

Research and development expenditure by the UK government QMI

Quality and Methodology Information for statistics on research and development (R&D) expenditure by the UK government, detailing how the data are compiled, methods used, and data uses and users.

Contact:
RandD@ons.gov.uk

Release date:
15 June 2020

Next release:
To be announced

Table of contents

1. [Output information](#)
2. [About this Quality and Methodology Information report](#)
3. [Important points](#)
4. [Quality summary](#)
5. [Quality characteristics of the research and development data](#)
6. [Methods used to produce the research and development data](#)
7. [Other information](#)

1 . Output information

National Statistic	No – the data are Official Statistics
Survey name	UK government expenditure on research and development (GovERD)
Frequency	Annual
How compiled	Estimates are derived from the GovERD survey, which is a census survey of UK government departments which perform and fund R&D, including UK Research and Innovation (UKRI) and Higher Education Funding Councils (HEFCs). Additional estimates of indicative contributions to the EU research and development expenditure are provided by HM Treasury.
Geographic coverage	UK (country and region)
Sample size	Approximately 140 including agencies, seven research councils (reported by UK Research and Innovation (UKRI), four Higher Education Funding Councils (HEFCs) (including Research England (part of UKRI) and the Northern Ireland Department of Finance (DoF)), civil departments and the Ministry of Defence .
Last revised	15 June 2020

2 . About this Quality and Methodology Information report

This quality and methodology report contains information on the quality characteristics of the data as well as the methods used to create it.

The information in this report will help you to:

- learn about existing uses and users of the data
- understand the methods used to create the data
- help you to decide suitable uses for the data
- reduce the risk of misusing data

3 . Important points

- The UK government expenditure on research and development (GovERD) survey produces estimates of UK government expenditure on performing and purchasing or funding research and development.
- These estimates were previously published in [the UK government expenditure on science, engineering and technology \(SET\) statistical bulletin](#); this has been renamed as the Research and development expenditure by the UK government statistical bulletin, to better reflect that SET statistics predominantly relate to research and development.
- The statistics are compiled according to internationally agreed standards defined by the [Organisation for Economic Co-operation and Development \(OECD\)](#) and published in the [Frascati Manual 2015](#).
- The Frascati Manual defines research and development (R&D) as "creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture and society - and to devise new applications of available knowledge"; research and development must contain an appreciable amount of novelty.
- Estimates are shown in current or constant prices; current prices (also known as nominal or cash) are expressed in terms of the prices of the reference period, while constant prices (also known as real terms) are adjusted using the [gross domestic product \(GDP\) deflator](#); this is to remove the effects of inflation by fixing the prices of goods and services in one period (the base year), so that only the volumes change, allowing changes in government expenditure on R&D to be examined on a comparable basis over time.
- Additional information on knowledge transfer activities related to R&D are also included in the Research and development expenditure by the UK government statistical bulletin.
- Data are available dating back to 1986, when they were published as [Science, engineering and technology \(SET\) statistics](#).

4 . Quality summary

Overview

The statistics on research and development (R&D) expenditure by the UK government consist of:

- expenditure on in-house R&D performed by government organisations (intramural R&D)
- expenditure on purchased R&D and funding provided for R&D to external organisations (extramural R&D)
- funding received from external organisations for R&D
- indicative UK contributions to the EU's research and development expenditure
- expenditure on knowledge transfer activities (including technology transfers) associated with R&D, and which contribute to the dissemination and application of scientific and technical knowledge

Net R&D expenditure is defined as:

"In-house R&D plus purchased or funding provided for R&D less funding received for R&D."

This concept is the basis for many of the data tables associated with the R&D by the UK government expenditure statistical bulletin.

Estimates of indicative UK contributions to EU R&D expenditure are provided by HM Treasury. EU member states' contributions are not made to individual expenditure programmes, but to the EU budget as a whole. They are therefore referred to as indicative estimates. It is unknown where and how UK contributions to EU R&D expenditure are spent, so these estimates are not regarded as in-house R&D performed in the UK.

Knowledge transfer activities (including technology transfers) are activities designed to help the conveyance of ideas, research, results and skills between researchers, businesses and wider communities. These actions contribute to the dissemination and application of scientific and technical knowledge, including consultancy services, demonstration projects, and sharing information. For example, developing partnerships, establishing forums for knowledge exchange, specialist training, and licensing. As well as being included in the estimates of total government expenditure on R&D and related knowledge transfer, in Tables 1 and 2, they are separately identified in Tables 5 and 6.

The UK government has seven publicly-funded research councils responsible for supporting, coordinating and promoting research and development in seven distinct fields. From 2018, the research councils became part of UK Research and Innovation (UKRI).

The research councils cover the full spectrum of academic disciplines from the medical and biological sciences to the arts and humanities.

Also, the UK government manages research institutes and laboratories via several government departments, most notably the [Department of Health \(DH\)](#), the [National Health Service \(NHS\)](#), the [Department for Business, Energy and Industrial Strategy \(BEIS\)](#) and the [Department for International Development \(DFID\)](#). The variety of research ranges from space exploration to research into mental health. See Section 3 for more information on UKRI.

Uses and users

Estimates of government R&D expenditure are used by a wide range of policy-makers and other users in the UK and EU, as research and development expenditure (R&D) is perceived as an important determinant of economic growth.

The UK Government's [Industrial Strategy](#) includes a target to raise investment on R&D to 2.4% of gross domestic product (GDP) by 2027. In addition, in the March 2020 Budget, the Chancellor set out plans to increase public R&D investment to £22 billion per year by 2024 to 2025. Information collected by the UK government expenditure on research and development (GovERD) survey is needed to assess progress towards these policy goals.

The in-house R&D element of the statistics are also provided to Eurostat to comply with the [European Commission \(EC\) Regulation](#) requirements (PDF).

Users of the statistics include the following:

- [the Department for Business, Energy and Industrial Strategy \(BEIS\)](#) and the [Government Office for Science](#) use government R&D estimates to assess policy impact and inform debate
- the [Welsh Government \(WG\)](#), [Scottish Government \(SG\)](#) and the [Northern Ireland Executive](#) use government R&D estimates as an important indicator for measuring the performance of their respective economies within the UK, as well as to monitor and develop R&D policies that seek to increase R&D investment
- [HM Treasury](#) uses the statistic to monitor progress toward spending targets
- [European Union's Statistical Office \(Eurostat\)](#) - the UK provides statistics measuring R&D activity in accordance with the European Commission Regulation Number 995/2012 of the European Parliament and the council; the estimates in this publication are therefore comparable with other EU member states
- [Organisation for Economic Co-operation and Development \(OECD\)](#) use R&D estimates for constructing internationally comparable data tables and producing regular statistical publications such as the [Main Science and Technology Indicators \(MSTI\)](#); these data are also used for analytical studies, which underpin economic analyses and policy reviews
- the [Research and Development Society](#) is a UK-based organisation formed to promote the better understanding of R&D in all its forms; its members include representatives from industry, government departments and agencies, universities and consultants.

5 . Quality characteristics of the research and development data

Accuracy and reliability

(The degree of closeness between an estimate and the true value.)

Sampling error

The Government Expenditure on Research and Development Survey (GovERD), which collects the data, is an annual census survey and is therefore not subject to sampling errors.

Non-sampling error

Non-sampling errors are not easy to quantify and include errors of coverage, measurement, processing, and non-response. There can be difficulty in identifying the population of actual or likely research and development (R&D) performers and in ensuring that government departments adhere to the [Frascati Manual](#) R&D definitions. However, response rates are high and response bias minimised because of expert reviews of question changes.

Coherence and comparability

(Coherence is the degree to which data that are derived from different sources or methods, but refer to the same topic, are similar. Comparability is the degree to which data can be compared over time and domain, for example, geographic level.)

[R&D expenditure by the UK government](#) is one Office for National Statistics (ONS)s publication that relates to R&D expenditure, which we publish annually. The others are:

- [Business enterprise research and development \(BERD\)](#), which is the UK business expenditure on R&D performed in the UK
- [UK gross domestic expenditure on research and development \(GERD\)](#), which includes UK gross expenditure on R&D performed in all sectors of the UK economy

In addition to the ONS R&D publications, [Statistics at Ministry of Defence](#) provides professional analytical, economic and statistical services and advice to the Ministry of Defence (MOD), and defence-related statistics to Parliament, other government departments and the public.

The main impact on the comparability of the [R&D expenditure by the UK government](#) data over time is the change of responsibilities within government departments, which can occur after a change of government, or the introduction of new or changed policies. Responsibility for R&D expenditure on specific projects can transfer between different departments, which can impact historical comparisons. Detailed notes on these changes are included in the data table footnotes in the publications.

Caution should therefore be taken when examining departmental time series especially where there has been machinery of government changes.

Accessibility and clarity

(Accessibility is the ease with which users are able to access the data, also reflecting the format in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the release details, illustrations and accompanying advice.)

Our recommended format for accessible content is a combination of HTML web pages for narrative, charts and graphs, with data being provided in usable formats such as CSV and Excel. We also offer users the option to download the narrative in PDF format. In some instances other software may be used, or may be available on request.

Available formats for content published on our website but not produced by us, or referenced on our website but stored elsewhere, may vary. For further information please refer to the contact details at the beginning of this report.

For information regarding conditions of access to data, please refer to these links:

- [Terms and conditions \(for data on the website\)](#)
- [Accessibility](#)

Timeliness and punctuality

(Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the gap between planned and actual publication dates.)

Government expenditure on science, engineering and technology (SET) statistics were previously published annually by the Department for Business, Energy and Industrial Strategy (BEIS) (formerly BIS) in September. We published the [SET statistical bulletin](#) for the first time on 11 July 2014, covering the 2012 reference period. We also brought forward the publishing of the SET statistical bulletin to June, enabling access to these estimates even earlier.

For more details on related releases, the [GOV.UK release calendar](#) is available online and provides 12 months' advance notice of release dates. If there are any changes to the pre-announced release schedule, public attention will be drawn to the change and the reasons for the change will be explained fully at the same time, as set out in the [Code of Practice for Statistics](#).

Concepts and definitions

(Concepts and definitions describe the legislation governing the output, and a description of the classifications used in the output.)

The updated Frascati manual introduced in 2015 included five new important criteria to help determine whether an activity should be regarded as R&D, for the purposes of R&D surveys that contribute to GERD. These criteria are that R&D work should be all of the following:

- novel - new findings that support new concepts, products and processes
- creative - original and not obvious
- uncertain - the final outcome cannot be predicted
- systematic - to be planned, budgeted and outcomes documented
- transferable or reproducible - to lead to results that could be reproduced

Research and development (R&D) activity is distinguished by the presence of an appreciable element of novelty. If the activity follows an established pattern it is excluded; if it departs from routine and breaks new ground it is included. For example, activities such as routine testing, market research, patent applications, trial production runs and artistic work are excluded. Overheads of R&D projects are included. Value Added Tax (VAT) is excluded.

[Organisation for Economic Co-operation and Development \(OECD\)](#) terminology is used throughout the statistical bulletin.

The term "Government" corresponds to the "general government" sector of the national accounts and includes local as well as central government.

Why you can trust our data

The Office for National Statistics (ONS) is the UK's largest independent producer of statistics and is its national statistical institute. The [Data policies section of our website details the policies that underpin our data principles](#) detailing how data are collected, secured and used in the publication of statistics. We treat the data that we hold with respect, keeping it secure and confidential, and we use statistical methods that are professional, ethical and transparent.

6 . Methods used to produce the research and development data

How we collect the data

Government departments are sent an Excel-based questionnaire via Secure Electronic File Transfer (SEFT). They are also provided with detailed notes that accompany the UK government expenditure on research and development (GovERD) survey to assist them to adhere to the [Frascati Manual](#) definitions of research and development (R&D). The completed questionnaires are returned to us also via SEFT.

Research councils and Higher Education Funding Councils (HEFCs) are included in the GovERD survey and their expenditure is shown separately in the published data tables.

Sample size

There are approximately 140 departmental responders including agencies, seven research councils (reported for 2018 onwards by UK Research and Innovation (UKRI), four Higher Education Funding Councils (HEFCs) (including Research England (part of UKRI) and the Department for Employment and the Department for the Economy in Northern Ireland), civil departments and the [Ministry of Defence](#).

There are approximately 58 responders to the survey, as some agencies report together.

Sample frame

UK government departments, including research councils and HEFCs, are contacted to establish their department's structure and whether they carried out and/or fund R&D activities in the survey period. This ensures that the correct respondents receive the survey.

A reference list of departments is updated annually prior to the survey despatch. Sources that are used to keep the frame up to date include government websites like the [UK Parliament](#) website, the main [UK government](#) website and the [Cabinet Office](#). Each department is contacted two months before the survey despatch date to check its structure and to confirm contact details.

How we process and quality assure the data

Detailed validation checks are carried out on the returned survey data to compare figures with those previously reported and to investigate dubious data changes. Where necessary respondents are recontacted to discuss and resolve anomalies with the returned data.

There is no weighting as GovERD is a census survey.

The target response rate is 95% for largest departments (approximately 14) and 90% for the remainder. Future estimates provided on previous surveys are used to estimate data individually for any non-responding government departments.

How we review the data

Research and development expenditure by the UK government estimates are revised in accordance with our revision policy, which is to revise data for the previous two periods. The majority of revisions are because of misreporting and the late receipt of data. GovERD estimates can be revised for longer periods if there is significant misreporting.

7 . Other information

Differences between estimates in R&D by the UK government and GERD statistical bulletins

There are important differences between estimates in the R&D expenditure by the UK government and [gross domestic expenditure on research and development \(GERD\)](#) statistical bulletins. These are:

- the GERD bulletin only includes estimates of expenditure on R&D performed "in-house", that is, by organisations themselves
- estimates in the [R&D expenditure by the UK government statistical bulletin](#) include in-house R&D, purchased R&D and other funding provided to external organisations for R&D (both within the UK and overseas); as well as taking account of funding received for R&D, to provide estimates of net expenditure
- as a result, UK government net expenditure on R&D has been significantly larger than the value of R&D performed in-house by the government sector itself - for example, the UK government sector reported net expenditure on R&D in the 2018 [R&D expenditure by the UK government bulletin](#), which was approximately five times larger than the value of in-house R&D performed by the government sector reported in the [GERD 2018 bulletin](#)
- the R&D expenditure by the UK government bulletin additionally contains two components that are not included in GERD, namely the UK's indicative contributions to EU R&D expenditure budget and knowledge transfer

UK Research and Innovation (UKRI) and research councils

In 2018, UK Research and Innovation (UKRI) was created to bring together the UK's seven research councils, Innovate UK and Research England into one unified body. In the government R&D statistics, Research England, the new council within UKRI, has taken over some functions of the former Higher Education Funding Council for England (HEFCE) and so is included with the higher education funding councils (HEFCs) for Scotland, Wales and the Department for Employment and Learning in Northern Ireland, rather than as part of the UKRI sector.

In previous publications of government R&D expenditure (published in the [UK government expenditure on science, engineering and technology \(SET\) statistical bulletin](#)), estimates were available for research councils individually and collectively as a sector. In the 2018 Government R&D release, separate estimates for the research councils are no longer available as these now form part of the UKRI sector. The category for "research councils" has therefore been replaced by "UKRI" in the data tables for the 2018 period.

The category "UKRI" for 2018 is not directly comparable with the Research council's category in previously published SET datasets. This is because UKRI also includes Innovate UK, which, until the [2017 SET bulletin](#), was part of the Department for Business, Energy and Industrial Strategy (BEIS) and therefore part of the civil departmental total.

Data tables 14 and 15 were introduced in the 2014 SET statistical bulletin, to give more detailed breakdowns of the flows of funds between departments, and to show how estimates relate to those in the [UK gross domestic expenditure on research and development \(GERD\)](#) bulletin. These tables were developed to meet user needs.

The SET publication used to include data tables on personnel associated with scientific and technical postgraduate education and training, which are sourced from the [Labour Force Survey](#). From the publication of estimates for 2016 in the 2018 bulletin, these estimates have been included in the [UK gross domestic expenditure on research and development \(GERD\)](#) statistical bulletin.

SET statistics were published on our website as official statistics for the first time on 11 July 2014. Until 2013 they were published by The Department for Business, Energy and Industrial Strategy (BEIS) (previously known as the [Department for Business, Innovation and Skills](#)).