

Statistical bulletin

Gross domestic expenditure on research and development, UK: 2016

Estimates of research and development performed and funded by business enterprise, higher education, government, research councils, and private non-profit organisations.



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1 . Main points

- Research and development (R&D) continued to grow, expanding by £1.4 billion to £33.1 billion in 2016, an increase of 4.3%, above the long-term annual average increase of 4.1% since 1990.
- Most of this year's growth came from the business sector, where it grew by £1.2 billion to £22.2 billion, an increase of 6%.
- Total R&D expenditure in the UK in 2016 represented 1.67% of gross domestic product (GDP), unchanged from 2015, remaining below the European Union (EU-28) provisional estimate of 2.03%.
- As a percentage of GDP, the UK ranked 11th of all EU countries, unchanged from 2015.
- Funding of UK R&D from overseas fell for the second year running and in 2016 is 7% lower than the all-time high reached in 2014 of £5.6 billion.

2 . Statistician's comment

"Research and development spending in the UK continued to grow in 2016, to reach a new record high. Most of this growth came from the business sector, which now accounts for two-thirds for all R&D."

Daniel Groves, National Accounts and Economic Statistics, Office for National Statistics.

3 . Things you need to know about this release

This release provides estimates of research and development (R&D) performed in and funded by the following four sectors of the UK economy, as defined in the "[Frascati Manual \(2015\)](#)":

- business enterprise (BERD)
- higher education (HERD)
- government, which includes research councils (GovERD)
- private non-profit organisations (PNP)

These sectors' R&D data are known collectively as gross domestic expenditure on R&D (GERD).

GERD is the preferred measure of R&D activity for use in international comparisons. This release reports on R&D expenditure in the UK irrespective of the country of residence of the ultimate owner or users of the R&D produced.

R&D is measured by the expenditure on R&D performed by an organisation, or the funding received by an organisation for R&D work. These are often but not always the same. R&D performed is regarded as a more accurate measure than funding received by an organisation, as not all funds received may be used on R&D as intended.

The business sector is the largest component of GERD; its estimates in this release are derived from the [Business enterprise research and development 2016 statistical bulletin](#), published on 21 November 2017.

A definition of “R&D” can be found in the [Frascati Manual \(2015\)](#). This is the internationally agreed standard as defined by the Organisation for Economic Cooperation and Development (OECD).

The gross domestic product (GDP) measure used is non-seasonally adjusted money GDP between 1955 to 1956 and 2015 to 2016 (1955 to 2016) consistent with [UK Economic Accounts](#) published on 22 November 2017.

All figures quoted are in current prices unless otherwise stated.

4 . Long-term upward trend for UK R&D expenditure continues

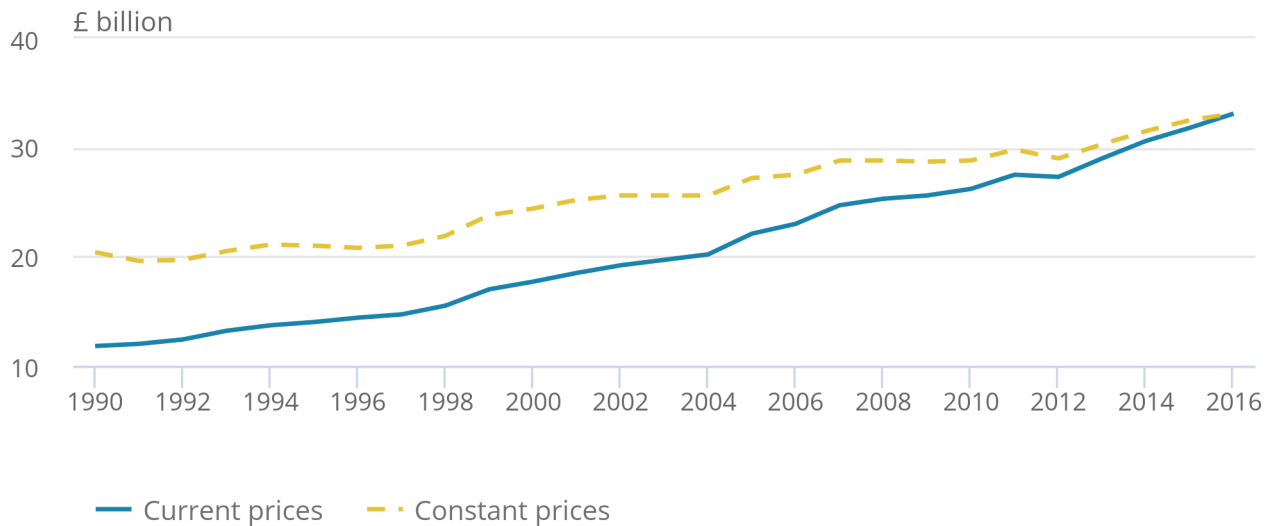
Expenditure on research and development (R&D) performed in the UK was £33.1 billion in 2016, reaching its highest level on record. This was up from £31.8 billion in 2015, an increase of 4.3%, above the long-term annual average growth since 1990 of 4.1%.

In constant prices (adjusted to remove the effects of inflation), the 2016 estimate surpassed 2015’s previous high by £0.6 billion, with growth of 2%. With an average annual growth rate of 1.9% since the 1990 level of £20.4 billion, the long-term upward trend, in constant prices, is still evident (Figure 1).

In 2016, the UK spent £505 per head of population, an increase of 145% from £206 in 1990. Removing the effects of inflation this represents an increase of 42%.

Figure 1: UK gross domestic expenditure on research and development, 1990 to 2016

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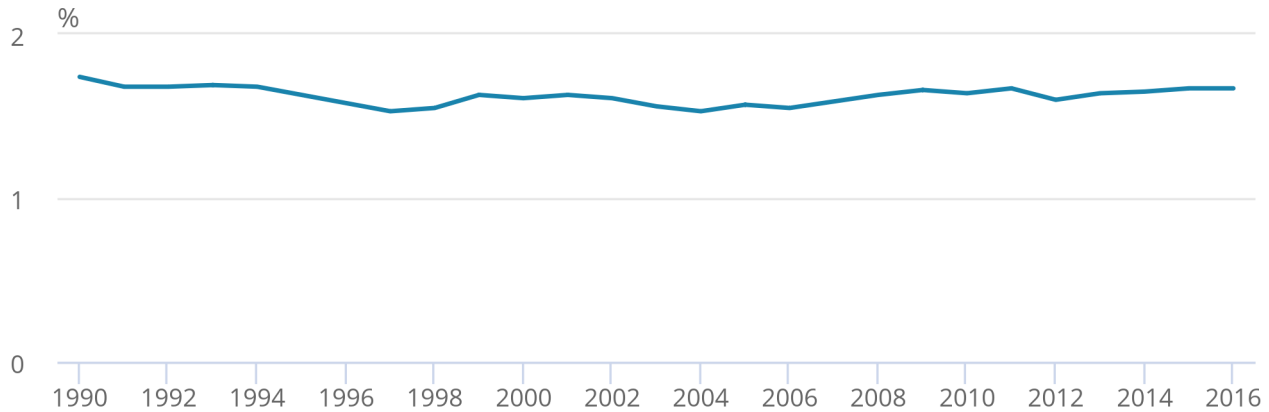


Source: Office for National Statistics

Figure 2 shows gross domestic expenditure on R&D performed in the UK, as a percentage of gross domestic product (GDP). Total expenditure on R&D in 2016 represented 1.67% of GDP, unchanged from 2015. As a percentage of GDP, this expenditure declined steadily between 1990 and 1997. Since then, the level has fluctuated between 1.53% and 1.67% with an average estimate of 1.61% for the period 1998 to 2016.

Figure 2: UK gross expenditure on research and development as a percentage of gross domestic product, 1990 to 2016

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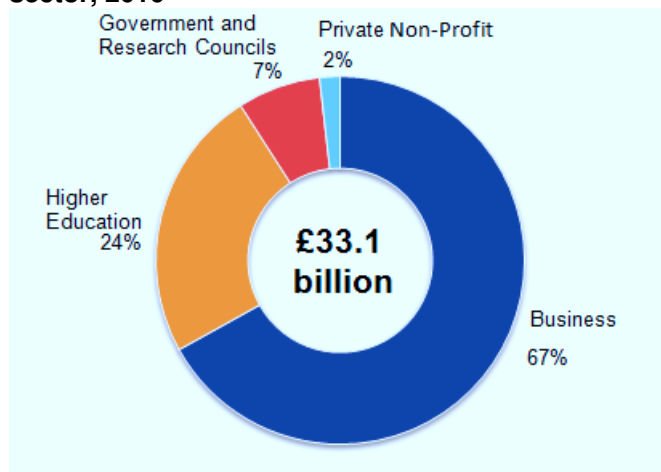


Source: Office for National Statistics

5 . Proportion of total UK funding of performing R&D by business continues to increase

UK estimates of research and development (R&D) cover the four sectors of the economy, namely business, higher education, government (including research councils) and private non-profit organisations. Figure 3 shows the contribution each sector made to the total UK R&D expenditure estimate in 2016.

Figure 3: Composition of UK gross domestic expenditure on research and development by performing sector, 2016



Business

The business sector performs the most R&D in the UK. In 2016, it performed £22.2 billion, representing 67% of total expenditure on R&D in the UK. This grew 6% from £21.0 billion in 2015.

On an annual basis, the 400 largest business R&D performers are asked to select the industry product groups that best describe the type of R&D they undertake. For the smaller R&D performers, no product group data are collected; however, these businesses' dominant [Standard Industrial Classification \(SIC\)](#) is used as a proxy to determine product group. The concept of "product groups" is described in more detail in the [UK business enterprise research and development Quality and Methodology Information \(QMI\)](#).

The product groups with the largest R&D expenditure in 2016 were:

- pharmaceuticals (£4.1 billion)
- motor vehicles and parts (£3.4 billion)
- aerospace (£1.9 billion)
- computer programming and information service activities (excluding software development) (£1.8 billion)
- miscellaneous business activities (£1.3 billion)
- research and development services (£1.0 billion)

In 2015, the computer programming and information service activities group was the third largest with £2.5 billion. For 2016, R&D into software development has been separated from this group to be monitored individually.

More detailed information on business R&D expenditure can be found in the [Business enterprise research and development 2016 statistical bulletin](#) published on 21 November 2017.

Higher education

The higher education sector, which includes universities and higher education institutes, was the second-largest sector, performing 24% (£8.0 billion) of total UK R&D expenditure in 2016, a growth of 0.4% from the 2015 estimate.

Please note that new higher education financial reporting standards for reporting periods starting on or after 1 January 2015 have introduced significant changes in the way financial performance is reported, which present difficulties in comparing results from 2015 onwards with historical trends. The funding for this sector is provided mainly by the higher education funding councils for [England](#), [Scotland](#), [Wales](#), the [Department for Employment and Learning in Northern Ireland](#) and the seven UK research councils.

Government and research councils

The UK government owns many research institutes and laboratories that carry out R&D. These are managed by various government departments, including the Department for Business, Energy and Industrial Strategy, the Department for Environment, Food and Rural Affairs and the Department of Health.

In 2016, R&D expenditure in the UK performed by the government and research councils sector grew by 4% from £2.1 billion in 2015 to £2.2 billion. This sector performed 7% of total expenditure on R&D carried out in the UK in 2016.

[Research Councils UK \(RCUK\)](#) is the strategic partnership of the UK's seven research councils. Each year the councils perform research covering the full spectrum of academic disciplines from the medical and biological sciences to the arts and humanities. RCUK also offers access to the UK's research facilities and infrastructure to individuals and businesses overseas.

Research councils' R&D expenditure grew by 9% from £771 million in 2015 to £837 million in 2016.

Private non-profit organisations

The private non-profit (PNP) sector includes registered charities and trusts specialising mainly in health and medical research and development. This sector includes, for example, a number of cancer charities that carry out extensive research, from cancer prevention to drug development and clinical trials.

The PNP sector is the smallest R&D-performing sector in the UK. In 2016, expenditure on R&D performed by these organisations was £0.7 billion, which contributed 2% to total UK-performed R&D expenditure. However, this sector did see the largest increase overall in percentage terms, up 10% from 2015. It should be noted that from 2011 the PNP survey has been biennial and therefore the 2016 results were estimated based on previous years' data. The increase in the 2016 estimate has taken into account the large increase in 2015 due to the addition of several organisations, set up specifically to carry out large R&D projects.

6 . Government funding of UK R&D decreases

In 2016, the largest funder of research and development (R&D) performed in the UK was the business sector, which funded £17.2 billion (52%), of total UK-performed R&D. This was an increase of 10% from £15.6 billion in 2015.

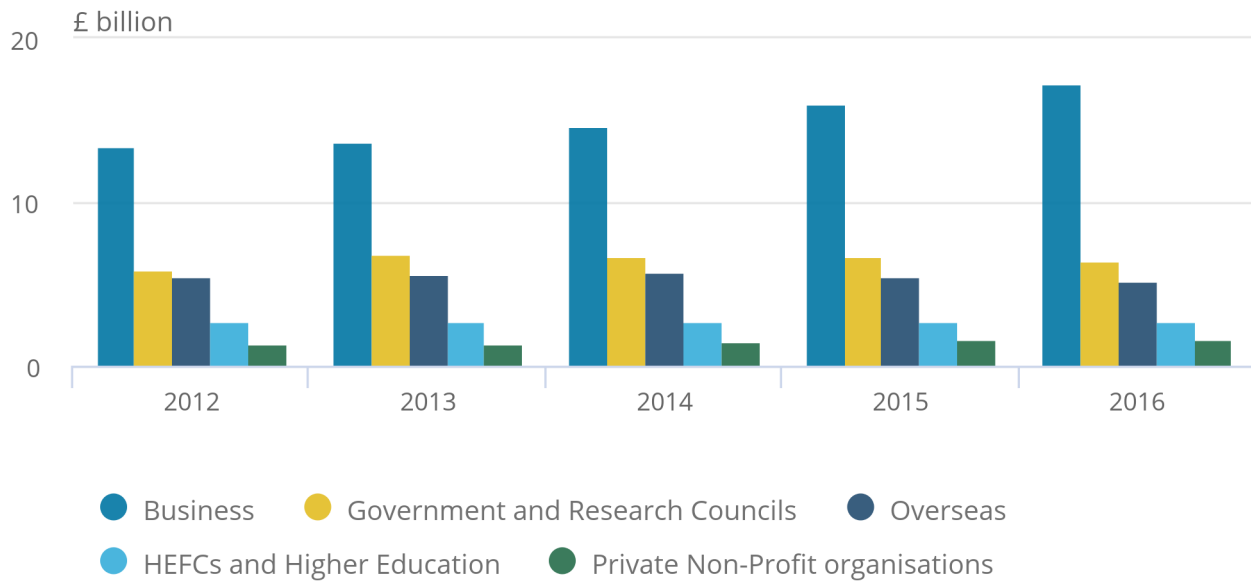
The government sector was the second-largest sector of funding with £6.5 billion (20%) of total UK R&D funding in 2016. This was a decrease of 0.5% from the 2015 estimate. In comparison, the sector itself only spent £2.2 billion in 2016 performing R&D in the UK.

Since 1990, there has been a change in the profile of how UK R&D expenditure has been funded. In 1990, R&D funding from overseas in constant prices was £2.4 billion, 12% of total UK-performed R&D. Since then, there has been a steady increase in the value of funding from overseas to the all-time high of £5.8 billion in 2014, which represented 18% of total UK funding. Funding from overseas has fallen for the second time since 2014, reducing 10% to £5.2 billion in 2016, while the average annual growth rate since 1990 was 3%.

Figure 4 shows the breakdown of UK gross domestic expenditure on research and development by funding sector since 2012.

Figure 4: Composition of UK gross domestic expenditure on research and development by funding sector in constant prices, 2012 to 2016

Figure 4: Composition of UK gross domestic expenditure on research and development by funding sector in constant prices, 2012 to 2016



Source: Office for National Statistics

Notes:

1. HEFCs – Higher Education Funding Councils.

It is important to note that sectors can fund themselves. For example, in 2016, the business sector performed £22.2 billion, of which £16.7 billion was funded by the business sector itself. The remaining £5.5 billion of R&D expenditure performed by businesses was funded by other sectors or from overseas.

7 . UK defence expenditure on R&D increases but down on 2005 high

Research and development (R&D) expenditure in the UK for defence purposes was 5% of total R&D expenditure (£1.8 billion) in 2016. This was an increase of 4% from 2015. In constant prices, defence R&D expenditure has fallen by 61% since the 1990 estimate of £4.5 billion.

The business sector was by far the largest performer of both civil and defence R&D in 2016, at £20.7 billion (66%) and £1.6 billion (88%) respectively. Business expenditure on performing R&D in the civil sector grew by 90% in constant prices since 1990, but business expenditure on performing R&D in the defence sector fell by 48% over the same period.

The UK government's funding of defence R&D in 2016 was unchanged from 2015 at £1.1 billion. As a proportion of total UK defence funding, government sector funding has decreased from 67% in 2015 to 64% in 2016. The business sector provided £0.5 billion (27%) of funding, up from 23% in 2015, and £0.1 billion (8%) came from overseas compared with 9% in 2015.

8 . South East and East of England continue to spend most on R&D

Research and development (R&D) expenditure can be analysed by UK country and region (Figure 5). In this context, the country and region refers to the location where the R&D is performed.

In 2016, the South East and East of England dominated R&D activity in the UK. These regions together accounted for 37% of total UK R&D expenditure (£12.3 billion).

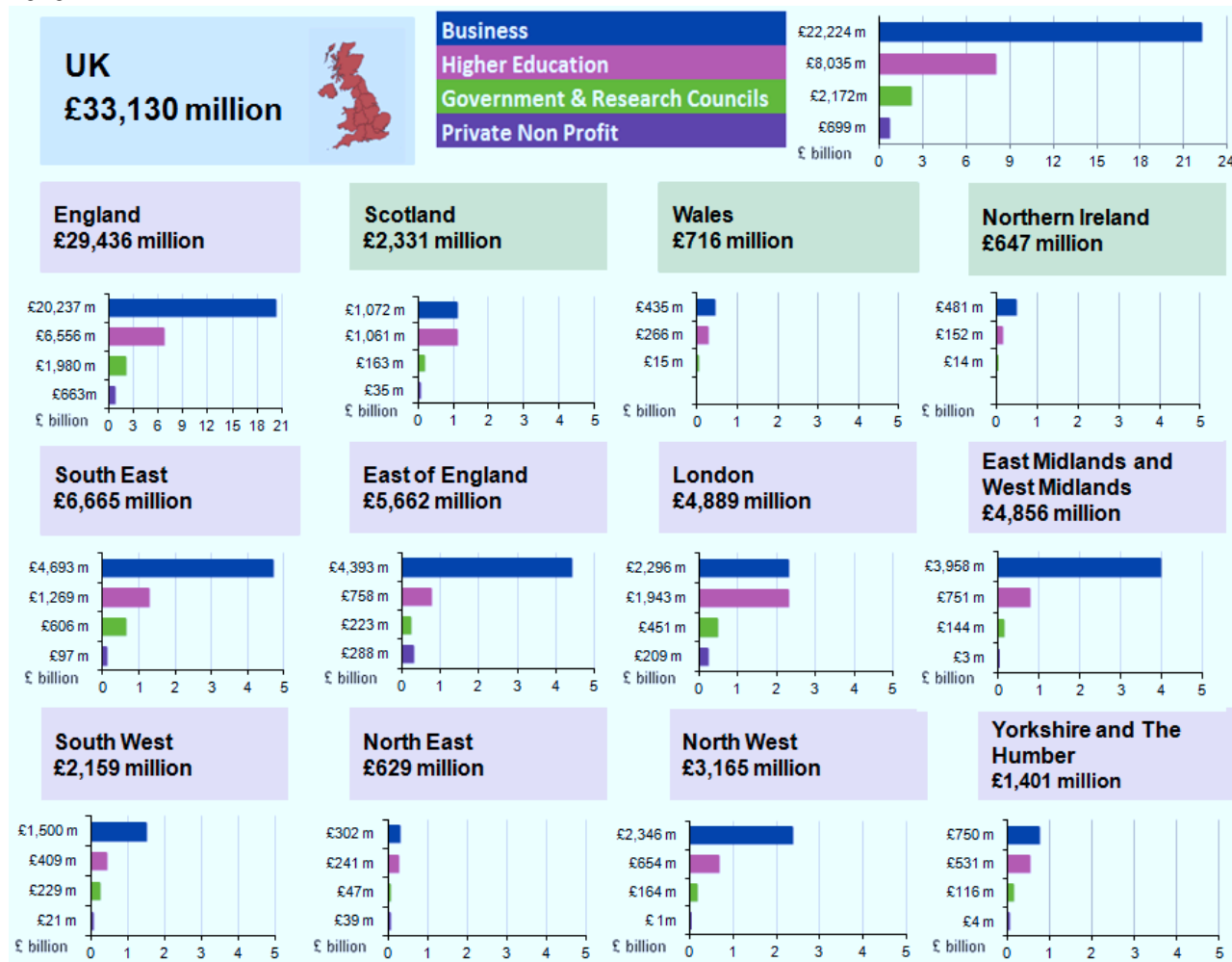
The majority of UK R&D expenditure was carried out in England at £29.4 billion (89%) in 2016. Scotland accounted for £2.3 billion (7%), with Wales and Northern Ireland performing £0.7 billion (2%) and £0.6 billion (2%) respectively.

In 2016, the business sector remained dominant throughout the UK. However, the higher education sector had a similar value to the business sector in Scotland with expenditure of £1.1 billion. In 2015, the higher education sector had the highest expenditure on performing R&D in both London and Scotland, which had been evident for some time. In 2016, the business sector overtook higher education in both regions.

Since 2001, the largest annual average increase in the business sector was in London at 8.2%, while the South East had the lowest growth at 2.6%.

While the UK spent £505 per head of population in 2016, England spent £533, Scotland £431, Northern Ireland £348 and Wales £230 respectively.

Figure 5: UK gross domestic expenditure on research and development by sector, country and region, 2016



9 . UK's GERD as a percentage of GDP ranked 11th of all EU-28 countries

[Europe 2020 targets](#) specify five targets for the European Union (EU) to achieve by 2020, including a target of 3% of the EU's gross domestic product (GDP) to be invested in research and development (R&D). Therefore, the estimates in this release are used in monitoring progress towards this target.

The latest [preliminary estimates produced by Eurostat](#) indicate that for the EU as a whole the percentage of GDP spent on R&D fluctuated between 1.74% and the high of 2.04% in 2015 before declining slightly to 2.03% in 2016 (Figure 6). Please note that the 2016 results for the EU-28 and Organisation for Economic Co-operation and Development (OECD) countries are early estimates and are provisional at the time of this release.

Figure 6: GERD to gross domestic product ratio as a percentage (research and development intensity) by country, European Union (EU-28), 2016

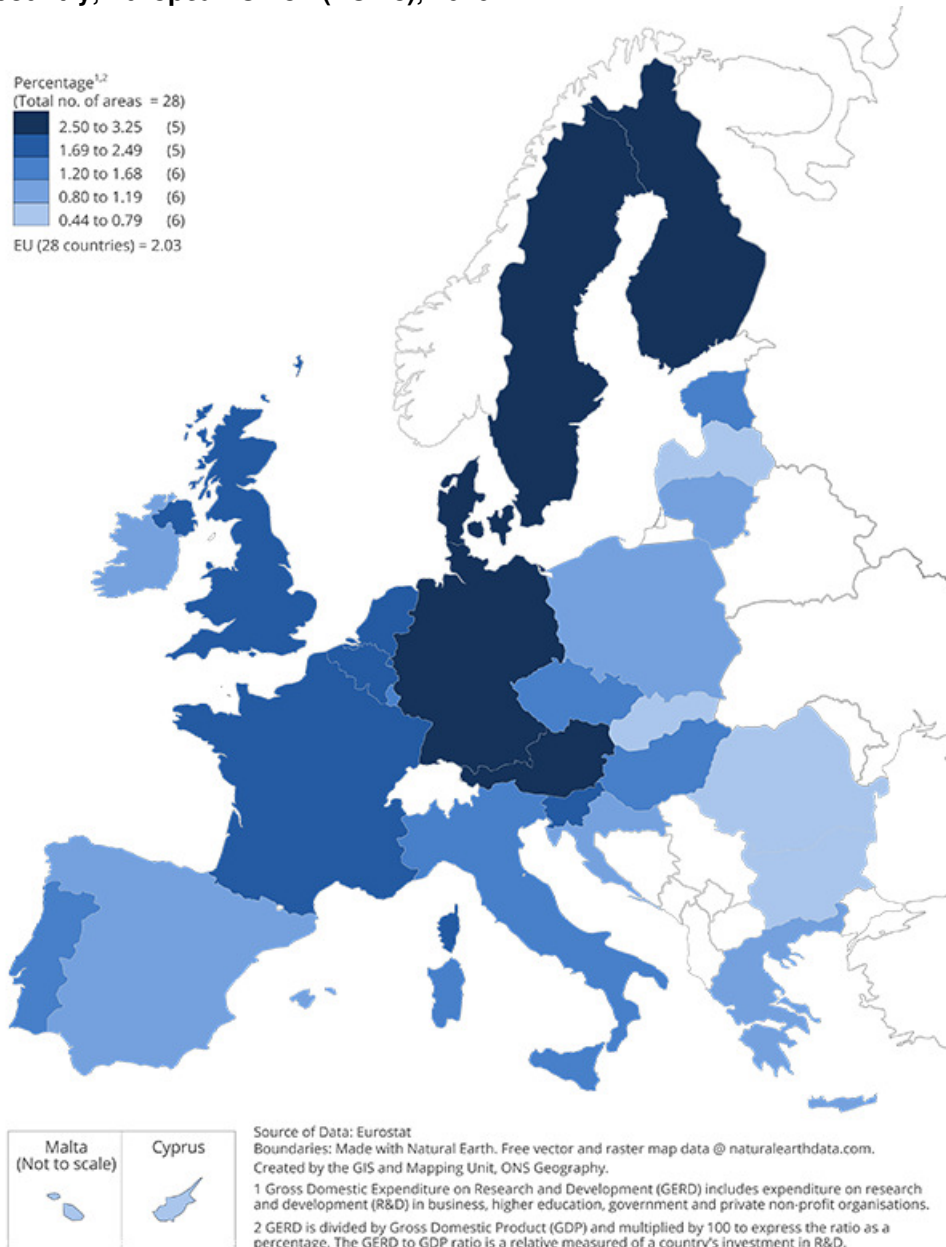
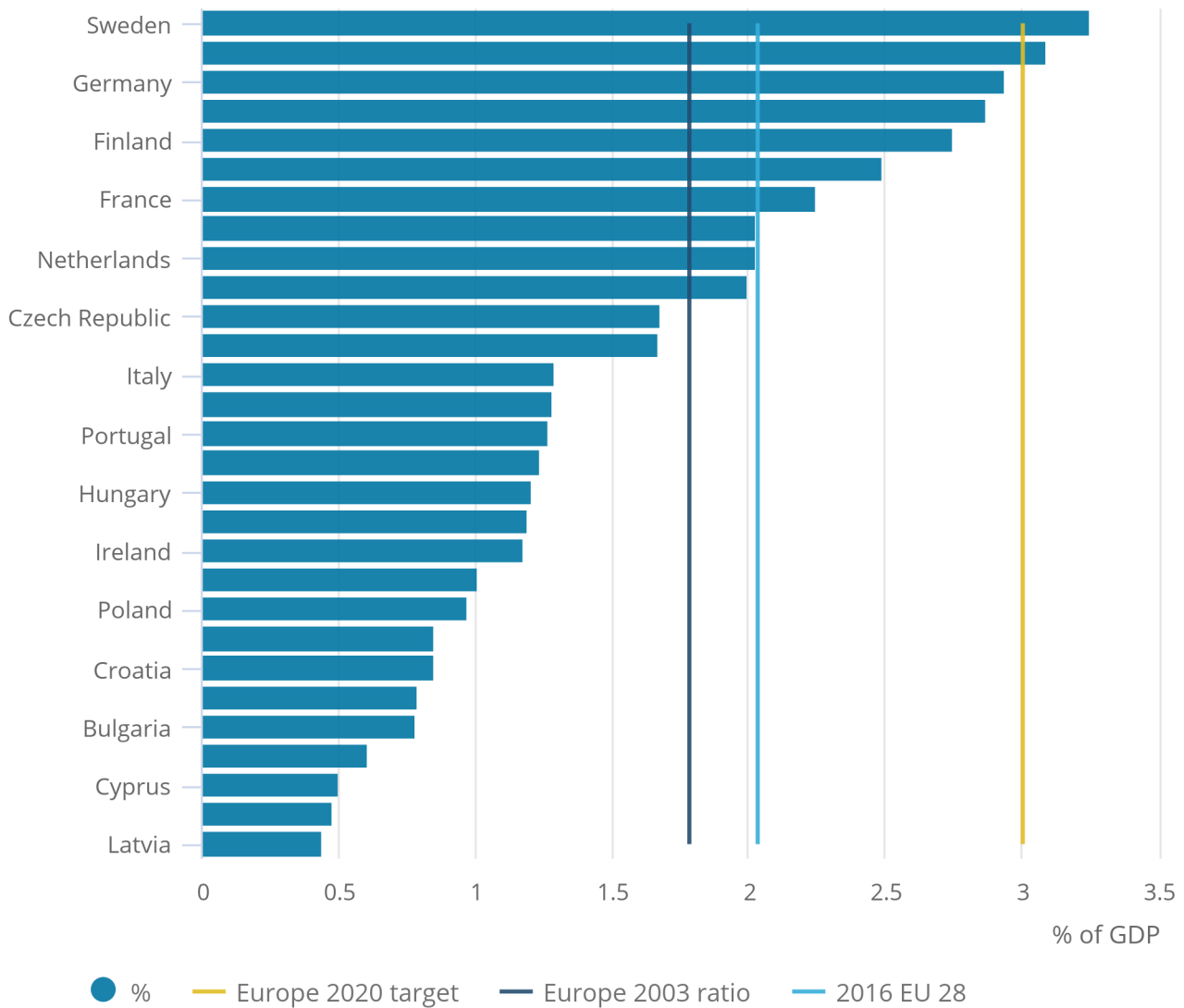


Figure 7 shows the UK's R&D as a proportion of GDP compared with other EU countries.

It includes the average for the EU-28, compared with the Europe 2020 target of 3%. The UK's GERD represented 1.67% of GDP in 2016, unchanged from 2015. The UK remained the 11th-highest GERD as a percentage of GDP of all EU-28 countries, where the average was 2.03% of GDP.

Figure 7: EU countries' gross domestic expenditure on research and development as a percentage of gross domestic product (R&D intensity), 2016

Figure 7: EU countries' gross domestic expenditure on research and development as a percentage of gross domestic product (R&D intensity), 2016



Source: Eurostat

Notes:

1. Some EU countries' 2016 estimates taken from the Eurostat website are provisional.

When comparing total R&D intensity across countries, it is important to take into account differences in individual countries' economic structures. The OECD has produced a [Science, Technology and Industry Scoreboard](#) to facilitate these comparisons.

10 . Links to related statistics

This release includes data tables ([LF1 and LF2](#)) on qualified scientists and engineers in the labour force by sex. These estimates are from our Labour Force Survey and are categorised by type of qualification and occupation from the population of Great Britain aged 16 to 64. Occupation is based on the [Standard Occupational Classification 2010: SOC 2010](#)). Prior to 2015, this information was previously published in the [UK government expenditure on science, engineering and technology statistical bulletin](#). However, these data are more relevant in the context of GERD R&D and can be made accessible at an earlier date.

Further statistics on [research and development expenditure in the UK](#) are available.

11 . Quality and methodology

The [UK gross domestic expenditure on research and development Quality and Methodology Information report](#) contains important information on:

- the strengths and limitations of the data and how they compare with related data
- uses and users of the data
- how the output was created
- the quality of the output including the accuracy of the data

About the data

These points should be noted when examining this bulletin or the data tables:

- there may be differences between totals and the sum of their independently- rounded components
- in some tables, entries have either been aggregated or suppressed to avoid disclosure of figures in which the returns of individual organisations could be identified – where this happens, footnotes have been added to the tables
- note that £1.0 billion equals £1,000 million in this release
- the majority of the data series started in 1989 and constant price comparisons have been made using the start of the next decade in 1990
- the 2015 and 2016 estimates have been revised where necessary to take account of businesses misreporting and late returns
- all figures quoted are in current prices unless otherwise stated

UK gross domestic expenditure on research and development (R&D), 2016

Published on 15 March 2018

Please click on the links below to access the datasets:

[Table 1](#) Expenditure on R&D in the UK by performing and funding sectors, 2016

[Table 2](#) Expenditure on R&D in the UK by sector of performance: 2005 to 2016

[Table 3](#) Expenditure on civil and defence R&D in the UK by sector of performance: 2005 to 2016

[Table 4](#) Expenditure on R&D in the UK by sector of funding: 2005 to 2016

[Table 5](#) Expenditure on civil and defence R&D in the UK by sector of funding: 2005 to 2016

[Table 6](#) Country and regional breakdown of expenditure on R&D in the UK by sector of performance, 2016

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1 EXPENDITURE ON R&D IN THE UK BY PERFORMING AND FUNDING SECTORS, 2016

Current prices	Sector performing the R&D					Total	Overseas	£ million
	Government	Research Councils	Higher Education	Business Enterprise	Private ¹ Non-Profit			
Sector funding the R&D								
Government	1136	137	483	1,730	98	3,584	542	
Research Councils	47	554	2,107	5	197	2,909	292	
Higher Education Funding Councils	-	-	2,207	-	-	2,207	-	
Higher Education	2	17	299	-	131	449	-	
Business Enterprise	15	25	350	16,742	18	17,151	6,658	
Private Non-Profit	13	42	1,242	188	170	1,655	-	
Overseas	122	60	1,346	3,560	85	5,174	-	
TOTAL	1,335	837	8,035	22,224	699	33,130	-	
of which:								
Civil	1,178	837	7,994	20,658	688	31,354	-	
Defence	156	-	42	1,567	11	1,776	-	

Source: Office for National Statistics

1 Prior to 2011 PNP data was estimated. From 2011 data has been collected from a biennial survey with intermediate years being estimated using previous years data.

- denotes nil, figures unavailable or too small to display.

Please note:

Differences may occur between totals and the sum of their independently rounded components.

2 EXPENDITURE ON R&D IN THE UK BY SECTOR OF PERFORMANCE: 2005 to 2016

£ million

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector performing the R&D													
Current prices													
TOTAL³	GLBA	22106	22,993	24,696	25,345	25,632	26,173	27,452	27,257	29,015	30,577[†]	31,766	33,130
Government ³	GLBK	1,238	1,252	1,320	1,348	1,406	1,372	1,321	1,391	1,503	1,391	1,321 [†]	1,335
Research Councils	DMRS	1,051	1,061	1,034	1,041	1,097	1,141	1,035	804	814	819	771 [†]	837
Business Enterprise	GLBL	13,734	14,144	15,676	15,814	15,532	16,045	17,452	17,409	18,617	19,982 [†]	21,038	22,224
Higher Education	GLBM	5,580	6,022	6,119	6,545	6,931	6,963	7,117	7,133	7,593	7,835	8,003 [†]	8,035
Private Non-Profit ²	GLBN	502	513	546	595	666	652	526	520	489	549	634	699
As % of GDP		1.57 [†]	1.55	1.59	1.63	1.66	1.64	1.67	1.60	1.64	1.65	1.67	1.67
		2005 [†]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector performing the R&D													
Constant prices (2016) ¹													
TOTAL³	GLBD	27,238	27,471	28,791	28,799	28,707	28,787	29,765	28,952	30,302	31,477	32,483	33,130
Government ³	GLBW	1,525	1,496	1,539	1,532	1,575	1,509	1,432	1,478	1,570	1,432	1,351	1,335
Research Councils	DMSU	1,295	1,268	1,205	1,183	1,229	1,255	1,122	854	850	843	788	837
Business Enterprise	GLBX	16,923	16,899	18,275	17,969	17,396	17,648	18,923	18,492	19,443	20,570	21,513	22,224
Higher Education	GLBY	6,875	7,195	7,134	7,437	7,763	7,659	7,717	7,577	7,930	8,066	8,184	8,035
Private Non-Profit ²	GLBZ	619	613	637	676	746	717	570	552	511	565	648	699
Source: Office for National Statistics													
		2005 [†]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP deflator used to convert current prices to constant prices		81.158	83.699	85.777	88.008	89.287	90.918	92.228	94.144	95.752	97.140	97.794	100

1 Please note that the latest deflators have been applied to the business research and development estimates in this bulletin which has resulted in small differences being observed between the BERD and GERD publications.

2 Prior to 2011 PNP data was estimated. From 2011 data has been collected from a biennial survey with intermediate years being estimated using previous years data.

3 Estimates of launch investment loan repayments received by government from business have been removed following a review of how these payments should be reported. These loan repayments are in relation to loans given out in previous years and therefore should not be included in current totals of R&D expenditure. The total of loan repayments have been removed from the total performed by government and the UK total for 2013, and 2015, there were no repayments in 2014. In current prices the values removed were 2013 (£212 million) and 2015 (£112 million).

[†] crosses denote earliest data revision.

Please Note:

Differences may occur between totals and the sum of their independently rounded components.

3 EXPENDITURE ON CIVIL AND DEFENCE R&D IN THE UK BY SECTOR OF PERFORMANCE: 2005 to 2016

£ million

		Civil											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector performing the R&D													
Current prices													
TOTAL³	GLBB	19,255	20,416	21,963	22,945	23,424	24,255	25,471	25,470	27,161	28,828 †	30,063	31,354
Government ²	GLBO	882	895	1,042	1,087	1,119	1,146	1,164	1,241	1,339	1,233	1,156	1,178
Research Councils	DMSC	1,046	1,057	1,034	1,041	1,097	1,141	1,035	804	814	819	771	837
Business Enterprise	GLBP	11,288	11,975	13,269	13,718	13,648	14,392	15,667	15,808	16,966	18,435	19,546	20,658
Higher Education	GLBQ	5,538	5,976	6,080	6,505	6,894	6,925	7,082	7,099	7,556	7,795	7,963	7,994
Private Non-Profit ²	GLBR	502	513	539	595	666	651	524	518	487	546	627	688
As % of GDP		1.37	1.38	1.41	1.47	1.52	1.52	1.55	1.50	1.53	1.56	1.58	1.58
		Civil											
		2005 †	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector performing the R&D													
Constant prices (2016) ¹													
TOTAL³	C3V7	23,725	24,392	25,605	26,071	26,234	26,678	27,617	27,054	28,366	29,677	30,741	31,354
Government ²	C3V9	1,087	1,069	1,215	1,235	1,253	1,260	1,262	1,318	1,398	1,269	1,182	1,178
Research Councils	C3V2	1,289	1,263	1,205	1,183	1,229	1,255	1,122	854	850	843	788	837
Business Enterprise	C3VA	13,909	14,307	15,469	15,587	15,286	15,830	16,987	16,791	17,719	18,978	19,987	20,658
Higher Education	C3VB	6,824	7,140	7,088	7,391	7,721	7,617	7,679	7,541	7,891	8,025	8,143	7,994
Private Non-Profit ²	C3VC	619	613	628	676	746	716	568	550	509	562	641	688
		Defence											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector performing the R&D													
Current prices													
TOTAL	GLBC	2,851	2,577	2,732	2,399	2,208	1,918	1,980	1,787	1,854	1,749 †	1,703	1,776
Government	GLBS	357	357	279	262	288	226	158	150	164	158	164	156
Research Councils	DMSM	4	4	-	-	-	-	-	-	-	-	-	-
Business Enterprise	GLBT	2,446	2,169	2,407	2,097	1,884	1,653	1,785	1,601	1,651	1,548	1,491	1,567
Higher Education	GLBU	43	46	39	40	36	38	35	34	37	40	40	42
Private Non-Profit ²	GLBV	-	-	8	1	-	1	2	2	2	3	8	11
As % of GDP		0.20	0.17	0.18	0.15	0.14	0.12	0.12	0.11	0.10	0.09	0.09	0.09
		Defence											
		2005 †	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector performing the R&D													
Constant prices (2016) ¹													
TOTAL	C3V8	3,513	3,079	3,185	2,726	2,473	2,110	2,147	1,898	1,936	1,800	1,741	1,776
Government	C3VD	440	427	325	298	323	249	171	159	171	163	168	156
Research Councils	C3V3	5	5	-	-	-	-	-	-	-	-	-	-
Business Enterprise	C3VE	3,014	2,591	2,806	2,383	2,110	1,818	1,935	1,701	1,724	1,594	1,525	1,567
Higher Education	C3VF	53	55	45	45	40	42	38	36	39	41	41	42
Private Non-Profit ²	C3VG	-	-	9	1	-	1	2	2	2	3	8	11
Source: Office for National Statistics													
		2005 †	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP deflator used to convert current prices to constant prices		81.158	83.699	85.777	88.008	89.287	90.918	92.228	94.144	95.752	97.140	97.794	100

1 Please note that the latest deflators have been applied to the business research and development estimates in this bulletin which has resulted in small differences being observed between the BERD and GERD publications.

2 Prior to 2011 PNP data was estimated. From 2011 data has been collected from a biennial survey with intermediate years being estimated using previous years data.

3 Estimates of launch investment loan repayments received by government from business have been removed following a review of how these payments should be reported. These loan repayments are in relation to loans given out in previous years and therefore should not be included in current totals of R&D expenditure. The total of loan repayments have been removed from the total performed by government and the UK total for 2013, and 2015, there were no repayments in 2014. In current prices the values removed were 2013 (£212 million) and 2015 (£112 million).

- denotes nil, figures unavailable or too small to display.

† crosses denote earliest data revision.

Please Note:

Differences may occur between totals and the sum of their independently rounded components.

4 EXPENDITURE ON R&D IN THE UK BY SECTOR OF FUNDING: 2005 to 2016

£ million

		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector funding the R&D													
Current prices													
TOTAL³	GLBA	22,106	22,993	24,696	25,345	25,632	26,173	27,452	27,257	29,015	30,577[†]	31,766	33,130
Government	GLCA	2,584	2,531	2,581	2,703	2,939	3,044	3,022	2,933	3,642	3,606 [†]	3,623	3,584
Research Councils	DMSR	2,574	2,709	2,543	2,765	2,908	2,958	2,942	2,666	2,892	2,950	2,902 [†]	2,909
Higher Education Funding Councils	DMSM	1,928	2,085	2,234	2,227	2,395	2,303	2,257	2,185	2,266	2,290	2,218	2,207
Business Enterprise ³	GLCB	9,580	10,377	11,519	11,511	11,362	11,443	12,413	12,624	13,157	14,325 [†]	15,615	17,151
Higher Education	GLCC	266	288	284	303	314	315	353	345	369	387	433	449
Private Non-Profit ²	GLCD	1,022	1,076	1,153	1,247	1,279	1,267	1,293	1,316	1,374	1,426	1,554 [†]	1,655
Overseas	GLCE	4,152	3,927	4,382	4,589	4,436	4,842	5,172	5,188	5,316	5,591 [†]	5,421	5,174
		2005 [†]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016

Sector funding the R&D													
Constant prices (2016) ¹													
TOTAL³	GLBD	27,238	27,471	28,791	28,799	28,707	28,787	29,765	28,952	30,302	31,477	32,483	33,130
Government	GLCP	3,184	3,024	3,009	3,071	3,292	3,348	3,277	3,115	3,804	3,712	3,705	3,584
Research Councils	DMSV	3,172	3,237	2,965	3,142	3,257	3,253	3,190	2,832	3,020	3,037	2,967	2,909
Higher Education Funding Councils	DMSW	2,376	2,491	2,604	2,530	2,682	2,533	2,447	2,321	2,367	2,357	2,268	2,207
Business Enterprise ³	GLCQ	11,804	12,398	13,429	13,079	12,725	12,586	13,459	13,409	13,741	14,747	15,967	17,151
Higher Education	GLCR	328	344	331	344	352	346	383	366	385	398	443	449
Private Non-Profit ²	GLCS	1,259	1,286	1,344	1,417	1,432	1,394	1,402	1,398	1,435	1,468	1,589	1,655
Overseas	GLCT	5,116	4,692	5,109	5,214	4,968	5,326	5,608	5,511	5,552	5,756	5,543	5,174

Source: Office for National Statistics

	2005 [†]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP deflator used to convert current prices to constant prices	81.158	83.699	85.777	88.008	89.287	90.918	92.228	94.144	95.752	97.140	97.794	100

1 Please note that the latest deflators have been applied to the business research and development estimates in this bulletin which has resulted in small differences being observed between the BERD and GERD publications.

2 Prior to 2011 PNP data was estimated. From 2011 data has been collected from a biennial survey with intermediate years being estimated using previous years data.

3 Estimates of launch investment loan repayments received by government from business have been removed following a review of how these payments should be reported. These loan repayments are in relation to loans given out in previous years and therefore should not be included in current totals of R&D expenditure. The total of loan repayments have been removed from the total funding by business and the UK total for 2013, and 2015, there were no repayments in 2014. In current prices the values removed were 2013 (£212 million) and 2015 (£112 million).

[†] crosses denote earliest data revision.

Please Note:

Differences may occur between totals and the sum of their independently rounded components.

**EXPENDITURE ON CIVIL AND DEFENCE R&D IN THE UK BY SECTOR OF FUNDING:
2005 to 2016**

£ million

		Civil											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector funding the R&D													
Current prices													
TOTAL³	GLBB	19,255	20,416	21,963	22,945	23,424	24,255	25,471	25,470	27,161	28,828[†]	30,063	31,354
Government	GLCF	1,299	1,281	1,421	1,577	1,690	1,838	1,758	1,736	2,411	2,415 [†]	2,474	2,448
Research Councils	DMSX	2,574	2,709	2,543	2,765	2,908	2,958	2,941	2,666	2,892	2,950	2,902 [†]	2,909
Higher Education Funding Councils	DMSY	1,928	2,085	2,234	2,227	2,395	2,303	2,257	2,185	2,266	2,290	2,218	2,207
Business Enterprise ³	GLCG	8,963	9,646	10,603	10,775	10,659	10,945	11,900	12,206	12,704	13,932 [†]	15,229	16,666
Higher Education	GLCH	266	288	284	303	314	315	353	345	369	387	432 [†]	449
Private Non-Profit ²	GLCI	1,022	1,076	1,153	1,247	1,279	1,267	1,311	1,368	1,416 [†]	1,546	1,546	1,648
Overseas	GLCJ	3,203	3,331	3,726	4,054	4,180	4,628	4,995	5,023	5,151	5,438 [†]	5,263	5,027

		Civil											
		2005 [†]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector funding the R&D													
Constant prices (2016) ¹													
TOTAL³	C3V7	23,725	24,392	25,605	26,071	26,234	26,678	27,617	27,054	28,366	29,677	30,741	31,354
Government	C3VH	1,601	1,530	1,657	1,792	1,893	2,022	1,906	1,844	2,518	2,486	2,530	2,448
Research Councils	C3V4	3,172	3,237	2,965	3,142	3,257	3,253	3,189	2,832	3,020	3,037	2,967	2,909
Higher Education Funding Councils	C3V5	2,376	2,491	2,604	2,530	2,682	2,533	2,447	2,321	2,367	2,357	2,268	2,207
Business Enterprise ³	C3V1	11,044	11,525	12,361	12,243	11,938	12,038	12,903	12,965	13,268	14,342	15,573	16,666
Higher Education	C3VJ	328	344	331	344	352	346	383	366	385	398	442	449
Private Non-Profit ²	C3VK	1,259	1,286	1,344	1,417	1,432	1,394	1,374	1,393	1,429	1,458	1,581	1,648
Overseas	C3VL	3,947	3,980	4,344	4,606	4,682	5,090	5,416	5,335	5,380	5,598	5,382	5,027

		Defence											
		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector funding the R&D													
Current prices													
TOTAL	GLBC	2,851	2,577	2,732	2,399	2,208	1,918	1,980	1,787	1,854	1,749[†]	1,703	1,776
Government	GLCK	1,285	1,250	1,160	1,126	1,249	1,206	1,263	1,198	1,231	1,193	1,149 [†]	1,136
Research Councils	GLCM	-	-	-	-	-	-	-	-	-	-	-	-
Higher Education Funding Councils	DMSZ	-	-	-	-	-	-	-	-	-	-	-	-
Business Enterprise	GLCL	616	730	916	737	703	498	513	419	452	393	387 [†]	485
Higher Education	GLCM	-	-	-	-	-	-	-	-	-	-	1	-
Private Non-Profit ²	GLCN	-	-	-	-	-	-	26	5	6	10	8	7
Overseas	GLCO	949	597	657	536	256	214	177	165	165	153	159	147

		Defence											
		2005 [†]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Sector funding the R&D													
Constant prices (2016) ¹													
TOTAL	C3V8	3,513	3,079	3,185	2,726	2,473	2,110	2,147	1,898	1,936	1,800	1,741	1,776
Government	C3VM	1,583	1,493	1,352	1,279	1,399	1,326	1,369	1,273	1,286	1,228	1,175	1,136
Research Councils	C3ZO	-	-	-	-	-	-	-	-	-	-	-	-
Higher Education Funding Councils	C3V6	-	-	-	-	-	-	-	-	-	-	-	-
Business Enterprise	C3VN	759	872	1,068	837	787	548	556	445	472	405	396	485
Higher Education	C3VO	-	-	-	-	-	-	-	-	-	-	1	-
Private Non-Profit ²	C3VP	-	-	-	-	-	-	28	5	6	10	8	7
Overseas	C3VQ	1,169	713	766	609	287	235	192	175	172	158	163	147

Source: Office for National Statistics

	2005 [†]	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
GDP deflator used to convert current prices to constant prices	81.158	83.699	85.777	88.008	89.287	90.918	92.228	94.144	95.752	97.140	97.794	100

1 Please note that the latest deflators have been applied to the business research and development estimates in this bulletin which has resulted in small differences being observed between the BERD and GERD publications.

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3 Estimates of launch investment loan repayments received by government from business have been removed following a review of how these payments should be reported. These loan repayments are in relation to loans given out in previous years and therefore should not be included in current totals of R&D expenditure. The total of loan repayments have been removed from the total funding by business and the UK total for 2013, and 2015, there were no repayments in 2014. In current prices the values removed were 2013 (£212 million) and 2015 (£112 million).

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† crosses denote earliest data revision.

Please Note:

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6 COUNTRY AND REGIONAL BREAKDOWN OF EXPENDITURE ON R&D IN THE UK BY SECTOR OF PERFORMANCE, 2016

Current prices						£ million
Area Codes		Government ^{1, 5, 6}	Higher Education ²	Business ³	Private Non-Profit ^{4, 5}	Total
K02000001	United Kingdom	2,172	8,035	22,224	699	33,130
E12000001	North East	47	241	302	39	629
E12000002	North West	164	654	2,346	1	3,165
E12000003	Yorkshire and the Humber	116	531	750	4	1,401
E12000004	East Midlands ⁵	..	344	1,655	..	2,074
E12000005	West Midlands ⁵	..	407	2,303	..	2,782
	East Midlands and West Midlands⁵	144	751	3,958	3	4,856
E12000006	East of England	223	758	4,393	288	5,662
E12000007	London	451	1,943	2,296	209	4,899
E12000008	South East	606	1,269	4,693	97	6,665
E12000009	South West	229	409	1,500	21	2,159
E92000001	England	1,980	6,556	20,237	663	29,436
W92000004	Wales	15	266	435	-	716
S92000003	Scotland	163	1,061	1,072	35	2,331
N92000002	Northern Ireland	14	152	481	-	647

Source: Office for National Statistics

1 Government estimates include research councils and those areas of government not available from the GovERD survey or from local authorities.

2 Higher education estimates provided by HEFCE.

3 Business estimates first published in the BERD 2016 statistical bulletin on 21 November 2017.

4 Prior to 2011 PNP data was estimated. From 2011 data has been collected from a biennial survey with intermediate years being estimated using previous years data.

5 East Midlands and West Midlands regions data have been combined due to confidentiality.

6 The methodology for producing regional estimates of government expenditure has been reviewed. From 2015, estimates are based on actual respondent data. This has replaced the old method of using government full time equivalent (FTE) R&D employees by region, as a proxy for estimating regional expenditure. The 2015 estimates published in the GERD 2015 statistical bulletin on 16 March 2017 were shown based on the old and new methods to enable comparison. However, 2016 estimates are shown using the new method only.

- denotes nil, figures unavailable or too small to display.

.. denotes disclosive figures.

Please note:

Regional expenditure data by funding sector are unavailable.
Differences may occur between totals and the sum of their independently rounded components.