

## Royal Society Submission to the House of Commons Science and Technology Select Committee Inquiry into the Science Budget

### Summary

- Research brings broad benefits for society and scientific excellence is one of the UK's strengths. Public investment underpins the UK's research and innovation ecosystem, which attracts further investment from businesses, charities and overseas. The UK's investment in research is low by international standards and the Society is calling on the government to increase its investment in R&D to at least match the OECD average of 0.67% of GDP by 2020.
- Government should maintain the ring fence around the science budget and ensure resource investment is better aligned with welcome recent capital investment. Improving capabilities for strategic thinking about research spending would help to ensure the UK gets value for money.
- Research funded by government departments complements that funded through the science budget. However, as budgets have declined across Government during the last parliament, some departmental R&D budgets have declined particularly steeply and disproportionately to other funding lines.
- The breadth and diversity of the UK research base means that it is well placed to help tackle grand challenges facing society, which will require multidisciplinary solutions. Government should continue to support the full spectrum of inquiry through the dual support system.
- The health of the research and innovation ecosystem depends not only on direct public investment, but also on a broad range of policies across government. To maximise the benefits of its investment in research and place research at the heart of plans for growth, the Government must take a whole-of-government approach to supporting the research and innovation ecosystem.

### Introduction

1. The Royal Society welcomes the opportunity to submit written evidence to the House of Commons Science and Technology Committee's inquiry into the science budget. This supplements the oral evidence given to the committee by the President of the Royal Society, Sir Paul Nurse.
2. The Royal Society is the national academy of science for the UK. It is a self-governing Fellowship of many of the world's most distinguished scientists working across a broad range of disciplines in academia, industry, charities and the public sector. The Society draws on the expertise of the Fellowship to provide independent and authoritative scientific advice to UK, European and international decision makers.
3. While the topic of this inquiry is the 'science budget', the health of the UK's research and innovation ecosystem also depends on having the right policies in place, and public funding beyond the science resource budget in the Department for Business, Innovation and Skills (BIS). This submission therefore addresses the inquiry's specific questions and other related themes, with a particular focus on their implications for the 2015 Spending Review.
4. This submission is divided into six sections, corresponding to the questions set out in the Terms of Reference for this inquiry:
  - The role and level of public investment in research
  - The ring fence, resource and capital budgets
  - Departmental research
  - Distribution of funding
  - Broader policy environment
  - Keeping up with other nations

## The role and level of public investment in research

### *Benefits of public investment in research*

5. Outstanding research and innovation advance our economic, social and cultural well-being, and our health. Research and innovation create high-value jobs and skills, are a key source of competitive advantage, make a major contribution to long-term growth,<sup>1</sup> and can help increase productivity.<sup>2</sup>
6. The UK has a world-leading research base and scientific excellence is one of the UK's key strengths. In 2012 the UK was responsible for 15.9% of the world's most highly cited articles despite being home to only 4.1% of researchers and 0.9% of the global population.<sup>3</sup> The 2014 Research Excellence Framework found that 22% of outputs were judged to be 'world leading', up from 14% in the previous 2008 exercise,<sup>4</sup> and in 2014 the UK was ranked second in the world for the quality of its scientific research institutions by the World Economic Forum.<sup>5</sup>
7. Public investment is the foundation of the UK's excellent research and innovation ecosystem. This investment creates a strong multiplier effect, crowding in private, charitable and overseas investment. Analysis suggests that an extra £1 of public funding will give rise to an increase in private funding of between £1.13 and £1.60.<sup>6</sup> UK research excellence also attracts a disproportionate amount of European funding; of the 312 awards announced in a €575 million European Research Council scheme in 2014, 20% went to UK-based researchers.<sup>7</sup> In 2013 medical research charities funded over £1.3 billion of health research.<sup>8</sup>
8. Industry is responsible for performing nearly two thirds of UK research and development (R&D), and public investment is fundamental to maintaining the system that supports this endeavour. Home-grown and foreign companies choose to invest in R&D in the UK and co-locate with academic research departments.<sup>9</sup> The World Economic Forum's ranking of the UK's university-industry collaborations improved from 9<sup>th</sup> in the world in 2008/2009 to 4<sup>th</sup> in 2014/2015.<sup>10,11</sup>
9. The link between the science budget and Total Factor Productivity growth in an industry depends crucially on the R&D performance, or co-operation with the university sector, of the industry itself.<sup>12</sup> In the UK, 51% of productivity growth between 2000 and 2008 was due to innovation, with 32% attributable to changes in technology resulting from science and innovation.<sup>13</sup>

### *UK investment in research*

10. The UK has a long history of excellence in research and today reaps the benefits of its past investment. The commitment to invest in research capital is welcome but "flat cash" settlements over the last Parliament have meant that the cumulative erosion of the ring-fenced science resource budget grew to over £1 billion.<sup>14</sup>
11. It is too soon to know the full effects of the erosion of research spending. However, a recent fall in success rates for grant applications has been attributed by some experts to a large drop in funding allocated by research councils and inflationary pressures on the flat-cash research budget.<sup>15</sup>
12. The research and innovation ecosystem relies on a stable funding environment and a long-term framework for investment. Uncertainty in funding disrupts discovery and innovation, hampers the long-term approaches needed to deal with challenges such as energy and climate change, and makes it difficult to capitalise on past investments. Unpredictable funding also risks internationally mobile researchers, companies and capital switching country or sector.
13. Any further decline in research funding could be extremely damaging to the research base and in turn to the UK's future prosperity. The research community has made large savings through efficiencies, such as equipment sharing and team science; universities are estimated to have made more than £1 billion in efficiency and cost savings over the last three years.<sup>16</sup> This cannot continue indefinitely, and many of the easiest and highest return improvements have already been made.
14. UK investment in R&D as a percentage of GDP is low compared to other leading knowledge economies. Over the past 15 years overall UK investment in R&D has remained between 1.59 %

and 1.71% of GDP, and was 1.67% in 2013.<sup>17</sup> In contrast many of the the UK's international collaborators and competitors have been increasing their investment as a proportion of their economies. Overall R&D expenditure as a proportion of GDP in 2013 was around 2.73% in the US and around 2.85% in Germany, up from around 2.62% and 2.40% respectively in 2000.<sup>18</sup> In China, investment in R&D has increased from around 0.9% of GDP in 2000 to around 2.08% in 2013.

#### *Increasing investment in research*

15. The government has made successive, clear public commitments to science and innovation,<sup>19</sup> and should now place research and innovation at the heart of its long-term plans for growth. To do so would help the government to meet its goals of promoting growth, innovation and productivity. The level of UK public investment in research and innovation needs to be closer to that of its international competitors and collaborators. Narrowing the gap with other knowledge economies will help the UK research base to tackle national and global challenges, attract research talent and investment, and maintain its place as a world-leading research nation.
16. The UK already invests research funding efficiently and is a highly productive research nation<sup>20</sup>, and the results of the 2014 REF exercise<sup>21</sup> confirmed the quality of research in UK institutions. The Society believes that the government can be confident in the system as a whole, but opportunities to consider its evolution and suggest improvements, such as through the Nurse Review, are welcome.
17. The outcomes of research are unpredictable and reaped over the long term, but history shows that research brings broad benefits for society and the economy. As discussed above, public investment in research creates a strong multiplier effect, crowding in private, charitable and overseas investment. Public investment in research underpins all of this activity.
18. In 2014 the House of Commons Business, Innovation and Skills Select Committee urged the Government to aim for 3% of GDP to be spent on public and private R&D overall by 2020<sup>22</sup>, and that same year a report for the Government suggested such investment should be closer to 2.9% of GDP.<sup>23</sup> Analysis has also shown that comparator countries that spend more than the UK do not seem to get a poor return on their investment.<sup>24</sup>
19. The Society has welcomed the support that the Government has shown to science when faced with difficult choices about Britain's public finances.<sup>25</sup> In spite of this support, UK investment in research and innovation has been failing to keep pace with other leading nations. For example, in 2013 government financed investment in research and development as a % of GDP in Germany and the USA were 0.85% and 0.76% respectively, while in the UK it was 0.49%.<sup>26,27</sup> Reductions in investment over recent years mean that there is a significant and growing risk that the UK's capacity to carry out high quality research is being eroded. The Royal Society will therefore be calling on the Government to make staged increases in investment in R&D over the next five years with the goal of at least matching the OECD average of 0.67% of GDP by 2020.<sup>28</sup>

#### **The ring fence, resource and capital budgets**

20. The 'science ring fence' offers stability and a degree of certainty in turbulent fiscal times. Such clear commitment is crucial for investigations that can span decades or even lifetimes.<sup>29</sup> The Society, with its sister academies,<sup>30</sup> has called on Government to secure the ring fence around the science budget. However, a ring-fenced science budget alone is insufficient to properly support the research and innovation system; the magnitude of budgets within and beyond the ring fence are key.
21. Over the last parliament, the science resource budget was ring fenced, but other crucial budgets including the science capital budget, were not. The Society welcomed the long-term investment in research capital announced by Government in 2013,<sup>31,32</sup> and recognises the current government's commitment to implementing the £6.9 billion 2016-21 capital roadmap.<sup>33</sup> This indicates some welcome stability for science capital over the lifetime of this parliament. However, if resource and capital budgets are not tied as part of the Spending Review process, and a flat-cash settlement for the resource budget continues, the disparity between capital and resource budgets will grow, resulting in inefficient use of public funds.<sup>34</sup>

22. A significant part of the funding that is important to the research base lies outside the ring fence and reductions in Britain's public finances will put pressure on overall UK research capability. The ring fence should be maintained but the government should also avoid reductions elsewhere that jeopardise the research endeavour. Coordination beyond BIS is important too. The identification of "place" as a new and prominent element of Government thinking in research and innovation policy presents an exciting opportunity, but also a different kind of strategic challenge.<sup>35</sup> Aligning the planning and resourcing of science and regions could help turn regions into hubs of excellence with distinctive opportunities for investment from the UK or overseas, including partnering within Europe. The "place" theme needs careful development. Excellence should generally be the primary criterion for research funding but there is also the need for approaches that allow the development of capacity building in areas where UK research is weak, so our ability to respond to new developments is increased.
23. In its submission to the Nurse Review of the Research Councils<sup>36</sup>, the Society suggested the creation of a high-level, transparent, accountable and independent Science Strategy Advisory Body (SSAB) to better align strategic priorities across the Research Councils and other funders. Its primary role would be to advise the Director General of Knowledge and Innovation, or his/her equivalent, on strategic investment and national capability.

### **Departmental research**

24. Strategic research funded by government departments provides vital evidence to inform Government decision making. As budgets declined across government during the last parliament, some departmental R&D budgets declined particularly steeply and disproportionately to other funding lines.<sup>37</sup> This is worrying. The science budget within BIS cannot replace funding for research undertaken by government departments, either internally or in collaboration with the academic research community.<sup>38</sup> In its science and innovation strategy, the Government stated that it planned to consider controls to protect departmental R&D spending from short-term pressure.<sup>39</sup> The Society looks forward to seeing the outcomes of this work and recommends that these considerations inform the 2015 Spending Review. If suitable measures are identified they should be implemented as soon as possible.

### **Distribution of funding**

25. The challenges of the 21<sup>st</sup> century, such as the impacts of an ageing population, food security and climate change, will require solutions drawing on expertise across the full range of the engineering, social, physical, medical, chemical, biological and mathematical sciences. The UK has a world-leading research base with excellence across the breadth of academic disciplines,<sup>40</sup> and drawing together expertise across disciplines allows us to tackle these global issues more effectively than would otherwise be the case.
26. Applied investigation needs a constant stream of ideas from discovery-oriented work, and many of the benefits of 'blue skies' research are unforeseen but of great practical use. The distinction between applied and basic research should not be overstated. To fully realise the economic and social benefits of research and innovation, the full spectrum of inquiry has to be supported.<sup>41</sup>
27. The UK research and innovation ecosystem comprises a rich and diverse range of funding sources, which together support a rich mixture of basic and applied research across the breadth of disciplines and institutions. Funding from charities, such as the Wellcome Trust and Cancer Research UK, and businesses, from SMEs to large multinational companies complements the UK's public investment. Different sources of public funding also create diversity and stability in the system. Breadth and diversity increase the resilience of the system and support innovation, as well as building economic complexity, which makes countries more productive.<sup>42</sup>
28. The exceptional productivity of the UK research system suggests that the dual support system is fit for purpose and the Research Councils perform well. The dual support system should be maintained and any reform of the Research Councils should maximise excellent research and its benefits, while minimising harmful disruption. With improved strategic decision making, the system might be better equipped to address any future need for change.

### **Broader policy environment**

29. The health and productivity of the research and innovation ecosystem depends not only on direct public investment, but also on a broad range of policies across government. To reap the greatest possible rewards from its investment in research and place research at the heart of plans for growth, a whole-of-government approach to supporting the research and innovation ecosystem should be taken.
30. While support for innovation in the last Parliament was encouraging, it did not go far enough and is not on the same scale as many competitors and collaborators.<sup>43</sup> Government must continue to support the channels through which investment in knowledge and skills create value, but investment in innovation should not come at the expense of other parts of the research base.
31. There were several changes to the landscape of innovation and industry support over the course of the last parliament, and this government should endeavour to make any further changes to support for innovation in the context of a period of relative stability. For example, the Catapult centres need time to “bed in”, and having made a substantial investment in establishing them, the UK should continue to provide them with sufficient support to maximise the returns on this investment.
32. UK industrial expenditure on research is relatively low by international standards, research is concentrated in only a few areas, there is insufficient innovation in small and medium sized enterprises (SMEs) and there are opportunities to increase R&D in UK owned firms.<sup>44</sup> R&D tax credits are one way of rewarding companies that engage in research. Uptake of R&D tax credits has increased in recent years, particularly among smaller companies, and they are now an established part of the system. The number of claims from SMEs increased by 30% between 2011-12 and 2012-13.<sup>45</sup> The total amount of R&D support claimed in 2012-13 was £1.4 billion. Recent evaluations indicate that for each £1 of tax foregone, between £1.53 and £2.35 of R&D expenditure is stimulated.<sup>46</sup>
33. Government should work to remove barriers to research created by policies in other areas. For example, current fiscal rules exempt research charities, including universities, from paying VAT on research buildings. However, if the amount of commercially sponsored research carried out within the building exceeds a limit currently set at 5%, VAT is to be paid on the entire building. This means that both universities and business are discouraged from working together, as the former would have to bear a cost they would otherwise be exempt from, or the latter would have to cover the entire additional cost, exceeding extramural research budgets. Removing this restriction would facilitate greater engagement between academia and industry, by making it easier for universities to do more commercial work. It would also allow them to support companies spun out from their research base for longer, incubating them in house in order to support their growth.
34. The UK needs to have the right policies in place to encourage valuable immigration, and minimise unnecessary barriers to the flow of talented researchers and students. Clear messages and policies are needed to counter perceptions that recent changes to immigration policy mean the UK is closed for business.<sup>47</sup> The Society is concerned that the government’s renewed focus on reducing net migration—and particularly any changes to the routes used by skilled migrants to come to the UK—could be detrimental to the country’s future prospects, if they prevent UK institutions from accessing the best of the international talent pool.

### **Keeping up with other nations**

35. The Royal Society encourages the Government to realise its commitment to make the UK the best place in the world for science and business<sup>48</sup> by creating a world class research and innovation environment that is attractive to the brightest talent, and facilitates greater collaboration and investment from industry and from overseas. The UK can be proud of its world class research track record but once lost such leadership is very difficult to replace. The UK must not jeopardise its long-held position and prospects for long-term prosperity in the name of short-term savings. To ensure that the UK can exploit all that its knowledge and innovation base has to offer and remain an economic powerhouse, it must keep investing in and building a world class research environment.

- <sup>1</sup>Jones R (2013) The UK's innovation deficit and how to repair it. <http://speri.dept.shef.ac.uk/wp-content/uploads/2013/10/SPERI-Paper-No.6-The-UKs-Innovation-Deficit-and-How-to-Repair-it-PDF-1131KB.pdf>
- <sup>2</sup> Department for Business, Innovation and Skills 2014 Our plan for growth: science and innovation – Evidence paper. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf)
- <sup>3</sup>Elsevier (2013). International comparative performance of the UK research base – 2013. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf)
- <sup>4</sup>HEFCs (2014). Research Excellent Framework 2014. <http://www.ref.ac.uk/media/ref/content/pub/REF%20Brief%20Guide%202014.pdf>
- <sup>5</sup>World Economic Forum (2014). Global Competitiveness report 2014-15. [http://www3.weforum.org/docs/WEF\\_GlobalCompetitivenessReport\\_2014-15.pdf](http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf)
- <sup>6</sup>Economic Insight (2015) What is the relationship between public and private investment in science, research and innovation? [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/438763/bis-15-340-relationship-between-public-and-private-investment-in-R-D.pdf)
- <sup>7</sup>European Commission (2014) Press release. [http://europa.eu/rapid/press-release\\_IP-14-16\\_en.htm](http://europa.eu/rapid/press-release_IP-14-16_en.htm)
- <sup>8</sup>Association of Medical Research Charities, see <http://www.amrc.org.uk/about-us>
- <sup>9</sup>Abramovsky, L., Harrison, R., and Simpson, H. (2007). University Research and the Location of Business R&D, *Economic Journal*, 117, C114-C141 <http://www.ifs.org.uk/wps/wp0702.pdf>
- <sup>10</sup>World Economic Forum (2008). Global Competitiveness report 2008-9. <http://www.weforum.org/pdf/GCR08/GCR08.pdf>
- <sup>11</sup>World Economic Forum (2014). Global Competitiveness report 2014-15. [http://www3.weforum.org/docs/WEF\\_GlobalCompetitivenessReport\\_2014-15.pdf](http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf)
- <sup>12</sup>Haskell J, Hughes A and Bascavusoglu-Moreau E (2014). The economic significance of the UK research base. <http://www.rsc.org/globalassets/04-campaigning-outreach/realising-potential-of-scientists/research-policy/research-innovation/economic-significance-uk-science-base-2014.pdf>
- <sup>13</sup>Department for Business, Innovation and Skills 2014 Our plan for growth: science and innovation – Evidence paper. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf)
- <sup>14</sup>CaSE (2015). *CaSE Budget Briefing*. <http://sciencecampaign.org.uk/CaSE2015BudgetBriefing.pdf>
- <sup>15</sup>Eise H (2014). Fall in grant applications success rates at five research councils. <https://www.timeshighereducation.co.uk/news/fall-in-grant-application-success-rates-at-five-research-councils/2017066.article>
- <sup>16</sup>Universities UK (2015) Efficiency, effectiveness and value for money. <http://www.universitiesuk.ac.uk/highereducation/Documents/2015/EfficiencyEffectivenessValueForMoney.pdf>
- <sup>17</sup>ONS (2015) Gross Domestic Expenditure on Research and Development, 2013. <http://www.ons.gov.uk/ons/rel/rdit1/gross-domestic-expenditure-on-research-and-development/2013/index.html>
- <sup>18</sup>OECD Main Science and Technology indicators. [http://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](http://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB)
- <sup>19</sup>See for example: Speech by the Chancellor of the Exchequer, Rt Hon George Osborne MP, on science in Cambridge (2014). <https://www.gov.uk/government/speeches/chancellor-of-the-exchequers-speech-on-science-in-cambridge>
- <sup>20</sup>Elsevier (2013) International comparative performance of the UK research base – 2013. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/263729/bis-13-1297-international-comparative-performance-of-the-UK-research-base-2013.pdf)
- <sup>21</sup> HEFCs (2014). Research Excellent Framework 2014. <http://www.ref.ac.uk/>
- <sup>22</sup>Business, Innovation and Skills Committee (2014) Seventh Report: Business-University Collaboration. <http://www.publications.parliament.uk/pa/cm201415/cmselect/cmbis/249/24902.htm>
- <sup>23</sup>Department for Business, Innovation and Skills (2014) Insights from international benchmarking of the UK science and innovation system. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/277090/bis-14-544-insights-from-international-benchmarking-of-the-UK-science-and-innovation-system-bis-analysis-paper-03.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/277090/bis-14-544-insights-from-international-benchmarking-of-the-UK-science-and-innovation-system-bis-analysis-paper-03.pdf)
- <sup>24</sup>Department for Business, Innovation and Skills (2014) Insights from international benchmarking of the UK science and innovation system. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/277090/bis-14-544-insights-from-international-benchmarking-of-the-UK-science-and-innovation-system-bis-analysis-paper-03.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/277090/bis-14-544-insights-from-international-benchmarking-of-the-UK-science-and-innovation-system-bis-analysis-paper-03.pdf)
- <sup>25</sup> See for example: Royal Society (2013). Chancellor champions science. <https://royalsociety.org/news/2013/chancellor-champions-science/>
- <sup>26</sup> OECD Main Science and Technology indicators. [http://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](http://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB)
- <sup>27</sup> CASE (2015). CaSE briefing on UK Gross Domestic Expenditure on R&D. <http://blog.sciencecampaign.org.uk/wp-content/uploads/2015/04/CaSE-RD-investment-briefing-April-2015.pdf>
- <sup>28</sup> OECD Main Science and Technology indicators. [http://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](http://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB) For the purposes of this paper the term "OECD average" refers to the "OECD total". This is effectively a weighted average, with weighting for size of economy and government financed expenditure on research and development.
- <sup>29</sup>UK National Academies (2015) Building a Stronger Future: Research, Innovation and Growth. <https://royalsociety.org/-/media/policy/Publications/2015/building-a-stronger-future-research-innovation-growth.pdf>
- <sup>30</sup>UK National Academies (2014) Submission to the Government's Science and Innovation Strategy. <https://royalsociety.org/policy/publications/2014/submission-on-science-innovation-strategy/>
- <sup>31</sup> Royal Society (2013). Chancellor champions science. <https://royalsociety.org/news/2013/chancellor-champions-science/>
- <sup>32</sup>HM Treasury (2013). Spending round 2013. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/209036/spending-round-2013-complete.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/209036/spending-round-2013-complete.pdf)
- <sup>33</sup>See for example: One Nation Science Speech by the Minister for Universities and Science, Jo Johnson MP (2015). <https://www.gov.uk/government/speeches/one-nation-science>
- <sup>34</sup>Campaign for Science and Engineering (2015) CaSE 2015 Budget briefing. <http://sciencecampaign.org.uk/CaSE2015BudgetBriefing.pdf>

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- <sup>35</sup>HM Government (2014) Our plans for growth: science and innovation. <https://www.gov.uk/government/publications/our-plan-for-growth-science-and-innovation>
- <sup>36</sup>The Royal Society (2015) Submission to the Nurse Review of the Research Councils. <https://royalsociety.org/-/media/policy/Publications/2015/royal-society-submission-to-nurse-review-2015-04-20.pdf>
- <sup>37</sup>Campaign for Science and Engineering (2014). CaSE analysis of departmental R&D spend 2011/12. <http://sciencecampaign.org.uk/documents/2014/DepartmentalR&Dexpenditure2011-12.pdf>
- <sup>38</sup>UK National Academies (2015). Building a stronger future: Research, Innovation and Growth. <https://royalsociety.org/policy/publications/2015/stronger-future/>
- <sup>39</sup>BIS (2014). Our Plan for growth: science and innovation. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/387780/PU1719\\_HMT\\_Science\\_.pdf?utm\\_source=Home\\_Page&utm\\_medium=FlexSlider&utm\\_campaign=UK\\_Governments\\_plan\\_for\\_growth](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387780/PU1719_HMT_Science_.pdf?utm_source=Home_Page&utm_medium=FlexSlider&utm_campaign=UK_Governments_plan_for_growth)
- <sup>40</sup>HM Government (2014) Our plan for growth: science and innovation. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf)
- <sup>41</sup>See for example: Office of Health Economics and the Science Policy Research Unit at the University of Sussex 2014 Exploring the interdependencies of research funders in the UK. <https://www.ohe.org/publications/exploring-interdependencies-research-funders-uk>
- <sup>42</sup>Department for Business, Innovation and Skills (2014) Our plan for growth: science and innovation - Evidence paper. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf)
- <sup>43</sup>Hauser H (2014) Review of the Catapult network. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/368416/bis-14-1085-review-of-the-catapult-network.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/368416/bis-14-1085-review-of-the-catapult-network.pdf)
- <sup>44</sup>Department for Business, Innovation and Skills (2014) Our plan for growth: science and innovation – Evidence paper. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/388015/14-1247-science-innovation-strategy-evidence.pdf)
- <sup>45</sup>HM Revenues & Customs (2014) Research and Development Tax Credit Statistics. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/356382/Research\\_and\\_Development\\_Tax\\_Credits\\_-\\_August\\_2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/356382/Research_and_Development_Tax_Credits_-_August_2014.pdf)
- <sup>46</sup>HM Revenues and Customs (2015) Evaluation of Research and Development Tax Credit. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/413629/HMRC\\_WorkingPaper\\_17\\_R\\_D\\_Evaluation\\_Final.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/413629/HMRC_WorkingPaper_17_R_D_Evaluation_Final.pdf)
- <sup>47</sup>House of Lords Science and Technology Committee (2014) Fourth Report: International science, technology, engineering and mathematics (STEM) students. <http://www.publications.parliament.uk/pa/ld201314/ldselect/ldsctech/162/162.pdf>
- <sup>48</sup>BIS (2014). Our plan for growth: science and innovation [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/387780/PU1719\\_HMT\\_Science\\_.pdf?utm\\_source=Home\\_Page&utm\\_medium=FlexSlider&utm\\_campaign=UK\\_Governments\\_plan\\_for\\_growth](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/387780/PU1719_HMT_Science_.pdf?utm_source=Home_Page&utm_medium=FlexSlider&utm_campaign=UK_Governments_plan_for_growth)