

Summary of Total Investment in Research and Innovation (TWIN) 2015-2021

Every year, the Rathenau Institute presents an overview of statistics on government R&D budgets. The overview also furnishes data on R&D tax advantages for businesses (hereafter: "tax aid") and – as of 2014 – on government budgets in support of innovation. In this summary, we present the key figures on government budgets for research and innovation. These key figures indicate the current financial context for government's research and science policy.

Content of this summary

This summary provides an overall overview of three types of government budgets for the 2015-2021 period, based on the ministerial budget estimates for 2017 that were issued on Budget Day 2016:

- Direct R&D expenditure
- Direct expenditure on innovation not classified as R&D
- Indirect support (= tax aid) for R&D, the WBSO (see end note 1), but excluding the budget for the Innovation Box tax scheme.

The complete TWIN publication, which is available in Dutch, provides more details about the various budget elements. The complete publication also looks at public R&D budgets abroad (in the EU) and at regional R&D and innovation efforts.

The Innovation Box has not been incorporated into the tables covering government support for R&D and innovation. The Innovation Box is a tax scheme meant to reward businesses that have proven to be innovative. Based on this scheme, businesses may qualify for a lower tax rate (corporation tax) on profits generated from WBSO projects and patents. Thus far, the Innovation Box has not been included in the Budget Memorandum, but the Budget Memorandum for 2017 indicates a budgetary reserve in 2016 and 2017 of € 1,390 million and € 1,365 million respectively. This is more than double the original estimate of € 625 million in previous years.

Government expenditure and budgets for R&D and innovation: overall picture

The following table presents an overall summary of the R&D and innovation budgets. These can be divided into direct financial R&D expenditure (including R&D expenditure relevant to innovation), direct expenditure on innovation not classified as R&D, and indirect tax aid.

Government expenditure and budgets for R&D and innovation, 2015-2021, in millions of euros

	2015	2016	2017	2018	2019	2020	2021
Direct expenditure on R&D	4880,7	5022,1	4887,3	4874,9	4819,4	4843,5	4834,2
of which innovation-relevant	1121,9	1189,4	1111,4	1115,5	1098,1	1107,4	1103,6
Direct expenditure on innovation not classified as R&D	241,9	324	281,7	276,2	268,1	261,7	230,3
Indirect tax aid for R&D (mostly WBSO)	1009,8	1153,8	1215,8	1215,8	1215,8	1215,8	1215,8
Total	6132,4	6499,8	6384,7	6366,9	6303,2	6321,0	6280,2

Data: [Download as csv](#) [1]

Source: TWIN-database Rathenau Instituut

Notes: Note 1: The tax aid for R&D does not include the Innovation Box. Note 3: The figures concerning direct expenditure on innovation not classified as R&D should be interpreted with some caution, given that relevant data have only been collected for a short while and more time and experience are needed to produce a satisfactory estimate of this type of expenditure. Note 4: Direct expenditure on R&D excludes additional funds from the Ministry of Education, Culture and Science (from 2018 onwards) due to implementation of the student loan system ("Studievoorschot"), as these are supposed to be applied only for quality improvements in higher education.

Between 2015 and 2021, about 77% of government support for R&D will consist of direct expenditure. This concerns spending on university research, research conducted by public research institutes, and contract research commissioned by government. Almost a quarter of this expenditure can be labelled innovation-relevant. Indirect tax aid amounts to 19% of the total, while direct expenditure on innovation not classified as R&D hovers at around 4%.

The table further shows that the total amount provided in financial support rose between 2015 and 2016 from € 6.1 billion to € 6.5 billion. Thereafter it falls to € 6.4 billion in 2017 and € 6.3 million from 2019 onwards. Direct expenditure on R&D follows more or less the same pattern, whereas indirect tax aid rose between 2015 and 2017 and thereafter remains at 2017 levels. Direct expenditure on innovation not classified as R&D also rose between 2015 and 2016 and then declines gradually. Because this item is smaller than the others, relative changes are larger.

A longer time series with data from 2000 onwards on direct and indirect government support for R&D can be found in the [datapublication on government support in the Netherlands for R&D](#) [2].

Direct expenditure on R&D by ministry

The following table provides direct R&D expenditure by ministry. The figures for 2015 are actual outlays. The figures for 2016 concern provisional expenditure for that year insofar as known when the budgets for 2017 were published (on Budget Day, September 2016). With respect to 2017, the table presents figures from the provisional budget, also taken from the budgets of September 2016. The figures for 2018-2021 are multiyear forecasts.

Direct R&D expenditure and budget per ministry (cash basis), in millions of euros

	2015	2016	2017	2018	2019	2020	2021
General Affairs	0,6	0,6	0,6	0,6	0,6	0,6	0,6
Foreign Affairs	34,9	39,9	37,5	37,8	37,8	37,8	37,8
Security and Justice	22,1	21,5	21,1	21	21	21	21
Interior and Kingdom Relations	12,2	12,8	10,4	8,9	8,9	9,3	10,7
Education, Culture and Science	3599	3668,5	3624	3628,3	3588,1	3606,4	3615,9
Defence	61,6	60,7	60,5	60,5	60,5	60,5	60,5
Infrastructure and the Environment	70,6	70,9	69,1	56,4	56,2	57	51,9
Economic Affairs	835,7	906,4	829,7	838,9	819,7	832	827,5
Social Affairs and Employment	5,6	8,9	9,5	8,4	8,4	8,2	8,2
Health, Welfare and Sport	238,4	231,9	224,9	214,3	218,2	210,8	200,2
Total	4880,7	5022,1	4887,3	4874,9	4819,4	4843,5	4834,2

Data: [Download as csv](#) [3]

Source: TWIN-database Rathenau Instituut

Notes: Note 1: The Ministry of Education, Culture and Science's investment includes the research share that forms part of the first funding stream for universities. The Rathenau Institute has calculated the size of this research share. The Ministry's figures include the (estimated) research share of the government block grant that the Ministry of Economic Affairs disburses to Wageningen University. The figures from Economic Affairs in the table do not include this share (estimated at approximately € 113 million in 2017). Note 2: The amount for the Ministry of Education, Culture and Science excludes additional funds (from 2018 onwards) due to implementation of the student loan system ("Studievoorschot"), as these are intended only for quality improvements in higher education.

The table shows that the Ministry of Education, Culture and Science is the most important source of direct R&D funding, accounting for nearly three-quarters of all expenditure, followed by the Ministry of Economic Affairs (17%) and the Ministry of Health, Welfare and Sport (4 to 5%). The other ministries account for between 0.01% and 1.4%.

Most ministries show a stable pattern of R&D expenditure between 2017 and 2021. Exceptions are Infrastructure and the Environment (-25%) and Health, Welfare and Sport (-11%).

Important changes since the previous TWIN publication

This section compares the 2015-2021 TWIN data with the figures of the previous TWIN statistics (2014-2020). The comparison reveals the changes in the ministerial budgets between 2016 and 2017.

Whereas the 2014-2020 TWIN publication shows a projected decrease of € 225 million between 2016 and 2020, the current figures covering the 2017-2021 period show that the projected overall financial assistance for R&D and innovation decreases to a lesser extent of € 100 million. We review the changes below. The following table summarises the changes in the three categories, i.e. direct expenditure on R&D, direct expenditure on innovation not classified as R&D, and indirect tax aid. The table indicates that government ultimately spent less on financial assistance in 2015 than originally budgeted. In 2016 and the years thereafter, we expect government to invest more in R&D and innovation than shown by the TWIN data for the 2014-2020 period. This will be the case in each of the three separate categories.

Comparison of TWIN 2014-2020 and TWIN 2015-2021, in millions of euros

	2015	2016	2017	2018	2019	2020
Direct expenditure on R&D	-139,5	160,6	149,7	214,7	162,3	161,2
Direct expenditure on innovation not classified as R&D	-19,3	143	86,2	78,6	94,7	100,3
Indirect tax support for R&D and innovation	-33	0,0	84,9	84,8	84,8	87,8
Total	-191,7	303,6	320,8	378,1	341,7	349,3

Data: [Download as csv](#) [4]

Source: TWIN-database Rathenau Instituut

The following table looks specifically at direct R&D expenditure and budgets and zooms in on changes at the ministries. It shows that the biggest absolute changes compared with last year's budget figures occurred at the Ministries of Education, Culture and Science, Economic Affairs and – to a lesser extent – Health, Welfare and Sport. That was also the case last year.

Changes in direct financial support for R&D between TWIN 2014-2020 and TWIN 2015-2021, by ministry, in millions of euros

	2015	2016	2017	2018	2019	2020
Difference, total	-139,5	160,6	149,7	214,7	162,3	161,2
Difference, Education, Culture and Science	4,4	117,2	101,6	130,4	90,3	97
Difference, Economic Affairs	-135,1	30,9	28,9	53,7	45,2	38,6
Difference, Health, Welfare and Sport	5,4	4,9	19,5	25,4	21,1	18,5
Difference, other ministries	-14,2	7,7	-0,4	5,2	5,7	7,1

Data: [Download as csv](#) [5]

Source: TWIN-database Rathenau Instituut

Comparing the two TWIN budget periods with one another reveals the changes at the ministries. Below are the main changes, specifically for the period from 2017 (when the provisional budget was issued) to 2020 (the final overlapping year).

- Education, Culture and Science: compared with the previous TWIN figures, expenditure at this Ministry will increase by € 100 million in 2017. Thereafter it will rise to € 130 million in 2018 and drop again to about €100 in 2020 (the final overlapping year). This is due to a combination of rising, falling and stable budget items. One item in particular will increase: the research portion of the first funding stream for universities. Between TWIN 2014-2020 and TWIN 2015-2021, this item will increase from € 82 million in 2017 to € 102 million in 2020. On the other hand, funding for the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Netherlands Organisation for Scientific Research (NWO) will decline. The drop in funding for the Royal Academy is the result of a lower research coefficient for the research institutes, which is based on data in the annual account of the KNAW.
- Economic Affairs: total expenditure for 2017-2020 will increase by between € 30 million and € 55 million. Some of this increase is real, but part of it is also the result of carrying sums forward between different years. For example, expenditure associated with the Future Fund (Toekomstfonds) was € 50 million lower in 2015 than in the 2014-2020 TWIN summary, because the funds were carried forward to 2018 and beyond (this is partly why TWIN 2015-2021 reports a decrease in 2015 at Economic Affairs). Other changes evident in the present summary: the new budget item 'Start-ups/SMEs'; the lower SER Energy Agreement item owing to a reduction in the R&D percentage; and changes in expenditure for the item 'Competitive, sustainable, safe agricultural, fishery and food chains', which will depress spending on this item starting in 2018.

- Health, Welfare and Sport: higher R&D expenditure compared with the previous TWIN figures is largely the result of a higher grant in support of programme expenditure by the Netherlands Organisation for Health Research and Development (ZonMw).
- Other ministries: the most important changes concern expenditure by the Ministries of Foreign Affairs, Interior and Kingdom Relations, and Social Affairs and Employment. The R&D expenditure reported by the Ministry of Foreign Affairs will be about € 5 million lower in the years ahead because expenditure has been linked to the size of its programmes. The R&D expenditure by the Ministry of the Interior and Kingdom Relations is reported to be € 7 to 8 million lower in the years ahead due to budget conversions. The R&D expenditure indicated by the Ministry of Social Affairs and Employment shows an increase owing to better screening of the budget for R&D expenditures.

Relative trends in government R&D expenditure

In this section we relate the absolute figures for direct and indirect financial support for R&D and innovation to gross domestic product (GDP). By linking the expenditure data to GDP, it becomes possible to compare the Netherlands to other countries and to see to which extent R&D profits from the growth of the earning capacity in the Netherlands.

The following table shows direct and indirect government support for R&D and innovation in the 2015-2021 period as a share of GDP. The table shows that, if no additional investments are made, direct and indirect government financial support for R&D and innovation will not keep pace with GDP growth. This is particularly true for direct R&D expenditure, which is set to fall between 2017 and 2021 by 0.06% of GDP.

Direct and indirect financial support for R&D and innovation, 2015-2021, in percentage of GDP

	2015	2016	2017	2018	2019	2020	2021
Direct expenditure on R&D	0,72	0,72	0,69	0,67	0,65	0,65	0,63
Direct expenditure on innovation not classified as R&D	0,04	0,05	0,04	0,04	0,04	0,03	0,03
Indirect tax aid for R&D and innovation	0,15	0,17	0,17	0,17	0,16	0,16	0,16
Total	0,91	0,93	0,90	0,88	0,86	0,84	0,82

Data: [Download as csv](#) [6]

Source: TWIN database Rathenau Instituut

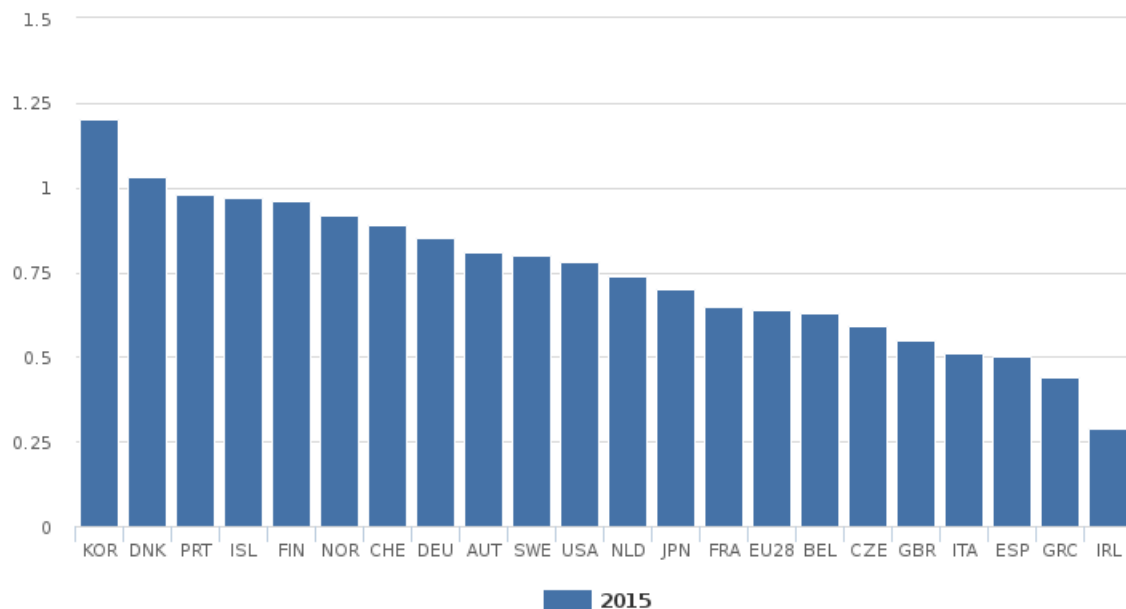
Notes: GDP figures 2015-2021 are based on the most recent data by the Netherlands Bureau for Economic Policy Analysis (CPB): Central Economic Plan 2017, 24 March 2017 (<http://www.cpb.nl/en/publication/central-economic-plan-2017>). GDP figures for 2015-2017 are nominal GDP figures published by CPB. GDP volume growth in 2018 is 1.8 percent and GDP volume growth for 2019-2021 is forecast at 1.7 percent per annum.

International perspective

The figure below reveals how the Dutch government's expenditure on R&D compares to that of other countries (2015). The Netherlands scores higher than the EU average (0.64%). The Netherlands also scores higher than a number of individual EU member states, including France, Belgium and the United Kingdom. On the other hand, it has a lower score than several countries that are often considered benchmarks, for example the Scandinavian countries, Germany and Switzerland. Figures from 2000 onwards show that the relative government budget for R&D increased in most countries between 2000 and 2010, as it did in the Netherlands. Between 2010 and 2015, the budget then falls in most countries, including the Netherlands. The main exceptions to this downward trend in the 2010-2015 period were Czechia, Denmark, Greece, Austria and Norway, where the budgets increased. We see this reflected in the average expenditure of the 28 EU member states, which rose from 0.69% in 2000 to 0.72% in 2010 and then fell to 0.64% in 2015. The Dutch figures for these years are 0.76%, 0.77% and 0.74% respectively.

An international comparison of both indirect government support and direct government support can be found in the [datapublication on government support from an international perspective](#) [7].

Direct government budgets for R&D as percentage of GDP, 2015



Data: [Download as csv](#) [8]

Source: EUROSTAT

Notes: Note 1: The indicator is based on provisional figures taken from the R&D budget estimates (and not on data provided by R&D performers as collected by Statistic Netherlands). The international term for these figures is GBARD (Government Budget Allocations for R&D). The figures for Iceland, Switzerland, the USA and South Korea are for 2014 instead of 2015. Note 2: The Dutch percentage (0.74%) given in this figure differs from that in the table with the GDP-data (0.72%) because it is based on the TWIN figures for the 2014-2020 period, whereas the data on R&D expenditure and GDP in the GDP table are based on the most recent figures for the 2015-2021 period.

Conclusions and final remarks

After a decline of 1.8 percent between 2016 and 2017, total government expenditure on R&D and innovation are projected to decline slightly in the near future (2017-2021), from € 6.4 to € 6.3 billion. Direct R&D expenditure declines between 2016 and 2017 by 2.7 percent, from € 5.0 to € 4.9 billion and is projected to amount to € 4.8 billion between 2019 and 2021. Indirect tax aid for R&D increases between 2015 and 2017 by 20 percent, to 1.2 billion and is projected to remain at this level until 2021. In direct expenditure on innovation not classified as R&D a downward trend is noted. Because the absolute volume of this expenditure is smaller, small absolute changes produce large relative changes. Another reason to be cautious in interpreting changes in the figures for direct expenditure on innovation not classified as R&D, is that the data has only been collected for a short while and is therefore not robust enough to draw definitive conclusions from it. The expenditure reported on in this summary is higher than that reported in the previous TWIN publication, however. We intend to work together with the Ministries in the years ahead to gain a better understanding of these innovation budgets.

The declining financial support for R&D and innovation seen in the previous TWIN publications was partly the consequence of the Government's strategy of gradually cutting R&D project funding from the Economic Structure Enhancing Fund (FES). This strategy also involved cutting grants (some of which were tied to R&D projects), and replacing direct support for some R&D projects with tax-related measures to some extent (especially in 2015). On the other hand, there has been some intensification of expenditure in recent years, specifically with regard to more basic research.

Compared with the previous TWIN publication, direct government expenditure on R&D has increased by approximately 3% (2017 figures). Besides the intensification measures mentioned above, this increase can also be attributed to the research share of the first funding stream at universities, which the Rathenau Institute has estimated based on research coefficients. In addition, since the TWIN overview for 2014-2020 the Ministry of Economic Affairs has created a new budget item: the Innovation Fund for investment in basic and applied research (part of the Future Fund).

These developments will not lead to a rise in R&D expenditure as a percentage of GDP over the near future. On the contrary, if policy remains unchanged, the GDP percentage will fall. This means that government support for R&D will not keep pace with economic growth (GDP indexed).

Alongside the international benchmarks presented above, these figures can also be evaluated in the light of the Government's stated target for 2020 that public and private parties together will spend 2.5% of GDP on R&D. In 2015, the Netherlands was 0.49 percentage points below this target. To achieve an expenditure pattern of 2.5% by 2020, public and private R&D expenditure combined should show a structural increase of € 5.5 billion between 2015 and 2020.

Notes on the data

The ministries provide data on government support for R&D and innovation each year based on a uniform format. They are guided in this process by definitions and guidelines based on international agreements such as documented in the OECD's Frascati Manual. It is then up to the ministries to determine which budget expenditure is allocated to R&D and innovation and which portion of expenditure can be described as 'innovation-relevant'.

The Rathenau Institute sends the figures to EUROSTAT, the European Union's statistical office, which subsequently shares them with the OECD, in accordance with a European regulation.

Additional notes

Note 1: WBSO = Wet Bevordering Speur- en Ontwikkelingswerk, Dutch Research and Development (Promotion) Act. The WBSO was merged with the Research & Development Allowance (RDA) in 2016.

Note 2: Innovative activities that cannot be classified as R&D include the purchasing of products (e.g. software or equipment) or external expertise and activities such as industrial design (J. van Steen, 2014. Total Investment in Research and Innovation 2012-2018, Rathenau Instituut, March 2014).

In addition, the following activities could also be considered as innovative activities:

- The development of web-based exams or other web-based applications such as patient registration systems
- The development of new teaching methods
- The introduction of new electronic sales and purchasing practices
- The development of new organizational models for healthcare or public administration
- The introduction of mobile care systems for the elderly
- The implementation of new communication strategies
- The implementation of new service centers for public management
- The introduction of new forms of museum activity
- The development and implementation of open source software.

Note 3: The estimate for the research share of the first funding stream for universities is based on a specific research coefficient that Statistics Netherlands calculates for the Rathenau Instituut every year. In 2015, the coefficient was 62%. To avoid the excessive fluctuations that variable coefficients could cause in the TWIN data for the first funding stream for universities, the Rathenau Instituut has calculated the amounts for the first funding stream based on a three-year average of the coefficient, starting with the 2017 budget. This means that the coefficient used for the 2015-2021 period is based on the average for 2013, 2014 and 2015, which is 60.6%.

For a more detailed description of this calculation method, see: J. van Steen (2013). Totale Onderzoek Financiering 2011-2017. Rathenau Instituut, March 2013, p. 12.

Note 4: In early November 2016, the Dutch House of Representatives adopted a motion requesting that the Government conduct an analysis exploring how expenditure on R&D can be increased to 2.5% of the Netherlands' GDP by 2020.

Source URL: <https://www.rathenau.nl/en/page/summary-total-investment-research-and-innovation-twin-2015-2021>

Links

[1] https://www.rathenau.nl/en/tablefield/export/node/1762/field_paragrafen/und/1

[2] <https://www.rathenau.nl/en/page/government-support-netherlands-rd>

[3] https://www.rathenau.nl/en/tablefield/export/node/1762/field_paragrafen/und/3

[4] https://www.rathenau.nl/en/tablefield/export/node/1762/field_paragrafen/und/5

[5] https://www.rathenau.nl/en/tablefield/export/node/1762/field_paragrafen/und/7

[6] https://www.rathenau.nl/en/tablefield/export/node/1762/field_paragrafen/und/9

[7] <https://www.rathenau.nl/en/page/government-support-rd-gdp>

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