

CaSE briefing on UK Gross Domestic Expenditure on R&D

Each year, the Office for National Statistics (ONS) releases Gross Domestic Expenditure on R&D (GERD) statistics¹. This is the preferred measure of R&D activity for international comparisons and allows the monitoring of investment trends for five sectors: government, industry, higher education, non-profit, and overseas funders.

This briefing summarises the findings and provides new analysis performed by CaSE.

Key findings:

- The government invested £8.4 billion in UK R&D in 2013, 0.49% of GDP. In real terms and as a proportion of GDP, this is an increase from 2012 but still below 2009 and 2003 levels.
- CaSE analysis shows that there has been a steady but severe decline in UK government R&D investment as a proportion of total government spending over the past decade, from 1.37% in 2003 to 1.18% in 2013.
- Total UK Gross Domestic Expenditure on R&D funded by all sectors rose by 5% in real-terms in 2013, reaching an all-time high of £28.9 billion. Business is the largest contributor to this.
- The UK lags behind international averages and competitor nations for R&D investment as a proportion of GDP and total government spend.
- The UK remains 12th among the 28 member states for total R&D investment as a proportion of GDP.

Government R&D investment has fallen since 2003

The government invested £8.4 billion in R&D performed in the UK in 2013. This is up by 5% or £555 million from 2012 in constant prices.

As a proportion of GDP, government investment in R&D increased from 0.46% in 2012 to 0.49% in 2013 but has been on an overall decline since 2009 and is still lower than in 2003 (Figure 1)². International league tables³ for government investment are not yet complete and currently contain underestimated values for UK GERD in 2013 so accurate international comparisons are difficult at this time. However, as a rough comparator, the Organisation for Economic Co-operation and Development (OECD) average in 2012 was 0.7% of GDP and the EU average was 0.64%. Germany's was 0.84% and America's 0.86%.

CaSE analysis shows that as a proportion of total government spending (Total Managed Expenditure), government investment in R&D, including Research Councils and Higher Education Funding Councils, has been declining since 2003 and only took a positive upturn between 2012 and

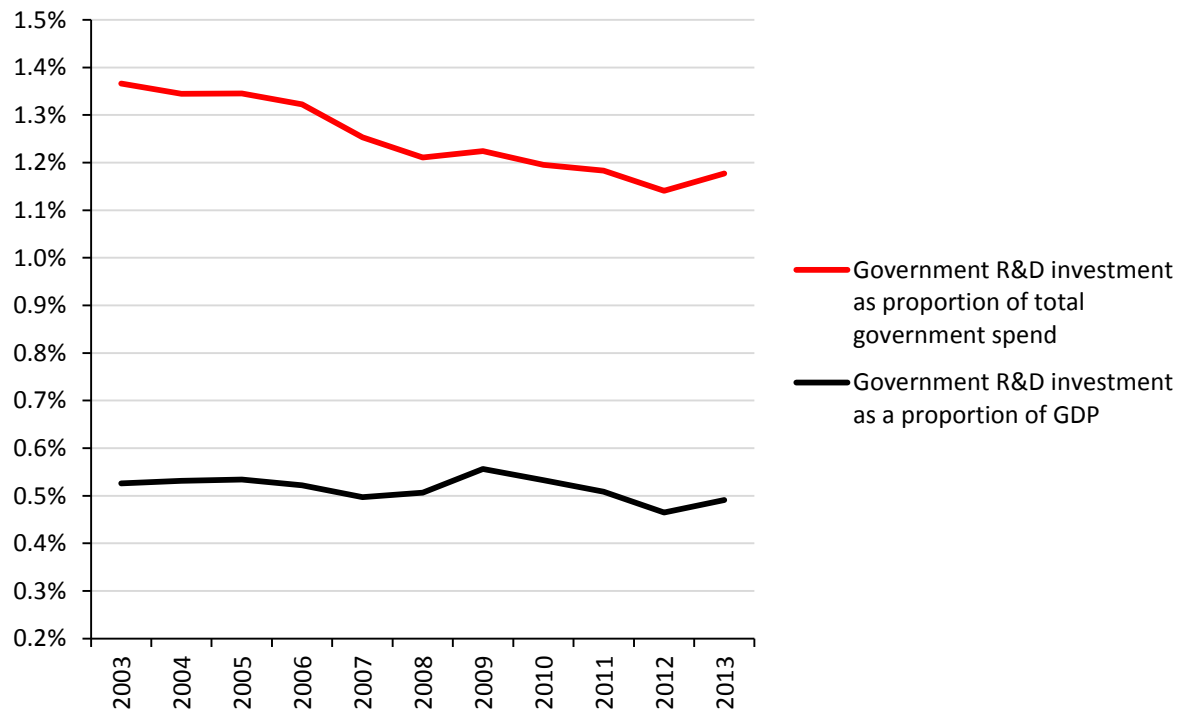
¹ http://www.ons.gov.uk/ons/dcp171778_398876.pdf

² The 2012 figures differ slightly from those previously reported by CaSE and other organisations due changes in GDP estimates reported by the ONS.

³ Main Science and Technology Indicators (MSTI database) <http://stats.oecd.org/index.aspx?r=906522> (accessed 31 March 2015)

2013 (Figure 1)⁴. In 2003, 1.37% of total government spending went on R&D. In 2013 this figure was 1.18%. The 2013 EU average was 1.4%, Germany spent 2% of its government budget on R&D in 2013 and America spent 2.2% in 2012⁵. The UK was 17th among EU countries by this measure in 2013.

Figure 1: Government R&D funding, 2003 to 2013⁴



Between 2003 and 2013 total government spending increased by 56% in cash terms but investment in R&D only increased by 34%. This decline shows that successive governments have prioritised other areas of government spending over R&D.

Total UK R&D investment increased in 2013

R&D ecosystems vary across the world with different mixes of funders and R&D performers in each country. International comparisons therefore primarily use total R&D investment (GERD) which includes business, government, higher education, non-profits and overseas sources.

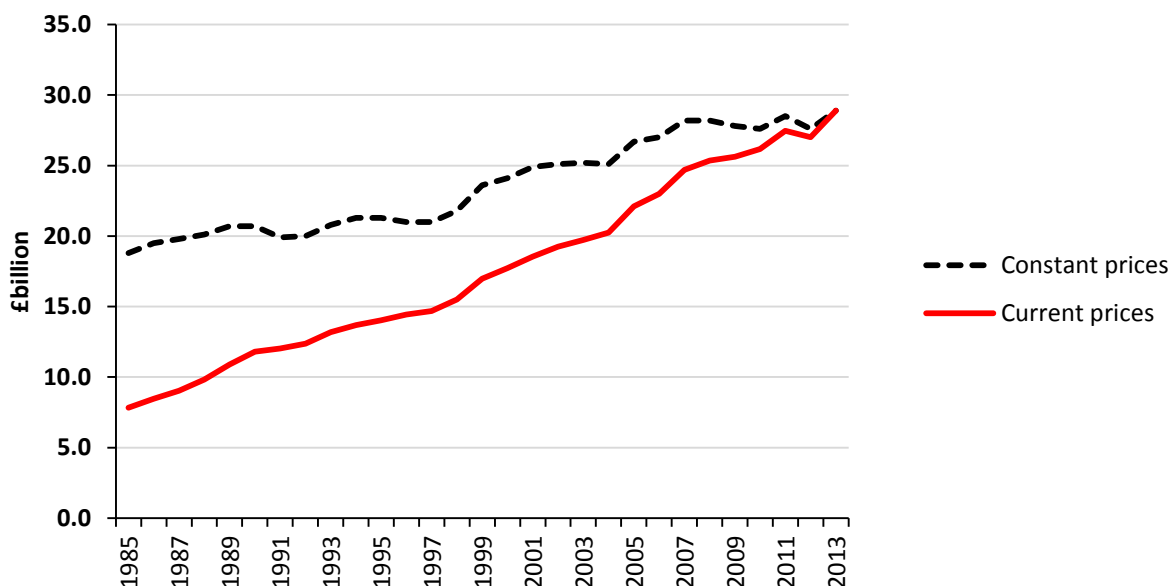
In 2013, £28.9 billion was spent on R&D by these sectors combined. This is a cash-terms increase of £1.9 billion from 2012, or 7%. If inflation is taken into account, in constant prices, this represents a 5% increase and an all-time high, beating the last peak in 2011 (Figure 2).

⁴ Total Managed Expenditure figures: <https://www.gov.uk/government/statistics/public-expenditure-statistical-analyses-2014>

GDP figures (as used in ONS analysis): <https://www.gov.uk/government/statistics/gdp-deflators-at-market-prices-and-money-gdp-december-2014-autumn-statement>

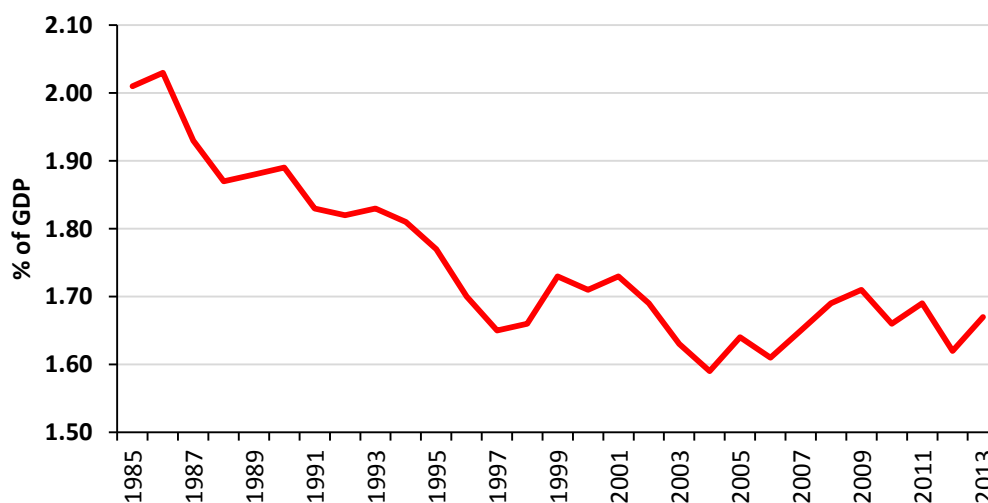
⁵ <http://ec.europa.eu/eurostat/data/database>

Figure 2: UK Gross Domestic Expenditure on R&D, 1985 to 2013



As a percentage of GDP the 2013 spend is not an all-time high however. Total R&D expenditure represented 1.67% of GDP, an increase on the 1.62% level for 2012 but far lower than in the 80s and early 90s when it was between 1.8% and 2% (Figure 3). Since 2001, R&D expenditure as a percentage of GDP has been within a range of 1.59% to 1.73%.

Figure 3: UK Gross Domestic Expenditure on R&D as a percentage of GDP, 1985 to 2013



Note: The 1.62% figure for 2012 is different to the figure published by the ONS last year⁶, when it was 1.72%. This is because in September 2014 the ONS changed how it calculates GDP⁷ due to accounting changes at an EU level. In brief, GDP estimates have gone up so, correspondingly, GERD as a proportion has gone down. Graphs in this publication use the new GDP calculation for each year. Notably, the biggest driving force behind the new GDP figures is R&D expenditure because it wasn't being fully accounted for as a contributor to GDP in the old system. It is now counted as investment rather than intermediate consumption (i.e. seen as a longer term investment rather than shorter term spend). The House of Commons Library has produced a briefing note for further information⁸.

The UK is not investing as much in R&D as its competitors

The UK remains in 12th place among the 28 EU member states for total R&D spend (GERD) as a proportion of GDP⁹ (Figure 4). The EU average for 2013 was 2% and Germany and other Northern European countries were close to or above 3%. The OECD average was 2.4%. China spent 2% in 2013 and both Israel and Korea spent around 4.2%. 2013 data isn't available for the United States but in 2012 they spent 2.8% of their GDP on R&D.

UK business is the largest investor in UK R&D

Business is by far the largest funder of R&D in the UK, contributing £13.3 billion in 2013, 46% of the total (Figure 5). This was up £750 million in constant prices from 2012. The pharmaceutical industry was the largest business investor at £4.1 billion and the automotive industry was second at £2.1 billion.

Government, including research councils and higher education funding councils, is the second largest funding sector, investing £8.4 billion in UK R&D activity, 29% of total funding. This is up by £555 million from 2012 in constant prices. The dip in government investment in 2012 can largely be accounted for by the £400 million lower capital investment that year following the 2010 Spending Review. Capital investment has since been increased considerably¹⁰. Nonetheless government contribution to GERD is down overall.

As a proportion of total GERD, business and government contributions have remained fairly steady at around 45% and 30%, respectively. Other funding sectors are overseas, primarily comprising including businesses and the EU; higher education and non-profit. Their contribution to total GERD has also remained fairly steady between 2003 and 2013 but is far lower than business or government (Figure 5).

⁶ <http://www.ons.gov.uk/ons/rel/rdit1/gross-domestic-expenditure-on-research-and-development/2012/stb-gerd-2012.html>

⁷ <http://www.ons.gov.uk/ons/guide-method/method-quality/specific/economy/national-accounts/changes-to-national-accounts/blue-book-and-pink-book-2014-changes/index.html>

⁸ <http://www.parliament.uk/business/publications/research/briefing-papers/SN06982/gdp-and-the-national-accounts-2014-revisions>

⁹ The ONS used data from the Eurostat website to compile this graph. Many values are only provisional and the UK's position may therefore change up and down when final GERD figures are known. Ireland figures are 2012.

¹⁰ <http://sciencecampaign.org.uk/?p=16607>

Figure 4: EU countries GERD as a percentage of GDP, 2013⁷

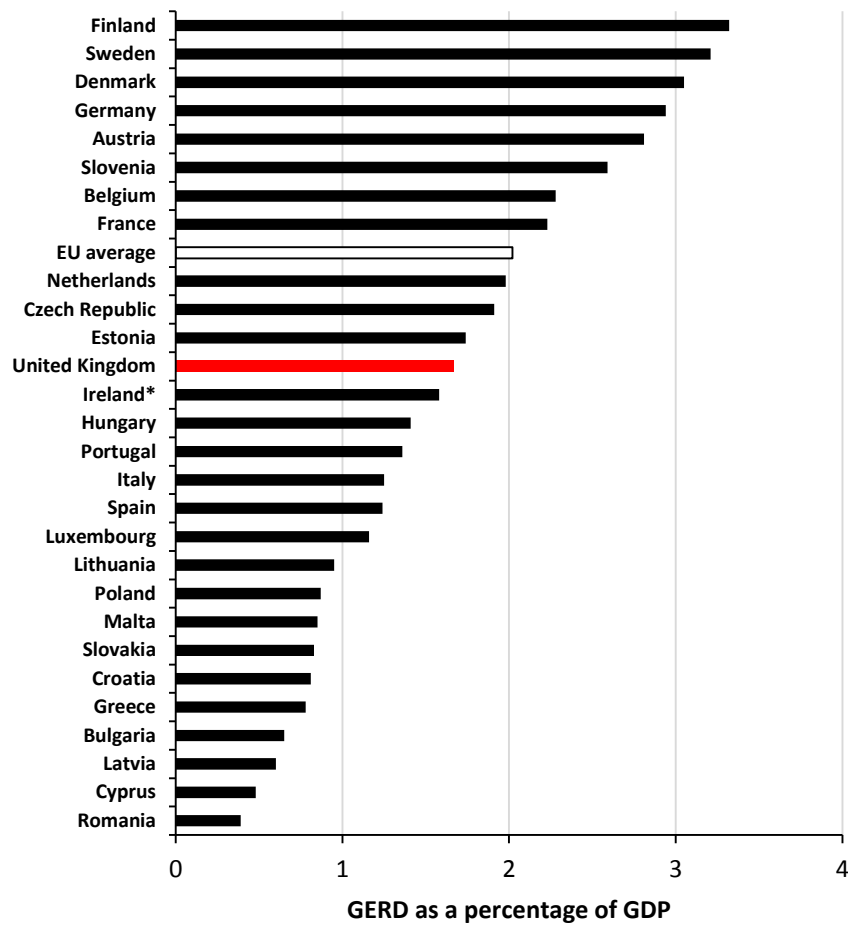
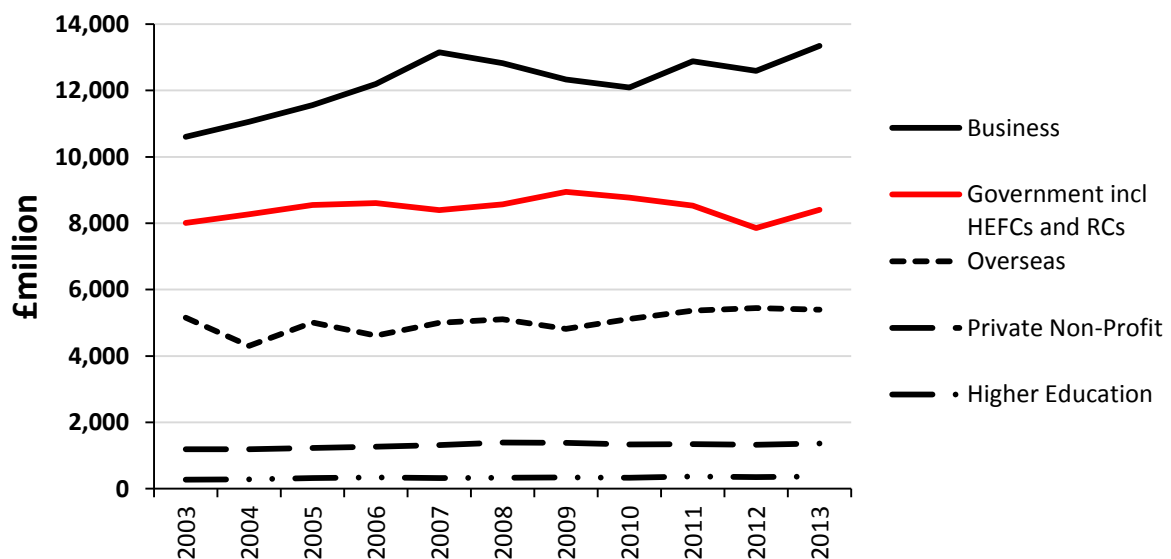


Figure 5: GERD funding by sector in constant prices, 2003 to 2013



CaSE policy priority actions for science and engineering investment

There is a growing evidence base to support advice that government can drive economic growth by investing in science and engineering research^{11,12,13}. Public spending on science and engineering is an investment bringing significant returns that can boost economic growth and deliver benefits to society. However, the UK is falling behind other nations through structural underinvestment in R&D, as evidenced in this briefing, with knock-on effects to our skills base and attractiveness as a place for industry to invest.

The government must commit to an upward trajectory for government investment in science and engineering that exceeds growth and brings the UK up to levels of comparable nations such as the United States and Germany.

For more detail on CaSE's policy actions for science and engineering investment see our Investment Briefing, published in October 2014¹⁴.

A few notes about the ONS figures

Figures currently available on the Organisation for Economic Co-operation and Development (OECD) website¹⁵ show GERD dropped in 2013. The difference is because the OECD figures are provisional and were published before the ONS stats, which are more accurate.

It is important to note that the GERD stats don't capture all R&D expenditure by the government. The Science, Engineering and Technology (SET) statistics are a separate set that comprise government R&D expenditure (performed in the UK and overseas), knowledge transfer activities, the indicative UK contributions to the EU R&D expenditure, and staff associated with scientific and technical postgraduate education and training. They also include useful breakdowns of R&D spending by government department.

For further information on this briefing or any other areas of CaSE's work, please contact the CaSE team.

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¹¹ <http://www.wellcome.ac.uk/About-us/Publications/Reports/Biomedical-science/WTP056596.htm>

¹² <http://www.sciencecampaign.org.uk/UKScienceBase.pdf>

¹³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/333006/bis-14-990-rates-of-return-to-investment-in-science-and-innovation-revised-final-report.pdf

¹⁴ <http://sciencecampaign.org.uk/CaSE2015InvestmentBriefing.pdf>

¹⁵ <http://stats.oecd.org/index.aspx?r=906522> (accessed 31 March 2015)