



House of Commons Science and Technology
Committee inquiry on the balance and
effectiveness of research and innovation
spending

A submission from the British Academy

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1. The British Academy – the UK’s national academy for the humanities and social sciences - welcomes the opportunity to respond to this inquiry on the balance and effectiveness of research and innovation spending. The Academy has been working with its sister national academies (the Academy of Medical Sciences, Royal Academy of Engineering, and Royal Society) to better understand the existing evidence for the range of benefits that research and innovation bring to the UK, the geographic distribution of those benefits, how they are achieved and how best to measure them to inform future decisions on investment in research and innovation. The findings from this work will be published shortly. The national academies are also producing resources and holding events to encourage wider conversations about the value of creating a more research and innovation intensive economy in the UK to all UK citizens, and how best to invest resources wisely and efficiently in the national interest.
2. The Academy has welcomed the Government’s commitment to increasing combined public and private R&D investment to 2.4% of GDP, with a future increase to 3%. This target is vital in maintaining the UK’s position as a destination for outstanding research in an increasingly competitive environment. Creating a stable long-term investment environment for research and innovation is vital in building a stronger future throughout the UK. The creation of UK Research and Innovation (UKRI) is an opportunity to drive forward a positive and expanded role for research and innovation, by developing a strategy and associated investment framework that can operate on a cross-disciplinary scale and be delivered more coherently, effectively, and efficiently.
3. The British Academy believes that excellence should be the primary guiding principle for investment in research. The high international reputation of UK research, including in the humanities and social sciences, has owed much to its strong emphasis on quality within the dual framework of regular and rigorous research assessment combined with competitive bidding. It is essential that we build on the mechanisms that have enabled the UK to be effective at exploiting its investment in research. As the UK reaps the benefits of past investment it must ensure continued investment for future prosperity given fierce competition from abroad and growing opportunities for international collaboration.
4. Future decisions about the balance and effectiveness of research and innovation spending must be shaped in the context of the UK’s forthcoming departure from the European Union. The national academies commissioned a study which demonstrated the extensive role of EU funding in supporting research carried out within the UK,¹ and the British Academy has looked in more detail at the picture for the humanities and social sciences.² At present, the terms of the UK’s future association with EU Framework Programmes for Research and Innovation remain uncertain, but it is vital that the significant place that EU forms of research support and funding currently plays within the UK research landscape, particularly for humanities and social sciences, is reflected in future budget scenarios.

¹ Technopolis (2017) The role of EU funding in UK research and innovation (available from <https://www.britac.ac.uk/sites/default/files/2017-05-22%20TG%20Role%20of%20EU%20funding%20-%20MAIN%20FINAL.pdf>)

² The British Academy (2017) Brexit means...? The British Academy's Priorities for the Humanities and Social Sciences in the Current Negotiations (available from <https://www.britac.ac.uk/sites/default/files/Brexit%20Means...TheBritishAcademy%27sPrioritiesForTheHumanitiesandSocialSciencesInTheCurrentNeogtiations.pdf>)

The effectiveness of public spending on R&D, including through mechanisms such as the Industrial Strategy Challenge Fund

5. The UK has a world-leading research base, which provides the foundation for new ideas and discoveries, and fuels economic growth and the creation of high-value jobs.³ This enables the UK to compete with other leading nations and to develop the capabilities needed to respond to national and global challenges now and in the future. This position is the result of several underlying factors, particularly the public commitment to sustained and broad support for research and innovation.
6. The UK is an attractive and productive place to conduct world class research. The potential of this research to transform society, revitalise the economy, stimulate productivity, improve health and enhance social and cultural wellbeing, in the UK and elsewhere, is well established, and in the years to come research and innovation will play an even more central role in our knowledge-driven economy. Estimating returns is challenging in the short term. However, looking across the evidence on non-academic economic returns from public investment in research, it is possible to conclude that the general returns are in the region of 20-30% fairly consistently across time and place.⁴ However, these figures are an underestimate, as they do not capture the full breadth of benefits beyond the relatively easily-measured economic impact. It is vital that in measuring the effectiveness of public spending on research and innovation, both the tangible and intangible benefits are captured.
7. The British Academy has repeatedly emphasised that the Industrial Strategy and associated Challenge Fund needs to take greater account of the dominant role of the services sector within the UK economy, in order to maximise the potential economic return from the investment it plans to make and the engagement of the research base with the strategy.⁵ It should not just favour established areas but support emerging sectors and innovations of the future.
8. The Academy would strongly urge the Government to continue to extend its challenge areas for investment to include both the cultural and creative industries and the wider service sector, areas which depend on insights from research in the humanities and social sciences. The Academy supports the recommendation of Sir Peter Bazalgette's Independent Review of the creative industries that the Industrial Strategy must recognise and encourage R&D activity in the creative industries,

³ The UK continually punches above its weight in measures of research productivity and quality: for a country with 0.9% of the global population, it has 11.6% of global citations and 15.9% of the world's most highly cited articles. (see Elsevier (2013) International comparative performance of the UK research base – 2013, available from

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)

⁴ Haskel, Hughes & Bascavusoglu-Moreau (2014) The Economic Significance of the UK Science Base: A Report for the Campaign for Science and Engineering (available from

<http://www.sciencecampaign.org.uk/asset/4567DD2A-0604-42E5-AF8EEA248D3DCE1B/>)

⁵ The British Academy (2017) The Most Important Challenges of Our Time: Positioning Britain to succeed and priorities for research and innovation (available from

<https://www.britac.ac.uk/sites/default/files/The%20most%20important%20challenges%20of%20our%20time.pdf>); The British Academy (2017) Response to the Industrial Strategy Green Paper (available from <https://www.britac.ac.uk/sites/default/files/Industrial%20Strategy%20Green%20Paper%20submission%20from%20the%20British%20Academy%20.pdf>)

which requires a broad definition of the term 'R&D'.⁶ We have also highlighted the need for a transparent and inclusive decision making process in determining the challenges set for the fund, and for allowing sufficient time for the research community to build the collaborations which are necessary to address the questions posed by the challenge areas.

The rationale needed for deciding on the balance of public R&D funding between:

- individual research disciplines, research councils and cross-disciplinary schemes;

9. The breadth of the UK research base is one of its great strengths and the source of its international competitiveness and attractiveness. As so many of the challenges facing society today and in the future, from security to health, from climate change to demographic change, from technology to artificial intelligence, require expertise drawn from across the humanities, social sciences and natural sciences, continued investment across the whole breadth of the research base remains essential.
10. The percentage of all active UK research staff submitted to REF 2014 working in the humanities and social sciences (defined as submissions made to main panels C and D) was around 48%. This does not include psychologists (submitted to main panel A), and therefore the actual total is likely to be higher. However, the funding allocated in 2015-16 to the two research councils covering these discipline areas was only 9% of the total research council allocation (£251.5 million out of a total of £2.67 billion). In this context, the success of the social sciences and humanities in REF is even more impressive: 95 % (580 out of 612) of individual submissions to the 11 sub-panels in Main Panel C (broadly social sciences) were awarded some 4* in their overall profiles, and over 71% of all research submitted to Main Panel D (arts and humanities) was judged either world-leading or internationally excellent.
11. Many of today's global challenges cannot be tackled effectively by a technical, scientific, or medical solutions alone; we must properly resource the research that uncovers why individuals, communities, societies, and populations behave and interact as they do. The cultural and service sectors will be of increasing importance for job generation in the future. Economic growth will rely heavily on the UK's ability to exploit and commercialise research and ideas drawn from across all disciplines: "the investments needed to make this happen range from product and service design to developing innovative skills and organisational innovation."⁷ This is where the humanities and social sciences must take centre stage.
12. We recognise that the costs of undertaking research in the natural, medical, and physical sciences, and in engineering, are often higher than those in the humanities and social sciences. However, it is our belief that, based on the size of the research community in the humanities and social sciences, the quality of the output, and the significance of the challenges we face as a society, there is a strong case for re-

⁶ Bazalgette (2017) Independent Review of the Creative Industries (available from https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/649980/Independent_Review_of_the_Creative_Industries.pdf)

In 2014, the creative economy was worth £133.3bn, accounting for 8.2% of the UK economy and 2.8m jobs, approximately 1 in 11 of all UK jobs. The creative economy grew by 25% between 2011 and 2014, a rate twice that of the UK economy as a whole. (see Department for Culture, Media and Sport Economic Estimates 2016: www.gov.uk/government/statistics/creative-industries-economic-estimates-january-2016)

⁷ Nesta (2009) The Innovation Index: Measuring the UK's investment in innovation and its effects (available from https://media.nesta.org.uk/documents/innovation_index_2009.pdf)

examining the low proportion of research council funding currently allocated to the AHRC and ESRC.

13. Consistent investment across the whole spectrum of intellectual disciplines is mutually reinforcing. The research landscape is too connected across disciplines for a weakening of one to not have a negative effect on the others, particularly when it comes to 'grand challenge' research projects which require interdisciplinary solutions.

- the two research funding streams of the 'dual support' system;

14. The British Academy strongly supports the current structure of dual support for UK research funding. The complementarity of both legs of the dual support system – block grants from Research England (formerly HEFCE), HEFCW, SFC and DELNI in the form of QR funding (or equivalent), and project funding via the research councils, plus the funding, generally for individuals, distributed via the four national academies – is a real strength of the UK system and a necessary condition of the UK's research excellence. For the humanities and social sciences in particular, quality related (QR) funding is critical, where much research is carried out by individual scholars, and does not need the same degree of strategically organised major project funding as is common in other disciplines.⁸
15. QR funding underpins research activity across the disciplinary spread, allowing institutions to set long term strategies and to invest in bottom-up, curiosity driven research that can flourish into larger, more targeted programmes. There are powerful examples from the history of science, most recently perhaps the creation of graphene at the University of Manchester, of curiosity-driven research having a significant economic, material and intellectual impact.
16. A balance of funding streams is necessary to maintain a healthy ecosystem for excellent research. The mixed economy model supports the fundamental process of developing a research project. It allows for a funding 'ladder' of grants, of which all parts are an essential component, each enabling and complementing the other. For a humanities or social sciences discipline, public QR funding provides essential infrastructural support, and space for researchers to undertake 'blue sky', curiosity-driven research. This may be followed by a British Academy Small Grant to commission a pilot project, analyse the findings of a small survey, or hold a workshop. The results of a workshop will then be fed into a larger research council grant application, leveraging further funds from the cultural or commercial sector.

- research and innovation;

17. It is commonly held that the UK is strong in research but weak at innovation. The links between research and innovation are complex and diffuse and it is unhelpful to think about a hard split between the two, or of a linear process.⁹ Innovation is not just about the development of new products, but also about changing the way we do things and being more efficient. Effective adoption of technology throughout businesses and improvements in management and workforce skills depends on the understanding and insight which the humanities and social sciences can bring to the

⁸ HEFCE (2014) A Review of QR Funding in English HEIs: Process and Impact (available from http://www.hefce.ac.uk/media/hefce/content/pubs/indirreports/2014/A_review_of_QR_funding_in_English_HEIs/2014_qrreview.pdf)

⁹ Godin (2006) 'The Linear Model of Innovation: The Historical Construction of an Analytical Framework', *Science, Technology, & Human Values* 31(6): 639-67

complexity of social phenomena and human behaviour.¹⁰ Technological developments will alter the working patterns, and we will need a workforce that can exploit and manage opportunities, risks and disruptive changes it will bring.¹¹ Much of this is ‘hidden innovation’ which is not well measured or taken into account in evaluating the effectiveness of innovation policies. The allocation of funding, and the role of Innovate UK, needs to reflect the breadth of activity which might be considered to be ‘innovation’.

- pure and applied research;

18. The British Academy considers the distinction between ‘pure’ and ‘applied’ research to be unhelpful. Research labelled as ‘fundamental’ or ‘basic’ can create unforeseen opportunities. Similarly, ‘applied’ research can lead to fundamental discoveries. Supporting a diverse range of ‘pure’ research, often through response mode funding, is crucial to the success of more strategic ‘applied’ research and vice versa. Research is an interactive and cumulative process, where results and discoveries in one area trigger developments in another, regardless of how the research domains are labelled.

- block funding, responsive mode funding and directed funding for the Industrial Strategy;

19. As set out in paragraphs 14-16 above, the British Academy strongly supports the mixed model of research funding in the UK. Challenge funding is one way of incentivising research to tackle the major problems of society. Interdisciplinary research is often needed to tackle such problems, which do not exist in neat disciplinary boxes but rather require insights from a broad and often innovative mix of different methods and understandings. The Academy’s project on interdisciplinary research demonstrated the strong mono-disciplinary incentive structures that exist within the UK higher education and research system.¹² Challenge-based funding can incentivise researchers to break out of these structures, but reward and recognition structures on other dimensions of success often fall strictly within disciplines, which can be challenging for academics trying to build a successful career.
20. But not all inter-, multi- and cross-disciplinary research is challenge-led; it may be discovery driven and exploratory, and have knowledge goals that evolve over time. Conversely, the Industrial Strategy Challenge Fund will encourage impactful research on challenges that matter, but it will inevitably be selective and challenge areas cannot be set for everything that is important. The Academy would warn against substantial increased emphasis on strategic large grants as society’s

¹⁰ For example, the CLEAR IDEAS innovation development model has improved cost-efficiency in service delivery for public sector organisations. In Sheffield alone savings of £1.7 million for social care services have been achieved (see <http://www.esrc.ac.uk/research/research-and-impact-evaluation/economic-impact-reports/>)

¹¹ The British Academy and The Royal Society (2018) The Impact of AI on Work (see <https://www.britac.ac.uk/projects/ai-and-work>); The British Academy (2017) The Right Skills: Celebrating Skills in the Arts, Humanities and Social Sciences (available from <https://www.britac.ac.uk/sites/default/files/The%20Right%20Skills%20-%20Celebrating%20Skills%20in%20the%20Arts%2C%20Humanities%20and%20Social%20Sciences.pdf>)

¹² The British Academy (2016) Crossing Paths: Interdisciplinary institutions, careers, education and applications (available from <https://www.britac.ac.uk/sites/default/files/Crossing%20Paths%20-%20Full%20Report.pdf>)

challenges become more severe. These challenges will be best tackled through a healthy balance between different modes.

- the 'golden triangle' of London, Oxford and Cambridge, and the rest of the UK;

21. The Academy believes that excellent research should be funded wherever it is found. Jointly with the other national academies, the British Academy recently documented the UK's spend on research and development through the Science Budget. This shows that R&D spend varies from region to region, with each having different strengths and dependencies.¹³ Case studies submitted to REF 2014 illustrated that impactful research is being carried out, and having impact, across the UK.¹⁴
22. The nexus between technology and creativity is increasingly recognised as the driver for innovation and the industries of the future. It is also the most likely lever for promoting regional growth beyond London and the South East, so helping to regenerate cities and foster dynamism so as to help even out disparities in all the nations of the United Kingdom. The AHRC's cultural value project shows clearly the value of culture-led urban regeneration and research institutions have the potential to attract and retain high skilled people.¹⁵

- global challenges and other strategic/national priorities.

23. The British Academy believes that there are two further dimensions to the allocation of research funding which the Committee should take into account in its inquiry, as influence the overall distribution of the science budget. Firstly, the balance of investment between resource (the day to day cost of research) and capital (research infrastructures). The British Academy is supporting the ongoing review of research infrastructure being carried out by UKRI and encourages the Committee to refer to the findings from this as they emerge.¹⁶
24. Secondly, the funding provided by UKRI in the form of postgraduate studentships is vital in attracting, nurturing and training the researchers of the future. Funding for postgraduate research students and early career researchers is essential to ensure that there are adequate numbers of appropriately trained people to replenish the research base, to capitalise on the opportunities presented by increased investment in research and innovation, and to provide the high-level analytical and communication skills that are in demand from employers.¹⁷

The effectiveness of and balance between the different available UKRI/Government levers for encouraging innovation, including: R&D tax credits, the Small Business Research Initiative (SBRI), Innovate UK loans and grants, measures proposed in the 'patient capital' review, and other initiatives.

¹³ The Academy of Medical Sciences, The British Academy, Royal Academy of Engineering & The Royal Society (2017) Investing in UK R&D (available from <https://www.britac.ac.uk/sites/default/files/Investing%20in%20UK%20R%26D%20May%20update%202018.pdf>)

¹⁴ Kings College London & Digital Science (2015) The nature, scale and beneficiaries of research impact: An initial analysis of Research Excellence Framework (REF) 2014 impact case studies (available from <https://www.kcl.ac.uk/sspp/policy-institute/publications/Analysis-of-REF-impact.pdf>)

¹⁵ Crossick & Kaszynska (2016) Understanding the value of arts & culture: The AHRC Cultural Value Project (available from <https://ahrc.ukri.org/documents/publications/cultural-value-project-final-report/>)

¹⁶ See <https://www.ukri.org/research/infrastructure/>

¹⁷ See <https://www.vitae.ac.uk/impact-and-evaluation/what-do-researchers-do>

25. Initiatives to financially support innovation and commercialisation should not be concentrated in traditional sectors of the UK economy which no longer dominate. Consideration should be given to encouraging innovation in services, in design and in new technological areas such as Artificial Intelligence, where the UK is strong and where innovation and commercialisation processes can be different.¹⁸ For example, tax credits for R&D rely on a definition of R&D that does not capture the full range of research and innovation activity that underpins productivity in important sectors in the UK economy such as the creative industries, as noted in paragraph 8 above.

The most appropriate phasing of the increase in R&D spending by UKRI over the next few years, in order to meet the Government's 2.4%/3.0% of GDP targets, and what if any changes will be needed in the forthcoming 2019 Spending Review to deliver these targets.

26. The British Academy believes that the most important consideration is the need to create a stable long-term investment environment for research and innovation. Excellent research is a long-term undertaking, which depends on stable funding. Much of the UK's weakness in attracting private investment in research and innovation is the result of short-termism in policy approaches.¹⁹ The government's current commitment to research should be extended to at least 10 years, in order to ensure sustained high-quality development of research and national and international collaborations, to keep pace with our competitors, and to deliver growth and prosperity by enabling businesses to take the long-term risks that developing new products and services require.

Assumptions about the public/private mix in delivering the 2.4%/3.0% of GDP targets, the extent past patterns will be replicated in future and the levers that can be used to increase private sector spend on R&D.

27. Public investment in research encourages further investment from business, as public investment provides the vital underpinning infrastructure that business investors seek. Historically, the evidence has shown that every £1 increase in public R&D investment generates a further £1.36 of private investment.²⁰ However, as work by the national academies has shown, the overall research and innovation investment landscape in the UK is complex, with substantial proportions also coming from private non-profit sources (charities and philanthropic) as well as from overseas.²¹ To deliver the 2.4%/3% targets we need to create a vibrant environment that fosters research and innovation through UK universities, public services, businesses, industries and third sector.

¹⁸ Miles & Green (2008) Hidden innovation in the Creative Industries (available from https://media.nesta.org.uk/documents/hidden_innovation_creative_industries_report.pdf)

¹⁹ The British Academy (2015) Response to House of Commons Business, Innovation and Skills Select Committee Inquiry on the Productivity Plan (available from https://www.britac.ac.uk/sites/default/files/British%20Academy%20BIS%20Inquiry%20on%20the%20Productivity%20Plan%20final%20response_0.pdf)

²⁰ Moretti, Steinwender & Van Reenen (2016) The Intellectual Spoils of War? Defense R&D, Productivity and Spillovers (available from <http://eml.berkeley.edu/~moretti/military.pdf>); Haskel, Goodridge, Hughes & Wallis (2015) The contribution of public and private R&D to UK productivity growth (available from <http://spiral.imperial.ac.uk/bitstream/10044/1/21171/2/Haskel%202015-03.pdf>)

²¹ The Academy of Medical Sciences, The British Academy, Royal Academy of Engineering & The Royal Society (2017) Investing in UK R&D (available from <https://www.britac.ac.uk/sites/default/files/Investing%20in%20UK%20R%26D%20May%20update%202018.pdf>)