



Main Science and Technology Indicators

Main Science and Technology Indicators

Volume 2018/1

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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/innofrascati-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 suppress 'b' flags indicating breaks in series.
- 's' flags are not replaced with 'd'.

Key figures

Key Figures

2016 or latest year available

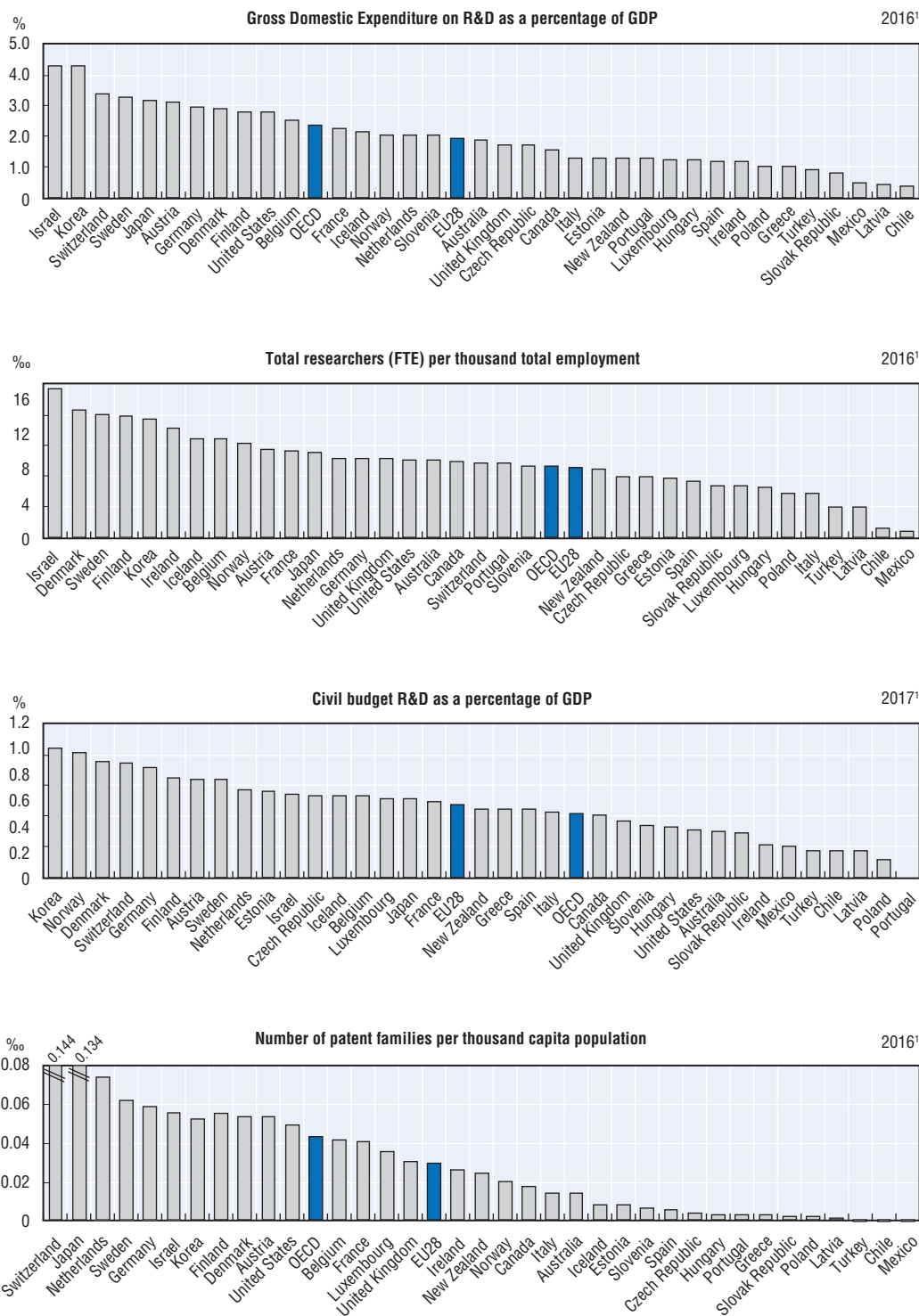
| | Gross Domestic Expenditure on R&D | | | | | | Total Researchers |
|------------------------------|-----------------------------------|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------------|
| | 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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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.

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.



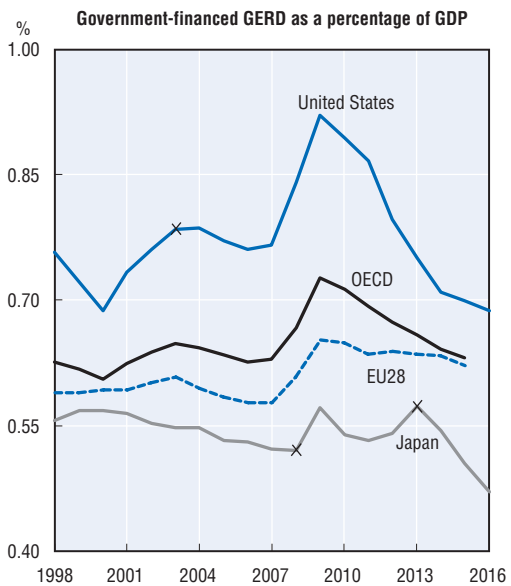
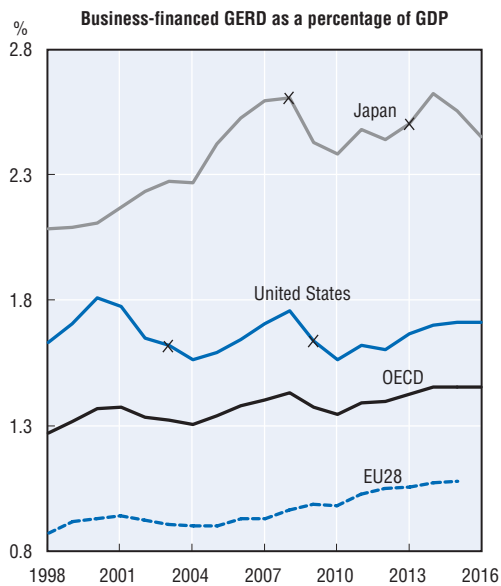
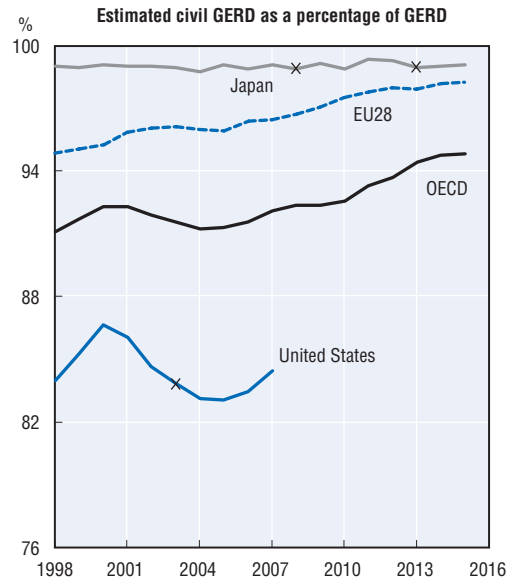
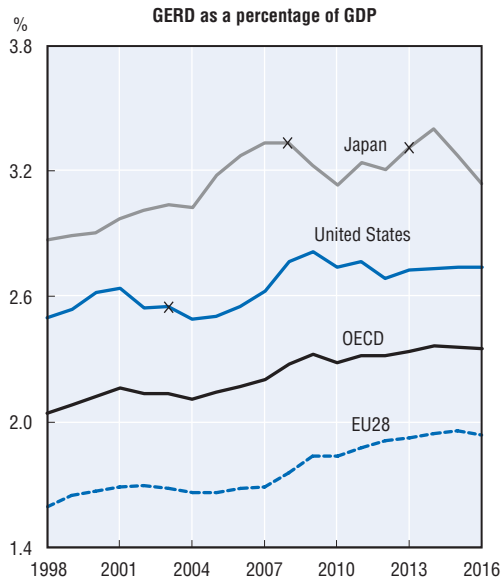
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1. Or latest year.

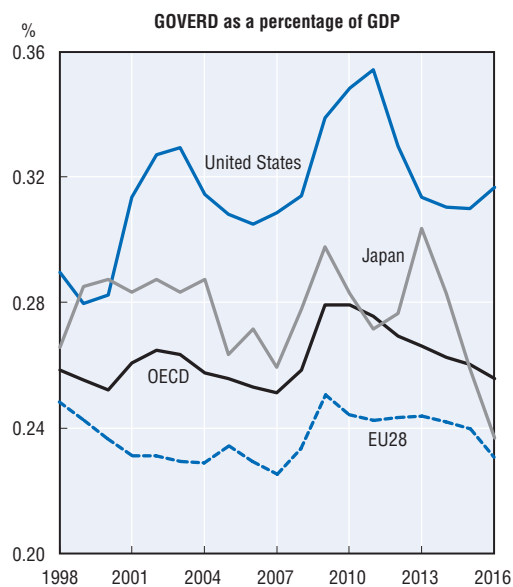
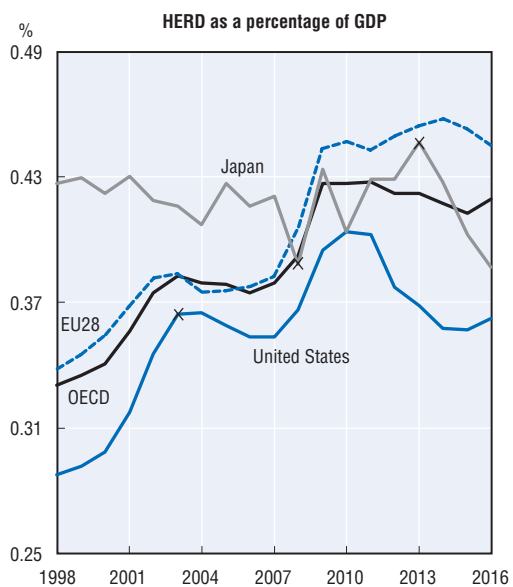
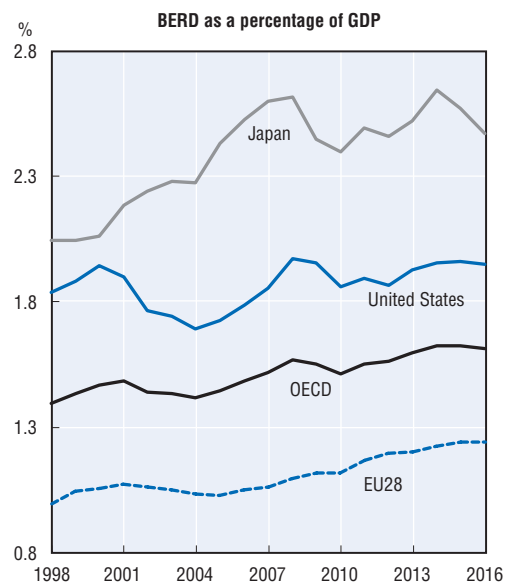
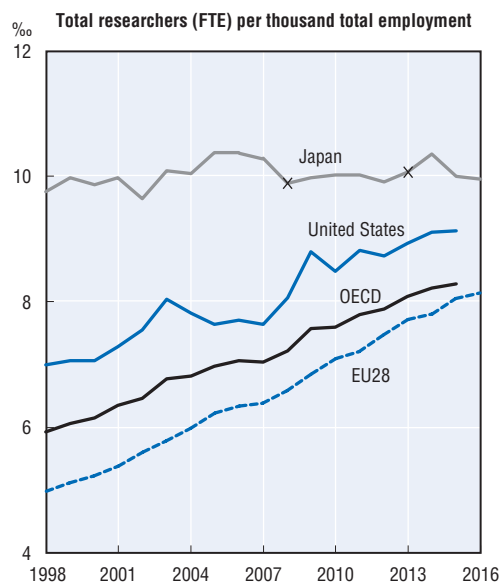
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X Break in series.

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× Break in series.

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

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-Total² | 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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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 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-Total² | 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-Total² | 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-Total² | 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-Total² | 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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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 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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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 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-Total² | 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-Total² | 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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Source: OECD, Main Science and Technology Indicators database, July 2018

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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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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 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-Total² | 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-Total² | 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-Total² | 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-Total² | 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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Source: OECD, Main Science and Technology Indicators database, July 2018

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-Total² | 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-Total² | .. | 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-Total² | 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-Total² | 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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Source: OECD, Main Science and Technology Indicators database, July 2018

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-Total² | 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-Total² | 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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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 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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-Total² | 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-Total² | 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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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 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-Total² | 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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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 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-Total² | 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-Total² | 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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Source: OECD, Main Science and Technology Indicators database, July 2018

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-Total² | 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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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 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-Total² | 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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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 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-Total² | .. | 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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-Total² | .. | 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-Total² | 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-Total² | 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-Total² | 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-Total² | 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-Total² | 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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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 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-Total² | .. | 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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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 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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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, 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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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, 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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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, 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-Total² | 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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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 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-Total² | 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-Total² | 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-Total² | 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-Total² | .. | .. | 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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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 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-Total² | .. | .. | 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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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 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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-Total² | 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-Total² | 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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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 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-Total² | 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-Total² | 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-Total² | 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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Source: OECD, Main Science and Technology Indicators database, July 2018

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-Total² | 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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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 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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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 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-Total² | 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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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 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-Total² | 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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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 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-Total² | 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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Source: OECD, Main Science and Technology Indicators database, July 2018

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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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 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| Argentina | .. | .. | .. | .. | .. | .. | .. |
| China | .. | .. | .. | .. | .. | .. | .. |
| Romania | .. | .. | .. | .. | .. | .. | .. |
| Russian Federation | .. | .. | .. | .. | .. | .. | .. |
| Singapore | .. | .. | .. | .. | .. | .. | .. |
| South Africa | .. | .. | .. | .. | .. | .. | .. |
| Chinese Taipei | .. | .. | .. | .. | .. | .. | .. |

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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, 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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 | 311 ^e | 313 ^e | 310 ^e |
| Austria | 409 | 361 | 379 | 378 | 411 ^e | 434 ^e | 444 ^e |
| Belgium | 543 | 460 | 429 | 431 | 408 ^e | 412 ^e | 407 ^e |
| Canada | 718 | 580 | 526 | 618 | 582 ^e | 556 ^e | 538 ^e |
| Chile | 6 | 16 | 10 | 11 | 12 ^e | 12 ^e | 11 ^e |
| Czech Republic | 25 | 35 | 36 | 32 | 41 ^e | 43 ^e | 47 ^e |
| Denmark | 389 | 259 | 283 | 263 | 283 ^e | 285 ^e | 285 ^e |
| Estonia | 3 | 7 | 4 | 9 | 9 ^e | 9 ^e | 8 ^e |
| Finland | 391 | 228 | 290 | 271 | 284 ^e | 283 ^e | 286 ^e |
| France | 3 048 | 2 597 | 2 434 | 2 413 | 2 423 ^e | 2 473 ^e | 2 470 ^e |
| Germany | 7 141 | 4 822 | 4 588 | 4 904 | 4 706 ^e | 4 626 ^e | 4 583 ^e |
| Greece | 24 | 11 | 22 | 20 | 20 ^e | 22 ^e | 25 ^e |
| Hungary | 58 | 43 | 31 | 20 | 30 ^e | 32 ^e | 33 ^e |
| Iceland | 7 | 2 | 2 | 2 | 1 ^e | 3 ^e | 2 ^e |
| Ireland | 98 | 70 | 73 | 94 | 99 ^e | 109 ^e | 110 ^e |
| Israel ¹ | 502 | 367 | 400 | 436 | 422 ^e | 446 ^e | 462 ^e |
| Italy | 965 | 721 | 725 | 769 | 791 ^e | 817 ^e | 836 ^e |
| Japan | 18 932 | 18 997 | 18 650 | 17 617 | 17 116 ^e | 17 022 ^e | 17 066 ^e |
| Korea | 2 746 | 2 367 | 2 495 | 2 547 | 2 678 ^e | 2 670 ^e | 2 671 ^e |
| Latvia | 10 | 3 | 2 | 2 | 1 ^e | 1 ^e | 1 ^e |
| Luxembourg | 21 | 24 | 21 | 15 | 20 ^e | 19 ^e | 21 ^e |
| Mexico | 19 | 18 | 16 | 19 | 22 ^e | 25 ^e | 30 ^e |
| Netherlands | 1 762 | 969 | 1 039 | 1 136 | 1 193 ^e | 1 271 ^e | 1 306 ^e |
| New Zealand | 73 | 51 | 104 | 69 | 89 ^e | 99 ^e | 99 ^e |
| Norway | 142 | 94 | 101 | 103 | 101 ^e | 96 ^e | 96 ^e |
| Poland | 18 | 64 | 69 | 59 | 69 ^e | 79 ^e | 75 ^e |
| Portugal | 16 | 26 | 23 | 21 | 27 ^e | 30 ^e | 34 ^e |
| Slovak Republic | 2 | 12 | 8 | 9 | 7 ^e | 8 ^e | 9 ^e |
| Slovenia | 22 | 10 | 10 | 14 | 13 ^e | 11 ^e | 11 ^e |
| Spain | 293 | 222 | 231 | 230 | 237 ^e | 239 ^e | 239 ^e |
| Sweden | 969 | 615 | 662 | 587 | 614 ^e | 628 ^e | 617 ^e |
| Switzerland | 1 083 | 1 058 | 1 139 | 1 112 | 1 146 ^e | 1 175 ^e | 1 206 ^e |
| Turkey | 16 | 37 | 31 | 41 | 38 ^e | 42 ^e | 45 ^e |
| United Kingdom | 2 164 | 1 726 | 1 700 | 1 818 | 1 725 ^e | 1 734 ^e | 1 740 ^e |
| United States | 17 374 | 13 209 | 13 723 | 14 781 | 15 243 ^e | 15 343 ^e | 15 219 ^e |
| EU28 (OECD estimates) | 18 403 | 13 302 | 13 094 | 13 523 | 13 446 ^e | 13 597 ^e | 13 616 ^e |
| OECD-Total² | 60 467 | 50 401 | 50 600 | 51 164 | 51 176^e | 51 372^e | 51 346^e |
| Argentina | 16 | 10 | 8 | 6 | 9 ^e | 10 ^e | 11 ^e |
| China | 523 | 1 506 | 1 951 | 2 187 | 2 624 ^e | 3 144 ^e | 3 766 ^e |
| Romania | 7 | 9 | 14 | 13 | 12 ^e | 14 ^e | 14 ^e |
| Russian Federation | 91 | 86 | 93 | 76 | 88 ^e | 86 ^e | 92 ^e |
| Singapore | 170 | 122 | 107 | 129 | 139 ^e | 141 ^e | 143 ^e |
| South Africa | 49 | 44 | 33 | 29 | 26 ^e | 24 ^e | 22 ^e |
| Chinese Taipei | 145 | 488 | 384 | 335 | 369 ^e | 376 ^e | 371 ^e |

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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 | 0.56 ^e | 0.56 ^e | 0.55 ^e |
| Austria | 0.66 | 0.68 | 0.70 | 0.69 | 0.74 ^e | 0.78 ^e | 0.79 ^e |
| Belgium | 0.88 | 0.86 | 0.80 | 0.79 | 0.74 ^e | 0.74 ^e | 0.72 ^e |
| Canada | 1.16 | 1.09 | 0.98 | 1.13 | 1.06 ^e | 0.99 ^e | 0.95 ^e |
| Chile | 0.01 | 0.03 | 0.02 | 0.02 | 0.02 ^e | 0.02 ^e | 0.02 ^e |
| Czech Republic | 0.04 | 0.07 | 0.07 | 0.06 | 0.07 ^e | 0.08 ^e | 0.08 ^e |
| Denmark | 0.63 | 0.49 | 0.52 | 0.48 | 0.51 ^e | 0.51 ^e | 0.50 ^e |
| Estonia | 0.00 | 0.01 | 0.01 | 0.02 | 0.02 ^e | 0.02 ^e | 0.01 ^e |
| Finland | 0.63 | 0.43 | 0.54 | 0.50 | 0.51 ^e | 0.51 ^e | 0.51 ^e |
| France | 4.92 | 4.86 | 4.51 | 4.42 | 4.39 ^e | 4.42 ^e | 4.37 ^e |
| Germany | 11.52 | 9.03 | 8.51 | 8.98 | 8.53 ^e | 8.27 ^e | 8.10 ^e |
| Greece | 0.04 | 0.02 | 0.04 | 0.04 | 0.04 ^e | 0.04 ^e | 0.04 ^e |
| Hungary | 0.09 | 0.08 | 0.06 | 0.04 | 0.06 ^e | 0.06 ^e | 0.06 ^e |
| Iceland | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 ^e | 0.00 ^e | 0.00 ^e |
| Ireland | 0.16 | 0.13 | 0.14 | 0.17 | 0.18 ^e | 0.20 ^e | 0.19 ^e |
| Israel ¹ | 0.81 | 0.69 | 0.74 | 0.80 | 0.77 ^e | 0.80 ^e | 0.82 ^e |
| Italy | 1.56 | 1.35 | 1.34 | 1.41 | 1.43 ^e | 1.46 ^e | 1.48 ^e |
| Japan | 30.54 | 35.57 | 34.57 | 32.24 | 31.03 ^e | 30.44 ^e | 30.18 ^e |
| Korea | 4.43 | 4.43 | 4.63 | 4.66 | 4.85 ^e | 4.78 ^e | 4.72 ^e |
| Latvia | 0.02 | 0.01 | 0.00 | 0.00 | 0.00 ^e | 0.00 ^e | 0.00 ^e |
| Luxembourg | 0.03 | 0.04 | 0.04 | 0.03 | 0.04 ^e | 0.03 ^e | 0.04 ^e |
| Mexico | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 ^e | 0.05 ^e | 0.05 ^e |
| Netherlands | 2.84 | 1.81 | 1.93 | 2.08 | 2.16 ^e | 2.27 ^e | 2.31 ^e |
| New Zealand | 0.12 | 0.10 | 0.19 | 0.13 | 0.16 ^e | 0.18 ^e | 0.18 ^e |
| Norway | 0.23 | 0.18 | 0.19 | 0.19 | 0.18 ^e | 0.17 ^e | 0.17 ^e |
| Poland | 0.03 | 0.12 | 0.13 | 0.11 | 0.13 ^e | 0.14 ^e | 0.13 ^e |
| Portugal | 0.03 | 0.05 | 0.04 | 0.04 | 0.05 ^e | 0.05 ^e | 0.06 ^e |
| Slovak Republic | 0.00 | 0.02 | 0.02 | 0.02 | 0.01 ^e | 0.01 ^e | 0.02 ^e |
| Slovenia | 0.04 | 0.02 | 0.02 | 0.03 | 0.02 ^e | 0.02 ^e | 0.02 ^e |
| Spain | 0.47 | 0.42 | 0.43 | 0.42 | 0.43 ^e | 0.43 ^e | 0.42 ^e |
| Sweden | 1.56 | 1.15 | 1.23 | 1.07 | 1.11 ^e | 1.12 ^e | 1.09 ^e |
| Switzerland | 1.75 | 1.98 | 2.11 | 2.03 | 2.08 ^e | 2.10 ^e | 2.13 ^e |
| Turkey | 0.03 | 0.07 | 0.06 | 0.08 | 0.07 ^e | 0.08 ^e | 0.08 ^e |
| United Kingdom | 3.49 | 3.23 | 3.15 | 3.33 | 3.13 ^e | 3.10 ^e | 3.08 ^e |
| United States | 28.03 | 24.74 | 25.44 | 27.05 | 27.63 ^e | 27.44 ^e | 26.91 ^e |
| EU28 (OECD estimates) | 29.69 | 24.91 | 24.27 | 24.75 | 24.38 ^e | 24.32 ^e | 24.08 ^e |
| OECD-Total² | 97.56 | 94.38 | 93.80 | 93.64 | 92.78^e | 91.88^e | 90.80^e |
| Argentina | 0.03 | 0.02 | 0.01 | 0.01 | 0.02 ^e | 0.02 ^e | 0.02 ^e |
| China | 0.84 | 2.82 | 3.62 | 4.00 | 4.76 ^e | 5.62 ^e | 6.66 ^e |
| Romania | 0.01 | 0.02 | 0.03 | 0.02 | 0.02 ^e | 0.03 ^e | 0.02 ^e |
| Russian Federation | 0.15 | 0.16 | 0.17 | 0.14 | 0.16 ^e | 0.15 ^e | 0.16 ^e |
| Singapore | 0.27 | 0.23 | 0.20 | 0.24 | 0.25 ^e | 0.25 ^e | 0.25 ^e |
| South Africa | 0.08 | 0.08 | 0.06 | 0.05 | 0.05 ^e | 0.04 ^e | 0.04 ^e |
| Chinese Taipei | 0.23 | 0.91 | 0.71 | 0.61 | 0.67 ^e | 0.67 ^e | 0.66 ^e |

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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 | 423 ^e |
| Austria | 212 | 161 | 158 | 154 | 162 | 150 | 155 ^e |
| Belgium | 145 | 206 | 233 | 239 | 236 | 216 | 225 ^e |
| Canada | 820 | 976 | 1 034 | 938 | 817 | 912 | 943 ^e |
| Chile | 2 | 3 | 5 | 5 | 16 | 18 | 17 ^e |
| Czech Republic | 17 | 12 | 27 | 26 | 21 | 21 | 22 ^e |
| Denmark | 161 | 158 | 111 | 145 | 152 | 153 | 147 ^e |
| Estonia | 6 | 11 | 3 | 16 | 10 | 4 | 5 ^e |
| Finland | 754 | 729 | 771 | 627 | 553 | 498 | 514 ^e |
| France | 1 504 | 1 342 | 1 377 | 1 366 | 1 433 | 1 351 | 1 349 ^e |
| Germany | 2 293 | 2 332 | 2 333 | 2 309 | 2 344 | 2 549 | 2 608 ^e |
| Greece | 14 | 18 | 19 | 20 | 25 | 13 | 13 ^e |
| Hungary | 27 | 67 | 71 | 54 | 68 | 57 | 61 ^e |
| Iceland | 5 | 0 | 3 | 1 | 2 | 2 | 2 ^e |
| Ireland | 82 | 137 | 124 | 109 | 125 | 134 | 140 ^e |
| Israel ¹ | 673 | 629 | 745 | 763 | 743 | 758 | 788 ^e |
| Italy | 347 | 318 | 334 | 330 | 323 | 309 | 309 ^e |
| Japan | 7 817 | 11 541 | 11 662 | 10 311 | 10 180 | 10 426 | 10 776 ^e |
| Korea | 2 135 | 4 359 | 4 430 | 4 651 | 5 091 | 5 380 | 5 571 ^e |
| Latvia | 4 | 1 | 6 | 1 | 3 | 7 | 6 ^e |
| Luxembourg | 5 | 10 | 13 | 9 | 15 | 6 | 5 ^e |
| Mexico | 14 | 22 | 20 | 22 | 32 | 50 | 48 ^e |
| Netherlands | 1 266 | 645 | 579 | 607 | 591 | 596 | 592 ^e |
| New Zealand | 43 | 36 | 36 | 39 | 33 | 37 | 35 ^e |
| Norway | 100 | 75 | 100 | 85 | 72 | 74 | 87 ^e |
| Poland | 13 | 47 | 37 | 52 | 70 | 102 | 99 ^e |
| Portugal | 20 | 28 | 18 | 23 | 17 | 35 | 37 ^e |
| Slovak Republic | 3 | 6 | 8 | 10 | 10 | 13 | 14 ^e |
| Slovenia | 5 | 14 | 9 | 14 | 7 | 7 | 7 ^e |
| Spain | 131 | 297 | 286 | 227 | 234 | 186 | 198 ^e |
| Sweden | 689 | 1 115 | 1 285 | 1 151 | 1 355 | 1 413 | 1 464 ^e |
| Switzerland | 220 | 311 | 334 | 311 | 279 | 260 | 283 ^e |
| Turkey | 11 | 47 | 93 | 101 | 106 | 150 | 147 ^e |
| United Kingdom | 1 351 | 1 205 | 1 200 | 1 402 | 1 444 | 1 342 | 1 373 ^e |
| United States | 14 942 | 15 334 | 16 818 | 18 484 | 17 416 | 16 987 | 17 400 ^e |
| EU28 (OECD estimates) | 9 071 | 8 887 | 9 060 | 8 953 | 9 259 | 9 227 | 9 409 ^e |
| OECD-Total² | 36 219 | 42 521 | 44 673 | 45 007 | 44 407 | 44 627 | 45 869^e |
| Argentina | 7 | 16 | 3 | 4 | 5 | 13 | 12 ^e |
| China | 1 812 | 9 673 | 10 725 | 12 796 | 14 517 | 18 937 | 19 958 ^e |
| Romania | 6 | 14 | 26 | 29 | 31 | 36 | 36 ^e |
| Russian Federation | 153 | 212 | 286 | 308 | 282 | 262 | 259 ^e |
| Singapore | 192 | 206 | 190 | 188 | 211 | 244 | 244 ^e |
| South Africa | 54 | 56 | 75 | 70 | 64 | 49 | 49 ^e |
| Chinese Taipei | 66 | 171 | 205 | 243 | 283 | 223 | 235 ^e |

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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 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 | 142 ^e |
| Austria | 56 | 92 | 91 | 63 | 72 | 77 | 75 ^e |
| Belgium | 114 | 139 | 105 | 101 | 104 | 124 | 122 ^e |
| Canada | 302 | 287 | 221 | 256 | 228 | 243 | 240 ^e |
| Chile | 2 | 17 | 14 | 18 | 23 | 33 | 32 ^e |
| Czech Republic | 5 | 7 | 11 | 9 | 13 | 13 | 12 ^e |
| Denmark | 186 | 169 | 180 | 175 | 190 | 160 | 152 ^e |
| Estonia | 2 | 7 | 2 | 3 | 1 | 3 | 4 ^e |
| Finland | 48 | 52 | 35 | 58 | 48 | 46 | 45 ^e |
| France | 321 | 545 | 465 | 493 | 505 | 515 | 505 ^e |
| Germany | 661 | 670 | 643 | 598 | 621 | 669 | 661 ^e |
| Greece | 5 | 6 | 4 | 3 | 5 | 5 | 4 ^e |
| Hungary | 9 | 18 | 12 | 15 | 8 | 14 | 13 ^e |
| Iceland | 4 | 10 | 2 | 1 | 2 | 2 | 2 ^e |
| Ireland | 22 | 34 | 19 | 28 | 32 | 26 | 25 ^e |
| Israel ¹ | 161 | 160 | 144 | 136 | 156 | 171 | 178 ^e |
| Italy | 160 | 121 | 149 | 119 | 136 | 131 | 131 ^e |
| Japan | 1 466 | 1 195 | 1 164 | 1 231 | 1 254 | 1 348 | 1 373 ^e |
| Korea | 202 | 521 | 499 | 509 | 569 | 685 | 703 ^e |
| Latvia | 1 | 0 | 0 | 1 | 1 | 1 | 1 ^e |
| Luxembourg | 1 | 2 | 4 | 1 | 2 | 5 | 6 ^e |
| Mexico | 11 | 18 | 10 | 19 | 17 | 20 | 18 ^e |
| Netherlands | 223 | 209 | 198 | 220 | 210 | 220 | 216 ^e |
| New Zealand | 50 | 27 | 29 | 29 | 20 | 22 | 20 ^e |
| Norway | 30 | 28 | 36 | 38 | 56 | 30 | 34 ^e |
| Poland | 10 | 23 | 29 | 33 | 32 | 27 | 27 ^e |
| Portugal | 10 | 12 | 13 | 14 | 10 | 12 | 11 ^e |
| Slovak Republic | 0 | 3 | 0 | 3 | 2 | 2 | 2 ^e |
| Slovenia | 4 | 7 | 7 | 8 | 6 | 5 | 5 ^e |
| Spain | 121 | 183 | 184 | 194 | 159 | 157 | 153 ^e |
| Sweden | 129 | 119 | 110 | 95 | 107 | 99 | 100 ^e |
| Switzerland | 139 | 160 | 163 | 167 | 171 | 195 | 193 ^e |
| Turkey | 2 | 4 | 4 | 12 | 10 | 12 | 13 ^e |
| United Kingdom | 491 | 387 | 409 | 431 | 479 | 499 | 498 ^e |
| United States | 4 575 | 4 440 | 4 364 | 4 810 | 4 491 | 5 027 | 5 081 ^e |
| EU28 (OECD estimates) | 2 584 | 2 813 | 2 680 | 2 677 | 2 755 | 2 819 | 2 779 ^e |
| OECD-Total² | 9 732 | 9 829 | 9 483 | 10 035 | 9 891 | 10 749 | 10 802^e |
| Argentina | 9 | 8 | 13 | 16 | 12 | 6 | 5 ^e |
| China | 112 | 508 | 449 | 523 | 606 | 788 | 800 ^e |
| Romania | 1 | 1 | 1 | 2 | 2 | 2 | 2 ^e |
| Russian Federation | 51 | 53 | 66 | 56 | 46 | 39 | 37 ^e |
| Singapore | 64 | 69 | 126 | 108 | 86 | 82 | 78 ^e |
| South Africa | 16 | 11 | 11 | 15 | 20 | 13 | 12 ^e |
| Chinese Taipei | 11 | 36 | 46 | 38 | 78 | 86 | 79 ^e |

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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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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 | 7 799.6P |
| Austria | 3 006.3 | 4 656.7 | 5 967.8 | 6 728.8 | 7 902.7 | 8 472.5 | 7 133.5P |
| Belgium | 5 653.0 | 9 968.9 | 11 249.0 | 12 631.5 | 14 335.6 | 18 237.3 | 17 500.0P |
| 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 | 2 436.2P |
| Denmark | 3 269.5 ^b | 5 152.3 | 7 108.0 | 6 685.2 | 6 363.1 | 6 645.4 | 6 045.6P |
| Estonia | 66.1 | 191.4 | 341.9 | 309.3 | 294.8 | 365.2 | 277.9P |
| Finland | 4 621.2 | 7 769.1 | 8 146.2 | 8 847.6 | 7 695.4 ^b | 6 560.7 | 5 022.4P |
| France | .. | .. | .. | .. | .. | .. | .. |
| Germany | 29 087.7 | 45 207.9 | 53 846.8 | 55 773.3 | 55 232.7 ^b | 57 025.7 | 53 734.3P |
| Greece | 871.5 | 1 383.9 | 1 267.1 | 814.1 | 951.7 | 1 144.6 | 950.7P |
| Hungary | 2 476.4 | 3 812.2 | 4 340.3 | 4 057.9 | 5 210.3 | 4 821.1 | 3 817.1P |
| Iceland | .. | 179.1 | 215.2 | 239.1 | 201.0 ^b | 294.8 | 243.8P |
| Ireland | 24 778.6 | 44 576.2 | 48 898.0 | 54 349.7 ^b | 57 334.5 | 76 593.7 | 98 091.4P |
| Israel ¹ | 1 869.1 | 2 494.0 | 2 634.5 ^b | 3 660.5 | 3 231.1 | 3 792.1 | 3 512.3P |
| Italy | 4 553.2 | 13 865.5 | 15 201.5 | 12 806.8 | 14 274.5 | 14 238.3 | 12 015.7P |
| Japan | 6 384.7 | 6 038.6 | 5 197.0 | 5 622.7 | 5 919.8 | 4 842.6 | 4 978.7P |
| Korea | 4 525.1 | 10 234.3 | 9 900.5 | 11 052.0 | 12 038.4 | 15 540.0 | 16 409.0P |
| Latvia | 75.9 | 135.1 | 182.3 | 165.8 | 189.8 | 169.8 | 156.4P |
| Luxembourg | 876.4 | 2 180.4 | 3 193.6 | 4 997.7 ^b | 6 738.8 | 7 211.2 | 6 004.4P |
| 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 | 50 215.9P |
| 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 | 3 113.0P |
| Portugal | 755.5 | 1 459.5 | 1 658.6 | 1 292.9 | 1 456.3 | 1 936.3 | 1 726.5P |
| 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 | 10 097.3P |
| Sweden | 7 243.2 | 9 846.3 | 11 556.1 | 12 834.0 | 13 424.7 ^b | 16 632.5 | 15 751.6P |
| Switzerland | 13 893.8 | 21 172.1 | 26 436.0 | 28 803.0 | 30 114.9 | 36 019.4 | 33 998.8P |
| Turkey | .. | .. | .. | .. | .. | .. | .. |
| United Kingdom | 13 949.1 | 18 435.4 | 17 826.1 | 18 598.9 | 21 788.1 | 22 995.4 | 21 280.4P |
| United States | 31 851.0 | 69 577.0 | 81 826.0 | 84 168.0 | 87 920.0 | 90 459.0 | 88 891.0P |
| EU28 (OECD estimates) | .. | .. | .. | .. | .. | .. | .. |
| OECD-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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 | 2 205.4P |
| 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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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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 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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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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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

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 SStructural 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/ocdpatentstatisticsmanual.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 |
|---|-------------|
| • <i>pharmaceutical industry</i> (Table 70) | 21 |
| • <i>computer, electronic and optical industry</i> (Table 71) | 26 |
| • <i>aerospace industry</i> (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>).

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 FTE incorporate 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).

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-Total² | 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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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 (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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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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 (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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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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Source: OECD, Main Science and Technology Indicators database, July 2018 (underlying sources described in section 10)

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-Total² | 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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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 (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-Total² | 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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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 (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-Total² | 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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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 (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-Total² | 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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Source: OECD, Main Science and Technology Indicators database, July 2018 (underlying sources described in section 10)

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-Total² | .. | .. | .. | .. | .. | .. | .. |
| 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 \$)
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