[d]	466.7[d]	423.9[d]
Iceland	69.8	55.7[b,e]	..	16.5[b]	17.7	16.5	17.1
Ireland	148.3	158.6	160.4	159.0	159.1	167.4	164.5
Israel[1]	186.4[d]	199.1[d]	198.4[d]	209.1[d]	217.0[d]	223.2[d,e]	229.8[d,e]
Italy	3 158.8	3 497.6	4 066.2	3 984.0	4 001.6	3 919.0	3 952.1[p]
Japan	10 669.1	12 428.3	13 130.7	15 096.3	14 116.7	13 402.1	12 730.4
Korea	3 631.6[d]	6 847.1	7 299.4	7 446.8	8 196.6	8 893.1	9 161.1
Latvia	30.7	66.2	77.9	80.7	78.4	77.7	70.6
Luxembourg	60.1[d]	163.3[d]	172.3[d]	196.0[d]	212.7[d]	221.2[d]	221.4[d]
Mexico	1 238.8	3 143.5	3 722.3	3 907.1	4 439.1[e,p]	4 306.0[e,p]	4 019.8[e,p]
Netherlands	1 355.4[d]	1 578.1[d]	1 797.2[b,d]	1 953.1[d]	1 943.9[d]	2 005.3[d]	2 019.9[p]
New Zealand	308.1	401.1	..	430.2	..	446.8	..
Norway	513.1	822.6	873.0	898.4	884.7	930.3	885.4
Poland	1 085.2	2 240.3	2 234.1	2 196.2	2 191.5	2 473.6	252.3[b,p]
Portugal	264.3	303.9	205.2	252.1	241.6	246.5	216.1[p]
Slovak Republic	130.8[d]	255.9[d]	284.4[d]	254.8[d]	390.9[d]	524.3	280.1
Slovenia	163.7	204.9[b]	200.2	206.1	183.2	192.6	182.5[p]
Spain	2 258.7	3 868.2	3 678.8	3 610.6	3 636.5	3 773.3	3 701.1
Sweden	506.9[b]	578.8	671.0[e]	533.7[e]	531.7[e]	523.7	537.7[p]
Switzerland	..	..	103.4[d]	..	148.7[d]	156.4[d]	..
Turkey	531.0	1 307.7	1 408.9	1 442.1	1 544.0	1 771.8	1 799.6[d]
United Kingdom	3 234.9	3 326.7	3 097.1	3 280.7	3 181.6	3 006.8	2 998.6
United States	40 378.0[d]	54 974.0	53 342.0	52 372.0	54 106.0	56 210.0	59 028.0
EU28 (OECD estimates)	31 990.8[e]	42 475.4[e]	43 407.1[e]	45 174.9[e]	46 160.9[e]	47 024.5[e]	46 825.4[e]
OECD-Total[2]	**93 022.8[e]**	**126 116.6[e]**	**127 265.8[e]**	**130 789.6[e]**	**133 742.7[e]**	**136 588.7[e]**	**138 300.5[e]**
Argentina	903.6	1 890.4	2 282.8	2 400.4	2 406.8	2 842.6	2 344.5
China	18 921.8	40 473.8	47 542.1	53 982.8	58 564.0	65 841.0	70 818.5
Romania	288.6	732.0[b]	751.6	755.4	674.2	797.6	728.2
Russian Federation	4 723.4	10 500.4	12 202.6	11 684.3	12 293.4	12 341.6	12 751.8
Singapore	491.5	851.1	823.8	992.6	1 147.7	..	..
South Africa	842.6	1 040.1	1 107.0	1 164.2	1 287.6	1 393.5	..
Chinese Taipei	3 220.3	4 138.9	4 100.0	4 094.0	4 080.5	4 183.6	4 693.0

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 51. Government intramural expenditure on R&D (GOVERD) as a percentage of GDP

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	0.24	0.24	0.24[e]	0.21	0.24[e]	..
Austria	0.12[e]	0.14	0.13[e]	0.13	0.14[e]	0.14	0.14[p]
Belgium	0.15	0.17	0.19[b]	0.20	0.21	0.23	0.24[p]
Canada	0.19	0.16	0.15	0.15	0.15	0.12	0.12[p]
Chile	..	0.01	0.01	0.03[b]	0.03	0.03	0.05[p]
Czech Republic	0.27[b]	0.32	0.34	0.36	0.37	0.39	0.30
Denmark	0.15	0.06	0.07	0.07	0.07	0.07[p]	0.06[e]
Estonia	0.10	0.19	0.20	0.15	0.16	0.16	0.15
Finland	0.32	0.32	0.31	0.29	0.27	0.24	0.22
France	0.36	0.30	0.29	0.29	0.29	0.29	0.29[p]
Germany	0.34[d]	0.41[d]	0.41[d]	0.42[d]	0.42[d]	0.41[d]	0.40[d]
Greece	0.12	0.16	0.17	0.23	0.23	0.27	0.25
Hungary	0.26[d]	0.19[d]	0.18[d]	0.21[d]	0.19[d]	0.18[d]	0.16[d]
Iceland	0.64	0.44[b,e]	..	0.12[b]	0.12	0.10	0.10
Ireland	0.09	0.08	0.08	0.07	0.07	0.05	0.05
Israel[1]	0.11[d]	0.08[d]	0.08[d]	0.08[d]	0.08[d]	0.07[d,e]	0.07[d,e]
Italy	0.18	0.16	0.19	0.18	0.18	0.18	0.17[p]
Japan	0.26	0.27	0.28	0.30	0.28	0.26	0.24
Korea	0.31[d]	0.44	0.45	0.45	0.48	0.50	0.49
Latvia	0.10	0.16	0.18	0.18	0.17	0.16	0.14
Luxembourg	0.19[d]	0.34[d]	0.35[d]	0.38[d]	0.38[d]	0.38[d]	0.37[d]
Mexico	0.09	0.16	0.18	0.19	0.20[e,p]	0.20[e,p]	0.18[e,p]
Netherlands	0.22[d]	0.21[d]	0.23[b,d]	0.24[d]	0.24[d]	0.24[d]	0.23[p]
New Zealand	0.29	0.28	..	0.27	..	0.26	..
Norway	0.23	0.27	0.27	0.26	0.26	0.29	0.29
Poland	0.20	0.26	0.25	0.23	0.23	0.24	0.02[b,p]
Portugal	0.11	0.11	0.07	0.09	0.08	0.08	0.07[p]
Slovak Republic	0.15[d]	0.18[d]	0.20[d]	0.17[d]	0.25[d]	0.33	0.17
Slovenia	0.34	0.35[b]	0.34	0.34	0.29	0.30	0.27[p]
Spain	0.19	0.26	0.25	0.24	0.23	0.23	0.22
Sweden	0.17[b]	0.14	0.16[e]	0.12[e]	0.12[e]	0.11	0.11[p]
Switzerland	..	..	0.02[d]	..	0.03[d]	0.03[d]	..
Turkey	0.07	0.09	0.09	0.09	0.08	0.09	0.09[d]
United Kingdom	0.17	0.14	0.13	0.13	0.12	0.11	0.11
United States	0.31[d]	0.35	0.33	0.31	0.31	0.31	0.32
EU28 (OECD estimates)	0.23[e]	0.24[e]	0.24[e]	0.24[e]	0.24[e]	0.24[e]	0.23[e]
OECD-Total[2]	**0.26[e]**	**0.28[e]**	**0.27[e]**	**0.27[e]**	**0.26[e]**	**0.26[e]**	**0.26[e]**
Argentina	0.17	0.23	0.28	0.28	0.28	0.32	0.26
China	0.28	0.29	0.31	0.32	0.32	0.33	0.33
Romania	0.14	0.20[b]	0.20	0.19	0.16	0.19	0.16
Russian Federation	0.26	0.30	0.33	0.31	0.33	0.34	0.35
Singapore	0.21	0.22	0.20	0.23	0.25	..	..
South Africa	0.18	0.16	0.17	0.17	0.18	0.19	..
Chinese Taipei	0.49	0.44	0.42	0.40	0.38	0.38	0.41

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 52. Government intramural expenditure on R&D (GOVERD) at 2010 prices and PPP

Million 2010 USD

	2005	2011	2012	2013	2014	2015	2016
Australia	..	2 320.4	2 439.7	2 421.9[e]	2 165.0	2 586.4[e]	..
Austria	407.2[e]	496.3	486.2[e]	478.1	512.4[e]	518.9	533.2[p]
Belgium	606.6	772.5	859.3[b]	882.4	971.6	1 039.4	1 100.8[p]
Canada	2 466.0	2 262.2	2 175.3	2 223.2	2 227.1	1 779.9	1 866.8[p]
Chile	..	46.0	51.2	117.8[b]	112.2	111.7	181.5[p]
Czech Republic	684.1[b]	949.4	1 001.6	1 058.0	1 120.5	1 241.0	985.9
Denmark	364.8	144.5	171.6	171.3	166.2	173.1[p]	162.4[e]
Estonia	30.6	57.7	63.7	50.6	53.9	55.3	51.5
Finland	635.3	686.6	648.2	612.1	568.3	491.5	475.1
France	8 197.6	7 241.7	7 001.3	7 021.6	7 033.6	7 090.8	7 185.7[p]
Germany	10 315.1[d]	13 499.7[d]	13 738.6[d]	14 092.9[d]	14 379.4[d]	14 285.2[d]	14 363.4[d]
Greece	374.0	456.2	458.2	579.8	594.3	697.5	644.6
Hungary	561.9[d]	410.6[d]	393.4[d]	455.2[d]	426.5[d]	429.9[d]	392.0[d]
Iceland	74.1	55.1[b,e]	..	15.8[b]	16.4	14.8	15.2
Ireland	168.1	156.0	152.9	147.9	150.0	146.0	143.2
Israel[1]	192.6[d]	194.0[d]	186.9[d]	187.2[d]	197.5[d]	194.1[d,e]	196.3[d,e]
Italy	3 826.1	3 385.6	3 826.3	3 652.5	3 645.3	3 551.4	3 454.3[p]
Japan	11 763.2	12 167.8	12 570.7	14 087.6	13 171.1	12 207.8	11 284.8
Korea	3 832.9[d]	6 852.6	7 232.5	7 437.6	8 163.8	8 641.0	8 765.7
Latvia	37.4	63.8	73.5	73.9	70.3	70.3	63.1
Luxembourg	72.9[d]	152.5[d]	157.2[d]	173.6[d]	183.1[d]	189.7[d]	191.7[d]
Mexico	1 495.3	2 972.0	3 463.6	3 592.4	3 990.7[e,p]	4 000.0[e,p]	3 680.1[e,p]
Netherlands	1 548.3[d]	1 544.1[d]	1 709.7[b,d]	1 774.5[d]	1 787.1[d]	1 841.9[d]	1 848.5[p]
New Zealand	366.2	390.4	..	390.5	..	405.6	..
Norway	609.2	793.1	816.9	818.2	806.3	871.5	843.7
Poland	1 299.5	2 168.1	2 106.3	2 025.3	2 016.9	2 277.3	232.4[b,p]
Portugal	310.2	304.9	200.9	232.7	219.5	222.8	191.8[p]
Slovak Republic	156.5[d]	254.1[d]	277.9[d]	241.1[d]	366.2[d]	499.3	266.7
Slovenia	178.4	198.4[b]	187.6	185.0	163.3	172.1	161.6[p]
Spain	2 637.0	3 802.4	3 516.8	3 339.7	3 308.1	3 439.9	3 339.0
Sweden	596.4[b]	561.1	629.8[e]	492.5[e]	489.3[e]	484.2	496.4[p]
Switzerland	..	..	95.4[d]	..	130.7[d]	133.8[d]	..
Turkey	707.6	1 270.1	1 344.7	1 359.2	1 398.1	1 620.0	1 644.6[d]
United Kingdom	3 655.9	3 281.7	2 989.3	3 079.2	2 949.3	2 770.6	2 725.9
United States	44 431.2[d]	53 862.0	51 317.7	49 583.7	50 322.3	51 718.3	53 626.9
EU28 (OECD estimates)	37 316.6[e]	41 370.7[e]	41 408.6[e]	41 596.5[e]	41 865.3[e]	42 497.0[e]	41 801.3[e]
OECD-Total[2]	**104 633.6[e]**	**123 359.1[e]**	**122 272.9[e]**	**122 672.2[e]**	**123 723.4[e]**	**125 390.6[e]**	**125 209.3[e]**
Argentina	994.3	1 852.1	2 196.1	2 272.6	2 238.6	2 573.7	2 106.8
China	20 822.0	39 656.1	45 739.2	51 110.6	54 471.4	60 587.9	64 381.2
Romania	419.9	710.0[b]	702.9	701.8	624.4	737.5	664.1
Russian Federation	6 849.3	9 935.4	11 264.7	10 765.2	11 400.6	11 594.7	11 884.6
Singapore	540.6	833.1	792.1	939.2	1 067.3	..	..
South Africa	927.2	1 019.1	1 065.0	1 102.1	1 200.1	1 283.3	..
Chinese Taipei	3 543.6	4 055.1	3 944.6	3 876.1	3 795.3	3 849.3	4 263.7

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 53. Percentage of Government intramural expenditure on R&D (GOVERD) financed by the business sector

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	7.1	7.7	..	9.9	..	..
Austria	..	4.2	..	4.2	..	6.0	..
Belgium	9.2	5.7	4.9[b]	5.4	3.6	6.2	..
Canada	3.8	2.8	2.2	2.1	2.1	0.9	0.9[p]
Chile	..	2.0	2.4	1.5[b]	3.3	2.7	1.8[p]
Czech Republic	9.4[b]	4.0	4.5	3.7	3.8	2.8	4.0
Denmark	2.1	3.6	1.6	2.8	1.7	1.2[p]	..
Estonia	0.0	1.5	1.2	1.3	1.3	1.6	2.9
Finland	12.4	11.0	9.9	9.9	8.3	8.7	..
France	7.4	7.8	7.8	8.0	8.0	7.6	..
Germany	9.9[d]	9.3[d]	10.3[d]	10.3[d]	11.2[d]	11.3[d]	11.2[d]
Greece	1.3	6.6[b]	5.5	3.6	3.1	4.5	3.2
Hungary	10.3[d]	11.5[d]	9.8[d]	9.7[d]	7.8[d]	8.8[d]	..
Iceland	7.4	16.3[b,e]	..	15.0[b]	15.3	15.5	9.7
Ireland	4.1	1.7	1.8	1.9	1.9	0.7	0.8[s]
Israel[1]	7.7[d]	2.1[d]	1.8[d]	2.2[d]	2.5[d]	2.7[d,e]	..
Italy	2.4	5.3	5.3	4.2	4.1	4.2	..
Japan	0.7	2.0	1.7	1.9	1.9	2.3	2.4
Korea	4.3[d]	3.2	3.5	2.8	2.8	2.3	3.0
Latvia	15.6	9.9	13.9	13.2	15.6	16.9	..
Luxembourg	3.9[d]	5.0[d]	4.6[d]	2.0[d]	..	1.3[d]	..
Mexico	1.2[e]	1.3	0.9	0.7	0.7[e,p]	0.7[e,p]	0.8[e,p]
Netherlands	14.6[d]	17.9[d]	18.3[b,d]	16.6[d]	16.0[d]	13.6[d]	..
New Zealand	19.0	17.6	..	17.2	..	18.3	..
Norway	10.6	9.5	9.1	8.9	9.6	7.4	8.0
Poland	14.3	7.4	4.9	4.3	..[c]	4.5	..
Portugal	2.0	1.0	1.5	1.7	1.2	1.9	..
Slovak Republic	8.5[d]	12.5[d]	13.2[d]	8.2[d]	13.4[d]	8.6	..
Slovenia	12.1	7.0[b]	8.4	7.6	7.8	8.0	..
Spain	7.3	6.9	5.0	5.9	5.8	6.0	..
Sweden	1.3[b]	5.2	..	3.7[e]	..	3.9	..
Switzerland	..	..	0.0[d]	..	0.0[d]	2.4[d]	..
Turkey	1.5	2.0	2.1	2.0	2.6	2.8	..
United Kingdom	9.9	9.7	12.5	11.6	12.0	2.2	..
United States	0.0[d]	0.3[d]	0.3[d]	0.4[d]	0.4[d]	0.4[d]	0.3[d,p]
EU28 (OECD estimates)	8.3[e]	8.4[e]	8.6[e]	8.4[e]	8.6[e]	7.8[e]	..
OECD-Total[2]	**3.5[e]**	**3.6[e]**	**3.7[e]**	**3.7[e]**	**3.8[e]**	**3.5[e]**	**..**
Argentina	0.2	1.1	1.9	0.5	0.2	0.3	0.5
China	4.9	4.2	4.1	4.6	4.1	3.9	4.7
Romania	16.1	22.7[b]	17.3	16.0	17.0	15.2	..
Russian Federation	11.4	11.8	13.1	13.8	11.5	11.6	9.1
Singapore	2.3	2.9	3.8	6.1	4.3	..	..
South Africa	7.9	1.4	2.7	7.0	3.2	4.7	..
Chinese Taipei	3.0	2.6	3.0	3.1	3.4	2.9	2.9

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 54. Government researchers in full-time equivalent

FTE

	2005	2011	2012	2013	2014	2015	2016
Australia	..	8 454	8 311	..	7 637	..	..
Austria	1 232[d,e]	1 511[d]	1 555[d,e]	1 567[d]	1 648[d,e]	1 682[d]	1 735[d,p]
Belgium	2 274	2 781	3 591[b]	3 657	4 062	4 041[b]	4 208[p]
Canada	8 360	9 450	9 490	9 100	9 260	..	..
Chile	..	337[d]	404[d]	710[b,d]	769[d]	863[d]	1 296[d,p]
Czech Republic	6 564[b]	6 611	6 453	6 725	6 979	7 393	7 500
Denmark	2 105	1 181	1 208	1 254	1 384	1 426[p]	1 413[e]
Estonia	474	536	546	553	533	514	505
Finland	4 374	4 630	4 432	4 482	4 089	3 550	3 209
France	25 889[d]	26 808	27 413	27 893	28 065	28 445	..
Germany	39 911	54 185	55 597	56 755	52 854[b]	54 011[d]	53 971[d]
Greece	2 076[d]	4 370[b,d]	4 510[d]	5 778[d]	5 844[d]	7 256[d]	6 263[d]
Hungary	4 959	5 271	4 674	4 782	4 776	4 680	4 965
Iceland	501	411[b]	..	181[b]	..	239[b]	143
Ireland	419	547	495	437	461	494	504
Israel[1]	..	477[d]	503[d,e]	..	..	..	..
Italy	14 454	18 780	20 499	21 313	21 045	21 592	21 528[p]
Japan	34 035[d]	32 164[d]	31 567[d]	30 904[d]	30 373[d]	30 242[d]	30 238[d]
Korea	12 791[d]	21 203	22 204	23 292	24 750	26 431	27 170
Latvia	589[d]	686[d]	703[d]	707[d]	681[d]	691[d]	626[d]
Luxembourg	374	747	732	733	708	617	615[p]
Mexico	6 589[e]	8 263	7 205	7 273	..	..	..
Netherlands	7 028[d]	6 761[d]	8 581[b,d]	8 616[d]	8 624[d]	8 953[d]	9 151[p]
New Zealand	1 800	1 900	..	2 000	..	1 900	..
Norway	3 449[d]	4 601	4 654	4 705	4 627	4 735	4 788
Poland	12 175	13 824	13 583	13 571	13 847	13 618	..
Portugal	3 338	2 531	1 682	1 386[b]	1 447	1 351	1 301[p]
Slovak Republic	2 503[d]	2 892[d]	2 967[d]	2 635[d]	3 123[d]	3 084	3 087
Slovenia	1 591	1 817[b]	1 850	1 825	1 744	1 629	1 667[p]
Spain	20 446	22 893	21 850[d]	20 673[d]	20 180[d]	19 962[d]	20 663[d]
Sweden	2 929[b,d,e]	2 097[b,e]	2 002[e]	2 386[b,e]	2 304[e]	3 322[b,e]	3 362[p]
Switzerland	..	..	430[d]	..	466[d]	472[d]	..
Turkey	4 249	6 060	6 288	6 294	6 541	6 555	6 700
United Kingdom	9 311	7 571	7 729	7 641	7 769	7 057	6 765[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	179 520[e]	201 021[e]	204 449[e]	207 268[e]	203 737[e]	206 770[e]	207 504[e]
OECD-Total[2]	**293 014[e]**	**339 283[e]**	**339 402[e]**	**340 218[e]**	**339 783[e]**	**346 160[e]**	**..**
Argentina	13 285	22 566	23 237	23 444	24 814	26 266	27 168
China	200 377[d]	250 250	269 581	288 675	295 899	305 686	336 106
Romania	7 082	5 846[b]	6 372	6 583	6 409	6 659	6 755
Russian Federation	154 827	141 572	149 593	144 776	144 700	146 840	145 956
Singapore	1 364	1 827	1 756	1 843	1 950	..	..
South Africa	1 974	2 645	2 789	2 705	2 735	2 781	..
Chinese Taipei	13 789	14 706	14 630	14 599	14 753	14 887	15 366

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Table 55. Government researchers as a percentage of national total

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	..	..	..	..	..	..	..
Austria	4.3[d,e]	4.1[d]	3.9[d,e]	3.9[d]	3.9[d,e]	3.9[d]	3.9[d,p]
Belgium	6.9	6.5	7.9[b]	7.9	8.0	7.6[b]	7.8[p]
Canada	6.1	5.7	5.9	5.6	5.7	..	..
Chile	..	5.5[d]	5.9[d]	12.1[b,d]	10.1[d]	10.6[d]	14.4[d,p]
Czech Republic	27.2[b]	21.5	19.4	19.6	19.4	19.4	20.1
Denmark	7.5	3.0	3.0	3.1	3.3	3.4[p]	3.3[e]
Estonia	14.2	11.9	11.9	12.5	12.3	12.3	11.6
Finland	11.1	11.6[b]	11.0	11.4	10.7	9.5	8.9
France	12.8[d]	10.8	10.6[e]	10.5[e]	10.3[b]	10.2	..
Germany	14.7	16.0	15.8	16.0	15.0[b]	13.9[d]	13.5[d,e]
Greece	10.6[d]	17.7[b,d]	18.2[d]	19.8[d]	19.6[d]	20.9[d]	21.3[d]
Hungary	31.2	22.9	19.6	19.1	18.2	18.5	19.2
Iceland	23.3	18.2[b]	..	9.8[b]	..	12.3[b]	6.5
Ireland	3.6	3.6[e]	3.0[e]	2.6[e]	2.2[b,e]	1.9	1.9[e]
Israel[1]	..	0.9[d]	0.8[d,e]	..	..	..	..
Italy	17.5	17.7	18.5	18.3	17.8	17.2	17.0[p]
Japan	5.0[d]	4.9[d]	4.9[d]	4.7[b,d]	4.4[d]	4.6[d]	4.5[d]
Korea	7.1[d]	7.3	7.0	7.2	7.2	7.4	7.5
Latvia	17.9[d]	17.4[d]	18.0[d]	19.5[d]	18.2[d]	19.1[d]	19.9[d]
Luxembourg	16.8	26.4	31.7[b]	29.3	26.9	24.3	24.6[p]
Mexico	15.0[e]	20.7	24.8	24.3	..	..	..
Netherlands	14.7[d]	11.0[b,d]	11.7[b,d]	11.2[d]	11.3[d]	11.3[d]	11.1[p]
New Zealand	13.9	11.7	..	11.2	..	10.2	..
Norway	16.3[d]	16.9	16.7	16.6	15.8	15.5	15.0
Poland	19.6	21.6	20.3	19.0	17.6	16.5	..
Portugal	15.8	5.7	4.0	3.7[b]	3.8	3.5	3.2[p]
Slovak Republic	22.9[d]	18.9[d]	19.4[d]	17.9[d]	21.2[d]	21.4	21.8
Slovenia	30.3	20.7[b]	20.8	21.0	20.3	20.6	20.6[p]
Spain	18.6	17.6[d]	17.2[d]	16.8[d]	16.5[d]	16.3[d]	16.3[d]
Sweden	5.3[b,d,e]	4.3[b,e]	4.1[e]	3.7[b,e]	3.5[e]	5.0[b,e]	4.8[p]
Switzerland	..	..	1.2[d]	..	..	1.1[d]	..
Turkey	10.9	8.4	7.7	7.1	7.3	6.9	6.7
United Kingdom	3.7[b,e]	3.0	3.0[e]	2.9	2.8[e]	2.5	2.3[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	13.1[e]	12.4[e]	12.2[e]	12.0[e]	11.5[e]	11.2[e]	11.0[e]
OECD-Total[2]	**7.9[e]**	**7.9[e]**	**7.7[e]**	**7.5[e]**	**7.3[e]**	**7.3[e]**	**..**
Argentina	41.7	46.0[p]	46.0	46.2	48.0	49.6	50.3
China	17.9[d]	19.0	19.2	19.5	19.4	18.9	19.9
Romania	30.8	36.4[b]	35.4	35.4	35.4	38.1	37.4
Russian Federation	33.3	31.6	33.7	32.9	32.5	32.7	34.0
Singapore	5.7	5.4	5.1	5.1	5.3	..	..
South Africa	11.4	13.1	13.0	11.6	11.6	10.6	..
Chinese Taipei	15.5	10.9	10.4	10.3	10.3	10.2	10.4

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 56. Government Total R&D personnel in full-time equivalent

FTE

	2005	2011	2012	2013	2014	2015	2016
Australia	..	16 689	16 381	..	14 715	..	..
Austria	2 318[d,e]	2 567[d]	2 544[d,e]	2 538[d]	2 633[d,e]	2 674[d]	2 758[d,p]
Belgium	3 589	4 573	5 818[b]	5 932	6 381	6 470[b]	6 708[p]
Canada	17 860	19 740	19 070	18 110	17 950	..	..
Chile	..	504[d]	607[d]	1 382[b,d]	1 372[d]	1 495[d]	2 223[d,p]
Czech Republic	11 054[b]	11 627	11 864	12 275	12 380	12 953	13 099
Denmark	3 240	1 511	1 543	1 544	1 686	1 792[p]	1 775[e]
Estonia	696	776	774	851	800	782	841
Finland	7 422	6 881	6 360	6 319	5 880	4 519	4 039
France	49 645[d]	49 685	49 903	49 982	49 375	49 413	..
Germany	76 254[d]	93 663[d]	95 882[d]	98 161[d]	101 005[d]	101 717[d]	103 206[d]
Greece	4 345[d]	9 620[b,d]	9 982[d]	11 436[d]	11 125[d]	13 628[d]	11 750[d]
Hungary	7 652	8 480	7 605	7 765	7 215	8 111	7 456
Iceland	849	594[b]	..	266[b]	..	275	184
Ireland	1 132	1 034	921	818	826	951	993
Israel[1]	..	837[d]	883[d,e]	..	..	..	..
Italy	32 684	36 153	37 851	39 023	38 506	38 669	38 305[p]
Japan	62 975[d]	62 833[d]	62 752[d]	61 486[d]	61 585[d]	60 299[d]	61 615[d]
Korea	16 847[d]	28 246	32 977	34 367	35 574	38 174	38 119
Latvia	1 256[d]	1 169[d]	1 170[d]	1 178[d]	1 180[d]	1 184[d]	1 077[d]
Luxembourg	560[d]	1 173[d]	1 178[d]	1 195[d]	1 187[d]	1 136[d]	1 134[d,p]
Mexico	14 837[e]	16 817	16 638	16 944	..	..	..
Netherlands	12 706[d]	11 228[d]	13 496[b,d]	13 485[d]	14 121[d]	14 348[d]	14 770[d,p]
New Zealand	3 100	3 300	..	3 300	..	3 500	..
Norway	5 147	6 556	6 670	6 780	6 690	6 820	6 810
Poland	17 877	21 407	21 804	21 884	22 614	22 073	..
Portugal	4 533	3 265	2 204	1 983	2 037	2 066	2 023[p]
Slovak Republic	3 717[d]	4 103[d]	4 168[d]	3 545[d]	4 147[d]	4 335	4 414
Slovenia	2 517	2 628[b]	2 579	2 596	2 490	2 437	2 501[p]
Spain	32 077	43 913	41 787[d]	39 349[d]	38 764[d]	39 678[d]	39 972[d]
Sweden	3 444[b,e]	3 388[b,e]	3 359[e,m]	3 217[e]	3 404[e]	4 234[b,e]	4 269[p]
Switzerland	..	..	781[d]	..	897[d]	909[d]	..
Turkey	8 825	11 749	12 088	12 004	12 230	12 328	11 799
United Kingdom	20 415	16 919	16 880	16 592	16 250	14 615	14 010[p]
United States	..	..	..	..	..	..	..
EU28 (OECD estimates)	321 394[e]	356 382[e]	360 563[e]	363 165[e]	364 439[e]	367 855[e]	368 323[e]
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	21 688	33 277	34 472	35 850	37 757	39 271	40 248
China	254 506[d]	414 316	446 920	467 313	479 435	493 200	505 927
Romania	10 055	10 675[b]	11 381	12 336	11 866	12 080	12 663
Russian Federation	296 428	276 341	292 894	282 051	283 161	283 968	287 129
Singapore	2 173	3 039	3 003	3 134	3 497	..	..
South Africa	5 586	6 208	7 346	7 410	6 362	6 417	..
Chinese Taipei	25 673	25 645	25 246	24 727	24 876	24 948	25 578

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 57. Total GBARD (Government budget allocations for R&D) at current prices and PPP

Million USD

	2005	2013	2014	2015	2016	2017	2018
Australia	3 729.1[d]	4 961.7[d]	4 890.1[d]	4 735.6[d]	4 711.1[d]	4 858.2[d,p]	..
Austria	1 836.6[d]	3 246.3[d]	3 314.3[d]	3 435.1[d]	3 592.7[d]	3 563.9[p]	..
Belgium	2 004.6	3 129.0	3 409.3	3 166.4	3 342.9	3 571.6[p]	..
Canada	6 777.1[d]	8 192.0[d]	7 937.5[d]	7 953.8[d]	..	..	..
Chile	..	812.3[v]	859.7[v]	833.1[p,v]	..	..	..
Czech Republic	1 129.0	2 088.7	2 147.8	2 137.4	2 152.6	2 492.0[p]	..
Denmark	1 329.3	2 673.5	2 707.4	2 786.0[e]	2 593.1[e]	2 682.3[p]	..
Estonia	89.9[e]	294.7[e]	269.2[e]	260.5[e]	269.2[b]	..	..
Finland	1 648.0	2 228.8	2 206.3	2 201.4	2 028.8	2 086.3	2 104.0[e,p]
France	18 220.2	18 457.1	18 349.2	17 415.7	17 430.8	..	..
Germany	19 732.0	32 745.9	33 186.3	34 046.0	35 214.7	37 221.1[p]	..
Greece	895.8	1 360.1	1 278.9	1 512.4	1 566.7	..	..
Hungary	696.1	1 574.2[d]	702.5	721.0	1 035.7	..	..
Iceland	94.0	145.6	78.8[b]	85.4	96.6	113.4[p]	..
Ireland	710.7	889.5	887.4	906.0	886.1	..	..
Israel[1]	1 044.9[d]	1 686.1[d]	1 749.9[d]	1 863.5[d]	2 057.5[d]	..	..
Italy	11 199.3	11 453.0	11 425.0	11 271.9	12 090.4	..	..
Japan	27 617.8[d]	35 633.5[d]	35 431.8[d]	33 841.6[d]	34 455.5[d]	35 010.5[d]	38 637.9[b,d,e,p]
Korea	9 886.5[b,d]	19 730.2	20 391.9	21 689.4	21 894.1	..	..
Latvia	57.4	64.9	76.8	92.9	105.8	..	..
Luxembourg	81.5	333.9	359.1	364.7	364.5	388.0[p]	..
Mexico	2 963.4	6 321.0	7 184.7	6 915.0[e]	6 283.1	5 784.9[p]	..
Netherlands	4 391.9	6 006.6	6 026.0	5 991.5	6 034.1	6 266.3[p]	..
New Zealand	..	756.4	882.1	880.8	915.8	1 025.9	..
Norway	1 535.9	2 759.7	2 903.4	2 976.0	3 055.6	3 260.5	3 293.1[e,p]
Poland	1 548.8	3 426.5	4 185.8	4 120.2	1 656.6	..	..
Portugal	1 045.6	1 155.9	1 087.4	1 168.4	1 209.4	1 203.3	..
Slovak Republic	244.6	588.9	595.9	671.2	616.1	601.4[p]	..
Slovenia	273.3	295.6	272.9	267.2	272.1	..	..
Spain	6 440.7	8 420.5	8 721.4	9 047.4	9 136.1	..	..
Sweden	2 508.0	3 662.5	3 766.5	3 702.2	3 788.7	4 030.8	..
Switzerland	..	..	4 451.7	4 736.2	..	..	..
Turkey	..	5 445.5	5 080.2	5 132.9	5 777.7	5 634.5[p]	..
United Kingdom	12 116.1	14 362.8	14 663.0	14 506.1	14 604.0	..	..
United States	131 259.0	132 477.0	136 159.0	138 544.0	150 392.0	151 380.0[p]	..
EU28 (OECD estimates)	89 609.6[e]	120 550.1[e]	121 894.1[e]	122 375.0[e]	122 667.0[e]	..	..
OECD-Total[2]	**276 149.3[e]**	**341 627.6[e]**	**347 639.1[e]**	**349 978.9[e]**	**363 401.0[e]**	**..**	**..**
Argentina	1 219.9[d]	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	448.5	818.3[b]	872.6	1 101.0	1 273.2	949.4	..
Russian Federation	6 038.6[b]	21 898.8	20 808.0	19 084.1	17 017.5	14 191.8	..
Singapore	..	..	..	..	..	..	..
South Africa	..	..	..	..	..	..	..
Chinese Taipei	4 886.4	7 303.0	7 368.9	7 568.5	7 968.3	8 266.4	..

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 58. Defence Budget R&D
As a percentage of total GBARD (Government budget allocations for R&D)

Percentage

	2005	2013	2014	2015	2016	2017	2018
Australia	6.9[d]	6.2[d]	6.4[d]	7.5[d]	6.6[d]	7.0[d,p]	..
Austria	0.0[d]	0.0[d]	0.0[d]	0.0[d]	0.1[d]	0.2[p]	..
Belgium	0.3	0.2	0.2	0.1	0.1	0.1[p]	..
Canada	4.1[d]	3.0[d]	2.9[d]	2.6[d]	..	..	..
Chile	..	0.0[v]	0.0[v]	0.0[p,v]	..	..	..
Czech Republic	2.5	1.5	1.4	1.3	1.2	1.1[p]	..
Denmark	0.7	0.3	0.3	0.3[e]	0.3[e]	0.3[p]	..
Estonia	1.0[e]	0.5[e]	1.3[e]	1.5[e]	2.3[b]	..	..
Finland	3.3	1.9	2.1	1.9	1.9	2.2	2.5[p]
France	20.8	6.3[d]	6.6[d]	7.2[d]	6.4[d]	..	..
Germany	5.8[s]	3.7[s]	3.8[s]	3.1[s]	2.8	4.0[p]	..
Greece	0.5	0.4	0.1	0.1	0.9	..	..
Hungary	0.1	0.2[d]	0.1	0.6	0.1	..	..
Iceland	0.0	0.0	0.0[b]	0.0	0.0	0.0[p]	..
Ireland	0.0	0.0	0.0	0.0	0.0	..	..
Israel[1]	..	..	..	..	..	..	..
Italy	3.6	0.8	0.8	0.8	0.6	..	..
Japan	4.0[d,m]	4.6[d,m]	4.4[d,m]	4.4[d,m]	3.1[d,m]	3.5[d,m]	2.8[b,d,p]
Korea	12.4[b,d]	14.8	13.5	13.5	14.0	..	..
Latvia	1.1	1.2	1.8	1.9	2.7	..	..
Luxembourg	0.0	0.0	0.0	0.0	0.0	0.0[p]	..
Mexico	0.0	0.2	0.2	0.2[e]	0.1	0.2[p]	..
Netherlands	2.0	1.2	1.2	1.3	1.2	1.2[p]	..
New Zealand	..	0.0	0.0	0.0	0.0	0.0	..
Norway	6.4	4.2	4.0	3.8	3.7	3.5	3.6[p]
Poland	1.3	5.2	4.8	5.1	10.7	..	..
Portugal	0.1	0.2	0.3	0.3	0.3	0.3	..
Slovak Republic	8.3[d]	1.4	1.4	1.9	1.5	1.7[p]	..
Slovenia	4.9	0.7	0.2	0.2	0.2	..	..
Spain	3.9	1.4	1.3	1.4	1.0	..	..
Sweden	17.4	4.0[d]	3.8[d]	3.3[d]	3.4[e]	3.0[e]	..
Switzerland	..	..	0.5	0.4	..	..	..
Turkey	..	30.1	13.6	13.9	15.9	21.2[p]	..
United Kingdom	23.5	15.3	16.7	16.4	15.9	..	..
United States	56.9	52.7	51.2	51.4	51.9	51.7[p]	..
EU28 (OECD estimates)	10.2[e]	4.4[e]	4.7[e]	4.5[e]	4.2[e]	..	..
OECD-Total[2]	**31.4[e]**	**24.0[e]**	**23.3[e]**	**23.6[e]**	**24.5[e]**	**..**	**..**
Argentina	0.4[d]	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	1.7	1.4[b]	1.8	1.6	1.7	4.5	..
Russian Federation	..	..	..	..	..	..	..
Singapore	..	..	..	..	..	..	..
South Africa	..	..	..	..	..	..	..
Chinese Taipei	10.6	2.9	2.6	2.5	5.2	6.4	..

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Source: OECD, Main Science and Technology Indicators database, July 2018

Table 59. Civil Budget R&D
As a percentage of total GBARD (Government budget allocations for R&D)

Percentage

	2005	2013	2014	2015	2016	2017	2018
Australia	93.1[d]	93.8[d]	93.6[d]	92.5[d]	93.4[d]	93.0[d,p]	..
Austria	100.0[d]	100.0[d]	100.0[d]	100.0[d]	99.9[d]	99.8[p]	..
Belgium	99.7	99.8	99.8	99.9	99.9	99.9[p]	..
Canada	95.9[d]	97.0[d]	97.1[d]	97.4[d]	..	..	..
Chile	..	100.0[v]	100.0[v]	100.0[p,v]	..	..	..
Czech Republic	97.5	98.5	98.6	98.7	98.8	98.9[p]	..
Denmark	99.3	99.7	99.7	99.7[e]	99.7[e]	99.7[p]	..
Estonia	99.0[e]	99.5[e]	98.7[e]	98.5[e]	97.7[b]	..	..
Finland	96.7	98.1	97.9	98.1	98.1	97.8	97.5[p]
France	79.2	93.7[d]	93.4[d]	92.8[d]	93.6[d]	..	..
Germany	94.2[s]	96.3[s]	96.2[s]	96.9[s]	97.2	96.0[p]	..
Greece	99.5	99.6	99.9	99.9	99.1	..	..
Hungary	99.9	99.8[d]	99.9	99.4	99.9	..	..
Iceland	100.0	100.0	100.0[b]	100.0	100.0	100.0[p]	..
Ireland	100.0	100.0	100.0	100.0	100.0	..	..
Israel[1]	..	..	..	..	..	..	..
Italy	96.4	99.2	99.2	99.2	99.4	..	..
Japan	96.0[d]	95.4[d]	95.6[d]	95.6[d]	96.9[d]	96.5[d]	97.2[b,d,p]
Korea	87.6[b,d]	85.2	86.5	86.5	86.0	..	..
Latvia	98.9	98.8	98.2	98.1	97.3	..	..
Luxembourg	100.0	100.0	100.0	100.0	100.0	100.0[p]	..
Mexico	100.0	99.8	99.8	99.8[e]	99.9	99.8[p]	..
Netherlands	98.0	98.8	98.8	98.7	98.8	98.8[p]	..
New Zealand	..	100.0	100.0	100.0	100.0	100.0	..
Norway	93.6	95.8	96.0	96.2	96.3	96.5	96.4[p]
Poland	98.7	94.8	95.2	94.9	89.3	..	..
Portugal	99.9	99.8	99.7	99.7	99.7	99.7	..
Slovak Republic	91.7[d]	98.6	98.6	98.1	98.5	98.3[p]	..
Slovenia	95.1	99.3	99.8	99.8	99.8	..	..
Spain	96.1	98.6	98.7	98.6	99.0	..	..
Sweden	82.6	96.0[d]	96.2[d]	96.7[d]	96.6[e]	97.0[e]	..
Switzerland	..	..	99.5	99.6	..	..	..
Turkey	..	69.9	86.4	86.1	84.1	78.8[p]	..
United Kingdom	76.5	84.7	83.3	83.6	84.1	..	..
United States	43.1	47.3	48.8	48.6	48.1	48.3[p]	..
EU28 (OECD estimates)	89.8[e]	95.6[e]	95.3[e]	95.5[e]	95.8[e]	..	..
OECD-Total[2]	**68.6[e]**	**76.0[e]**	**76.7[e]**	**76.4[e]**	**75.5[e]**	**..**	**..**
Argentina	99.6[d]	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	98.3	98.6[b]	98.2	98.4	98.3	95.5	..
Russian Federation	..	..	..	..	..	..	..
Singapore	..	..	..	..	..	..	..
South Africa	..	..	..	..	..	..	..
Chinese Taipei	89.4	97.1	97.4	97.5	94.8	93.6	..

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Table 60. Civil GBAORD by socio-economic objectives (million current PPP$)

2018 or latest year available

	Economic development	Health and environment	Education and society	Space programmes	Non-oriented research	General university funds
Australia	1242.7[d, p]	1273.7[d, p]	85.9[d, p]	17.0[d, p]	430.4[d, p]	1468.8[d, p]
Austria	685.0[p]	252.6[p]	99.5[p]	32.3[p]	478.5[p]	2010.0[p]
Belgium	1335.8[p]	178.9[p]	178.5[p]	286.9[p]	937.4[p]	650.8[p]
Canada	1971.2[d]	1675.3[d]	441.9[d]	283.9[d]	733.0[d]	2644.0[e]
Chile	196.8	140.4	41.6	13.3	325.0	82.6[p]
Czech Republic	580.7[p]	280.6[p]	80.9[p]	44.2[p]	905.2[p]	571.8[p]
Denmark	369.6[p]	456.5[p]	224.1[p]	35.3[p]	349.1[p]	1239.1[p]
Estonia	52.0	25.0	26.3	4.6	155.1	0.0
Finland	504.4[e, p]	143.2[e, p]	93.4[e, p]	25.5[e, p]	591.9[e, p]	692.5[e, p]
France	2726.7[d]	1700.2[d]	405.1[d]	1027.0[d]	4058.4[d]	4204.3[d]
Germany	8036.7[p]	3661.5[p]	1716.9[p]	1777.6[p]	6238.0[p]	14312.3[p]
Greece	272.0	304.7	230.0	22.9	103.3	619.4
Hungary	322.6	215.1	33.8	5.0	236.5	221.4
Iceland	2.1[p]	3.7[p]	1.4[p]	0.0[p]	24.1[p]	82.1[p]
Ireland	298.0	77.5	36.8	23.8	303.7	146.4
Israel 1	799.2	46.8	60.8	14.9	64.5	1071.3
Italy	2548.9	2072.1	852.4	1115.3	262.2	5164.0
Japan	12511.9[d, e, p]	4218.7[d, e, p]	316.4[d, e, p]	1951.5[d, e, p]	8108.4[d, e, p]	10464.9[d, e, p]
Korea	9352.6	2830.8	1539.4	622.4	4481.1[e, w]	..[k]
Latvia	42.8	18.5	4.6	0.2	24.7	12.1
Luxembourg	69.7[p]	77.0[p]	27.0[p]	0.1[p]	97.7[p]	116.6[p]
Mexico	1849.5[p]	713.2[p]	173.3[p]	21.9[p]	1103.4[p]	1912.8[p, w]
Netherlands	841.4[p]	380.4[p]	166.0[p]	126.7[p]	1185.1[p]	3490.1[p]
New Zealand	443.8	223.1	6.5	0.0	108.3	244.1
Norway	643.6[e, p]	672.4[e, p]	250.6[e, p]	73.8[e, p]	500.5[e, p]	1033.1[e, p]
Poland	191.2	244.9	59.2	38.4	938.2	7.4
Portugal	149.0	200.5	92.6	6.6	119.1	631.7
Slovak Republic	77.1[p]	62.0[p]	35.0[p]	4.2[p]	100.0[p]	312.5[p]
Slovenia	58.3	43.9	15.6	0.4	152.5	0.9
Spain	1872.2	1787.4	274.2	466.5	1805.1	2839.0
Sweden	549.0[e]	188.8[e]	307.4[e]	36.2[e]	838.3[e]	1912.0[e]
Switzerland	201.4	28.9	78.2	147.3	1240.2	3020.2
Turkey	1356.1[p]	395.8[p]	417.3[p]	18.4[p]	220.8[p]	2031.0[p]
United Kingdom	2227.7	4079.0	608.1	553.3	1664.7	3145.9
United States	8390.0[p]	38540.0[p]	1858.0[p]	12853.0[p]	11401.0[p]	0.0
EU28 (OECD estimates)	23411.5[e]	16275.4[e]	5262.7[e]	5689.0[e]	22238.4[e]	42415.3[e]
OECD-Total (2)	57716.0[e]	64768.9[e]	9767.0[e]	21819.2[e]	49431.5[e]	68261.3[e]
Argentina	1189.7[d]	554.3[d]	130.0[d]	210.4[d]	521.0[d]	67.2[d]
China	..	..	..	..	..	..
Romania	226.0	111.5	76.9	19.0	473.6	..
Russian Federation	1986.6	421.3	516.4	3340.8	..	..
Singapore	..	..	..	..	..	..
South Africa	..	..	..	..	..	..
Chinese Taipei	2724.7	1944.4	476.0	152.1	1686.2	750.5

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Source: OECD, Main Science and Technology Indicators database, July 2018.

Table 61. R&D expenditure of foreign affiliates at current prices and PPP

Million USD

	2005	2010	2011	2012	2013	2014	2015
Australia	..	3 532.4	3 698.1	..	3 546.7[p]	..	..
Austria	..	..	3 426.9	..	4 307.5	..	4 635.2[p]
Belgium	2 406.2	..	4 453.4[p]	..	..	..	..
Canada	4 235.2	4 916.7[b]	4 971.4	4 822.4[p]	4 838.2[p]	5 194.4[p]	..
Chile	..	..	..	..	..	..	..
Czech Republic	961.8	..	..	..	1 220.0[b,p]	..	1 231.2[p]
Denmark	..	..	..	..	..	..	..
Estonia	..	..	..	..	..	..	..
Finland	638.2	..	626.0[p]	..	750.0[p]	..	..
France	5 767.3[b]	8 938.0	9 413.1	9 776.0	7 967.0[b]	7 636.4	8 025.1[p]
Germany	12 159.7	..	16 784.5	..	15 391.7	..	16 808.0
Greece	..	..	..	..	..	..	..
Hungary	299.7	..	..	..	..	..	..
Iceland	..	..	..	..	..	..	..
Ireland	924.2	..	1 467.6	..	1 625.6[p]	..	1 751.5[p]
Israel[1]	..	4 376.3	5 151.1	5 728.7	6 228.3	6 896.5	7 732.2[p]
Italy	2 315.4	3 341.4	3 456.0	3 498.6	3 620.0	3 991.1[p]	4 355.1[p]
Japan	5 038.4	5 567.6	..	6 510.4	7 578.6	8 758.0	8 986.7[p]
Korea	..	..	..	..	..	..	..
Latvia	..	..	..	..	..	..	..
Luxembourg	..	..	..	..	..	..	..
Mexico	..	..	..	..	..	..	..
Netherlands	..	1 384.1	1 602.1	1 733.4	1 701.4	1 806.4	1 797.2[p]
New Zealand	..	..	..	..	..	..	..
Norway	394.8	544.3	672.0	679.4	..	..	..
Poland	288.0	..	449.2	..	860.0	..	978.1[p]
Portugal	236.7	..	..	..	..	..	..
Slovak Republic	52.6	..	..	..	..	..	..
Slovenia	..	..	214.8	..	..[c]	..	327.9[p]
Spain	1 868.8	..	1 863.4	..	1 870.3	..	1 964.7[p]
Sweden	3 529.5	..	3 641.4	..	3 899.5	..	4 495.6[p]
Switzerland	..	..	..	1 906.7	..	..	1 633.2[p]
Turkey	..	..	..	..	..	..	..
United Kingdom	7 594.5	9 388.3	12 567.1	12 936.9	14 350.3[p]	14 668.3	15 411.8[p]
United States	31 099.0	42 360.0	45 177.0	50 259.0	54 070.0	56 952.0	56 743.0[p]
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	..	..	..	..	..	..	..
Russian Federation	..	..	..	..	..	..	..
Singapore	..	..	..	..	..	..	..
South Africa	..	..	..	..	..	..	..
Chinese Taipei	..	..	..	..	..	..	..

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Source: OECD, Activities of Multinational Enterprises database, February 2018

Table 62. R&D expenditure of foreign affiliates as a percentage of R&D expenditures of enterprises

Percentage

	2005	2010	2011	2012	2013	2014	2015
Australia	..	29.5	30.5	..	27.2[p]	..	..
Austria	..	..	50.0	..	50.7	..	49.4[p]
Belgium	56.8	..	66.0[p]	..	..	..	..
Canada	32.6	38.0[b]	36.5	35.9[p]	35.7[p]	35.1[p]	..
Chile	..	..	..	..	..	..	..
Czech Republic	51.5	..	..	..	62.8[b,p]	..	61.4[p]
Denmark	..	..	..	..	..	..	..
Estonia	..	..	..	..	..	..	..
Finland	16.1	..	14.8[p]	..	20.4[p]	..	..
France	23.5[b]	27.8	27.5	27.5	21.1[b]	19.8	20.6[p]
Germany	27.8	..	26.1	..	22.4	..	21.5
Greece	..	..	..	..	..	..	..
Hungary	59.7	..	..	..	..	..	..
Iceland	..	..	..	..	..	..	..
Ireland	70.3	..	65.6	..	65.2	..	63.7[p]
Israel[1]	..	62.3	66.0	66.4	67.2	70.8	70.8[p]
Italy	25.2	24.4	24.2	23.6	23.3	23.9[p]	25.1[p]
Japan	5.1	5.2	..	5.6	6.0	6.6	6.7[p]
Korea	..	..	..	..	..	..	..
Latvia	..	..	..	..	..	..	..
Luxembourg	..	..	..	..	..	..	..
Mexico	..	..	..	..	..	..	..
Netherlands	..	32.3	32.5	33.5	31.3	33.5	32.4[p]
New Zealand	..	..	..	..	..	..	..
Norway	28.5	29.3	33.7	31.6	..	..	..
Poland	30.4	..	44.8	..	47.0	..	44.7[p]
Portugal	34.0	..	..	..	..	..	..
Slovak Republic	23.9	..	..	..	..	..	..
Slovenia	..	..	29.1	..	..[c]	..	42.1[p]
Spain	26.2	..	35.2	..	37.0	..	38.4[p]
Sweden	41.5	..	38.5	..	39.0	..	42.1[p]
Switzerland	..	..	..	20.1	..	..	12.9[p]
Turkey	..	..	..	..	..	..	..
United Kingdom	39.1	41.1	50.8	52.1	53.6	51.3	51.1
United States	13.8	15.2	15.4	16.6	16.8	16.7	15.9[p]
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	..	..	..	..	..	..	..
Russian Federation	..	..	..	..	..	..	..
Singapore	..	..	..	..	..	..	..
South Africa	..	..	..	..	..	..	..
Chinese Taipei	..	..	..	..	..	..	..

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Source: OECD, Activities of Multinational Enterprises database, February 2018

Table 63. Number of triadic patent families
By priority year

	2005	2011	2012	2013	2014	2015	2016
Australia	479	320	336	309	311e	313e	310e
Austria	409	361	379	378	411e	434e	444e
Belgium	543	460	429	431	408e	412e	407e
Canada	718	580	526	618	582e	556e	538e
Chile	6	16	10	11	12e	12e	11e
Czech Republic	25	35	36	32	41e	43e	47e
Denmark	389	259	283	263	283e	285e	285e
Estonia	3	7	4	9	9e	9e	8e
Finland	391	228	290	271	284e	283e	286e
France	3 048	2 597	2 434	2 413	2 423e	2 473e	2 470e
Germany	7 141	4 822	4 588	4 904	4 706e	4 626e	4 583e
Greece	24	11	22	20	20e	22e	25e
Hungary	58	43	31	20	30e	32e	33e
Iceland	7	2	2	2	1e	3e	2e
Ireland	98	70	73	94	99e	109e	110e
Israel[1]	502	367	400	436	422e	446e	462e
Italy	965	721	725	769	791e	817e	836e
Japan	18 932	18 997	18 650	17 617	17 116e	17 022e	17 066e
Korea	2 746	2 367	2 495	2 547	2 678e	2 670e	2 671e
Latvia	10	3	2	2	1e	1e	1e
Luxembourg	21	24	21	15	20e	19e	21e
Mexico	19	18	16	19	22e	25e	30e
Netherlands	1 762	969	1 039	1 136	1 193e	1 271e	1 306e
New Zealand	73	51	104	69	89e	99e	99e
Norway	142	94	101	103	101e	96e	96e
Poland	18	64	69	59	69e	79e	75e
Portugal	16	26	23	21	27e	30e	34e
Slovak Republic	2	12	8	9	7e	8e	9e
Slovenia	22	10	10	14	13e	11e	11e
Spain	293	222	231	230	237e	239e	239e
Sweden	969	615	662	587	614e	628e	617e
Switzerland	1 083	1 058	1 139	1 112	1 146e	1 175e	1 206e
Turkey	16	37	31	41	38e	42e	45e
United Kingdom	2 164	1 726	1 700	1 818	1 725e	1 734e	1 740e
United States	17 374	13 209	13 723	14 781	15 243e	15 343e	15 219e
EU28 (OECD estimates)	18 403	13 302	13 094	13 523	13 446e	13 597e	13 616e
OECD-Total[2]	**60 467**	**50 401**	**50 600**	**51 164**	**51 176e**	**51 372e**	**51 346e**
Argentina	16	10	8	6	9e	10e	11e
China	523	1 506	1 951	2 187	2 624e	3 144e	3 766e
Romania	7	9	14	13	12e	14e	14e
Russian Federation	91	86	93	76	88e	86e	92e
Singapore	170	122	107	129	139e	141e	143e
South Africa	49	44	33	29	26e	24e	22e
Chinese Taipei	145	488	384	335	369e	376e	371e

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Source: OECD, Patent database, Spring 2018

Table 64. Share of countries in triadic patent families
By priority year

Percentage

	2005	2011	2012	2013	2014	2015	2016
Australia	0.77	0.60	0.62	0.57	0.56e	0.56e	0.55e
Austria	0.66	0.68	0.70	0.69	0.74e	0.78e	0.79e
Belgium	0.88	0.86	0.80	0.79	0.74e	0.74e	0.72e
Canada	1.16	1.09	0.98	1.13	1.06e	0.99e	0.95e
Chile	0.01	0.03	0.02	0.02	0.02e	0.02e	0.02e
Czech Republic	0.04	0.07	0.07	0.06	0.07e	0.08e	0.08e
Denmark	0.63	0.49	0.52	0.48	0.51e	0.51e	0.50e
Estonia	0.00	0.01	0.01	0.02	0.02e	0.02e	0.01e
Finland	0.63	0.43	0.54	0.50	0.51e	0.51e	0.51e
France	4.92	4.86	4.51	4.42	4.39e	4.42e	4.37e
Germany	11.52	9.03	8.51	8.98	8.53e	8.27e	8.10e
Greece	0.04	0.02	0.04	0.04	0.04e	0.04e	0.04e
Hungary	0.09	0.08	0.06	0.04	0.06e	0.06e	0.06e
Iceland	0.01	0.00	0.00	0.00	0.00e	0.00e	0.00e
Ireland	0.16	0.13	0.14	0.17	0.18e	0.20e	0.19e
Israel[1]	0.81	0.69	0.74	0.80	0.77e	0.80e	0.82e
Italy	1.56	1.35	1.34	1.41	1.43e	1.46e	1.48e
Japan	30.54	35.57	34.57	32.24	31.03e	30.44e	30.18e
Korea	4.43	4.43	4.63	4.66	4.85e	4.78e	4.72e
Latvia	0.02	0.01	0.00	0.00	0.00e	0.00e	0.00e
Luxembourg	0.03	0.04	0.04	0.03	0.04e	0.03e	0.04e
Mexico	0.03	0.03	0.03	0.03	0.04e	0.05e	0.05e
Netherlands	2.84	1.81	1.93	2.08	2.16e	2.27e	2.31e
New Zealand	0.12	0.10	0.19	0.13	0.16e	0.18e	0.18e
Norway	0.23	0.18	0.19	0.19	0.18e	0.17e	0.17e
Poland	0.03	0.12	0.13	0.11	0.13e	0.14e	0.13e
Portugal	0.03	0.05	0.04	0.04	0.05e	0.05e	0.06e
Slovak Republic	0.00	0.02	0.02	0.02	0.01e	0.01e	0.02e
Slovenia	0.04	0.02	0.02	0.03	0.02e	0.02e	0.02e
Spain	0.47	0.42	0.43	0.42	0.43e	0.43e	0.42e
Sweden	1.56	1.15	1.23	1.07	1.11e	1.12e	1.09e
Switzerland	1.75	1.98	2.11	2.03	2.08e	2.10e	2.13e
Turkey	0.03	0.07	0.06	0.08	0.07e	0.08e	0.08e
United Kingdom	3.49	3.23	3.15	3.33	3.13e	3.10e	3.08e
United States	28.03	24.74	25.44	27.05	27.63e	27.44e	26.91e
EU28 (OECD estimates)	29.69	24.91	24.27	24.75	24.38e	24.32e	24.08e
OECD-Total[2]	**97.56**	**94.38**	**93.80**	**93.64**	**92.78e**	**91.88e**	**90.80e**
Argentina	0.03	0.02	0.01	0.01	0.02e	0.02e	0.02e
China	0.84	2.82	3.62	4.00	4.76e	5.62e	6.66e
Romania	0.01	0.02	0.03	0.02	0.02e	0.03e	0.02e
Russian Federation	0.15	0.16	0.17	0.14	0.16e	0.15e	0.16e
Singapore	0.27	0.23	0.20	0.24	0.25e	0.25e	0.25e
South Africa	0.08	0.08	0.06	0.05	0.05e	0.04e	0.04e
Chinese Taipei	0.23	0.91	0.71	0.61	0.67e	0.67e	0.66e

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Source: OECD, Patent database, Spring 2018

Table 65. Number of patents in the ICT sector - applications filed under the PCT
By priority year

	2005	2011	2012	2013	2014	2015	2016
Australia	386	324	382	398	416	402	423e
Austria	212	161	158	154	162	150	155e
Belgium	145	206	233	239	236	216	225e
Canada	820	976	1 034	938	817	912	943e
Chile	2	3	5	5	16	18	17e
Czech Republic	17	12	27	26	21	21	22e
Denmark	161	158	111	145	152	153	147e
Estonia	6	11	3	16	10	4	5e
Finland	754	729	771	627	553	498	514e
France	1 504	1 342	1 377	1 366	1 433	1 351	1 349e
Germany	2 293	2 332	2 333	2 309	2 344	2 549	2 608e
Greece	14	18	19	20	25	13	13e
Hungary	27	67	71	54	68	57	61e
Iceland	5	0	3	1	2	2	2e
Ireland	82	137	124	109	125	134	140e
Israel[1]	673	629	745	763	743	758	788e
Italy	347	318	334	330	323	309	309e
Japan	7 817	11 541	11 662	10 311	10 180	10 426	10 776e
Korea	2 135	4 359	4 430	4 651	5 091	5 380	5 571e
Latvia	4	1	6	1	3	7	6e
Luxembourg	5	10	13	9	15	6	5e
Mexico	14	22	20	22	32	50	48e
Netherlands	1 266	645	579	607	591	596	592e
New Zealand	43	36	36	39	33	37	35e
Norway	100	75	100	85	72	74	87e
Poland	13	47	37	52	70	102	99e
Portugal	20	28	18	23	17	35	37e
Slovak Republic	3	6	8	10	10	13	14e
Slovenia	5	14	9	14	7	7	7e
Spain	131	297	286	227	234	186	198e
Sweden	689	1 115	1 285	1 151	1 355	1 413	1 464e
Switzerland	220	311	334	311	279	260	283e
Turkey	11	47	93	101	106	150	147e
United Kingdom	1 351	1 205	1 200	1 402	1 444	1 342	1 373e
United States	14 942	15 334	16 818	18 484	17 416	16 987	17 400e
EU28 (OECD estimates)	9 071	8 887	9 060	8 953	9 259	9 227	9 409e
OECD-Total[2]	**36 219**	**42 521**	**44 673**	**45 007**	**44 407**	**44 627**	**45 869e**
Argentina	7	16	3	4	5	13	12e
China	1 812	9 673	10 725	12 796	14 517	18 937	19 958e
Romania	6	14	26	29	31	36	36e
Russian Federation	153	212	286	308	282	262	259e
Singapore	192	206	190	188	211	244	244e
South Africa	54	56	75	70	64	49	49e
Chinese Taipei	66	171	205	243	283	223	235e

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Source: OECD, Patent database, Spring 2018

Table 66. Number of patents in the biotechnology sector - applications filed under the PCT
By priority year

	2005	2011	2012	2013	2014	2015	2016
Australia	209	155	158	138	143	148	142e
Austria	56	92	91	63	72	77	75e
Belgium	114	139	105	101	104	124	122e
Canada	302	287	221	256	228	243	240e
Chile	2	17	14	18	23	33	32e
Czech Republic	5	7	11	9	13	13	12e
Denmark	186	169	180	175	190	160	152e
Estonia	2	7	2	3	1	3	4e
Finland	48	52	35	58	48	46	45e
France	321	545	465	493	505	515	505e
Germany	661	670	643	598	621	669	661e
Greece	5	6	4	3	5	5	4e
Hungary	9	18	12	15	8	14	13e
Iceland	4	10	2	1	2	2	2e
Ireland	22	34	19	28	32	26	25e
Israel[1]	161	160	144	136	156	171	178e
Italy	160	121	149	119	136	131	131e
Japan	1 466	1 195	1 164	1 231	1 254	1 348	1 373e
Korea	202	521	499	509	569	685	703e
Latvia	1	0	0	1	1	1	1e
Luxembourg	1	2	4	1	2	5	6e
Mexico	11	18	10	19	17	20	18e
Netherlands	223	209	198	220	210	220	216e
New Zealand	50	27	29	29	20	22	20e
Norway	30	28	36	38	56	30	34e
Poland	10	23	29	33	32	27	27e
Portugal	10	12	13	14	10	12	11e
Slovak Republic	0	3	0	3	2	2	2e
Slovenia	4	7	7	8	6	5	5e
Spain	121	183	184	194	159	157	153e
Sweden	129	119	110	95	107	99	100e
Switzerland	139	160	163	167	171	195	193e
Turkey	2	4	4	12	10	12	13e
United Kingdom	491	387	409	431	479	499	498e
United States	4 575	4 440	4 364	4 810	4 491	5 027	5 081e
EU28 (OECD estimates)	2 584	2 813	2 680	2 677	2 755	2 819	2 779e
OECD-Total[2]	**9 732**	**9 829**	**9 483**	**10 035**	**9 891**	**10 749**	**10 802e**
Argentina	9	8	13	16	12	6	5e
China	112	508	449	523	606	788	800e
Romania	1	1	1	2	2	2	2e
Russian Federation	51	53	66	56	46	39	37e
Singapore	64	69	126	108	86	82	78e
South Africa	16	11	11	15	20	13	12e
Chinese Taipei	11	36	46	38	78	86	79e

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2. Lithuania was not an OECD Member at the time of preparation of this publication. Accordingly, Lithuania does not appear in the list of OECD Members and is not included in the OECD zone aggregates.

Source: OECD, Patent database, Spring 2018

Table 67. Technology balance of payments: receipts
At current prices and exchange rates

Million USD

	2005	2010	2011	2012	2013	2014	2015
Australia	2 654.5	4 577.3	5 049.2	4 907.8	4 843.4	4 979.4	4 427.9[p]
Austria	4 841.1	8 244.5	10 553.9	10 902.1	11 997.5	13 219.6	11 315.8[p]
Belgium	6 907.3	11 771.5	12 979.7	14 727.1	17 080.1	19 184.6	17 820.5[p]
Canada	2 652.3	3 000.5	2 652.8	2 637.1	2 620.9	..	..
Chile	..	..	..	..	..	..	..
Czech Republic	892.8[b]	2 224.0[b]	3 251.8	3 412.6	3 742.0	3 994.2	3 663.3[p]
Denmark	4 629.4[b]	6 352.2	7 455.0	8 305.9	8 424.9	8 708.6	7 686.3[p]
Estonia	77.2	294.7	361.2	387.2	458.2	491.8	444.8[p]
Finland	3 594.0	9 472.3	10 795.8	10 093.9	11 224.9[b]	11 670.2	10 781.4[p]
France	..	..	..	..	..	..	..
Germany	31 372.2	58 245.5	69 604.0	71 205.8	68 357.4[b]	75 809.6	71 836.5[p]
Greece	353.2	715.2	797.1	674.3	774.6	1 017.1	812.6[p]
Hungary	1 625.9	4 185.5	4 549.9	4 396.0	4 780.0	4 924.1	4 178.6[p]
Iceland	..	283.1	302.2	254.3	323.4[b]	443.6	543.1[p]
Ireland	21 519.2	40 878.4	49 683.4	55 080.8[b]	63 569.6	75 485.8	73 337.0[p]
Israel[1]	6 127.1	10 117.3	12 182.8[b]	13 141.2	14 558.7	14 779.4	15 371.5[p]
Italy	4 265.2	10 277.0	12 177.7	13 841.8	14 383.6	15 144.3	13 239.9[p]
Japan	18 402.5	27 758.5	29 887.2	34 102.4	34 788.2	34 549.4	32 631.4[p]
Korea	1 624.9	3 344.9	4 032.1	5 310.8	6 845.6	9 764.5	10 407.9[p]
Latvia	84.6	188.1	255.2	240.3	297.4	317.1	316.1[p]
Luxembourg	1 036.8	2 363.3	2 939.4	4 448.6[b]	4 943.4	5 702.6	4 968.8[p]
Mexico	69.5	87.8	96.4	79.7	199.1	..	..
Netherlands	19 353.4	..	39 985.7	40 171.2	44 424.9	52 122.3[b]	56 278.4[p]
New Zealand	416.8	885.6	1 184.2	837.7[b]	830.7	..	..
Norway	2 288.6	4 198.9	4 154.8	4 391.6	4 515.1	..	..
Poland	794.4	3 317.6	3 724.2[b]	4 120.7	4 926.6	6 020.8	4 853.1[p]
Portugal	458.6	1 276.2	1 540.0	1 576.7	1 805.1	2 000.2	1 771.2[p]
Slovak Republic	208.9	504.5	770.0	948.1	..	..	..
Slovenia	..	265.5	301.1	316.7	..	..	..
Spain	4 434.8	15 064.2	17 702.9	16 125.7	16 171.1	19 187.6	17 099.8[p]
Sweden	9 750.4	17 751.8	23 177.6	23 617.1	26 483.3[b]	28 034.4	27 970.4[p]
Switzerland	11 559.5	20 820.4	25 203.8	28 311.3	29 960.0	32 765.3	30 336.4[p]
Turkey	..	..	..	..	..	..	..
United Kingdom	29 001.9	31 119.7	35 653.8	39 559.5	41 547.0	45 790.1	41 060.6[p]
United States	74 826.0	100 569.0	119 936.0	122 658.0	125 519.0	134 325.0	130 834.0[p]
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	21.1[m]	19.9[m]	31.2[m]	92.3[m]	190.2[b]	..	..
Russian Federation	391.6	627.8	592.6	688.8	773.7	1 279.2	1 654.7[p]
Singapore	2 518.6	..	..	..	..	..	..
South Africa	45.3	..	..	..	..	..	..
Chinese Taipei	412.1[m]	822.1[m]	..	903.9[m]	1 013.7[m]	1 114.1[m,p]	..

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Source: OECD, Technology Balance of Payments database, June 2017

Table 68. Technology balance of payments: payments
At current prices and exchange rates

Million USD

	2005	2010	2011	2012	2013	2014	2015
Australia	3 359.4	7 299.8	8 812.1	8 990.5	9 516.9	9 205.3	7 799.6[p]
Austria	3 006.3	4 656.7	5 967.8	6 728.8	7 902.7	8 472.5	7 133.5[p]
Belgium	5 653.0	9 968.9	11 249.0	12 631.5	14 335.6	18 237.3	17 500.0[p]
Canada	1 207.3	565.9	764.0	892.7	1 227.4	..	..
Chile	..	..	..	..	..	..	..
Czech Republic	1 446.1[b]	2 149.4[b]	2 765.7	3 108.4	3 119.2	3 132.4	2 436.2[p]
Denmark	3 269.5[b]	5 152.3	7 108.0	6 685.2	6 363.1	6 645.4	6 045.6[p]
Estonia	66.1	191.4	341.9	309.3	294.8	365.2	277.9[p]
Finland	4 621.2	7 769.1	8 146.2	8 847.6	7 695.4[b]	6 560.7	5 022.4[p]
France	..	..	..	..	..	..	..
Germany	29 087.7	45 207.9	53 846.8	55 773.3	55 232.7[b]	57 025.7	53 734.3[p]
Greece	871.5	1 383.9	1 267.1	814.1	951.7	1 144.6	950.7[p]
Hungary	2 476.4	3 812.2	4 340.3	4 057.9	5 210.3	4 821.1	3 817.1[p]
Iceland	..	179.1	215.2	239.1	201.0[b]	294.8	243.8[p]
Ireland	24 778.6	44 576.2	48 898.0	54 349.7[b]	57 334.5	76 593.7	98 091.4[p]
Israel[1]	1 869.1	2 494.0	2 634.5[b]	3 660.5	3 231.1	3 792.1	3 512.3[p]
Italy	4 553.2	13 865.5	15 201.5	12 806.8	14 274.5	14 238.3	12 015.7[p]
Japan	6 384.7	6 038.6	5 197.0	5 622.7	5 919.8	4 842.6	4 978.7[p]
Korea	4 525.1	10 234.3	9 900.5	11 052.0	12 038.4	15 540.0	16 409.0[p]
Latvia	75.9	135.1	182.3	165.8	189.8	169.8	156.4[p]
Luxembourg	876.4	2 180.4	3 193.6	4 997.7[b]	6 738.8	7 211.2	6 004.4[p]
Mexico	1 847.7	656.4	773.0	562.3	523.9	..	..
Netherlands	17 274.4	..	29 427.7	30 877.8	33 375.4	48 838.7[b]	50 215.9[p]
New Zealand	956.9	1 312.1	1 860.5	1 311.7[b]	1 209.6	..	..
Norway	1 828.3	2 269.0	2 531.0	2 974.5	2 903.0	..	..
Poland	2 327.5	5 459.2	3 639.2[b]	3 918.0	5 284.1	5 709.5	3 113.0[p]
Portugal	755.5	1 459.5	1 658.6	1 292.9	1 456.3	1 936.3	1 726.5[p]
Slovak Republic	419.4	763.0	635.6	550.3	..	..	..
Slovenia	..	632.0	690.3	666.6	..	..	..
Spain	6 333.1	10 764.8	11 989.8	10 592.1	9 542.3	10 729.6	10 097.3[p]
Sweden	7 243.2	9 846.3	11 556.1	12 834.0	13 424.7[b]	16 632.5	15 751.6[p]
Switzerland	13 893.8	21 172.1	26 436.0	28 803.0	30 114.9	36 019.4	33 998.8[p]
Turkey	..	..	..	..	..	..	..
United Kingdom	13 949.1	18 435.4	17 826.1	18 598.9	21 788.1	22 995.4	21 280.4[p]
United States	31 851.0	69 577.0	81 826.0	84 168.0	87 920.0	90 459.0	88 891.0[p]
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	33.5[m]	101.0[m]	119.4[m]	121.1[m]	157.7[b]	..	..
Russian Federation	960.9	1 410.1	1 915.4	2 053.1	2 468.7	2 455.8	2 205.4[p]
Singapore	11 688.1	..	..	..	..	..	..
South Africa	1 070.8	..	..	..	..	..	..
Chinese Taipei	1 776.1[m]	4 479.7[m]	..	5 079.1[m]	5 082.4[m]	5 373.9[m,p]	..

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Source: OECD, Technology Balance of Payments database, June 2017

Table 69. Technology balance of payments: payments as a percentage of GERD (Gross domestic expenditure on R&D)

Percentage

	2005	2010	2011	2012	2013	2014	2015
Australia	..	25.7[e]	27.0[e]	..	29.5[e]	..	33.3[e,p]
Austria	40.1[e]	43.6[e]	51.9	56.4[e]	62.2	62.5[e]	61.3[p]
Belgium	81.9	100.5	99.0	111.6	117.9	143.9	155.9[p]
Canada	5.2	1.9	2.4	2.8[b]	3.9	..	..
Chile	..	..	..	..	..	..	..
Czech Republic	90.8[b]	77.5[b]	78.0	84.1	78.4	76.4	67.6[p]
Denmark	51.7[b]	54.9	70.2	68.5	62.3	64.6	67.8[p]
Estonia	51.1	62.0	64.0	63.2	68.1	96.0	82.8[p]
Finland	67.9	84.1	81.8	100.8	86.7[b]	75.9	74.6[p]
France	..	..	..	..	..	..	..
Germany	42.0	48.8	51.3	54.9	52.2[b]	51.0	54.6[p]
Greece	60.8	77.3[e]	65.5	47.4	48.9	57.9	50.3[p]
Hungary	237.9	255.5	259.3	251.2	277.4	254.2	227.6[p]
Iceland	..	..	58.8[b,e]	..	73.7[b]	85.2	66.3[p]
Ireland	981.5	1 260.8[e]	1 319.4[e]	1 533.7[b,e]	1 515.6[e]	1 944.3[e]	2 823.0[p]
Israel[1]	32.4[d]	27.1[d]	25.1[b,d]	34.2[d]	26.6[d]	29.3[d]	27.5[d,p]
Italy	23.5	53.3	55.2	48.6	51.2	49.3[e]	48.9[p]
Japan	4.2	3.4	2.6	2.8	3.5[b]	2.9	3.5[p]
Korea	19.2[d]	27.0	22.0	22.5	22.2	25.7	28.1[p]
Latvia	84.7	93.1	91.9	88.7	102.5	78.6	92.6[p]
Luxembourg	149.3	272.7	363.8	692.9[b]	837.9	863.0	817.4[p]
Mexico	52.8	11.6	12.8	9.6	8.2	..	..
Netherlands	142.1	..	173.0[b]	192.1[b]	197.2	277.4[b]	330.6[p]
New Zealand	74.4	..	89.7	..	54.9	..	..
Norway	39.9	32.1	31.2	36.0	33.6	..	..
Poland	135.1	158.0	92.3[b]	88.9	115.8	111.4	65.0[p]
Portugal	50.6	40.0	46.5	43.4	48.6	65.4	69.7[p]
Slovak Republic	173.4	138.4	97.6	73.2	..	..	..
Slovenia	..	64.0	55.5[b]	55.9	..	..	..
Spain	49.9	55.7	60.8	61.6	55.2	63.1	69.1[p]
Sweden	55.0[b]	62.7[e]	63.2	71.9[e]	70.2[b,e]	92.1[e]	96.9[p]
Switzerland	..	..	..	135.3	..	..	148.3[p]
Turkey	..	..	..	..	..	..	..
United Kingdom	35.4	45.3[e]	40.6	43.6[e]	48.3	45.7[e]	44.0[p]
United States	9.7[d]	17.0[d]	19.0[d]	19.4[d]	19.3[d]	19.0[d]	17.9[d,p]
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	8.3[m]	13.3[m]	13.1[b,m]	14.6[m]	21.3[b]	..	..
Russian Federation	11.8	8.2	9.2	9.0	10.5	11.1	14.7[p]
Singapore	424.5	..	..	..	..	..	..
South Africa	48.1	..	..	..	..	..	..
Chinese Taipei	20.3[m]	35.8[m]	..	34.7[m]	33.1[m]	33.8[m,p]	..

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Source: OECD, Technology Balance of Payments database, June 2017

Table 70. Trade balance and export market share: Pharmaceutical industry

	Trade balance (Million current USD)			Export market share (Percentage)		
	2010	2013	2016	2010	2013	2016
Australia	-5 062.0	-6 276.6	-5 663.7	0.78	0.66	0.49
Austria	863.4	940.1	202.8	1.72	1.90	1.91
Belgium	8 009.8	8 673.2	8 230.1	10.56	10.12	8.47
Canada	-6 548.4	-7 094.2	-3 900.2	1.22	1.07	1.62
Chile	-679.8	-1 061.5	-1 090.1	0.03	0.03	0.03
Czech Republic	-2 120.0	-1 927.1	-1 716.5	0.33	0.38	0.47
Denmark	5 535.2	8 046.3	9 551.5	1.94	2.42	2.58
Estonia	-260.9	-337.8	-386.2	0.01	0.01	0.02
Finland	-903.6	-1 198.4	-1 228.7	0.28	0.24	0.18
France	5 995.5	8 085.7	5 579.2	7.31	7.27	5.91
Germany	18 077.3	27 504.5	26 249.3	13.99	14.54	14.81
Greece	-3 324.6	-2 245.3	-1 969.1	0.29	0.27	0.22
Hungary	145.1	1 208.1	715.3	0.78	0.93	0.89
Iceland	6.1	-43.2	-88.9	0.03	0.02	0.01
Ireland	27 371.0	22 091.0	26 335.5	6.81	5.42	6.38
Israel	4 972.5	4 227.8	4 656.1	1.38	1.18	1.29
Italy	-3 972.0	127.8	-1 622.0	3.75	4.80	4.34
Japan	-13 114.0	-18 059.3	-20 804.1	0.90	0.69	0.84
Korea	-2 698.4	-3 063.8	-3 257.9	0.26	0.30	0.52
Latvia	-238.5	-244.3	-184.4	0.08	0.08	0.09
Luxembourg	-357.3	-362.6	-319.6	0.02	0.02	0.02
Mexico	-3 238.0	-3 621.7	-2 903.4	0.34	0.38	0.33
Netherlands	1 509.2	6 065.6	3 253.5	5.91	4.55	3.24
New Zealand	-612.7	-607.9	-605.2	0.05	0.06	0.06
Norway	-1 079.1	-1 118.3	-1 169.0	0.16	0.15	0.13
Poland	-3 630.1	-2 769.7	-2 779.4	0.47	0.60	0.56
Portugal	-2 289.6	-1 759.0	-1 427.0	0.14	0.19	0.24
Slovak Republic	-1 290.8	-1 511.2	-1 383.0	0.10	0.09	0.11
Slovenia	1 254.8	1 842.3	1 503.1	0.47	0.59	0.53
Spain	-3 314.5	-1 305.3	-3 030.3	2.50	2.63	2.18
Sweden	5 117.6	4 056.4	3 781.5	1.95	1.66	1.54
Switzerland	29 792.3	37 796.5	45 224.5	10.36	11.93	13.66
Turkey	-4 165.0	-3 659.5	-3 635.9	0.13	0.16	0.17
United Kingdom	9 994.0	4 085.5	-140.8	7.20	6.28	6.34
United States	-21 503.0	-23 528.3	-45 107.8	9.31	8.34	9.66
OECD-Total	**38 241.7**	**52 955.8**	**30 869.1**	**91.55**	**89.93**	**89.85**
Argentina	-966.6	-1 321.7	-1 301.1	0.16	0.19	0.20
China	2 773.9	-3 619.6	-8 196.9	2.29	2.39	2.62
Romania	-2 029.9	-2 327.9	-2 281.7	0.17	0.24	0.15
Russian Federation	-10 992.1	-14 279.7	-8 500.0	0.07	0.11	0.12
Singapore	3 746.1	5 348.0	3 876.9	1.30	1.52	1.24
South Africa	-1 736.1	-1 899.1	-1 512.5	0.09	0.09	0.09
Chinese Taipei	-1 850.4	-2 257.7	-2 497.0	0.06	0.10	0.11

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Source: OECD, STAN Bilateral Trade in Goods by Industry and End-use Category database, July 2018

Table 71. Trade balance and export market share: Computer, electronic and optical industry

	Trade balance (Million current USD)			Export market share (Percentage)		
	2010	2013	2016	2010	2013	2016
Australia	-21 354.4	-21 627.7	-19 368.2	0.17	0.16	0.18
Austria	-2 856.5	-1 313.0	-2 213.6	0.46	0.45	0.61
Belgium	-5 134.0	-5 088.9	-3 187.7	0.72	0.56	0.56
Canada	-26 246.3	-28 734.6	-23 365.0	0.87	0.61	0.59
Chile	-4 913.4	-6 609.6	-5 699.5	0.02	0.02	0.02
Czech Republic	-2 789.2	1 646.8	388.9	1.04	0.99	1.00
Denmark	-1 392.1	-2 098.1	-1 661.1	0.36	0.28	0.28
Estonia	-282.5	-105.5	-10.2	0.04	0.10	0.09
Finland	-683.5	-2 258.5	-2 341.3	0.47	0.14	0.14
France	-21 168.8	-19 005.6	-17 196.1	1.83	1.54	1.40
Germany	-13 953.8	-2 026.3	-5 862.1	5.32	4.74	4.89
Greece	-3 263.9	-2 220.2	-1 499.3	0.04	0.03	0.05
Hungary	6 899.1	2 433.1	726.4	1.37	0.78	0.61
Iceland	-207.9	-266.4	-347.8	0.00	0.00	0.00
Ireland	5 857.3	4 528.8	8 957.6	0.97	0.49	0.72
Israel	3 667.1	3 715.4	1 453.5	0.59	0.47	0.43
Italy	-29 879.7	-14 369.0	-13 169.3	0.80	0.69	0.66
Japan	22 130.4	-9 203.5	-9 094.2	5.55	4.08	3.76
Korea	70 871.9	70 967.3	56 003.1	6.10	5.72	5.74
Latvia	-257.6	-265.7	-237.7	0.03	0.05	0.05
Luxembourg	-506.7	-625.1	-535.2	0.04	0.02	0.02
Mexico	-1 046.3	-6 777.2	-6 271.2	3.16	2.88	3.01
Netherlands	831.5	-2 526.4	-2 366.0	3.68	2.96	2.68
New Zealand	-2 556.6	-3 101.7	-2 896.4	0.03	0.02	0.02
Norway	-3 925.7	-4 899.6	-4 420.1	0.19	0.13	0.11
Poland	-5 201.9	-5 298.1	-4 632.6	0.78	0.63	0.69
Portugal	-2 856.1	-2 077.1	-2 005.5	0.12	0.10	0.12
Slovak Republic	942.9	953.4	-143.2	0.69	0.64	0.57
Slovenia	-650.6	-335.6	-361.9	0.05	0.04	0.05
Spain	-18 164.4	-13 884.8	-14 153.9	0.38	0.24	0.29
Sweden	-1 141.3	-3 725.3	-3 725.4	0.86	0.61	0.54
Switzerland	11 216.6	17 687.1	14 174.5	1.28	1.45	1.32
Turkey	-8 324.7	-12 057.4	-14 291.7	0.13	0.11	0.10
United Kingdom	-27 049.8	-29 742.6	-29 430.6	2.00	1.49	1.39
United States	-140 399.2	-159 138.0	-180 670.7	8.96	8.04	8.18
OECD-Total	**-223 790.1**	**-257 449.5**	**-289 453.5**	**49.10**	**41.28**	**40.89**
Argentina	-5 875.3	-7 389.1	-5 703.5	0.01	0.01	0.01
China	131 709.9	169 327.7	151 021.5	22.61	27.82	26.34
Romania	-2 043.0	-3 070.7	-3 489.4	0.20	0.14	0.15
Russian Federation	-21 616.3	-24 019.8	-16 020.3	0.12	0.15	0.15
Singapore	34 226.9	32 250.2	31 600.6	5.62	5.56	5.29
South Africa	-7 558.7	-8 336.1	-6 228.2	0.06	0.07	0.06
Chinese Taipei	60 547.2	68 258.4	70 640.1	4.87	5.18	5.72

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1. Information on data for Israel:http://dx.doi.org/10.1787/888932315602
2. Lithuania was not an OECD Member at the time of preparation of this publication. Accordingly, Lithuania does not appear in the list of OECD Members and is not included in the OECD zone aggregates.

Source: OECD, STAN Bilateral Trade in Goods by Industry and End-use Category database, July 2018

Table 72. Trade balance and export market share: Aerospace industry

	Trade balance (Million current USD)			Export market share (Percentage)		
	2010	2013	2016	2010	2013	2016
Australia	-291.4	771.6	-975.1	0.27	0.38	0.41
Austria	318.3	-59.1	803.0	0.38	0.57	0.46
Belgium	838.0	775.6	86.7	0.66	0.60	0.55
Canada	3 725.5	3 177.3	2 814.6	4.43	3.42	3.30
Chile	-628.9	-1 153.2	-965.7	0.01	0.04	0.00
Czech Republic	-139.7	421.5	299.0	0.22	0.23	0.19
Denmark	-620.4	-30.4	-249.2	0.09	0.15	0.11
Estonia	-23.1	-5.7	-19.2	0.00	0.00	0.01
Finland	-195.1	-445.2	-575.8	0.18	0.09	0.08
France	23 851.3	29 066.7	20 523.2	19.92	17.38	15.64
Germany	4 183.4	14 938.4	21 709.1	13.91	13.17	12.27
Greece	-553.3	-13.5	-158.3	0.13	0.04	0.02
Hungary	-79.6	-2.9	-635.2	0.02	0.03	0.03
Iceland	-15.4	-79.5	-269.4	0.02	0.00	0.00
Ireland	-2 911.3	-7 582.5	-11 371.3	0.37	0.87	1.75
Israel	1 060.7	1 143.5	1 543.7	0.66	0.56	0.67
Italy	3 422.3	4 353.9	3 153.0	2.12	1.84	1.51
Japan	-3 007.5	-3 839.5	-3 658.0	1.55	1.79	2.00
Korea	-2 049.1	-1 315.5	-2 735.5	0.59	0.58	0.55
Latvia	-84.8	-14.5	-27.4	0.00	0.00	0.00
Luxembourg	-335.2	-1 661.6	-788.6	0.11	0.06	0.05
Mexico	604.1	930.0	804.3	0.43	0.47	0.59
Netherlands	378.2	816.3	-1 383.6	1.05	0.90	0.98
New Zealand	-515.3	-901.2	-1 491.3	0.05	0.02	0.03
Norway	-900.0	-564.6	-544.6	0.23	0.16	0.21
Poland	323.7	590.4	689.7	0.51	0.68	0.65
Portugal	-256.4	-279.7	-548.7	0.07	0.07	0.10
Slovak Republic	-4.6	-37.5	-82.2	0.03	0.01	0.01
Slovenia	-89.1	-51.3	4.9	0.01	0.02	0.02
Spain	712.7	3 636.6	397.7	1.55	2.00	1.47
Sweden	379.5	318.6	0.5	0.34	0.26	0.23
Switzerland	-1 213.3	47.8	-2 185.6	0.52	0.55	0.53
Turkey	-3 264.4	-1 665.7	-3 936.5	0.16	0.24	0.25
United Kingdom	-2 951.0	7 805.6	3 995.9	9.96	9.74	9.38
United States	49 450.8	69 865.9	87 016.3	29.48	30.04	33.52
OECD-Total	**69 119.5**	**118 956.5**	**111 240.4**	**90.03**	**86.94**	**87.56**
Argentina	-763.1	208.8	-878.0	0.22	0.13	0.08
China	-12 477.8	-23 000.6	-20 727.2	0.84	0.97	1.65
Romania	-15.1	44.6	2.3	0.07	0.07	0.08
Russian Federation	688.0	978.9	1 344.1	0.43	1.95	0.40
Singapore	-3 246.0	-1 905.0	-1 081.5	2.39	2.73	2.86
South Africa	-1 247.4	-289.9	-720.2	0.13	0.14	0.15
Chinese Taipei	-546.8	-312.5	-3 315.5	0.15	0.18	0.59

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1. Information on data for Israel:http://dx.doi.org/10.1787/888932315602
2. Lithuania was not an OECD Member at the time of preparation of this publication. Accordingly, Lithuania does not appear in the list of OECD Members and is not included in the OECD zone aggregates.

Source: OECD, STAN Bilateral Trade in Goods by Industry and End-use Category database, July 2018

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General methodology

R&D data (Tables 1 to 60)

A. Definitions and coverage

1. OECD standards

The R&D data used in this publication have been collected and presented in line with the standard OECD methodology for R&D statistics as laid out in the OECD "Frascati Manual" (see *http://oe.cd/Frascati*). The 2002 edition of the manual has now been superseded by the 2015 edition. The revised guidelines and definitions are in the course of being implemented and are not expected to change the main indicators significantly although some terminology changes will occur. This edition of MSTI has been compiled in accordance with the 2015 Frascati Manual, some countries may still be following the 2002 edition for certain series or datapoints.

2. The two types of R&D data

Most R&D data are derived from retrospective surveys of the units actually carrying out or "performing" R&D tasks. Thus, the indicators in Tables 1 to 56 are based on the sum of performers' reported R&D expenditures and personnel on national territory (i.e. excluding payments to international organisations and other performers abroad). Personnel data are expressed as full time equivalent (FTE) spent working on R&D (i.e. a person working half time on R&D is counted as 0.5 person-years) and headcount.

Because of the time such surveys take to undertake, it is difficult to obtain very up to date series; some recent data are provisional figures, national estimates, or projections (these data are annotated).

More up to date information on government support for R&D can be derived from budgetary sources. The indicators in Tables 57 to 60 are based on Government Budget Allocations for R&D (GBARD) as reported by the funding ministry or agency and include payments to international organisations and other performers abroad.

The specifications of these two sets of R&D data vary significantly and, while they can be used in complement to one-another, they should not be combined.

3. Fields of science

In general, the tables cover R&D in both Natural Sciences and Engineering (NSE, including agricultural and medical sciences) and Social Sciences and Humanities (SSH). A large number of countries collect data on R&D activities in the Business Enterprise sector for NSE only.

4. Sectors of performance and sources of funds

Domestic R&D efforts (expenditure or personnel) are divided into four *sectors of performance* for statistical purposes: Business Enterprise, Higher Education, Government, and Private Non Profit institutions (PNP).

R&D expenditure is also classified by *sources of funds*, including: funds from Business Enterprises, from Government, from Higher Education, from PNPs, and from the rest of the world. By convention and for international comparison purposes, public general university funds (GUF) are recorded as funds originating from the government sector. Since the amounts

financed by the Higher Education and PNP sectors are small, they have been combined as "other national sources" in Tables 15 and 37.

5. *R&D in the business enterprise sector*

The Business Enterprise sector covers private and public enterprises and institutes serving such enterprises. The industry breakdown is made according to the main activity of the enterprises. National statistical regulations prevent publication of results where there are very few firms in a given category, hence there are many gaps in the tables broken down by industry.

The industrial classification used is the International Standard Industrial Classification, Revision 4 (ISIC Rev.4). The indicators on BERD by industry concern R&D-intensive manufacturing industries and services:

	ISIC Rev. 4
• *pharmaceutical industry* (Table 39)	21
• *computer, electronic and optical industry* (Table 40)	26
• *aerospace industry* (Table 41)	303
• *services industry* (Table 42)	45-99

The above mentioned indicators were calculated primarily using the Analytical Business Enterprise R&D database (ANBERD) for OECD Member countries and those selected non-member economies covered by the database. For further information on this database see *http://oe.cd/anberd*.

6. *Government budget Allocations for R&D (GBARD)*

These statistics are assembled by national authorities using data collected for budgeting purposes. This essentially consists of identifying all the budget items involving R&D and measuring or estimating their R&D content. These estimates, based on funders' reports, have a different conceptual basis from the "performer reported" data in Tables 1 to 56 but as they are derived from the budget, they can be linked back to policy issues by means of a classification by "objectives" or "goals". Data are allocated to socio economic objectives on the basis of *intentions* at the time the funds are committed and not the actual content of the projects concerned. These breakdowns reflect *policies* at a given moment in time.

The classification used is the European Commission's Nomenclature for the Analysis and Comparison of Scientific Programmes and Budgets – (NABS) 2007, specially developed for R&D analysis (see "Frascati Manual 2015", section 12.4).

The breakdown is as follows:

Defence (Table 58)

All defence R&D financed by government, including military, nuclear, and space but excluding civilian R&D financed by ministries of defence (e.g. meteorology).

Civil (Table 59)

Total GBARD less Defence.

Economic development (Table 60)

R&D programmes financed for the purpose of transport, telecommunication and other infrastructures; energy; industrial production and technology; and agriculture (NABS chapters 04, 05, 06 and 08 respectively).

Health and environment (Table 60)

R&D programmes funded for the purpose of the exploration and exploitation of the earth; environment; and health (NABS chapters 01, 02 and 07 respectively).

Education and society (Table 60)

R&D programmes funded for the purpose of education; culture, recreation, religion and mass media; and political and social systems, structure and processes (NABS chapters 09, 10 and 11 respectively).

Space (Table 60)

Civil space R&D programmes (NABS chapter 03).

Non-oriented research (Table 60)

Research programmes financed in view of the general advancement of knowledge, except General University Funds (NABS chapter 13).

General university funds (Table 60)

The estimated R&D content of "block grants" paid by government to the Higher Education sector. This category (NABS chapter 12) is generally absent or underestimated for countries where only federal government is included.

Budget data can be more timely than those derived from performer surveys. Readers are warned that GBARD data vary in coverage from government-financed GERD series and that these two types of data should not be combined.

7. International comparability

Though all OECD countries generally collect and report R&D in line with the Frascati Manual, some detailed national specifications may vary from OECD standards. These differences are generally too minor to materially affect the general indicators quoted in this publication. The main exceptions are shown in Annex 1.

8. Expenditure in current dollars

National currency data have been converted to USD using purchasing power parity (PPP) series (Table C) from the OECD National Accounts Division (see *www.oecd.org/std/prices-ppp*). Due to lags in availability, the PPP series are estimated in the most recent years by comparing the growth in prices (implicit GDP deflator) in each country with that in the United States. These estimated parities are footnoted "*b*" in the tables as are any data converted to current dollars using them.

Only TBP data have been converted using current exchange rates as these transactions are conducted on international markets.

9. Expenditure in constant dollars

R&D expenditure series have been deflated using the implicit GDP deflator taken from the OECD National Accounts database. This is estimated for the most recent years based upon projections published in the biannual *OECD Economic Outlook* (except in the case of Norway where a deflator excluding trends in petroleum prices has been used) (Table B). Any expenditure series calculated on the basis of these estimated rates are footnoted "*b*".

10. Comparisons with economic indicators

R&D expenditures are shown as a percentage of selected indicators drawn from the OECD National Accounts database where available and estimated for the most recent years on the basis of the projections published in the *OECD Economic Outlook*. Any ratios where such estimated economic series are the denominator are footnoted "*b*" in the tables concerned. R&D personnel are expressed "per thousand" in relation to selected indicators from the OECD National Accounts and Labour Force databases. The main indicators used are shown in Annex 2.

R&D data are typically expressed as a percentage of GDP to allow cross-country comparisons. When compiling such indicators for the business enterprise sector, one may wish to exclude from GDP measures, economic activities for which BERD is null or negligible by definition. By doing so, the adjusted denominator (GDP, or Value Added, excluding non-relevant industries) better corresponds to the numerator (BERD) with which it is compared to. The MSTI variable "Value added in industry" is used to this end; it is calculated as the total Gross Value Added (GVA) excluding "real estate activities" (ISIC rev.4 68) where the "imputed rent of owner-occupied dwellings", specific to the framework of the System of National Accounts, represents a significant share of total GVA and has no R&D counterpart. Moreover, the R&D performed by the community, social and personal services is mainly driven by R&D performers other than businesses. Consequently, the following service industries are also excluded: ISIC rev.4 84 to 88 and 97 to 98.

In the same way, some indicators on R&D personnel in the business sector are expressed as a percentage of industrial employment. The latter corresponds to total employment excluding ISIC rev.4 68, 84 to 88 and 97 to 98.

Data on GVA and employment in industry are mainly taken from the STructural ANalysis (STAN) Database, complemented by the OECD and Eurostat National Accounts databases, as well as national sources.

Impact of changes to the measurement of GDP on R&D to GDP ratios: the 2008 update to the System of National Accounts (SNA) implemented various accounting changes which impacted the level of GDP, one key change was recognising the role of R&D as an activity leading to the creation of knowledge assets. One implication of recognising R&D as an asset-creating activity is that the level of GDP was, in many countries, revised upwards by a magnitude close to the value of domestic business investment in R&D. This reduced the R&D to GDP ratio, as the numerator stayed constant while the denominator increased to incorporate an element that was previously missing from the GDP estimate.

When possible, economic indicators for the non-member economies are also drawn from OECD databases. Alternatively, other international databases are used, such as the Eurostat National Accounts database (in the case of Romania, Bulgaria, Croatia, Cyprus, Lithuania, and Malta for the EU zone totals), the International Monetary Fund, and World Bank databases, as well as various national data sources.

11. Zone totals

Zone totals have been calculated for the OECD and the EU-28 for most tables. The OECD zone includes all Member countries of the OECD i.e Australia, Austria, Belgium, Canada, Chile, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea, Latvia, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, the United Kingdom, and the United States. Lithuania was not an OECD Member at the time of preparation of this publication. Accordingly, Lithuania does not appear in the list of OECD Members and is not included in the OECD zone aggregates.

The EU-28 includes Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden and the United Kingdom. Zone totals for EU-15 (the first 15 countries of the EU-28) are available in the electronic editions of this publication.

In order to obtain a full set of figures for the OECD countries the Secretariat has made a number of estimates to fill gaps and to bring series up-to-date. These estimates were

computed using simple statistical routines or information from national publications and observations of trends. Data points where such estimates would exceed 25% of the zone total have been suppressed. Israel, Korea, and Mexico are included in the OECD total as of 1991. The Czech Republic, Estonia, Hungary, Latvia, Poland, the Slovak Republic and Slovenia are likewise included as of 1995; Luxembourg is included in zone totals beginning 2000; Croatia and Malta are included in the EU-28 total beginning 2002; Chile is in the OECD total from 2007.

Data for non-OECD countries used to calculate EU-28 have been provided by Eurostat.

OECD estimates for the EU-15 and the EU-28 zones may slightly differ from those published by Eurostat. In this publication, in line with standard OECD practice, national estimates are aggregated using USD Purchasing Power Parity (PPP) indices instead of EUR exchange rates applied by Eurostat. For example, the EU-28 measure of GERD to GDP ratio will be an average of EU countries' GERD intensities, weighted by the share of countries' GDP to EU GDP expressed in USD by applying PPP conversion as opposed to EUR-based GDP shares.

B. Sources

The data are derived from national R&D surveys and budgets are supplied by national statistical agencies to the Secretariat via an OECD/Eurostat co-ordinated collection.

R&D expenditures of foreign affiliates (Tables 61 and 62)

A. Definitions and coverage

These data are collected as part of the OECD effort to measure globalisation through the role of multinationals. A "foreign controlled affiliate" (FCA) is a company located inside the country/economy of interest and in which a controlling stake (over 50% of voting shares) is owned by a company outside the country/economy of interest. These figures thus present the amounts spent on R&D by FCAs based in the domestic economy. For further information on methodological and conceptual aspects of globalisation statistics, see *Handbook on Economic Globalisation Indicators* (OECD, 2005). Data, in some cases, are not directly comparable with standard BERD figures. Details on national sources and definitions are published in *Measuring Globalisation, Activities of Multinationals, 2007*. Data are available on-line at *http://oe.cd/amne*.

B. Sources

OECD database on Activities of Multinational Enterprises (AMNE), February 2018.

Patents (Tables 63 to 66)

A. Definitions and coverage

1. *Patents and patent families*

A patent family is defined as a set of patents protecting a single invention across various jurisdictions. Inventors seeking protection file a first application (priority), often in their country of residence. Following this, there is a period where protection may also be applied for in other jurisdictions. Patent families, as opposed to patents, are provided with the intention of improving international comparability (the "home advantage" is suppressed; the patent data are more homogeneous).

The patent families presented in this publication refer to triadic families: i.e. a patent is included if and only if it is filed at the European Patent Office (EPO), the Japan Patent Office (JPO), and the US Patent & Trademark Office (USPTO).

In addition, the number of patent applications filed under the Patent Co-operation Treaty (PCT) is provided for two specific sectors of interest: the ICT and biotechnology sectors, alongside the total number of applications filed across all sectors. These sectors are defined according to selected classes of the International Patent Classification (IPC), *www.wipo.int/classifications/ipc/en/index.html*. From the 2017-1 MSTI edition onwards, the definition of ICT-related patents has been modified to better align with the evolution of the ICT sector, affecting the whole time-series. The PCT procedure offers the possibility to seek patent rights in a large number of countries by filing a single international application with a single patent office, and then to enter the national stage in the desired countries at a later date.

2. Presentation and availability

For patent counts, the choice of the country and date of reference among the set of information included in patent documents is important. Patents are presented here according to the country (or countries) of residence of the inventor(s), giving an indication of technological innovativeness of researchers and laboratories located in a country.

The *priority date*, the date of the first international filing of a patent, is chosen as the reference date. It is the earliest *available date* and therefore the closest to the invention date. Although the application date may provide more recent series, counts by *application date* introduce a bias between residents and foreigners for a selected patent office with respect to the *priority date*. Residents usually first file a patent application at their domestic office, the extension of application to other countries takes one year following the traditional procedure, and up to two and a half years for the PCT procedure.

However, counting patent families according to the earliest priority date exacerbate one drawback of traditional patent counts: timeliness. The time lag between the priority date and the availability of information on patent applications could be up to 4 years. From 2013 onwards, patent families for individual countries are Secretariat estimates, based on the latest trends in patent filings observed at the three patent offices. Furthermore, because of changes in the rules and regulations at the USPTO, triadic patent families before 2001 are based on USPTO granted patents.

The PCT procedure expanded after 1990 and is increasingly used by applicants from all signatory states: since the early 2000s, most countries are well represented. For the transition period (1990-2000), cross-country comparisons and time series should be interpreted with care.

A broader set of patent-related indicators is available on-line at *http://oe.cd/ipstats*, along with methodological notes. These present patents by main technology classes and by region, as well as indicators on international co-operation in patenting. For further details on patent data, refer to the *OECD Patent Statistics Manual, 2009, www.oecd.org/science/inno/oecdpatentstatisticsmanual.htm*.

B. Sources

The data on patents filed at intellectual property offices (EPO, JPO, USPTO) are mainly derived from EPO's Worldwide Statistical Patent Database (PATSTAT, Spring 2018). Triadic patent families series have been compiled by the Secretariat. PCT applications series are based on data published by the EPO.

Technology balance of payments (TBP) (Tables 67 to 69)

A. Definitions and coverage

The TBP registers commercial transactions related to international technology transfers. It consists of money paid or received for the acquisition and use of patents, licences, trademarks,

designs, know how and closely related technical services (including technical assistance), and for industrial R&D carried out abroad, etc.

Payments as a percentage of GERD (Table 69) give an indication of the share of imported technology in relation to domestic R&D efforts.

It has not been possible to produce zone totals for the TBP due to a lack of data and because of the challenges of excluding flows within the zones.

B. Sources

OECD database on Technological Balance of Payments (TBP), June 2017.

International trade in highly R&D-intensive industries (Tables 70 to 72)

A. Definitions and coverage

These tables present indicators concerning the international trade in goods of selected R&D intensive industries. Data are categorised in accordance with the International Standard Industrial Classification, Revision 4 (ISIC Rev.4). In general, prior to 1988 underlying source data are based on ISIC Revision 2.

These series are taken from the OECD's Bilateral Trade in Goods by Industry and End-use Category database (BTDIxE), derived from the OECD International Trade Statistics and United Nations Statistics Division COMTRADE databases, which have been converted from the Harmonised System (HS) to International Standard Industrial Classification (ISIC).

Industries covered are as follows:

	ISIC Rev. 4
• *pharmaceutical industry* (Table 70)	21
• *computer, electronic and optical industry* (Table 71)	26
• *aerospace industry* (Table 72)	303

A note indicating a break in series is assigned to the first available year of ISIC Revision 4 data. Prior to 1993, the data for Belgium include Luxembourg.

The zone total for EU-15 (presented online only) excludes intra-EU trade. The OECD total has not been adjusted to exclude trade between member countries.

From 1996, calculation of the Export market shares is relative to total aggregate exports of the declaring countries available in the OECD BTDIxE database. Prior to 1996, Export market shares are based on the share of OECD total exports.

B. Sources

OECD Bilateral Trade in Goods by Industry and End-use Category database (BTDIxE), July 2018 (*http://oe.cd/btd*).

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ANNEX 1

National specifications

OECD member countries

- From 2011, **Australia** has included submission from agencies that have previously not submitted R&D expenditure data. The agencies have been asked to provide retrospective time series and this results in a break in series in 2002 in GBARD data. From 1999, Australia has prepared its Federal Budget details according to the principles of accrual accounting, leading to a break in the series for GBARD data.

  Up to 1998, TBP data come from the Business Enterprise R&D Survey, and only refer to technical know-how. From 1999 TBP data are based on ABS's quarterly Survey of International Trade in Services, and include all TBP components.

  Since 2006, a definition of foreign ownership has not been provided in the national survey and R&D data on foreign affiliates have been accepted (by the Australian Bureau of Statistics) as reported.

- In **Austria**: from 2016, government R&D support through tax incentives is reported as funds from the business sector. Beforehand, it was included in the government funding.

  Since 2009, a large unit previously omitted has been included as an R&D performer in the PNP sector.

  From 2007 onwards, the former "post-secondary colleges for teacher training" ("Paedagogische Akademien") have become "Universities of Education" and are, consequently surveyed as units of the Higher education sector (up to 2006 these units were covered in the Government sector).

  In the BE sector, the "research premium" is included in "funds from government" beginning 2006. This measure was introduced for the first time for the calendar year 2002, and for the 2002 and 2004 data, government funding for R&D via the "research premium" was subsumed under "funds from enterprises".

  In 2004, Statistics Austria's regular annual updating procedure of the R&D expenditure data resulted in revisions showing a significant increase compared to previous estimates, mainly due to the inclusion of results from the 2002 survey of the business enterprise sector.

  As of 1995, TBP data cover royalties and license fees, technology-related services and R&D performed abroad. Until 1991 inclusive, these data cover only royalties and license fees. TBP data are published according to the Balance of Payments and International Investment Position Manual (BPM6) as of 2006.

- In **Belgium**: the personnel data increased markedly in 2015 due to the introduction of a new government incentive scheme for hiring researchers. However, this was not matched by a counterpart increase in R&D expenditure, which grew only slightly. It is therefore likely that labour costs are being underreported in relation to the number of R&D personnel employed.

  Some institutions were reallocated from the PNP sector to the Government sector in 2012.

  Beginning with the 1998 data, two large non-profit organisations, formerly included in the higher education sector, were reclassified in the government sector.

As of 1993 (1992 for the Business enterprise sector), data are based on full surveys and no longer on a combination of budget figures and survey findings.

Total national R&D expenditures are underestimated in 1987 and 1988, as is the contribution of government as R&D financed by federative authorities (about 2-4 % of GERD and 7-15 % of government-financed GERD) is excluded. As a breakdown of this sum by sector of performance is not available, the impact on the other R&D expenditure tables cannot be estimated, though it probably affects R&D in the Government and Higher Education sectors.

As of 1995, TBP data are collected according to the OECD, IMF, and Eurostat Manuals. Up to 2001, data refer to the Belgium-Luxembourg Economic Union (BLEU). From 2002 onwards, data refer to Belgium only. TBP data are published according to the BPM6 as of 2008.

- In **Canada**, new sampling method (weighted sample survey supplemented by administrative tax data) and conceptual changes in the business R&D survey caused a break in series in 2014. From 2012 the coefficients used for estimating R&D expenditure in the Higher Education sector have been revised, as well as the distribution of HERD between funds directly from government for R&D, GUF, and from institutions' own funds. From 1988, the estimated values for R&D in hospitals not covered by university reports are included in the R&D expenditure of the higher education sector (not previously included). From 2010, the federal government R&D expenditures are better measured.

  From 1989, non-federal sources are no longer excluded from GUF in GBARD.

- For **Chile**, the method for reporting international observatories' R&D expenditure has been revised in 2016, leading to a break in series in the PNP sector. Prior to 2014, higher education data was obtained from the research departments of each institution (in a centralised way). Thereafter, it is obtained from the units directly (research centres of universities, scientific centres, etc). In 2013, some institutions, previously classified in the PNP sector, were included in the government sector. BERD funded by the business and the rest of the world sectors has also significantly increased as a result of better reporting in the R&D surveys starting with reference year 2013. From reference year 2009 in the business sector innovation and R&D surveys were separated and the survey sampling modified. Astronomical observatories are surveyed and included in the PNP sector from 2009; this may include some observatories operated by international organisations.

- For the **Czech Republic**, beginning in 2005, there is a change in methodology for the collection of R&D personnel data in FTE. Data are provided in FTE by the reporting units, and based on new, more precise guidelines. From 2005 onward, certain institutional units previously classified in the business sector have been reallocated to the Government sector to comply with the new System of National Accounts (SNA) 2008.

  Between 2004 and 2008, some public research institutions were included in the business enterprise sector because of their classification as non-financial enterprises (ISEKTOR 11) in the European System of Accounts (ESA). These institutions have been re-classified into the government sector and R&D expenditure and personnel data have been recalculated for those years.

  Up to 2004, TBP data come from the balance of payments figures produced by the Czech National Bank. From 2005, TBP data are prepared by the Czech Statistical Office and come from the quarterly trade in services survey, except for the item "Sale/purchase of patents and inventions" which continued to be collected by the central bank up to 2008. TBP data are published according to the BPM6 as of 2010.

- In **Denmark**, from reference year 2007, the surveys are conducted by Statistics Denmark (previously by the Danish Centre for Studies in Research and Research

Policy). Modifications in the questionnaires have increased the response rate; this is particularly noticeable in the Business enterprise sector where survey response is now mandatory. Additionally, due to changes in the administrative structure, a number of institutes, previously classified in the Government sector, were merged with universities.

Until 2002, the HE-sector R&D expenditure was underestimated as R&D carried out in hospital departments at the university-hospitals was included in the Government sector.

As of 2002, the business enterprise survey specifically requests data on researchers, technicians and other personnel. Earlier data for R&D personnel by occupation are based on qualification.

In 2017, unit reclassification led to a break in series in the "industrial production and technology" socio-economic objective (increase) and the "general advancement of knowledge, other than GUF" (decrease). From 2002, GBARD data include government-financed R&D on renewable energy. In 2001, a new principle concerning budgeting of commitments was introduced: commitments of grants are carried to the debit side at the time of entering the commitment, where previously commitment of grants was carried to the debit side at maturity.

From 1999, provincial and local government funding is included in the GBARD data (in particular funding in provincial hospitals), as well as funding from the Danish National Research Foundation and the Danish Investment Fund. In 1983, 1988, and 1993, the method for breaking down GBARD data by socio-economic objectives changed, leading to breaks in series.

- In **Estonia**, GBARD figures come from budget data from 2016 onward, whereas they were previously estimated from R&D survey data.
- In **Finland**: a new methodology for calculating the time spent on R&D by personnel in the Higher Education sector was implemented in 2011. As a consequence, R&D personnel (measured in FTE) in the Higher Education sector decreased.

  From 2004, R&D personnel data are available according to occupation. Previous breakdown was by formal qualification.

  From 1998 to 2004, due to a greater number of responses to the BE survey on the group level, the questionnaire category funds from other foreign enterprises of the group was merged with business enterprise funds (own funds) thus reducing the share of funds coming from the rest of the world.

  From 1997, the Higher Education sector includes central university hospitals.

  From 1997 and the implementation of ISCED 97, "Researchers" also includes holders of engineering degrees and graduates of vocational polytechnics, degrees which are now classified in First Stage Tertiary Education (ISCED 5A).

  In 1991, the method for measuring R&D expenditures in the Government and the Higher Education sectors changed. Since 1994, PNP institutions are included in the Government sector in non-survey years.

  Data on GBARD have been revised back to 1991 because of changes in R&D coefficients for certain research institutes. In 1991, there was an upward adjustment in the total due to the inclusion of pension costs. From 1995, funds received by the State research institutes from external sources are excluded from Government allocations. As of 1997, the data covers allocations for central university hospitals.

Prior to 1999, TBP data refer to royalties and licence fees. Thereafter, data also include Architectural, engineering and other technical services, computer services, and R&D performed abroad. TBP data are published according to the BPM6 from 2013.

- In **France**, from 2014 onwards, the better identification of R&D personnel in the university hospitals caused a break in series in the higher education sector; moreover, from that year, university hospitals collect R&D personnel data by gender whereas these figures were previously estimated. The National Centre for Scientific Research (CNRS) is included in the Higher Education sector, whereas in other countries such as Italy for example, this type of organisation is classified in the Government sector. This affects comparisons of the breakdown of R&D efforts by sector of performance.

  The methodology of the public administrations survey was changed in 2010: the method for measuring the resources devoted to R&D in ministries and some public organisations has been modified, leading to a better identification of their financing activities. The impact is notably a 900 million fall in GOVERD and a 3 200 drop in FTE personnel.

  From 2004 onwards, a new methodology was introduced to correct for some double-counting of funds for universities. In 2007, the sampling method in the BE sector was modified and the 2004 data revised according to the new methodology.

  Beginning with the 2006 survey, in order to better take into account SMEs, there is no longer a cut-off point in the business enterprise sector of one Full-time-equivalent on R&D for an enterprise to be included in the survey population.

  From 2001, coverage of the BE sector was expanded. Data communicated by the Ministry of Defence were also extended to cover research that was not considered R&D in earlier years. This also affected GBARD data.

  In 2000, several methodological changes which improved the quality of the public sector data resulted in a break in series for that year: social charges and civil pensions are better captured in universities' research expenses; modification of responses from some institutes to better harmonise with the corresponding multi-annual programme; and implementation of a redesigned questionnaire. National sources estimate that the previous method would have produced a 1.6% increase in GERD, where the current method resulted in 4%.

  Due to changes in the methods used to evaluate domestic expenditure on defence, the results of the 1998 surveys revealed significant modifications requiring new estimates for 1997. This break in series relates also to the GBARD data.

  In 1997, the method used to measure R&D personnel in administrations has changed.

  Between 1991 and 1992 France Télécom and GIAT Industries were transferred from the Government to the Business Enterprise sector following a change in their legal status.

  In 2006 and 2007, following the implementation of the Constitutional Bylaw on Budget Acts (LOLF act: "loi organique relative aux lois de finances"), some departments are no longer recorded in the GBARD data. Consequently, total GBARD is underestimated for both years.

- The data in this publication for **Germany** cover unified Germany from 1991 and western Germany only until 1990.

  In 2016, the method for calculating R&D coefficients was revised, introducing a break in series in the Higher Education sector. In particular, coefficients are thereafter based on time-use surveys.

  From reference year 2014, the distribution of R&D personnel by occupation is requested in the government survey whereas it was previously estimated from data by qualification.

The method for calculating public-financed R&D in the business enterprise sector was reviewed, resulting in the revision of business enterprise R&D and the national total back to 1991.

In 1992 the methodology of the survey on resources devoted to R&D in the Government sector was changed.

From 1991, the data for the Private Non-Profit sector have been included in the Government sector.

For 1997, the methodology for allocating GBARD by socio-economic objective changed. For 1997 and from 2001 to 2015, the global budget reduction was not distributed proportionally across SEO by the Federal Ministry of Education and Research. Therefore, the sum of the breakdown for those years does not add to the total. From 2016 onwards the global reduction is distributed across SEO proportionally.

Prior to 1986, the TBP data for Germany cover transactions concerning patents, licences, trademarks, models, and designs. Thereafter, this data also covers technical services, computer services, and industrial R&D. TBP data are published according to the BPM6 as of 2013.

- In **Greece**, in 2011, methodological improvements and a better coverage resulted in breaks in series: in the business enterprise sector, a new population frame was defined to cover all R&D-performing firms; in the government sector, the coverage was extended to also cover public hospitals as well as all institutions administered by the Ministry of Culture; in the higher education sector, all Technological Educational Institutes (TEI) and post-secondary establishments were included. These methodological changes were also applied to estimate the total GERD, BERD, GOVERD, and HERD between 2008 and 2010.

  The methods for estimating R&D in the Higher Education sector changed in 1983, 1989, and 1995.

  From 2008, GBARD data are exclusively based on R&D funders. Part of the increase in 2008 is also explained by a better identification of GBARD for cultural and archaeological activities.

- In **Hungary** the breakdown of R&D expenditure data by sector of performance and by source of funds is not complete. Beginning in 2006, government-financed R&D, some of which was not allocated to the appropriate sector, is now allocated, in particular to the Business enterprise sector. Prior to 2004, only defence R&D performed in the civil sector is covered. Up until 1993, Business Enterprise expenditure includes purchases of licenses and know-how. As of 1994, the Central Technology Fund has been reclassified from the Business Enterprise sector to the Government sector.

  2013 GBARD data include multi-annual R&D projects which are not allocated to the year in which they were budgeted.

  Up to 2003, the source of TBP data was the balance of payments statistics compiled by the Hungarian Central Bank; data covered royalties and licence fees and sale/purchase of patents and inventions only. Since 2004, TBP data have been collected by the Hungarian Central Statistical Office from enterprise surveys on trade in services. TBP data also include computer services, architectural, engineering and other technical services and R&D carried out abroad. TBP data are published according to the BPM6 from 2008 on.

- In **Iceland**, in 2015, the implementation of the 2015 Frascati Manual edition has affected the distribution of personnel data by occupation. From reference year 2013, the R&D data collection methodology has been changed resulting in breaks in series. The main differences concern the redesign of the questionnaire, use of business registers in the sample selection mechanism, the legal obligation for firms to respond, the definition of

key R&D concepts in the questionnaire, and changes in the allocation of institutions into the business or government sectors. New sampling methods caused a break in series in 2010 (or in 2011 for sectors with no 2010 data).

From 2014 onward, GBARD data are provided by Statistics Iceland and are compiled according to the Frascati Manual guidelines. From 2006, GBARD data make better use of R&D information from the state budget and are based on a better coverage of relevant R&D funding in major recipients organizations. From 1993, new methods for collecting and processing budget data for GBARD result in a break in series.

TBP data are published according to the BPM6 from 2013.

- In **Ireland**, from 2014, data on researchers in the higher education sector include PhD students. As of 2000, personnel data in the government sector were surveyed in FTE. Prior to 2000, data were collected for human resources devoted to S&T in FTE, and the R&D expenditure to total S&T expenditure ratio was applied.

  The government data were revised back to 1992, as some government expenditures are no longer classified as R&D.

  Prior to 2004, EU funds were included in GBARD data.

  TBP data are published according to the BPM6 as of 2012.

- In **Israel**, from 2000 onwards, hospitals were re-classified to the business sector from the government and PNP sectors. Both the business enterprise and higher education surveys were improved in 2009, causing a break in series for the BERD financed by the rest of the world and by the Business Enterprise sector, as well as a break in 2007 for the HERD financed by the rest of the world and by the Higher Education sector. Since 2001, the government sector is covered by a survey; beforehand government R&D was estimated through financial reports and interviews of accountants.

  Data for the higher education sector are partly based on universities'financial reports. Before 2008, humanities and law are only partially covered in the higher education sector.

  The 2009 BERD survey has given more options to businesses to break down the data by sources of funds. Using the results of the 2009 survey, BERD and GERD financed by Business Enterprises and by the rest of the world were revised back to 1993.

  TBP data are published according to the BPM6 as of 2011.

  The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities or third party. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

- For **Italy**, in 2005 and 1997, new methods for estimating R&D in universities were introduced, resulting in breaks in series in the higher education sector.

  Up until 1990, the total expenditure on R&D is overestimated by more than 10% as extramural R&D expenditures is included. From 1991, data on extramural R&D expenditure is available separately.

  2010 GBARD data are calculated with a new set of coefficients especially affecting the data on non-oriented research programmes.

  Up to 2007, the source of TBP data was the balance of payments statistics compiled by the Ufficio Italiano dei Cambi (UIC), based on the ITRS system (settlement data collection system). On 1st January 2008, UIC ceased to exist and its functions were taken over by the Bank of Italy. The data are derived from a new data collection system, mainly based on direct reporting from enterprises. Until 1991, R&D performed in the rest of the world is excluded.

- For **Japan** in 2008 and 2013, the FTE coefficients for researchers in the higher education sector were revised, producing an increase (in 2013) and a decrease (in 2008) in both R&D expenditure and personnel for this sector and the national total.

  Beginning with the 2002/2003 survey (OECD data 2002), the coefficients supplied by the Ministry of Education, Culture, Sports, Science and Technology were applied to doctoral level students as well as teachers when calculating FTE for the HE sector, resulting in a break in series in that year.

  Before 1996, Higher Education expenditure and personnel data in FTE are OECD estimates derived from official headcount-based data.

  GBARD data represent the budget for S&T and cover central government only. Since 2018, the aggregation method of S&T budgets has changed. From 2011 onwards, GBARD for the "Education and Society" socio-economic objective include a more accurate measure of the budget of the National Institute for Cultural Heritage. Military procurement contracts are excluded from defence GBARD. Before 2010, GUF excludes SSH.
- In **Korea**, SSH are excluded from the R&D data prior to 2007.

  From 2013, GBARD data on the education objective are available separately, having previously been included in non-oriented research. Since 2008, GBARD has been broken down to fit NABS 2007 using estimation techniques.

  TBP data for technology receipts and payments do not come from the same source and are therefore not comparable. Technology receipts data come from the R&D survey and are probably underestimated as all firms are not surveyed. Technology payments data come from the balance of payments statistics compiled by the Bank of Korea.
- In **Luxembourg**, a better identification of R&D in software-related activities resulted in a break in series in 2012 for BERD (and GERD). From 2009, some budgetary items of the Ministry of Research and other ministries are no longer included in the government's own R&D funds. The impact on GOVERD is a drop of less than 7 million.

  The significant increase in R&D performed in the higher education sector in 2004 is due to the re-defined role of higher education in the national system of innovation and research, in particular the newly created University of Luxembourg.

  Government budget allocations for space programs and GUF are included from 2006.

  The Luxembourg balance of payments was based on an International Transactions Reporting System (ITRS) up until 2011. From 2012 onwards, this has been replaced by direct reporting from companies. Banks are still reporting their own Balance of Payments transactions.
- In **Mexico**, post-graduate students are included in R&D expenditure data from 2007. Beginning with the 2004 data, the Business enterprise survey register was increased to include large firms not previously identified as R&D performers. The first R&D surveys based on the Frascati Manual covered the period 1992-93. Earlier data for R&D performed in the Government sector are based on national estimates and do not exactly correspond to the recommendations of the Frascati Manual.
- In the **Netherlands**, in 2012, the method for sampling enterprises included in ISIC industries 84 to 99 (community, social, and personal services) as well as the breakdown of personnel data by occupation were modified leading to breaks in series in the business and government sectors. In 2011, the method for producing business enterprise data changed: all observed enterprises are included whereas before 2011, only enterprises with substantial R&D activities (*i.e.* with a minimum number of R&D personnel) were incorporated. Subsequent changes affected the higher education sector: before 1999, a

large number of PhD candidates were formally employed by research institutes (in the government sector) financing their research. From 1999, universities became the formal employer of PhD candidates and their research activities moved from the Government sector to the Higher Education sector. Besides this, the R&D activities of the Universities of Applied Sciences (HBO) were taken into account for the first time. Finally the R&D activities of the Academic hospitals were increasingly underestimated due to the merging of the Academic hospitals and (parts) of the Faculties of Medicine of the universities into so-called University Medical Centers (UMC's). This started in 1998 and meant for instance that staff of the Faculty of Medicine of the university became employees of the UMC. As a result, data on R&D in the field of medical sciences were also revised. As of 2000, newly-recruited researchers on the payroll of the Netherlands Organisation for Scientific Research (NOW), previously included in the Government sector, were included with personnel in the higher education sector. In 1982 and 1990, the methodology of the survey on R&D expenditure changed.

In 2003, Statistics Netherlands revised the panel of the R&D survey for the Government and PNP sectors, resulting in breaks in series for both. Also beginning in 2003, R&D personnel in the PNP sector are grouped with Government sector R&D personnel.

In 1994 and 1996 there were major expansions of the scope of the Business Enterprise sector survey; R&D expenditure and personnel data in the latter sector and in the whole economy are thus not comparable with those for the previous years.

In 1990 and 1999, new methods for calculating GUF are introduced for GBARD series.

TBP data are published according to the BPM6 as of 2014.

- **New Zealand** revised the methods of collection and estimation of R&D data respectively in 1984 (for the Higher Education sector), 1992 (for GUF), and 2001 (BERD and national total and HE personnel).

  In 2016, part of R&D budgets previously reported in the "R&D financed from other sources than GUF" objective was reallocated to "economic development programmes" (more precisely to the "industrial production and technology" objective). GBARD figures have been revised back to 2007 resulting in a break in series. From 2006 onwards, GBARD data are collected from all government agencies, together with analysis of selected budgetary information. Prior to that year, data were derived from the budget estimate of the pool for science funding, together with figures on government departments' operational research.

  Up to 1997, TBP data came from the R&D survey conducted by the Ministry of Research, Science, & Technology. From 1999 onwards, the data are based on the quarterly International Trade in Services and Royalties Survey carried out by Statistics New Zealand. All TBP components are covered. TBP data are published according to the BPM6 as of 2012.

- In **Norway**, in 2007, a break in series occurs because of a change in compilation methods for health institutions. This affects both the Higher education sector (university hospitals) and Government sector (other hospitals).

  In 1995, the survey sample was revised to improve coverage of small firms (10 to 50 employees) and non-manufacturing industries.

  As of 1991, personnel in central administration units of higher education are not included, however the cost of such personnel is included in other current R&D expenditure (in line with the Frascati Manual).

  In 1987, own funds from Public enterprises were reclassified from funds from Government to the funds from the Business Enterprise sector. As of 1989, R&D performed by PNP institutes has been included in the government sector.

The growth in resources devoted to R&D in 1984 is due to the expansion of the scope of the Business Enterprise sector survey.

The method for compiling GBARD data changed in 1996. The series have been revised retrospectively to exclude contract research, state enterprises and payments to the European Commission.

Before 1988, TBP data cover only patent licensing and are consequently underestimated.

- In **Poland**, in 2016, some units previously classified in the Government sector were reallocated to the Business sector. From 2013, improvements in R&D surveys enable the distribution of all expenditure by type of R&D, leading to a break in basic research series.

  GBARD data exclude European Commission funds since 2012.

  Up to 1999, TBP data cover trade in techniques; transactions involving trademarks, patterns and designs; services with a technical content (including prospecting until 1995 and spatial planning, town planning and architectonic work); R&D performed abroad. From 2000, all categories are covered (acquisition/disposal of non-produced, non-financial assets, royalties and licence fees, computer services, architectural, engineering and other technical services and R&D services). TBP data are published according to the BPM6 from 2011.

- In **Portugal**, a significant number of entities previously classified in the PNP sector were re-classified to the higher education sector in 2013. Besides, R&D personnel occupation categories have been reviewed: researchers, technicians and other support staff have been defined according to the main functions performed by each individual as part of R&D activities and according to criteria based on the ISCO classification, rather than being defined only by the level of academic qualification. In 2008, the number of R&D personnel increased because of methodological improvements: the results of the individual survey forms were combined with information from other internal databases resulting notably in the inclusion of all permanent academic staff and all researchers funded by the Ministry of science, technology and higher education in 2008.

  Due to methodological improvements in the 2008 R&D survey as well as complementary information collected from internal databases, there is now a more complete and accurate measure of R&D resources – both expenditure and personnel – in the Higher education sector. In particular, the large increase in higher education funded R&D is due to the inclusion of more accurate data related to private higher education institutions.

  Beginning with the 2007 survey, the following measures resulted in a significant increase in Business enterprise R&D: the reintroduction of the fiscal incentive, SIFIDE; an increase in the number of the firms performing R&D activities; and an updating of the Business Enterprise register.

  New methodological procedures have been adopted for the 1997 survey so that only R&D activities are covered in the survey. The classification of BERD by NACE (Rev 1) was introduced and the data have been revised back to 1995. Some of the PNP units have been re-classified to the Business Enterprise and Higher Education sectors.

  In 1997, due to a new accounting method for structural funds from the European Commission, funds from the Rest of the World and direct Government financing are not comparable with those of earlier years.

  Before 2002, GBARD figures include EU funding programs. Thereafter, they are excluded, as set out in the 2015 Frascati Manual.

  TBP data are published according to the BPM6 as of 1996.

- For the **Slovak Republic**, data before 1994 refer to the Research and Development Base (RDB) and cover the whole activity of institutions and not only R&D. Defence R&D was totally excluded until 1997 and only partially included thereafter.

  Since 2002, a new budget classification compatible with COFOG enables the identification of government budget allocations for defence R&D. The defence category includes R&D allocations for defence, safety, and security of the country. For earlier years, defence R&D was included in the GBARD total.

- In **Slovenia**, before 2014, the GERD allocation by type of R&D was estimated from the number of projects recorded in each type of R&D, and not from the actual amount of R&D expenditure (as it is the case from 2014). In 2011, the increase in R&D personnel and expenditure is notably explained by both the improvement of non-response analysis and new administrative sources to better identify R&D performers. Beginning reference year 2008, survey coverage was expanded to include some innovative companies that were not previously recognized as R&D performers.

- For **Spain**, beginning in 2008, the R&D questionnaire includes a specific category for on-site consultants undertaking R&D projects in the enterprise; as well as a specific category within the breakdown of current costs.

  Since 2004, loans for R&D that are returnable are not included in GBARD, in order to ensure international comparability.

  From 2002, R&D expenditure and personnel data for the business enterprise sector include both occasional and regular R&D.

  Prior to 1989 R&D personnel data for the Higher Education sector only include researchers. In consequence, total R&D personnel may be underestimated in these years by between 10 and 15 %.

  In 1992 there was an upward reestimation of General University Funds causing a break in series in the financing of HERD and GERD. In 1995, the sources of funds for R&D in the Higher Education sector were reviewed; own funds are now separated from the General University Funds, where they were previously included.

  In 1997, the defence objective in GBARD almost doubled in magnitude due to an exceptional contribution by the Ministry for Industry and Energy. The incorporation in 1997 of the Spanish contribution to CERN has involved substantial changes in the "Energy" category.

  Up to 1992, TBP data come from the annual survey into technological transfer in companies conducted by the Ministry of Science and Technology (former Ministry of Industry and Energy). From 1996 onwards, TBP data come from the balance of payments statistics compiled by the Spanish Central Bank. All TBP items are covered. TBP data are published according to the BPM6 as of 2008.

- In **Sweden**, the organisation of the police force was changed in 2015 and this has altered the coverage of the R&D personnel figures (in the government sector) received through survey responses. Part of personnel data were reallocated from the category "technicians" to the category "researchers" in 2013. In 2011 and 2009, the PNP sector decreased due to a new sampling method. In 2011, for personnel data, the institutional coverage of the Government sector was improved.

  Beginning 2007, researchers in the Business enterprise, Government and PNP sectors are now surveyed by occupation; prior to that year, data correspond to university graduates instead of researchers.

  Until 2005, R&D data for Sweden were underestimated: R&D in the Government sector covered central government units only and companies between 10-49 employees were

excluded from the coverage. Moreover, prior to 1993 the surveys in the Business Enterprise, Government and Private Non-Profit sectors excluded R&D in the SSH. Also beginning 2005, FTE on R&D in the Higher education sector reflects a change in survey method. Concerning the Government sector, beginning 2005, the data exclude R&D personnel from the County councils, resulting in the personnel data being underestimated.

From 1997, funding from the Public Research Foundations, previously classified in the PNP sector, is considered as funding from the government sector, due to their re-classification.

In 1995, some institutions from the PNP sector were reclassified to the Business Enterprise or Government sectors; in the Higher Education sector, capital expenditures are excluded.

From 1998, GBARD series refer to the calendar year (January-December) instead of the period July-June which had been used until 1994. Budget allocations for 1995 and 1996 are estimates based on the period July 1995-December 1996. Also from 1998, funding by Public Research Foundations is excluded from the GBARD data.

Up to 1993, TBP data came from the R&D survey and referred to transactions linked to patents, licences, royalties and know-how. From 1998, the data are based on the quarterly trade in services survey. All TBP components are covered. TBP data are published according to the BPM6 from 2013.

- In **Switzerland**, the Business Enterprise sector comprises private enterprises only. Public enterprises are included in the Government sector.

  From 2000, the Government sector no longer includes the telecommunications companies that have been privatised (Swisscom).

  The Swiss contribution to the European Space Agency is allocated to the space objective in GBARD as of 2006, while it was before included in non-oriented research programmes. From 1998, the Federal Office of Agriculture and its research institutes no longer break down their R&D by socio-economic objective but group all under "Agriculture". For GBARD this results in a break in series for both Agriculture and Health objectives, where half of the funds previously declared under Health are now declared under Agriculture. Also in 1998, the telecommunications field of the Federal Post office has become the private enterprise Swisscom which is no longer included under the Infrastructure objective in GBARD. Before 1994, GBARD did not include the public sector financed R&D mandates.

  TBP statistics are drawn from the Swiss balance of payments. Up to 2001, they include sales and purchases of intangible assets, technological services (construction services, commercial and technical consulting), license and patent fees, including management fees, computer and information services. From 2002 onwards, TBP data include the following BPM6 items: Charges for the use of intellectual property; Computer services; Architectural, engineering and planning, scientific and other technical services; and Research and development services.

- Before 2016, total R&D personnel data for **Turkey** are underestimated because personnel data for the Higher Education sector only include researchers.

- In the **United Kingdom**, the methodology for distributing GOVERD by type of R&D was improved in 2010, resulting in a break in series. Beginning in 2005, numbers of researchers in FTEincorporate a more accurate measure of post-graduate students. Estimates are based on the sum of student time allocated to different research activities (some students may be involved in several research projects). Students who spend 50% or more of their time on research activities are counted as one FTE; those for whom it is less than 50% are not counted.

In 2001, the government research agency, the Defence Evaluation and Research Agency (DERA) was disbanded and two new organisations were created. Around one quarter of DERA remained within the Ministry of Defence as a government agency, whilst the remaining three quarters became a private limited company, resulting in a break in series in both the Government and business enterprise sectors as well as GBARD.

In 1996, following work to enhance the estimates of R&D by PNPs, estimates of PNP R&D were substantially revised downwards. The data for previous years were revised accordingly.

Until 1994 BERD funding by business includes funds that may have been from other national sources such as higher education or PNPs.

A new method for estimating government-financed R&D in the Higher Education sector was applied from 1993.

Reclassification of institutes explains most of the growth of the R&D personnel in the Government sector between 1991 and 1992 and the decline in the following year.

From 1991 the data for the Government sector include an estimate for R&D expenditures in the public health services.

Between 1985 and 1986 the "United Kingdom Atomic Energy Authority" was transferred from the Government sector to the Business Enterprise sector. Expenditure revisions have been made back to 1985.

Due to lack of official data for the higher education sector, the OECD Secretariat has made estimates for total researchers beginning 1999 and total R&D personnel beginning 1994.

As of 1995, the Health objective in GBARD has been broadened to include the total net costs to National Health Service trusts of their involvement in R&D.

Oil company operations have been included in the United Kingdom TBP data from 1984. From 1996 onwards, the TBP data cover sales of patents and inventions, patent licensing, trademark patterns and designs, technology-related services, and R&D. TBP data are published according to the BPM6 as of 2003.

- For the **United States**, in the business sector, the funds from the rest of the world previously included in the business-financed BERD, are available separately from 2009. In the higher education sector all fields of SSH are included from 2003 onwards.

  Following a survey of federally-funded research and development centers (FFRDCs) in 2005, it was concluded that FFRDC R&D belongs in the government sector – rather than the sector of the FFRDC administrator, as had been reported in the past. R&D expenditures by FFRDCs were reclassified from the other three R&D performing sectors to the Government sector; previously published data were revised accordingly. Between 2003 and 2004, the method used to classify data by industry has been revised. This particularly affects the ISIC category "wholesale trade" and consequently the BERD for total services.

  U.S. R&D data are generally comparable, but there are some areas of underestimation:

  i) Up to 2008, Government sector R&D performance covers only federal government activities. That by State and local government establishments is excluded;

  ii) Except for the Government sector, the R&D data exclude capital expenditures. For the Business Enterprise sector, depreciation is reported in place of gross capital expenditures.

  Higher education (and national total) data were revised back to 1998 due to an improved methodology that corrects for double-counting of R&D funds passed between institutions.

Breakdown by type of R&D (basic research, applied research, etc.) was also revised back to 1998 in the business enterprise and higher education sectors due to improved estimation procedures.

The methodology for estimating researchers was changed as of 1985. In the Government, Higher Education and PNP sectors the data since then refer to employed doctoral scientists and engineers who report their primary work activity as research, development or the management of R&D, plus, for the Higher Education sector, the number of full-time equivalent graduate students with research assistantships averaging an estimated 50 % of their time engaged in R&D activities. As of 1985 researchers in the Government sector exclude military personnel. As of 1987, Higher education R&D personnel also include those who report their primary work activity as design.

Due to lack of official data for the different employment sectors, the total researchers figure is an OECD estimate.

2009 GBARD data also includes the one time incremental R&D funding legislated in the American Recovery and Reinvestment Act of 2009. Beginning with the 2000 GBARD data, budgets for capital expenditure – "R&D plant" in national terminology – are included. GBARD data for earlier years relate to budgets for current costs only.

Up to 2000, the United States TBP data cover only royalties and licence fees. From 2001, data also include "Research, development and testing services". Beginning 2006, new statistics on total trade for several types of services are available for the first time. As of 2006, TBP data include royalties and license fees related to industrial processes, business format franchising fees, trademarks and other intangibles; research, development and testing services; computer and data processing services; architectural, engineering and other technical services; industrial engineering services.

Non-member economies

- For **Argentina**, from 2009, business R&D data are derived from a new survey covering an expanded sample of enterprises. The following national report gives further information about the impact of the new methodology on BERD estimates: *http://indicadorescti.mincyt.gob.ar/documentos/Informe_Encuesta%20I+D.pdf* (in Spanish).

  Since 1997, data for human resources relate to R&D. Before that, human resources data were expressed in terms of Science and Technology Activities (STA), involving R&D and diffusion activities of S&T (library services, training services, conferences, etc.). These have not been transferred to the OECD database. Since 2002, the source of funds data for private non-profit organisations, universities and S&T public organisations are requested for R&D. Before 2002, these sources of funds data were requested in terms of STA. These data were converted into R&D by means of a coefficient for each sector of performance. The main source of funds for science and technology activities in Argentina is the National Budget.

- In **China**, the national breakdown by source of funds does not fully match with the classification defined in the Frascati Manual. The R&D financed by the government, business enterprises, and by the rest of the world can be retrieved but part of the expenditure has no specific source of financing, i.e. self-raised funding (in particular for independent research institutions), the funds from the higher education sector and left-over government grants from previous years.

  The government and higher education sectors cover all fields of NSE and SSH while the business enterprise sector only covers the fields of NSE. There are only few organisations in the private non-profit sector, hence no R&D survey has been carried out in this sector and the data are not available.

From 2009, researcher data are collected according to the Frascati Manual definition of researcher. Beforehand, this was only the case for independent research institutions, while for the other sectors data were collected according to the UNESCO concept of "scientist and engineer".

In 2009, the survey coverage in the business and the government sectors has been expanded.

Before 2000, all of the personnel data and 95% of the expenditure data in the business enterprise sector are for large and medium-sized enterprises only. Since 2000 however, the survey covers almost all industries and all enterprises above a certain threshold. In 2000 and 2004, a census of all enterprises was held, while in the intermediate years data for small enterprises are estimated.

Due to the reform of the S&T system some government institutions have become enterprises, and their R&D data have been reflected in the Business Enterprise sector since 2000.

- In **Romania**, in 2011, R&D questionnaires have been redesigned for all sectors (and merged with the Community Innovation Survey in the case of the business enterprise sector). This has had an impact on the number of researchers in both the higher education and business enterprise sectors. A substantial proportion of R&D expenditure and R&D personnel reported in the data for the business enterprise sector are performed/employed in public enterprises (57.4% and 62% respectively for the year 2003).

  The higher education sector includes faculty hospitals. For some of these hospitals, as well as for other types of medical centres, there are problems of delimitation between R&D activities and health activities and in these cases no data is available on R&D expenditures and personnel. The higher education sector does not include experimental stations: given the specific nature of their activity, these are directly co-ordinated by the Ministry of Agriculture, and therefore included in the business enterprise sector.

  In 2013, a change in methodology for the allocation of GBARD data by socio-economic objectives has resulted in a break in series.

  TBP data are published according to the BPM6 as of 2013.

- In the **Russian Federation**, the business enterprise sector includes all organisations and enterprises whose main activity is connected with the production of goods and services for sale, including those owned by the state, and private non-profit institutions serving the above-mentioned organisations. In practice however, R&D performed in this sector is carried out mostly by industrial research institutes other than enterprises. This particularity reflects the traditional organisation of Russian R&D.

  Headcount data include full-time personnel only, and hence are underestimated, while data in full-time equivalents (FTE) are calculated on the basis of both full-time and part-time personnel. This explains why the FTE data are greater than the headcount data.

  New budgetary procedures introduced in 2005 have resulted in items previously classified as GBARD being attributed to other headings and have affected the coverage and breakdown by socio-economic objective.

- In **Singapore**, the Public Research Centres are located within the universities and draw upon university expertise. They are closely linked with the universities and several have "spun off" from university research groups. However they are administratively separate from the universities and funded by the Agency for Science, Technology and Research (A*STAR) and industry. The centres have been included in the "Public Research Institutes and Centres" category in the R&D survey since 1995. Until 1995 they were subsumed in the Higher Education sector. This leads to a discontinuity in the statistics for the Government/Public and Higher Education sectors between 1994 and 1995.

Data for TBP receipts do not include services with a technical content, unless covered under "licensing of new technologies".

- For the 2001/02 R&D survey in **South Africa**, no comprehensive business register was available, nor was there any official register of the specific subset of those entities that actually conduct R&D. However, lists of firms surveyed in previous R&D surveys, those covered in previous technology audits, public listings of the top 200 companies in the economy, as well as lists of firms that participate in public innovation and R&D support programmes were available to the survey agency. These lists provided the basis for a purposive sample of all firms known to have R&D activities. There may however be an underestimation of R&D expenditure by 10% to 15%.
- In **Chinese Taipei**, since 2003, the business sector includes R&D data of private enterprises in the sectors of electricity, gas and water supply; construction; and services, which were not surveyed before.

  Postgraduate students engaged in R&D were not included in the higher education sector until 2002.

  Researchers must have a university degree or above.

  TBP data do not include R&D performed in the rest of the world, services with a technical content, or transactions involving trademarks, design, patterns (sale, licensing, franchising).

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ANNEX 2

Background economic indicators

Table A. Gross domestic product at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	717 193	990 568	995 953	1 102 723	1 116 293	1 128 361	1 181 218
Austria	288 087	373 031	391 635	406 370	416 955	431 124	441 389
Belgium	349 277	455 705	471 332	486 674	499 939	512 016	525 969
Canada	1 167 581	1 427 467	1 464 565	1 550 270	1 617 564	1 599 828	1 625 361
Chile	206 274	350 575	374 242	394 292	404 733	404 737	420 457
Czech Republic	224 201	302 260	305 309	320 535	339 583	352 963	367 172
Denmark	185 074	247 352	250 525	262 368	270 331	276 643	280 839
Estonia	22 376	32 579	34 420	36 239	37 515	37 738	39 136
Finland	167 840	219 214	219 916	224 594	226 490	230 530	238 376
France	1 926 880	2 446 475	2 474 005	2 608 524	2 662 033	2 701 323	2 765 185
Germany	2 636 420	3 427 141	3 503 684	3 647 778	3 813 669	3 905 507	4 030 399
Greece	281 028	290 297	279 267	286 169	292 336	288 888	288 418
Hungary	172 305	227 766	229 106	242 016	251 839	257 371	262 042
Iceland	10 969	12 640	13 052	13 864	14 584	15 714	17 022
Ireland	168 219	206 779	213 300	222 253	237 518	322 445	339 478
Israel[1]	172 005	237 311	250 827	275 062	280 045	300 753	318 409
Italy	1 742 086	2 158 285	2 157 547	2 176 320	2 192 714	2 225 175	2 326 893
Japan	4 045 734	4 573 187	4 746 699	4 967 052	4 986 566	5 176 841	5 369 479
Korea	1 165 894	1 559 447	1 611 273	1 644 777	1 704 458	1 795 917	1 877 123
Latvia	31 002	40 727	43 235	45 640	47 468	48 469	50 137
Luxembourg	31 733	47 691	48 646	51 940	56 544	58 394	59 592
Mexico	1 341 775	1 911 319	2 012 768	2 064 491	2 171 632	2 170 275	2 266 350
Netherlands	608 165	768 994	782 578	817 810	819 745	838 995	860 689
New Zealand	106 147	143 508	145 406	160 891	168 136	174 016	185 218
Norway	220 866	307 810	328 453	340 620	339 137	320 353	307 834
Poland	530 344	869 770	907 168	940 325	973 192	1 010 239	1 039 650
Portugal	238 842	282 734	278 161	291 753	298 995	305 899	316 564
Slovak Republic	89 275	139 467	144 098	151 021	156 749	160 122	165 424
Slovenia	47 902	59 131	59 454	61 380	63 621	64 936	67 575
Spain	1 209 299	1 498 957	1 496 188	1 519 995	1 566 855	1 617 122	1 687 613
Sweden	306 709	413 451	425 754	438 480	451 104	469 296	485 284
Switzerland	301 741	444 549	462 615	486 239	506 895	527 160	534 903
Turkey	807 227	1 443 296	1 539 111	1 690 856	1 851 026	1 944 646	2 007 466
United Kingdom	1 959 227	2 315 781	2 401 858	2 520 761	2 630 223	2 708 048	2 798 060
United States	13 093 726	15 517 926	16 155 255	16 691 517	17 427 609	18 120 714	18 624 475
EU28 (OECD estimates)	13 645 566	17 499 580	17 820 298	18 487 810	19 058 660	19 602 397	20 256 824
OECD-Total[2]	**36 367 151**	**45 743 191**	**47 217 405**	**49 141 598**	**50 894 095**	**52 502 557**	**54 171 199**
Argentina	540 890	817 698	824 212	857 669	851 088	898 177	888 475
China	6 639 273	13 957 940	15 331 824	16 788 030	18 335 663	19 811 754	21 401 559
Romania	207 302	362 612	380 770	396 866	410 314	427 340	454 139
Russian Federation	1 827 554	3 475 385	3 692 393	3 765 661	3 768 772	3 615 033	3 635 868
Singapore	235 376	389 575	412 790	440 931	466 059	481 652	499 345
South Africa	468 740	633 368	659 311	686 673	710 374	728 086	741 691
Chinese Taipei	658 404	947 075	984 378	1 022 334	1 082 496	1 103 116	1 132 899

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Source: OECD, Main Science and Technology Indicators database, July 2018 (underlying sources described in section 10)

Table B. Implicit GDP price indices

Year 2010 = 1.000

	2005	2011	2012	2013	2014	2015	2016
Australia	0.807	1.019	1.017	1.032	1.024	1.020	1.057
Austria	0.916	1.018	1.039	1.056	1.077	1.102	1.114
Belgium	0.916	1.020	1.040	1.051	1.058	1.070	1.087
Canada	0.902	1.032	1.045	1.062	1.083	1.074	1.081
Chile	0.743	1.031	1.043	1.063	1.126	1.182	1.238
Czech Republic	0.930	1.000	1.015	1.029	1.055	1.067	1.080
Denmark	0.885	1.006	1.030	1.039	1.050	1.058	1.057
Estonia	0.750	1.053	1.086	1.124	1.141	1.155	1.174
Finland	0.915	1.026	1.056	1.083	1.101	1.122	1.131
France	0.920	1.011	1.024	1.032	1.038	1.050	1.052
Germany	0.948	1.011	1.026	1.046	1.065	1.087	1.101
Greece	0.867	1.008	1.004	0.981	0.963	0.953	0.944
Hungary	0.820	1.023	1.057	1.088	1.125	1.146	1.157
Iceland	0.680	1.030	1.064	1.083	1.128	1.196	1.221
Ireland	1.052	0.996	1.017	1.027	1.023	1.098	1.098
Israel[1]	0.905	1.019	1.056	1.079	1.090	1.119	1.129
Italy	0.914	1.015	1.029	1.041	1.051	1.061	1.070
Japan	1.053	0.983	0.976	0.973	0.989	1.011	1.013
Korea	0.889	1.016	1.026	1.035	1.041	1.066	1.087
Latvia	0.740	1.064	1.102	1.121	1.140	1.140	1.143
Luxembourg	0.843	1.048	1.075	1.093	1.111	1.125	1.111
Mexico	0.770	1.058	1.101	1.118	1.167	1.199	1.263
Netherlands	0.920	1.001	1.016	1.030	1.031	1.039	1.045
New Zealand	0.864	1.021	1.016	1.065	1.071	1.078	1.112
Norway	0.830	1.030	1.056	1.084	1.113	1.136	1.162
Poland	0.865	1.032	1.057	1.060	1.065	1.073	1.076
Portugal	0.909	0.997	0.993	1.016	1.023	1.044	1.060
Slovak Republic	0.941	1.016	1.029	1.035	1.033	1.031	1.027
Slovenia	0.878	1.011	1.016	1.032	1.040	1.050	1.060
Spain	0.908	1.000	1.001	1.005	1.003	1.009	1.012
Sweden	0.894	1.012	1.023	1.033	1.052	1.073	1.091
Switzerland	0.931	1.003	1.002	1.002	0.996	0.990	0.984
Turkey	0.681	1.082	1.162	1.235	1.327	1.430	1.546
United Kingdom	0.892	1.020	1.036	1.056	1.074	1.079	1.100
United States	0.909	1.021	1.039	1.056	1.075	1.087	1.101
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	0.445	1.237	1.513	1.875	2.631	3.330	4.665
China	0.775	1.081	1.107	1.132	1.141	1.142	1.155
Romania	0.627	1.040	1.088	1.125	1.144	1.174	1.198
Russian Federation	0.555	1.159	1.264	1.333	1.433	1.550	1.606
Singapore	0.911	1.012	1.018	1.016	1.013	1.049	1.049
South Africa	0.695	1.065	1.122	1.191	1.257	1.321	1.411
Chinese Taipei	1.057	0.977	0.982	0.996	1.013	1.046	1.055

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Source: OECD, Main Science and Technology Indicators database, July 2018 (underlying sources described in section 10)

Table C. Purchasing power parities

National currency per USD

	2005	2011	2012	2013	2014	2015	2016
Australia	1.39	1.51	1.54	1.45	1.45	1.47	1.49
Austria	0.88	0.83	0.81	0.80	0.80	0.80	0.80
Belgium	0.89	0.83	0.82	0.81	0.80	0.80	0.80
Canada	1.21	1.24	1.24	1.22	1.23	1.25	1.25
Chile	333.69	348.02	347.23	349.68	367.21	394.34	402.57
Czech Republic	14.56	13.35	13.30	12.79	12.70	13.02	13.00
Denmark	8.57	7.47	7.56	7.35	7.33	7.33	7.36
Estonia	0.50	0.51	0.52	0.52	0.53	0.54	0.54
Finland	0.98	0.90	0.91	0.91	0.91	0.91	0.91
France	0.92	0.84	0.84	0.81	0.81	0.81	0.81
Germany	0.87	0.79	0.79	0.77	0.77	0.78	0.78
Greece	0.71	0.71	0.68	0.63	0.61	0.61	0.60
Hungary	130.93	124.27	125.62	124.98	129.41	133.36	135.17
Iceland	95.84	135.15	136.97	137.02	138.55	142.23	144.11
Ireland	1.01	0.83	0.82	0.81	0.82	0.81	0.81
Israel[1]	3.72	3.94	3.96	3.84	3.94	3.87	3.83
Italy	0.86	0.76	0.75	0.74	0.74	0.74	0.72
Japan	129.55	107.45	104.27	101.30	103.05	102.76	100.28
Korea	788.92	854.59	854.89	869.08	871.88	870.93	874.63
Latvia	0.44	0.50	0.51	0.50	0.50	0.50	0.50
Luxembourg	0.95	0.91	0.91	0.90	0.88	0.89	0.89
Mexico	7.13	7.67	7.86	7.88	8.05	8.54	8.87
Netherlands	0.90	0.84	0.82	0.80	0.81	0.81	0.82
New Zealand	1.54	1.49	1.50	1.45	1.44	1.46	1.47
Norway	9.01	9.08	9.04	9.03	9.28	9.73	10.13
Poland	1.87	1.80	1.80	1.76	1.77	1.78	1.79
Portugal	0.66	0.62	0.61	0.58	0.58	0.59	0.59
Slovak Republic	0.56	0.51	0.50	0.49	0.49	0.49	0.49
Slovenia	0.61	0.62	0.61	0.59	0.59	0.60	0.60
Spain	0.77	0.71	0.69	0.67	0.66	0.67	0.66
Sweden	9.48	8.84	8.65	8.60	8.73	8.95	9.08
Switzerland	1.69	1.40	1.35	1.31	1.28	1.24	1.23
Turkey	0.83	0.97	1.02	1.07	1.10	1.20	1.30
United Kingdom	0.71	0.71	0.70	0.70	0.70	0.70	0.70
United States	1.00	1.00	1.00	1.00	1.00	1.00	1.00
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	1.08	2.66	3.20	3.90	5.38	6.63	9.22
China	2.82	3.51	3.52	3.55	3.51	3.48	3.47
Romania	1.40	1.55	1.56	1.61	1.63	1.67	1.68
Russian Federation	12.74	17.35	18.46	19.42	21.01	23.02	23.67
Singapore	0.90	0.89	0.88	0.86	0.85	0.87	0.86
South Africa	3.50	4.77	4.94	5.16	5.36	5.56	5.87
Chinese Taipei	18.37	15.11	14.92	14.90	14.88	15.20	15.14

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Table D. Value added in industry at current prices and PPP

Million USD

	2005	2011	2012	2013	2014	2015	2016
Australia	484 209	672 884	668 031	733 784	732 448	727 953	765 298
Austria	189 163	244 140	255 176	264 027	271 260	279 944	284 782
Belgium	220 030	283 316	290 627	298 685	306 360	316 232	324 337
Canada	772 894	918 851	938 173	993 773	1 042 316	1 030 886[e]	1 047 340[e]
Chile	151 417[e]	249 898	263 582	275 490	281 272	275 437[e]	284 870[e]
Czech Republic	155 817	207 870	208 734	217 781	234 396	244 044	253 557
Denmark	107 005	141 033	143 797	151 614	156 949	161 548	163 685
Estonia	15 236	21 595	22 790	23 951	24 525	24 013	24 531
Finland	102 863	127 320	125 505	127 024	127 894	130 085	134 592
France	1 141 873	1 417 809	1 424 293	1 497 601	1 526 212	1 548 391	1 585 529
Germany	1 697 866	2 168 882	2 223 338	2 306 650	2 426 217	2 489 012	2 564 623
Greece	172 166	153 105	145 801	152 657	156 353	155 403	152 578
Hungary	109 308	143 839	142 630	151 586	158 647	161 641	163 734
Iceland	6 436	7 991	8 138	8 587	8 806	9 591	10 390[e]
Ireland	114 952	141 770	145 930	154 546	167 050	245 690	258 294
Israel[1]	103 938[e]	139 940	148 603	164 061	164 081[e]	176 677[e]	186 921[e]
Italy	1 104 944	1 323 742	1 311 271	1 321 820	1 331 405	1 356 227	1 418 935
Japan	3 061 437	3 275 729	3 398 139	3 566 122	3 586 371	3 745 587	3 881 888[e]
Korea	798 471	1 078 532	1 109 265	1 133 309	1 169 340	1 231 014	1 278 124[e]
Latvia	20 748	26 525	27 826	28 884	29 707	30 460	31 181
Luxembourg	21 125	32 639	32 655	34 791	38 218	40 707	41 353
Mexico	995 958	1 428 335	1 516 019	1 531 083	1 591 007	1 580 241	1 655 580
Netherlands	396 829	502 413	516 385	534 272	532 594	548 744	560 718
New Zealand	71 276	92 456	93 046	104 319	108 916	112 456	119 694[e]
Norway	146 981	201 030	215 324	221 757	217 684	198 657	186 185[e]
Poland	365 586	608 067	642 529	664 790	687 412	718 512	737 279
Portugal	141 458	166 967	163 956	169 903	174 386	179 667	185 437
Slovak Republic	63 032	100 165	104 508	105 788	114 061	116 139	117 859
Slovenia	31 859	38 374	38 353	39 422	41 599	42 515	44 124
Spain	812 033	955 763	945 577	942 236	974 561	1 011 751	1 061 074
Sweden	189 919	257 471	263 803	269 898	277 921	292 361	299 668
Switzerland	216 809	318 794	330 774	346 846	360 651	373 187	377 411[e]
Turkey	552 853	980 382	1 050 945	1 154 990	1 280 546	1 350 534	1 380 984
United Kingdom	1 198 108	1 390 497	1 434 659	1 524 350	1 590 867	1 630 436	1 691 474
United States	8 495 951	9 731 152	10 203 554	10 577 593	11 080 045	11 463 438	11 782 125[e]
EU28 (OECD estimates)	8 662 188	10 911 929	11 086 372	11 477 982	11 856 015	12 252 778	12 662 490
OECD-Total[2]	**24 079 131**	**29 549 276**	**30 553 733**	**31 793 991**	**32 972 074**	**33 999 178**	**35 056 154**
Argentina	367 939	527 074	518 745	539 339[e]	536 781[e]	556 509[e]	551 708[e]
China	5 308 894[e]	11 029 678[e]	12 020 106[e]	13 028 581[e]	14 145 003[e]	14 981 423[e]	16 183 615[e]
Romania	144 834	251 385	264 692	278 133	282 156	297 549[e]	322 021[e]
Russian Federation	1 302 121[e]	2 395 621[e]	2 505 698[e]	2 517 073[e]	2 576 961[e]	2 573 429[e]	2 586 580[e]
Singapore	197 641[e]	316 417[e]	334 535[e]	355 816[e]	376 757[e]	388 742[e]	400 240[e]
South Africa	330 950[e]	440 520[e]	458 602[e]	475 712[e]	490 295[e]	499 763[e]	505 794[e]
Chinese Taipei	489 642[e]	697 544	715 349	754 022	811 051	829 025	853 726

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Source: OECD, Main Science and Technology Indicators database, July 2018 (underlying sources described in section 10)

Table E. Total population

Thousands

	2005	2011	2012	2013	2014	2015	2016
Australia	20 451	22 728	23 117	23 461	23 791	24 130	24 518
Austria	8 225	8 389	8 426	8 477	8 544	8 630	8 740
Belgium	10 479	10 994	11 068	11 125	11 180	11 238	11 295
Canada	32 242	34 343	34 751	35 152	35 535	35 833	36 265
Chile	16 283	17 267	17 450	17 640	17 836	18 045	18 278
Czech Republic	10 234	10 497	10 509	10 511	10 525	10 543	10 565
Denmark	5 419	5 570	5 591	5 613	5 643	5 682	5 729
Estonia	1 359	1 330	1 325	1 320	1 316	1 313	1 316
Finland	5 246	5 388	5 414	5 439	5 463	5 481	5 495
France	63 168	65 330	65 651	65 990	66 311	66 593	66 860
Germany	81 337	80 275	80 426	80 646	80 983	81 687	82 349
Greece	10 987	11 105	11 045	10 965	10 892	10 821	10 776
Hungary	10 087	9 972	9 920	9 893	9 866	9 843	9 814
Iceland	296	319	321	324	327	331	335
Ireland	4 160	4 577	4 590	4 602	4 615	4 642	4 683
Israel[1]	6 961	7 763	7 907	8 056	8 212	8 377	8 543
Italy	58 191	60 060	60 339	60 646	60 789	60 731	60 628
Japan	127 755	127 831	127 552	127 333	127 262	127 110	126 960
Korea	48 185	49 937	50 200	50 429	50 747	51 015	51 246
Latvia	2 239	2 059	2 034	2 013	1 994	1 977	1 959
Luxembourg	466	519	532	545	558	569	584
Mexico	107 151	115 683	117 054	118 395	119 713	121 005	122 273
Netherlands	16 317	16 693	16 752	16 800	16 863	16 932	17 026
New Zealand	4 148	4 393	4 418	4 460	4 534	4 623	4 720
Norway	4 623	4 953	5 019	5 080	5 137	5 191	5 236
Poland	38 161	38 526	38 534	38 502	38 484	38 455	38 427
Portugal	10 503	10 558	10 515	10 457	10 401	10 358	10 326
Slovak Republic	5 387	5 398	5 406	5 413	5 419	5 422	5 431
Slovenia	2 001	2 053	2 057	2 060	2 062	2 063	2 065
Spain	43 663	46 736	46 766	46 593	46 455	46 410	46 450
Sweden	9 030	9 449	9 519	9 600	9 696	9 799	9 934
Switzerland	7 482	7 912	7 997	8 089	8 189	8 282	8 372
Turkey	68 566	73 950	74 899	75 774	76 619	77 440	78 247
United Kingdom	60 413	63 285	63 705	64 106	64 597	65 110	65 648
United States	295 993	312 114	314 377	316 569	318 887	321 173	323 391
EU28 (OECD estimates)	494 907	504 840	506 032	507 074	508 256	509 697	511 281
OECD-Total[2]	**1 180 925**	**1 247 956**	**1 255 186**	**1 262 079**	**1 269 446**	**1 276 854**	**1 284 484**
Argentina	38 592	41 261	41 733	42 203	42 670	43 132	43 590
China	1 307 560	1 347 350	1 354 040	1 360 720	1 367 820	1 374 620	1 382 710
Romania	21 320	20 148	20 060	19 989	19 916	19 820	19 707
Russian Federation	143 519	142 961	143 000	143 300	143 700	143 888	143 965
Singapore	4 266	5 184	5 312	5 399	5 470	5 535	5 607
South Africa	47 602	51 771	52 325	53 104	53 912	54 750	55 620
Chinese Taipei	22 770	23 225	23 316	23 374	23 434	23 492	23 540

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Source: OECD, Main Science and Technology Indicators database, July 2018 (underlying sources described in section 10)

Table F. Total employment

Thousands

	2005	2011	2012	2013	2014	2015	2016
Australia	9 965	11 249	11 385	11 450	11 654	11 883	12 041
Austria	3 873	4 162	4 205	4 220	4 260	4 285	4 337
Belgium	4 255	4 535	4 555	4 540	4 560	4 601	4 658
Canada	16 407	17 560	17 749	17 988	18 091	18 262	18 454
Chile	6 176	7 463	7 614	7 771	7 897	8 009	8 117
Czech Republic	4 923	5 043	5 065	5 081	5 109	5 182	5 249
Denmark	2 783	2 787	2 767	2 766	2 794	2 829	2 877
Estonia	612	584	594	601	606	623	625
Finland	2 411	2 516	2 538	2 520	2 508	2 504	2 517
France	26 374	27 099	27 185	27 252	27 373	27 434	27 612
Germany	39 326	41 577	42 061	42 319	42 672	43 069	43 638
Greece	4 647	4 382	4 105	3 998	4 035	4 064	4 083
Hungary	4 174	3 971	3 979	4 022	4 216	4 308	4 422
Iceland	162	167	169	175	178	184	191
Ireland	1 962	1 872	1 862	1 908	1 940	1 989	2 045
Israel[1]	2 924	3 505	3 645	3 742	3 847	3 934	4 026
Italy	24 501	24 843	24 765	24 323	24 339	24 498	24 809
Japan	65 531	65 455	65 177	65 549	65 934	66 220	66 852
Korea	22 856	24 244	24 681	25 066	25 599	25 936	26 235
Latvia	969	856	869	889	877	889	886
Luxembourg	308	370	379	386	396	406	418
Mexico	32 801	35 382	36 396	36 615	36 976	37 554	38 181
Netherlands	8 339	8 854	8 836	8 732	8 724	8 806	8 901
New Zealand	2 059	2 185	2 177	2 238	2 312	2 355	2 485
Norway	2 354	2 630	2 685	2 713	2 746	2 757	2 764
Poland	14 057	15 457	15 475	15 464	15 731	15 970	16 061
Portugal	5 041	4 777	4 581	4 450	4 513	4 576	4 651
Slovak Republic	2 089	2 208	2 209	2 192	2 223	2 267	2 321
Slovenia	930	946	937	927	930	942	960
Spain	19 784	19 113	18 343	17 862	18 039	18 521	18 987
Sweden	4 349	4 594	4 627	4 672	4 737	4 807	4 889
Switzerland	4 145	4 594	4 674	4 733	4 822	4 895	4 965
Turkey	19 489	23 367	24 108	24 778	25 633	26 330	26 907
United Kingdom	28 853	29 375	29 695	30 042	30 752	31 281	31 725
United States	143 980	142 173	144 754	146 185	148 513	151 000	153 633[e]
EU28 (OECD estimates)	220 916	225 989	225 127	224 531	226 847	229 316	232 128
OECD-Total[2]	**527 232**	**549 895**	**554 843**	**558 169**	**565 537**	**573 170**	**581 521**
Argentina	15 708	17 503	17 620	17 886	17 859	18 146	18 050
China	746 470	764 200	767 040	769 770	772 530	774 510	776 030
Romania	9 267	9 082	8 645	8 569	8 635	8 526	8 449
Russian Federation	68 339	70 857	71 545	71 391	71 539	72 324	72 393
Singapore	2 320	3 229	3 358	3 494	3 624	3 656	3 673
South Africa	12 769	14 070	14 425	14 866	15 146	15 741	15 780
Chinese Taipei	9 942	10 709	10 860	10 967	11 079	11 198	11 267

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Source: OECD, Main Science and Technology Indicators database, July 2018 (underlying sources described in section 10)

Table G. Industrial employment

Thousands

	2005	2011	2012	2013	2014	2015	2016
Australia	7 453	8 182	8 267	8 255	8 399	8 493	8 566
Austria	2 951	3 140	3 169	3 176	3 206	3 211	3 247
Belgium	2 948	3 121	3 124	3 103	3 105	3 131	3 170
Canada	12 392	12 965	13 137	13 327	13 424	13 510	13 621
Chile	4 774[e]	5 785[e]	5 810[e]	5 967	6 003	6 053	6 175
Czech Republic	3 960	4 057	4 083	4 087	4 100	4 164	4 220
Denmark	1 858	1 825	1 816	1 814	1 839	1 872	1 919
Estonia	471	441	444	452	453	469	470[e]
Finland	1 707	1 770	1 787	1 766	1 757	1 749	1 762
France	18 048	18 481	18 556	18 550	18 604	18 628	18 788[e]
Germany	28 729	30 394	30 803	30 940	31 123	31 279	31 594
Greece	3 648	3 354	3 151	3 068	3 111	3 132	3 144
Hungary	3 242	3 052	3 062	3 057	3 207	3 250	3 344[e]
Iceland	116	121	121	124	127	131	137
Ireland	1 538	1 369	1 357	1 404	1 431	1 468	1 520
Israel[1]	1 882	2 269	2 330	2 403	2 447	2 494	2 569
Italy	18 355	18 521	18 417	17 999	17 929	18 058	18 320
Japan	53 833[e]	52 314[e]	51 774[e]	51 950[e]	52 016[e]	51 957[e]	52 280[e]
Korea	19 172	19 644	19 925	20 135	20 505	20 778	20 890
Latvia	747	653	663	683	673	685	679
Luxembourg	245	290	295	299	306	313	323
Mexico	25 303	26 966	27 674	27 817	28 077	28 449	29 070
Netherlands	6 066	6 295	6 273	6 188	6 220	6 323	6 421
New Zealand	1 557[e]	1 602[e]	1 601[e]	1 647[e]	1 698[e]	1 730[e]	1 826[e]
Norway	1 527	1 682	1 721	1 738	1 758	1 756	1 749[e]
Poland	11 097	12 185	12 181	12 091	12 302	12 516	12 634
Portugal	3 922	3 642	3 460	3 346	3 410	3 469	3 533
Slovak Republic	1 629	1 731	1 736	1 721	1 743	1 781	1 827
Slovenia	765	764	753	744	747	757	771
Spain	15 365	14 226	13 548	13 090	13 212	13 669	14 064
Sweden	2 842	3 055	3 082	3 108	3 141	3 169	3 199
Switzerland	3 202	3 477	3 514	3 537	3 595	3 629	3 658
Turkey	16 854	20 018	20 406	20 992	21 577	22 040	22 299
United Kingdom	21 261	21 153	21 481	21 680	22 330	22 821	23 246
United States	102 536	98 032	100 257	101 477	103 356	104 808	106 636[e]
EU28 (OECD estimates)	165 443	167 117	166 280	165 288	167 009	168 805	171 087
OECD-Total[2]	**397 218**	**406 573**	**409 779**	**411 735**	**416 932**	**421 742**	**427 671**
Argentina	..	..	..	..	..	..	..
China	..	..	..	..	..	..	..
Romania	8 321	7 930	7 508	7 466	7 556	7 334	7 276
Russian Federation	52 372	53 282	53 781	53 947	54 110	54 582	54 407
Singapore	2 040	2 833	2 938	3 059	3 165	3 190	3 194
South Africa	9 714[e]	10 505[e]	10 705[e]	11 026[e]	11 202[e]	11 694	11 749
Chinese Taipei	8 727	9 284	9 426	9 523	9 624	9 735	9 797

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Table H. Exchange rates

National currency per USD

	2005	2011	2012	2013	2014	2015	2016
Australia	1.309	0.969	0.966	1.036	1.109	1.331	1.345
Austria	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Belgium	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Canada	1.212	0.990	0.999	1.030	1.106	1.279	1.325
Chile	559.768	483.668	486.471	495.273	570.348	654.124	676.958
Czech Republic	23.957	17.696	19.578	19.571	20.758	24.599	24.440
Denmark	5.997	5.369	5.792	5.616	5.612	6.728	6.732
Estonia	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Finland	0.804	0.719	0.778	0.753	0.754	0.902	0.904
France	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Germany	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Greece	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Hungary	199.583	201.055	225.104	223.695	232.602	279.333	281.523
Iceland	62.982	115.954	125.083	122.179	116.767	131.919	120.812
Ireland	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Israel[1]	4.488	3.578	3.856	3.611	3.578	3.887	3.841
Italy	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Japan	110.218	79.807	79.790	97.596	105.945	121.044	108.793
Korea	1 024.117	1 108.292	1 126.471	1 094.853	1 052.961	1 131.158	1 160.433
Latvia	0.804	0.713	0.778	0.753	0.754	0.902	0.904
Luxembourg	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Mexico	10.898	12.423	13.169	12.772	13.292	15.848	18.664
Netherlands	0.804	0.719	0.778	0.753	0.754	0.902	0.904
New Zealand	1.420	1.266	1.234	1.219	1.205	1.434	1.437
Norway	6.443	5.605	5.818	5.875	6.302	8.064	8.400
Poland	3.235	2.963	3.257	3.161	3.155	3.770	3.943
Portugal	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Slovak Republic	1.030	0.719	0.778	0.753	0.754	0.902	0.904
Slovenia	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Spain	0.804	0.719	0.778	0.753	0.754	0.902	0.904
Sweden	7.473	6.494	6.775	6.514	6.861	8.435	8.562
Switzerland	1.245	0.888	0.938	0.927	0.916	0.962	0.985
Turkey	1.344	1.675	1.796	1.904	2.189	2.720	3.020
United Kingdom	0.550	0.624	0.633	0.640	0.608	0.655	0.741
United States	1.000	1.000	1.000	1.000	1.000	1.000	1.000
EU28 (OECD estimates)	..	..	..	..	..	..	..
OECD-Total[2]	**..**	**..**	**..**	**..**	**..**	**..**	**..**
Argentina	2.904	4.110	4.537	5.459	8.075	9.233	14.758
China	8.194	6.461	6.312	6.196	6.143	6.227	6.644
Romania	2.914	3.049	3.468	3.328	3.349	4.006	4.059
Russian Federation	28.284	29.382	30.840	31.837	38.378	60.938	67.056
Singapore	1.664	1.258	1.250	1.251	1.267	1.375	1.382
South Africa	6.359	7.261	8.210	9.655	10.853	12.759	14.710
Chinese Taipei	32.167	29.464	29.614	29.770	30.368	31.898	32.318

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ANNEX 3

List of indicators for the electronic publication

The electronic version of the MSTI publication contains, in addition to the indicators published in this volume, most of those which were published in the previous version of the publication before its revision. These are presented as of 1981.

1. Gross Domestic Expenditure on R&D – GERD (million national currency)
2. GERD (million current PPP $)
3. GERD as a percentage of GDP
4. GERD – (million 2010 dollars – constant prices and PPP)
5. GERD – Compound annual growth rate (constant prices)
6. GERD per capita population (current PPP $)
7. Estimated Civil GERD as a percentage of GDP
8. Basic research expenditure as a percentage of GDP
9. Total researchers (FTE)
10. Total researchers – Compound annual growth rate
11. Total researchers per thousand total employment
12. Total researchers per thousand labour force
13. Total R&D personnel (FTE)
14. Total R&D personnel – Compound annual growth rate
15. Total R&D personnel per thousand employment
16. Total R&D personnel per thousand labour force
17. Business-financed GERD as a percentage of GDP
18. Government-financed GERD as a percentage of GDP
19. Percentage of GERD financed by the business sector
20. Percentage of GERD financed by government
21. Percentage of GERD financed by other national sources
22. Percentage of GERD financed by the rest of the world
23. Percentage of GERD performed by the Business Enterprise sector
24. Percentage of GERD performed by the Higher Education sector
25. Percentage of GERD performed by the Government sector
26. Percentage of GERD performed by the Private Non Profit sector
27. Total researchers (headcount)
28. Women researchers (headcount)
29. Women researchers as a percentage of total researchers (headcount)
30. Business Enterprise Sector: Total researchers (headcount)
31. Business Enterprise Sector: Women researchers (headcount)

32. Business Enterprise Sector: Women researchers as a percentage of total researchers (headcount)
33. Government Sector: Total researchers (headcount)
34. Government Sector: Women researchers (headcount)
35. Government Sector: Women researchers as a percentage of total researchers (headcount)
36. Higher Education sector: Total researchers (headcount)
37. Higher Education sector: Women researchers (headcount)
38. Higher Education sector: Women researchers as a percentage of total researchers (headcount)
39. Business Enterprise Expenditure on R&D – BERD (million national currency)
40. BERD (million current PPP $)
41. BERD as a percentage of GDP
42. BERD – (million 2010 dollars – constant prices and PPP)
43. BERD – Compound annual growth rate (constant prices)
44. BERD as a percentage of value added in industry
45. Business Enterprise researchers (FTE)
46. Business Enterprise researchers – Compound annual growth rate
47. Business Enterprise researchers as a percentage of national total
48. Business Enterprise researchers per thousand employment in industry
49. Total Business Enterprise R&D personnel (FTE)
50. Total Business Enterprise R&D personnel – Compound annual growth rate
51. Total Business Enterprise R&D personnel as a percentage of national total
52. Total Business Enterprise R&D personnel per thousand employment in industry
53. Business-financed BERD – (million 2010 dollars – constant prices and PPP)
54. Business-financed BERD – Compound annual growth rate (constant prices)
55. Business-financed BERD as a percentage of value added in industry
56. Percentage of BERD financed by the business sector
57. Percentage of BERD financed by government
58. Percentage of BERD financed by other national sources
59. Percentage of BERD financed by the rest of the world
60. BERD performed in the pharmaceutical industry (million current PPP $)
61. BERD performed in the computer, electronic and optical industry (million current PPP $)
62. BERD performed in the aerospace industry (million current PPP $)
63. BERD performed in service industries (million current PPP $)
64. Percentage of BERD performed in the pharmaceutical industry
65. Percentage of BERD performed in the computer, electronic and optical industry
66. Percentage of BERD performed in the aerospace industry
67. Percentage of BERD performed in service industries
68. Higher Education Expenditure on R&D – HERD (million national currency)
69. HERD (million current PPP $)
70. HERD as a percentage of GDP

71. HERD – (million 2010 dollars – constant prices and PPP)
72. HERD – Compound annual growth rate (constant prices)
73. Percentage of HERD financed by the business sector
74. Higher Education researchers (FTE)
75. Higher Education researchers – Compound annual growth rate
76. Higher Education researchers as a percentage of national total
77. Higher Education Total R&D personnel (FTE)
78. Higher Education Total R&D personnel – Compound annual growth rate
79. Government Intramural Expenditure on R&D – GOVERD (million national currency)
80. GOVERD (million current PPP $)
81. GOVERD as a percentage of GDP
82. GOVERD – (million 2010 dollars – constant prices and PPP)
83. GOVERD – Compound annual growth rate (constant prices)
84. Percentage of GOVERD financed by the business sector
85. Government researchers (FTE)
86. Government researchers – Compound annual growth rate
87. Government researchers as a percentage of national total
88. Government Total R&D personnel (FTE)
89. Government Total R&D personnel – Compound annual growth rate
90. Total Government Budget Allocations for R&D – GBARD (million national currency)
91. Total GBARD (million current PPP $)
92. Defence Budget R&D as a percentage of Total GBARD
93. Civil Budget R&D as a percentage of Total GBARD
94. Civil GBARD for Economic Development programmes (million current PPP $)
95. Civil GBARD for Health and Environment programmes (million current PPP $)
96. Civil GBARD for Education and Society (million current PPP $)
97. Civil GBARD for Space programmes (million current PPP $)
98. Civil GBARD for Non oriented Research programmes (million current PPP $)
99. Civil GBARD for General University Funds (GUF) (million current PPP $)
100. Economic Development programmes as a percentage of Civil GBARD
101. Health and Environment programmes as a percentage of Civil GBARD
102. Education and Society as a percentage of Civil GBARD
103. Space programmes as a percentage of Civil GBARD
104. Non oriented Research programmes as a percentage of Civil GBARD
105. General University Funds (GUF) as a percentage of Civil GBARD
106. R&D expenditure of foreign affiliates (million national currency)
107. R&D expenditure of foreign affiliates (million current PPP $)
108. R&D expenditure of foreign affiliates as a percentage of R&D expenditures of enterprises
109. Number of “triadic” patent families (priority year)
110. Number of patent applications filed under the PCT(priority year)

111. Share of countries in “triadic” patent families (priority year)
112. Number of patents in the ICT sector – applications filed under the PCT (priority year)
113. Number of patents in the biotechnology sector – applications filed under the PCT (priority year)
114. Technology balance of payments: Receipts (million national currency)
115. Technology balance of payments: Payments (million national currency)
116. Technology balance of payments: Receipts (million current dollars)
117. Technology balance of payments: Payments (million current dollars)
118. Technology balance of payments: Payments as a percentage of GERD
119. Total exports: Pharmaceutical industry (million current dollars)
120. Total exports: Computer, electronic and optical industry (million current dollars)
121. Total exports: Aerospace industry (million current dollars)
122. Total imports: Pharmaceutical industry (million current dollars)
123. Total imports: Computer, electronic and optical industry (million current dollars)
124. Total imports: Aerospace industry (million current dollars)
125. Trade Balance: Pharmaceutical industry (million current dollars)
126. Trade Balance: Computer, electronic and optical industry (million current dollars)
127. Trade Balance: Aerospace industry (million current dollars)
128. Export market share: Pharmaceutical industry
129. Export market share: Computer, electronic and optical industry
130. Export market share: Aerospace industry
131. Implicit GDP Price Indices (2010 = 1.00)
132. Exchange Rates (national currency per dollar)
133. Purchasing Power Parity (national currency per dollar)
134. Gross Domestic Product (million national currency)
135. Gross Domestic Product (million current PPP$)
136. Value Added of Industry (million national currency)
137. Value Added of Industry (million current PPP$)
138. Population (thousands)
139. Labour Force (thousands)
140. Total Employment (thousands)
141. Industrial Employment (thousands)

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