Office for National Statistics

Statistical bulletin

Business enterprise research and development, UK: 2018

Annual spending and numbers employed on research and development in the UK broken down by product sector, and civil and defence businesses.

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1 . Main points

- Expenditure on research and development (R&D) performed by UK businesses continued to grow, expanding by £1.4 billion to £25.0 billion in 2018, an increase of 5.8%.
- Aerospace was the product group that had the largest increase in expenditure on R&D in 2018, at £210 million, an increase of 14%.
- The East of England had the largest growth in the value of regional expenditure, increasing by £464 million (9.9%) to £5.1 billion in 2018.
- In 2018, total UK business employment in R&D grew by 7.3% reaching a quarter of a million full-time equivalents for the first time.
- Overseas funding of R&D continues to decline, falling 20% (£813 million) since 2014 to £3.2 billion.

2 . Things you need to know about this release

Business enterprise research and development (BERD) covers estimates of UK business expenditure and employment relating to research and development (R&D) performed in the UK in 2018.

The UK government's Industrial Strategy includes a target to "raise investment on R&D to 2.4% of GDP by 2027". UK R&D statistics are needed to assess how sectors of the economy are contributing towards reaching this policy goal. As the largest contributor to total UK R&D expenditure, the business sector is integral to achieving this objective. Progress to this target can be seen in the UK gross domestic expenditure on research and development: 2017 (GERD) statistical bulletin, which showed that GERD represented 1.69% of gross domestic product (GDP) in 2017. The business sector accounted for 1.2% of GDP in 2018.

In this statistical bulletin, R&D and related concepts follow internationally agreed standards defined by the Organisation for Economic Cooperation and Development (OECD), as published in the Frascati Manual (2015).

This release reports on R&D expenditure in UK businesses 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 a business, or the funding received by a business for R&D work. These are often but not always the same. Performance is regarded as a more accurate measure than funding received by a business, as not all funds received may be used as intended.

The term "product group" refers to the type of R&D performed in contrast to the industry classification of the business performing the R&D. The concept of "product groups" is described in more detail in the UK Business Enterprise Research and Development Quality and Methodology Information (QMI) report.

Estimates of employment in R&D are produced on a full-time equivalent (FTE) basis, whereby businesses convert part-time employees' hours into full-time employees' equivalent. FTE estimates provide a better indication of total labour input than headcount.

All figures quoted are in current prices unless otherwise stated.

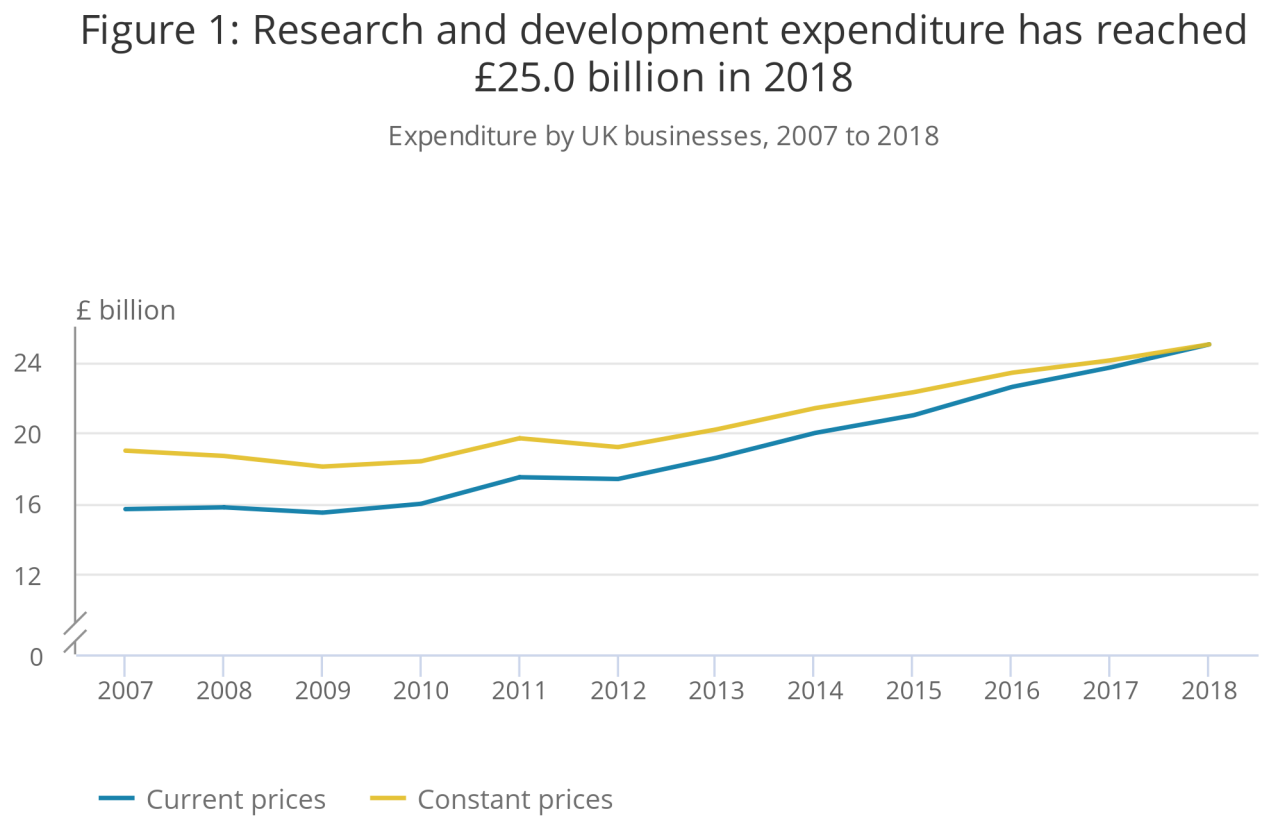
3 . R&D expenditure continues long-term upward trend

Expenditure on research and development (R&D) performed by UK businesses reached £25.0 billion in 2018. This was up from £23.7 billion in 2017, an increase of 5.8%. The average annual growth rate since 2007 was 4.4%.

A long-term upward trend is evident when considering R&D expenditure in constant price terms, with an average annual growth rate of 2.5% since 2007 levels (Figure 1). In constant price terms the increase from 2017 was 3.9%.

Figure 1: Research and development expenditure has reached £25.0 billion in 2018

Expenditure by UK businesses, 2007 to 2018



Source: Office for National Statistics

4 . Pharmaceuticals remains the largest product group performing R&D

In 2018, pharmaceuticals maintained its position as the largest product group, with £4.5 billion expenditure, representing a 3.3% (£143 million) increase on 2017. This product group accounted for 18% of total expenditure performed in UK businesses, unchanged from 2017 (Figure 2).

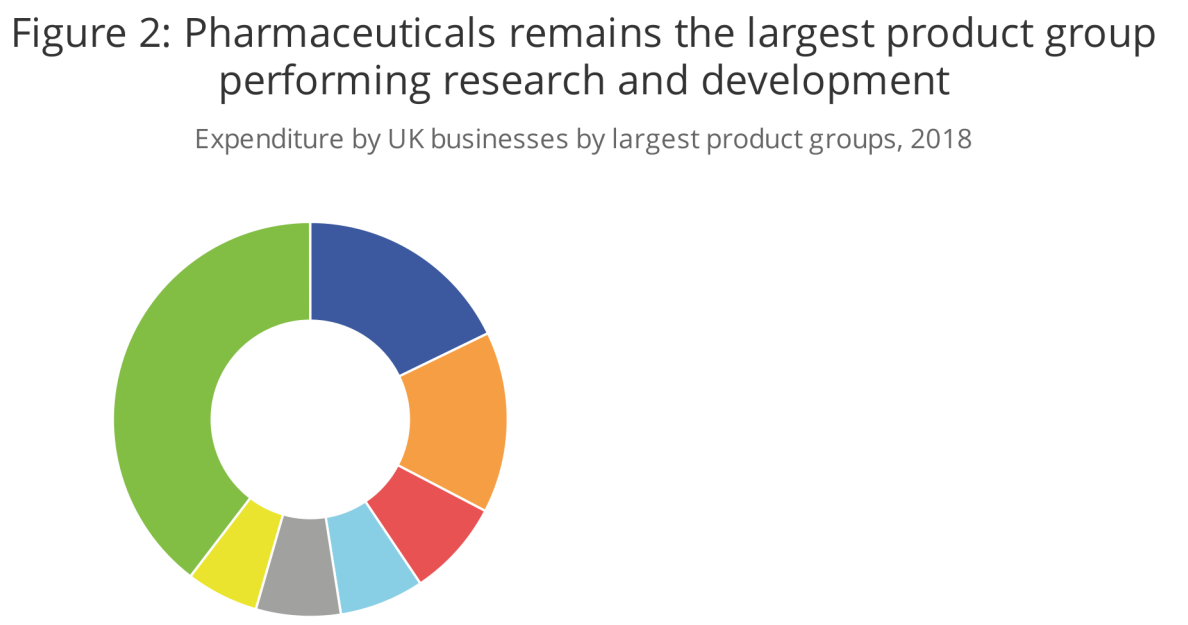
Motor vehicles and parts increased by 4.3% (£154 million) to £3.8 billion, continuing the growth seen over the last nine successive years. The group remains second, behind pharmaceuticals as the largest product group, accounting for 15% of the total expenditure on research and development (R&D) by UK businesses in 2018.

Other product groups reporting £1.0 billion or more R&D expenditure in the UK were:

- computer programming and information services activities (excluding software development), £1.9 billion (7.8% of total R&D expenditure)
- aerospace, £1.7 billion (6.8%)
- miscellaneous business activities; technical testing and analysis, £1.7 billion (6.8%)
- software development, £1.5 billion (6.1%)
- research and development services, £1.3 billion (5.1%)
- machinery and equipment, £1.0 billion (4.1%)

Figure 2: Pharmaceuticals remains the largest product group performing research and development

Expenditure by UK businesses by largest product groups, 2018



Source: Office for National Statistics

The transport and storage group grew by £20 million (45.5%) to £64 million in 2018. While this is one of the smaller product groups, it represents the largest proportional growth across all product groups and accounts for 0.3% of expenditure on R&D performed in UK businesses in 2018.

Large increases in expenditure were also seen in the telecommunications group, at £192 million (25%) and other manufactured goods at £48 million (21%).

The top five product groups reporting R&D expenditure accounted for over half (54%) of the total UK business R&D expenditure in 2018.

Over two-thirds of product groups saw increasing investment in R&D, however, 10 products saw a decline in investment. The largest 2 decreases were in electricity, gas and water supply; waste management, and food products and beverages; tobacco products which both fell by £21 million. The next largest decrease was in consumer electronics, which declined by £18 million.

More information on the UK Manufacturing and production industry and UK Businesses services is available.

5 . Civil and defence R&D continue to grow

Research and development (R&D) expenditure statistics can be split between the civil and defence sectors. Expenditure on R&D performed by UK businesses in the civil sector (£23.4 billion) accounted for 93% of the total in 2018, with defence accounting for the remaining £1.7 billion (7%).

In 2018, there was growth in both civil and defence R&D, by £1.3 billion (5.8%) and £100 million (6.3%) respectively.

Civil and defence R&D have alternative ways of funding. Civil R&D is primarily funded by business' own funding (81%), with 13% from overseas funding and 3.0% from the UK government. Conversely, the major source of defence funding in 2018 was from the UK government (61%), with 25% from own business funding.

Employment in R&D is heavily weighted towards civil R&D, with 232,000 full-time equivalents (FTEs) employed in the sector in 2018, an annual increase of 17,000. Defence R&D employment remained at 18,000 in 2018, with employment levels relatively constant for much of the last 10 years.

Further splits of civil and defence R&D, such as detailed product groups, sources of funds, capital expenditure and employment can be found in the 2018 datasets.

6 . Scientific R&D has highest level of industry expenditure

It is important to note that estimates of research and development (R&D) expenditure by industry and product group are not directly comparable. This is because businesses may report significant R&D in product groups that are different to the main classification of their business according to the Standard Industrial Classification (SIC). The concepts of product groups and SIC are described in more detail in the UK Business Enterprise Research and Development Quality and Methodology Information (QMI) report.

Businesses that were classified to the scientific research and development SIC had the highest level of expenditure on performing R&D in 2018 at £5.7 billion, up £283 million from 2017. This was the largest increase across all industries in 2018 and represented 23% of total UK expenditure.

There are seven further industries that had R&D expenditure of £1.0 billion or more:

- manufacture of motor vehicles and trailers, £3.1 billion (12%)
- computer programming, consultancy and related activities, £2.2 billion (9%)
- architectural and engineering activities, £1.7 billion (7%)
- manufacture of other transport equipment, £1.7 billion (7%)
- manufacture of computer, electronic and optical products, £1.2 billion (5%)
- wholesale and retail trade; repair of motor vehicles, £1.1 billion (4%)
- manufacture of machinery and equipment not elsewhere classified, £1.0 billion (4%)

The largest decrease by an industry, in contrast, was from arts, entertainment and recreation, which fell by £65 million (18%) since 2017. This industry accounted for 1.2% of expenditure on R&D performed by UK businesses.

7 . Employment in R&D reaches 250,000

Employment in research and development (R&D) reached its highest level to date in 2018 at 250,000 FTEs (full-time equivalents). This was an increase of 17,000 (7.3%) since 2017 and an increase of almost 100,000 since 2009.

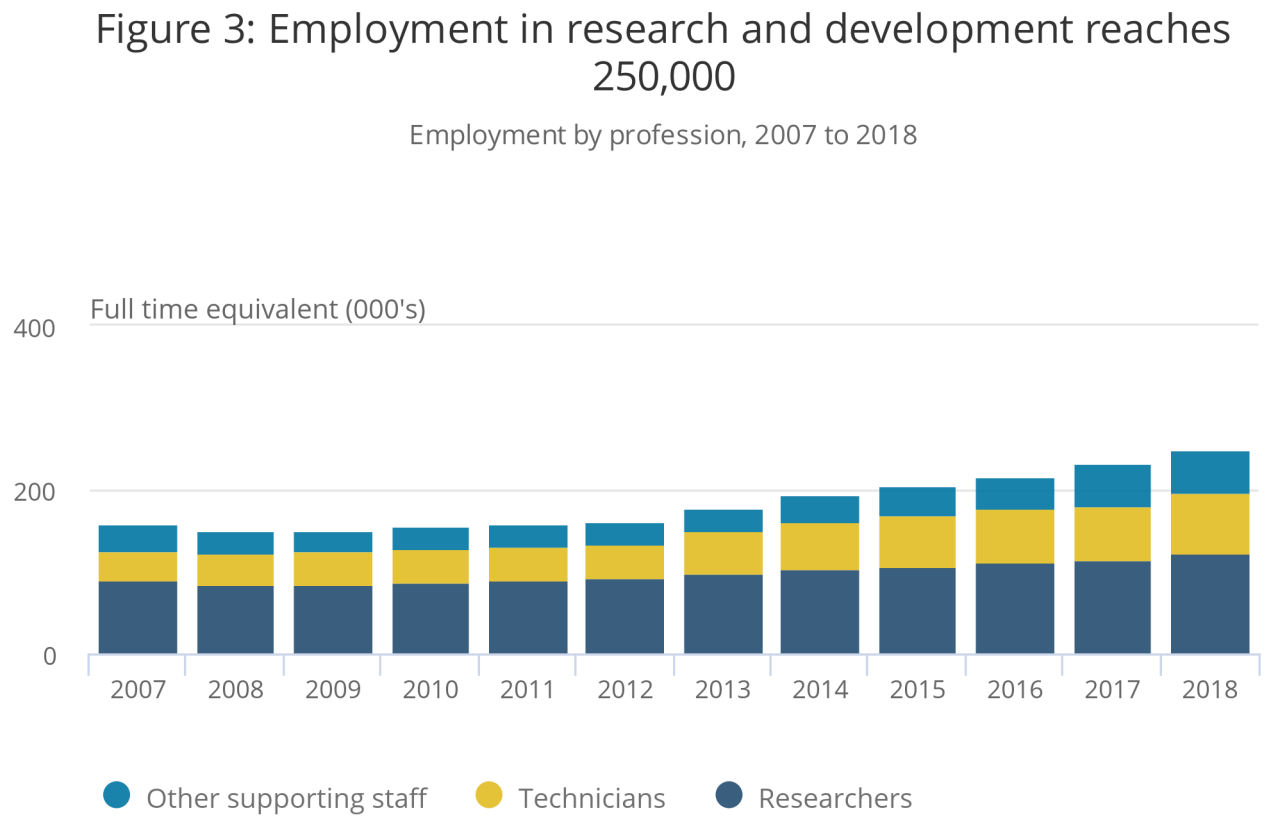
Employment in R&D is split between three professional categories: scientists and engineers (researchers), technicians (including lab assistants and draughtsmen) and all other support staff. There has been a gradual shift since 2008, with proportionally fewer researchers working on R&D, but with a move towards employing technicians and other support staff (Figure 3). Researchers made up 57% of employment in 2008 but their number fell to 49% in 2018.

The 2018 estimate comprised:

- 123,000 researchers (49%)
- 75,000 technicians (30%)
- 52,000 other supporting staff (21%)

Figure 3: Employment in research and development reaches 250,000

Employment by profession, 2007 to 2018



Source: Office for National Statistics

While there has been growth in recent years in the number of people working on R&D, this should be considered in the context of a general rise in the total employment in the UK labour market. Therefore, part of the growth in employment on R&D may reflect the wider growth in total employment in the economy. See our labour market statistics for more information on total employment levels.

8 . The South East and East of England continue as largest spenders on performing R&D

Analysis of research and development (R&D) by region refers to the location where a business performs R&D, not the location of either the business' headquarters or that of any external funders.

R&D in the UK has traditionally been focused on the East and South East of England. This is reflected at a national level, with England accounting for 91% of UK expenditure in R&D in 2018, an increase of £1.4 billion (6.3%).

R&D expenditure in Scotland declined slightly in 2018 by 0.6% to £1.2 billion, however, this follows a strong period of growth between 2010 and 2017 where R&D expenditure doubled. Scotland accounted for 5.0% of UK R&D and is followed by £524 million in Northern Ireland (2.1% of UK R&D) and £430 million in Wales (1.7%).

Employment levels followed the same pattern, with 222,000 full-time equivalents (FTEs) employed in R&D in England, 14,000 in Scotland, 8,000 in Northern Ireland and 6,000 in Wales.

The East and South East of England continue to dominate R&D in the UK, with the two regions accounting for a combined 41% of total UK R&D. Together they employed 87,000, which represented 35% of total R&D employment in 2018.

The East Midlands saw the largest proportional increase in expenditure since 2017, at 16% (£248 million). Additionally, R&D expenditure in the North East increased for the fourth year running, up 14% (£55 million) to £443 million.

R&D expenditure in the West Midlands has increased for nine consecutive years and continued to do so in 2018, with annual growth of 11%, at £275 million. Increased expenditure in the West Midlands is reflected in employment levels, with an extra 5,000 employed in the region leading to a high of 27,000.

Expenditure in the North West declined for the second year running, down £152 million since 2017 (and a decline of £358 million since 2016). Yorkshire and The Humber, and Scotland have also seen falling expenditure since 2017, at £16 million and £8 million respectively.

Table 1 shows the change in expenditure on performing R&D by UK businesses between 2017 and 2018 for all regions and nations.

Table 1: Regional expenditure on research and development performed in UK businesses, 2017 to 2018

	£ million		
	2017	**2018**	**% Change**
United Kingdom	23,669	25,048	5.8
North East	388	443	14.2
North West	2,183	2,031	-7.0
Yorkshire and the Humber	937	921	-1.7
East Midlands	1,521	1,769	16.3
West Midlands	2,469	2,744	11.1
East of England	4,677	5,141	9.9
London	2,791	2,906	4.1
South East	4,862	5,145	5.8
South West	1,661	1,752	5.5
Wales	421	430	2.1
Scotland	1,250	1,242	-0.6
Northern Ireland	508	524	3.1

Source: Office for National Statistics

Notes

1. Differences may occur between totals and the sum of their independently rounded components. Back to table

9 . UK funding of business R&D continues to grow

The largest source of research and development (R&D) funding in 2018 was businesses' own funds at £19.3 billion, an increase of £1.5 billion (8.5%) since 2017 (Figure 4). Businesses' own funds accounted for 77% of total business R&D expenditure in 2018 compared with the 2017 estimate of 75%.

The proportion of R&D funding from overseas sources has declined since 2010. In 2010, overseas funding accounted for 24% of all R&D funding, valued at £3.8 billion. By 2018, this had declined to 13% (£3.2 billion).

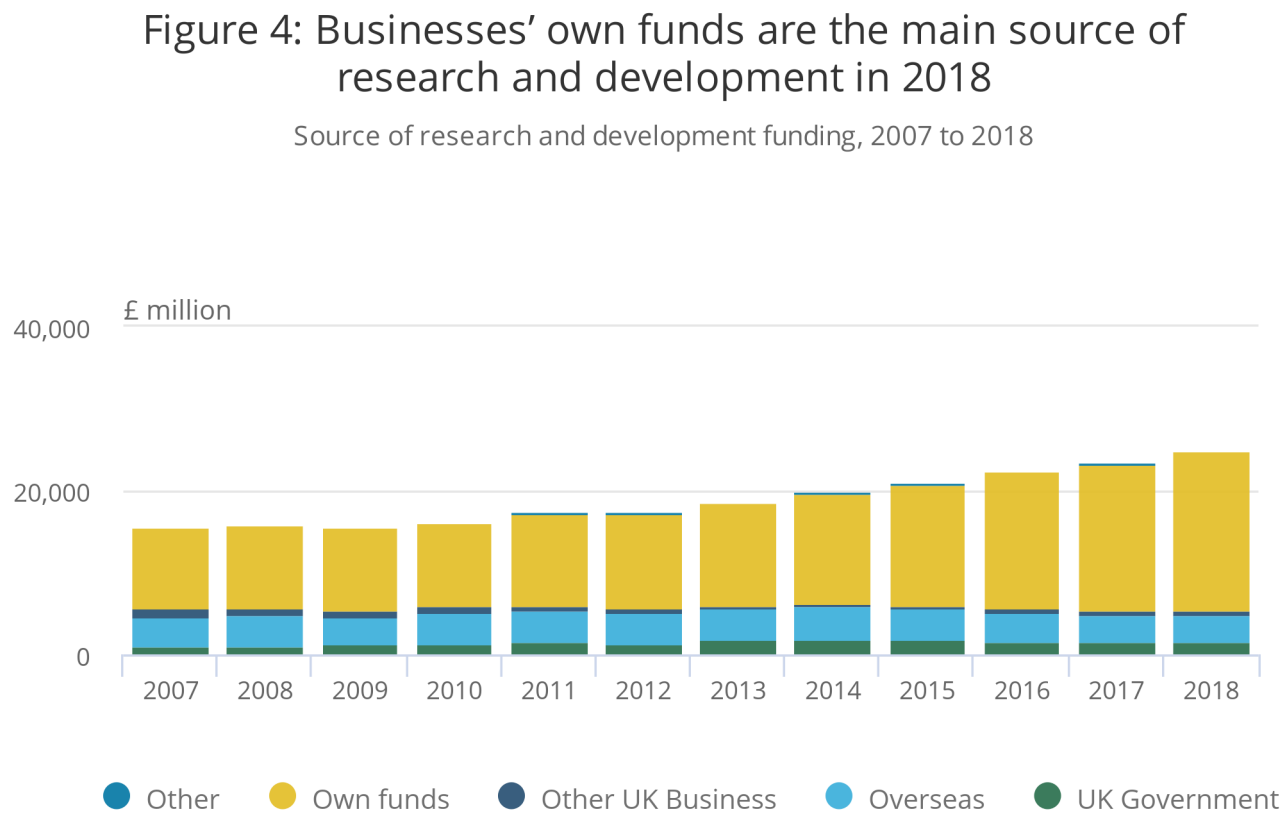
Overseas funding is split between two categories: European Commission grants and other overseas funding. European Commission grants, while a relatively minor source of funding, increased from £47 million to £75 million in 2018. This followed a relatively large decline between 2016 and 2017 of £46 million and should be seen in the context of fluctuating year-on-year levels of funding since 2007.

Other overseas funding, the second-highest source of funding in the UK, declined by £59 million to £3.2 billion since 2017. This was the fourth-year funding from other overseas sources declined, and represented a fall of £824 million from the 2014 high of £4.0 billion.

UK government funding of businesses' R&D in 2018 was £1.7 billion, a decline of £35 million (2.0%) from 2017, representing 6.9% of total business R&D. UK government defence funding remained stable at £1.0 billion, however, spending on civil R&D declined by £36 million (4.9%). The two product groups that benefitted most from UK government funding were machinery and equipment (£316 million) and shipbuilding (£315 million).

Figure 4: Businesses' own funds are the main source of research and development in 2018

Source of research and development funding, 2007 to 2018



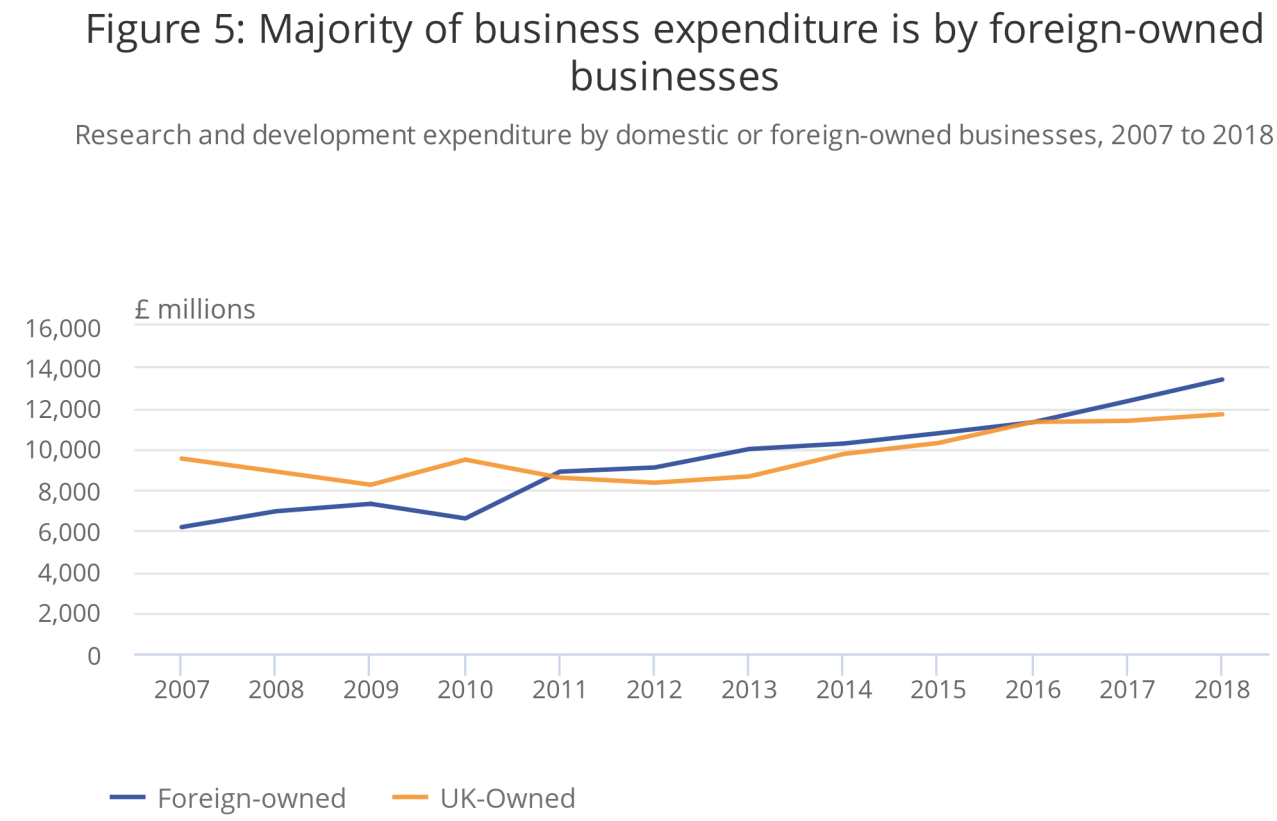
Source: Office for National Statistics

10 . Majority of UK business expenditure by foreign-owned businesses

While there was a £321 million (2.8%) increase in the expenditure of research and development (R&D) performed by UK-owned businesses in 2018, the proportion of R&D performed by UK-owned businesses declined from 48% to 47% (Figure 5).

Figure 5: Majority of business expenditure is by foreign-owned businesses

Research and development expenditure by domestic or foreign-owned businesses, 2007 to 2018

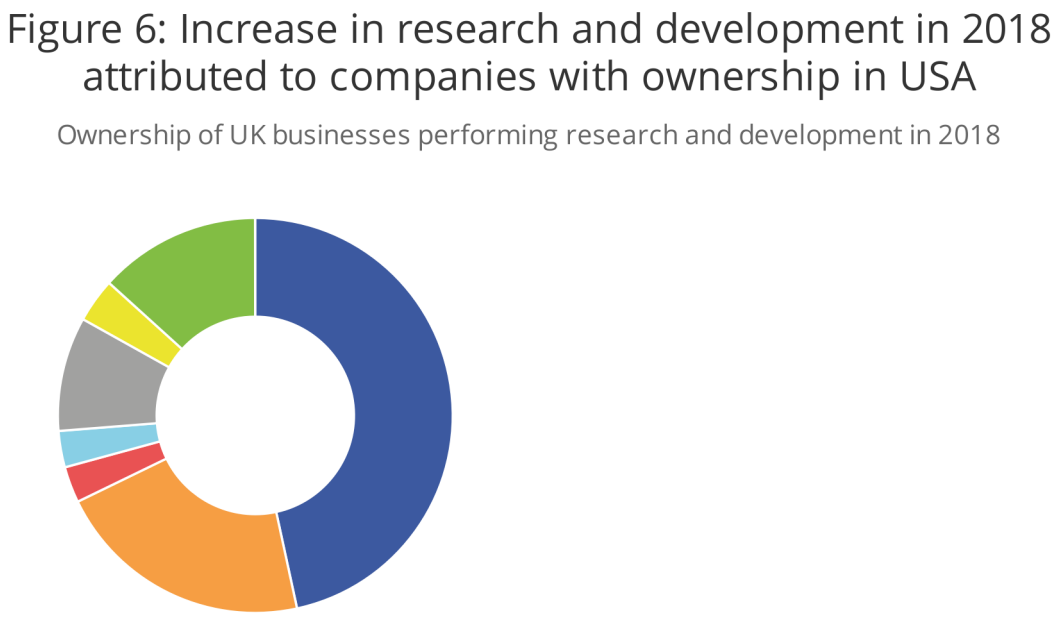


Source: Office for National Statistics

Growth in expenditure among foreign-owned businesses can mainly be attributed to the £798 million (18%) increase in R&D performed by businesses with ownership in the United States (Figure 6).

Figure 6: Increase in research and development in 2018 attributed to companies with ownership in USA

Ownership of UK businesses performing research and development in 2018



Source: Office for National Statistics

11 . Links to related statistics

Further statistics on research and development expenditure in the UK are available.

When comparing total business R&D intensity across countries, it is important to take into account differences in industrial structure. The Organisation for Economic Co-operation and Development (OECD) produces a Science, Technology and Industry Scoreboard to facilitate these comparisons. International comparisons of R&D data can also be found on the Eurostat website.

12 . Quality and methodology

The Business Enterprise 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

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

- respondents were asked to make a return for the calendar year 2018 or the nearest 12-month period for which figures were available - data for all years published in this statistical bulletin were collected on the same basis
- there may be differences between totals and the sum of their independently rounded components
- in some tables, entries have been aggregated to avoid disclosure of figures in which the returns of individual businesses could be identified - where this happens, footnotes have been added to the tables
- it is sometimes necessary to suppress figures for certain items in order to avoid disclosing data from individual institutions - tables that contain data which are disclosive will contain a relevant footnote
- the 2016 and 2017 estimates have been revised where necessary to take account of businesses misreporting and late returns
- gross domestic product (GDP) deflators at market prices, and money GDP used is non-seasonally adjusted; the GDP deflators at market prices, and money GDP: September 2017 (Quarterly National Accounts) can be viewed as a measure of general inflation in the domestic economy