Country Profile

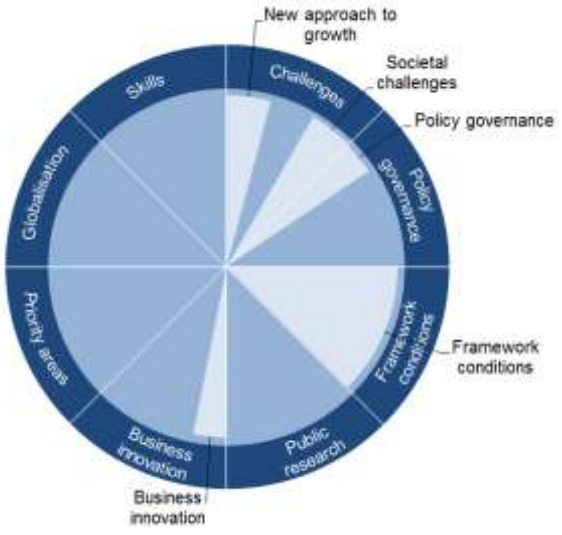
UNITED KINGDOM

The United Kingdom is a very open and globalised economy, and its STI system enjoys a good level of funding and participation by foreign firms. Although unemployment rates have fallen to 5% in 2016, the results of the Brexit referendum have raised uncertainty regarding economic growth. Brexit comes after several years of very sluggish labour productivity growth (figure 2). The Productivity Plan, Fixing the Foundations: Creating a More Prosperous Nation (2015), sets out a policy agenda to boost the UK's productivity growth, and the Competition Plan, A Better Deal: Boosting Competition to Bring Down Bills for Families and Firms (2015), aims to incentivise firms to invest in technology and to innovate. Maintaining research excellence, promoting innovation and strengthening the interface between universities and industry are major focus areas of new national strategies for productivity and competitiveness. These cross-governmental strategies have been complemented by a number of important recent reviews focused on specific aspects of the UK STI system, including the public research funding agencies and university-business collaborations. These reviews are providing the stimulus for significant structural changes in the governance and management, as well as the focus, of public investment in STI.

Table 1. Gross domestic expenditure on R&D (GERD)

	GBR	OECD
GERD		
USD million PPP, 2014	44 174	1 181 495
As a % of total OECD, 2014	3.8	100
GERD intensity and growth		
As a % of GDP, 2014	1.70	2.38
(annual growth rate, 2009-14)	(+1.4)	(+2.3)
GERD publicly financed		
As a % of GDP, 2014	0.51	0.61
(annual growth rate, 2009-14)	(-2.2)	(+2.5)

Figure 1. Major STI policy priorities, 2016



Hot issues

Promoting structural adjustment and a new approach to growth

The aerospace, automotive and pharmaceutical sectors are major contributors to the United Kingdom's industrial performance, and London is a leading global financial centre. UK industry is dominated by large enterprises (figure 6) and benefits from an increasing comparative advantage in biotechnologies (figure 7). BERD slightly increased over the last years to 1.09% in 2014. The Productivity Plan defines 15 action points around two main pillars: encouraging long-term investment and promoting a dynamic economy. This is a cross-departmental plan that has direct impacts on STI policy and aims to build on the UK's current strengths. Key themes include: skills and human capital; delivering a highly skilled workforce; maintaining world-class universities, open to all; reliable and low-carbon energy; and a world-class digital infrastructure. The UK Department for Business Innovation and Skills produced its own prior report, Our Plan for Growth: Science and Innovation (2014), which informed the broader Productivity Plan.

Improving the governance of the innovation system and policy

Since 2014, there has been an increasing focus on the development of more robust policy evaluations to determine the socio-economic impact of STI policy, and the public research system has gone through a major reform in governance. A new evaluation strategy for science and innovation was published in 2014 that focuses on improving the use and coverage of evaluations, strengthening governance, increasing analytical capability and ensuring independent and transparent quality assurance. Researchers have been actively engaged in thinking about the impact of research and about the pathways towards achieving a greater impact, using a toolkit that has been implemented within the UK Research Council application and assessment process. The UK Research Excellence Framework (REF) also considers the socio-economic impact of university research in the 2014 evaluation exercise. In addition, the Nurse Review, Ensuring a successful research endeavour: Review of the UK Research Councils, led by Paul Nurse (2015), proposed a new governance structure for public funding to address some of the weaknesses of the historical system in terms of coordination and duplication. As a consequence, a new single non-departmental public body operating at arm's length from government is to be created. The new body – UK Research and Innovation (UKRI) – will bring together the seven Research Councils and Innovate UK, with the latter retaining its distinctive business focus and separate funding stream. The functions of the research funding and knowledge exchange previously performed by the Higher Education Funding Council for England (HEFCE) will also be integrated within this new body, and legal protection will be provided for the dual research funding support system in England. The UKRI is designed to enable a greater focus on cross-cutting issues and improved collaboration between the research base and the commercialisation of discoveries in the business community. To complement these major structural changes in the way public investment in STI is to be managed, the Government Office for Science, working with the Research Councils, has launched a series of foresight exercises and science and innovation audits. These are designed to help build joint visions and directions.

Improving the framework conditions for innovation

The Competition Plan (2015) focuses on one key aspect of the broader national Productivity Plan. The aim is to implement regulatory frameworks and measures that promote open and dynamic markets and incentivise firms to invest in technology and to innovate. It is notable that whereas the R&D expenditure by domestic firms has decreased over the past decade, the R&D expenditure by foreign affiliates has increased. There has also been a substantial increase in R&D expenditure related to high-knowledge market services relative to manufacturing industries (figure 6).

Encouraging business innovation and innovative entrepreneurship

The UK performs well in terms of the attraction of venture capital and scores high in the ease of entrepreneurship index, while the number of young patenting firms per GDP is slightly below the OECD median (figure 5[h,j,i]). In terms of funding, the UK is to a certain degree moving away from competitive grants to businesses and more towards credit loans, guarantees and risk-sharing mechanisms. R&D tax credits and patent boxes are seen as important mechanisms for promoting business innovation, and new financial products to support innovation are being developed (figure 9). Public procurement is also seen as an important tool for promoting business R&D. The Competition Plan sets out the obstacles and challenges to business innovation and highlights the particular obstacles for established businesses to adopt innovation and for SMEs to establish themselves.

Addressing societal challenges (e.g. inclusiveness)

There is an emphasis in the Productivity Plan and the associated reviews on STI to address complex global challenges, such as developing a low-carbon economy. One initiative in this direction is a new Global Challenges Research Fund, with USD 2.17 billion PPP (1.5 billion pounds – GBP), to be spent over the 2016/17 to 2020/21 period. This fund will target areas where multidisciplinary research is required to address new and emerging social, environmental and health challenges throughout the world. This will be managed through the Research Councils, national academies and other partners. The Global Challenges Research Fund will provide additional funding to support research initiatives with a global dimension, and in particular to address the future needs of the developing world. This fund will complement targeted investment in areas such as energy, where a new grants programme, targeted at industry and focusing on clean energy, is being launched by the Department of Energy and Climate change. USD 724 million PPP (GBP 500 million) has been set aside for this programme over the period 2016-2021.

Some key STI performance indicators

Figure 2. Economic performance

Labour productivity, GDP per hour worked, index 2005=100

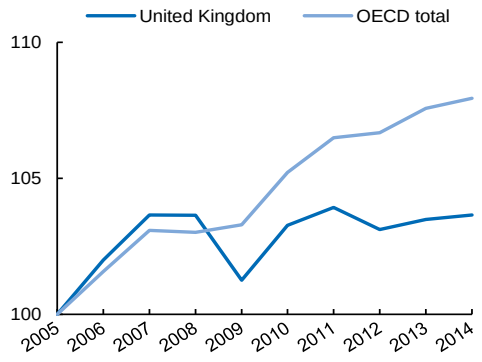


Figure 3. Environmental performance

Green productivity, GDP per unit of CO_2 emitted, index 2005=100

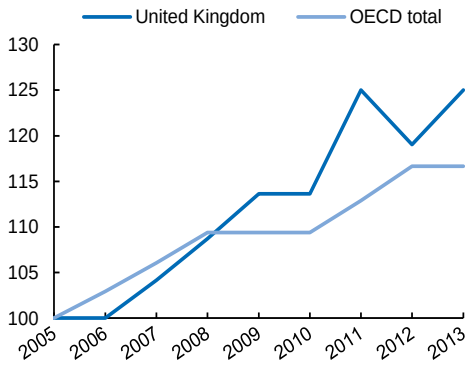
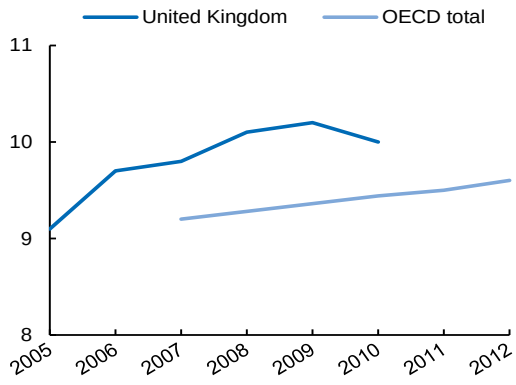


Figure 4. Income inequality

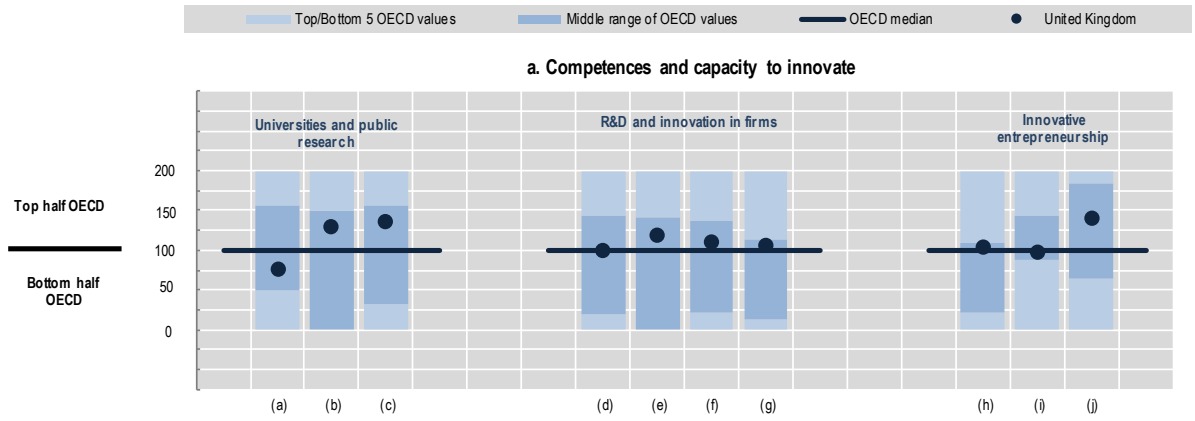
Ratio top decile/first decile of real household net disposable income



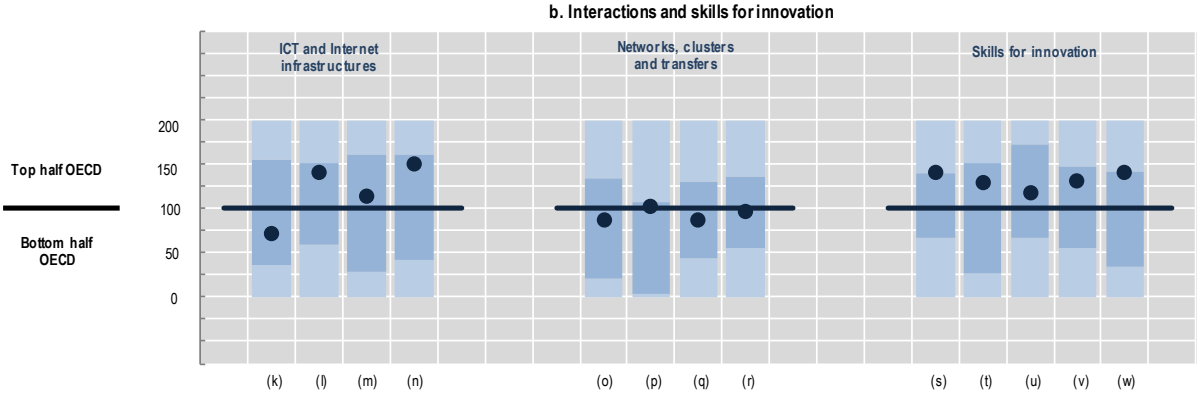
Benchmarking national STI systems

Figure 5. Science and Innovation in United Kingdom

Comparative performance of national science and innovation systems, 2016



(a) Public R&D expenditure (per GDP)
(b) Top 500 universities (per GDP)
(c) Publications in the top journals (per GDP)
(d) Business R&D expenditure (per GDP)
(e) Top 500 corporate R&D investors (per GDP)
(f) Triadic patent families (per GDP)
(g) Trademarks (per GDP)
(h) Venture capital (per GDP)
(i) Young patenting firms (per GDP)
(j) Ease of entrepreneurship index



(k) ICT investment (per GDP)
(l) Fixed broadband subscriptions (per population)
(m) Wireless broadband subscriptions (per population)
(n) E-government development index
(o) Industry-financed public R&D expenditure (per GDP)
(p) Patents filed by universities and public labs (per GDP)
(q) International co-authorship (%)
(r) International co-invention (%)
(s) Tertiary education expenditure (per GDP)
(t) Adult population at tertiary education level (%)
(u) Top adult performers in technology problem-solving (%)
(v) Top 15 year-old performers in science (%)
(w) Doctoral graduate rate in science and engineering (%)

Note: Normalised index of performance relative to the median values in the OECD area (Index median=100).

Highlights of the UK STI system

Universities and public research

The UK public research system is focused mainly on universities, There are relatively few public research organisations (PRIs), which means that the universities have a major role to play in conducting applied and experimental research and ensuring the transfer of knowledge and technology to industry (figure 8). One of the themes of the Productivity Plan is "maintaining world class universities, open to all". The United Kingdom is among the top performers in publication counts and boasts a large share of the world's leading universities, which are active in research and patent applications, although both government and business investment in public R&D is below the OECD average (figure 5[a,b,c,o]). Academic excellence plays a large part in university research funding, with block grant allocations dependent on the results of the Research Excellence Framework (REF) exercise for assessing research quality. Openness, including open access to scientific publications and Open Science more broadly, is an important aspect of the national Productivity and Competitiveness reviews. Both Research Councils UK (RCUK) and the Higher Education Funding Council for England (HEFCE) revised their open access policies in 2015. The HEFCE update included flexibilities to assist researchers new to Open Access. The RCUK update followed recommendations from the review of the implementation of the RCUK Policy on Open Access, compiled in 2015, which reviewed the policy's effectiveness after two years. The Open Access Coordination Group led by Universities UK brings together the universities and other stakeholders to support the transition towards open access in the UK. The Open Research Data Forum promotes the development of an open system for data arising from research funded from public and charitable sources.

Innovation in firms

Promoting R&D in domestic firms and manufacturing industries is a particular challenge for the UK. To this end, the UK government has implemented a variety of novel direct and indirect support measures to increase innovation in companies and support SMEs. In comparison to most OECD countries, the relative importance of R&D and innovation tax incentives in overall public support for business R&D and innovation has been increasing. R&D tax credits are the single largest government support for business investment in R&D and are available to any company in any sector liable to pay corporation tax. For the 2014-15 tax year, claims totalled USD 3.5 PPP (GBP 2.5 billion) from a total of 20 900 companies, against USD 31.1 billion PPP (GBP 21.8 billion) of expenditure. It is believed that claims are now made against a very high proportion of all business expenditure on qualifying R&D. An R&D expenditure credit scheme was introduced in 2013 that is slightly more generous than the large company R&D tax relief which it fully replaced from 2016. The rate of tax relief provided under the SME R&D tax credit scheme remained at 230%. Businesses are also entitled to an R&D Allowance, formerly known as the scientific research allowance, which gives 100% relief for capital expenditures on R&D. The Patent Box scheme was introduced to provide an additional incentive for companies to retain and commercialise existing patents. The Patent Box applies a lower rate of corporation tax to profits attributable to patents and equivalent forms of IP on products derived from UK and EU patents. The benefit is being phased in, and companies will benefit from the full 10% rate from 2017/18. Claims made for the Patent Box totalled USD429 million PPP (GBP 300 million) from a total of 700 companies in the 2013-14 tax year, the first year of the scheme. Further to an international agreement, from July 2016 the Patent Box changed to ensure closer linkage between UK R&D and Patent Box benefits. Existing users of the Patent Box will benefit from grandfathering provisions until 2021. In 2013, there was an expansion of the Small Business Research Initiative, which seeks to drive innovation through public procurement of R&D. An external review of this scheme, which had a contract value of over USD 268 million PPP (GBP 200 million) in 2015, is currently underway. The UK Government announced in 2015 its intention to broaden the range of finance options for innovative businesses, so that they can access more consistent and appropriate support at all stages of innovation. Innovate UK's funding models will evolve to make available up to USD 239 million PPP (GBP 165

million) per annum of support for innovation through new innovation finance products by the end of the current parliament (2019-20). Grant funding will still be available for early stage and riskier innovations. A new national development bank, the British Business Bank, was established in 2014 to increase the supply and diversity of finance available for UK SMEs.

ICT and Internet infrastructures

The UK enjoys strong and well-established ICT infrastructures, and the government makes relatively intensive use of digital tools to interact with citizens and deliver public services (figure 5[l,m,n]). Big Data and the integration of data from disparate sources will be important for addressing complex global challenges. The Open Data Institute (ODI) is an independent, not-for-profit company that receives funds from the UK government and aims to foster the evolution of an open data culture to create economic, environmental and social value. The ODI involves businesses and academic institutions. It focuses on innovation, commercialisation and the development of web standards to support the Open Data Agenda. It works with academic centres to increase the number of trained personnel with extensive Open Data skills and provides expert advice for government. The ODI also develops semantic web technologies for using data more effectively, and will advise the public sector and business as to how best to use these and manage their data so that it can be exploited for economic and social benefits. The new Alan Turing Institute, which was announced in 2014, with USD 60 million PPP (GBP 42 million) of government support over five years, is focused on Big Data. It is distributed across five UK universities, with its headquarters at the British Library, and it is expected to form partnerships with industry to promote innovation around data.

Technology transfer and commercialisation

Industry-science linkages in the UK, as measured by the private funding of public R&D, are below the OECD median (figure 5[o]). Whilst physical co-location is one way of promoting interaction between different STI actors (see clusters and regional policy below), national and international networks are also important. The objective of the Knowledge Transfer Network (KTN) is to stimulate innovation through knowledge transfer. The government, through Innovate UK, provided support of around USD 21 million PPP (GBP 15 million) in 2015-16 for the KTN, which has over 43 000 business members and 14 000 non-business members. The Dowling review on university-business research collaboration (2015) considered the role of government in fostering the conditions under which the excellence in UK universities can connect with innovative businesses at home and overseas. This review concluded that that the complexity of public support mechanisms for research and innovation poses a barrier to business engagement in collaborative activities, particularly for SMEs. It emphasised the importance of individuals and the need to promote and incentivise mobility and exchange between academia and industry. It was also critical of university technology transfer offices, suggesting that these need to focus more on knowledge exchange than on short-term income generation. The Dowling review also emphasised the critical role of individuals and skills for entrepreneurship and innovation.

Clusters and regional policies

The UK has established a number of networks, clusters, campuses or centres to bring academic research excellence closer to industry. The Catapult Centres are an elite network of technology and innovation centres to accelerate innovation and stimulate growth in important economic areas. Starting from 2012, seven Catapults have been fully established, two are operating from temporary locations, and two more have been approved. They are co-funded by industry and are expected to attract public and private investment exceeding USD 2.3 billion PPP (GBP 1.6 billion) over their first five years of operation. The new Graphene Global Research and Technology Hub, which is supported by USD 72 million PPP (GBP 50 million) of government capital investment, connects education and research institutions and companies to accelerate the development of commercial applications of graphene. The similarly conceived Higgs Centre in Edinburgh, which is supported by USD 15 million PPP (GBP 10.7 million) of public capital investment, will house start-up firms, principally in the space sector, and a number of University of Edinburgh academics

specialising in data-intensive science in astronomy and particle physics research. The UK has two national science and innovation campuses (Harwell and Daresbury) that support scientists, researchers and industry by providing a collaborative environment within which to perform cutting-edge research. A key attraction of these campuses is access to state-of-the-art research infrastructures. They each accommodate over 100 high-tech companies and are recognised as Business Enterprise Zones, which means that residents receive a range of benefits, including discounted business rates, lower levels of planning control and the potential to use enhanced capital allowances. The Launchpad scheme provides funding for business innovation that aims to support the development and strengthening of clusters of high-tech companies in specific technology areas and geographical locations. Seven launchpads have been supported with specific technology orientations, including aerospace, creative industries, ICTs and manufacturing.

Globalisation

While the United Kingdom's participation in international co-invention is almost on par with the OECD, there are in relative terms fewer British scientists engaged in international co-authorship (figure 5[g,r]). The Newton Fund, managed by the UK Department for Business, Energy and Industrial Strategy (BEIS), builds scientific and innovation partnerships with 16 partner countries to support their economic development and social welfare and to develop their research and innovation capacity for long-term sustainable growth. It has a total UK government investment of USD 1.1 billion PPP (GBP 735 million) up until 2021, with matched resources from the partner countries. The Department for International Trade (DIT) (formerly UK Trade & Investment, UKTI) established three new programmes in 2015 to promote the internationalisation of SMEs. A first programme is investing USD 12.3 million PPP (GBP 8.6 million) for a new "Exporting is GREAT" advertising campaign that provides advice on market entry, including on how to establish partnerships and offices overseas. The campaign aims to assist 100 000 UK exporters to sell their goods and services overseas by 2020. The GREAT campaign is another major international campaign to demonstrate UK capacity through impactful trade missions. Similarly, the DIT provides export services in terms of financial and non-financial support for first-time exporters and SMEs, such as an online learning tool for exporters (ExportSavvy) and an export marketing research scheme.

Skills for innovation

The UK ranks high on all human capital indicators, reflecting the robustness of its skills foundations (figure 5[s,t,u,v,w]). The UK has implemented a number of recent initiatives to improve education in science, engineering and mathematics, with particular attention to ICT literacy and data analysis skills. These measures include STEMNET, which works with thousands of schools, colleges and STEM employers to enable young people of all backgrounds and abilities to meet inspiring role models, understand real-world applications of STEM subjects and experience hands-on STEM activities. This includes a STEM ambassadors programme and advisory network. In addition, there are targeted programmes to encourage students to study physics and mathematics at advanced school level. The government is also providing more generous bursaries and scholarships to increase the number and quality of science and mathematics teachers in schools. The country continues to suffer shortfalls in engineering skills, as highlighted in the 2013 Perkins' Review of Engineering Skills, which calls on the government and the engineering community to focus their efforts on inspiring the engineers of the future and addressing skills shortages in the industry. The Review makes 22 recommendations, focusing on inspiration, academic foundations, vocational education and higher education. The government is investing in the creation of five new National Colleges: Digital Skills, High-Speed Rail, Onshore Oil and Gas, Creative and Cultural Industries, and Nuclear, in an effort to address skills gaps for school-leavers and work directly with employers. In tertiary education, government controls on total student numbers in publicly funded HEIs are being removed from 2015-16, allowing all institutions to compete freely for all suitably qualified students. The government anticipates that this will allow up to 60 000 additional, suitably qualified students to enter higher education. The government has said that it wants to focus these additional places on the STEM subjects that are central to long-term economic growth.

Structural aspects and specialisation

Figure 6. Structural composition of BERD, 2013 or latest year available

As a % of total BERD or sub-parts of BERD

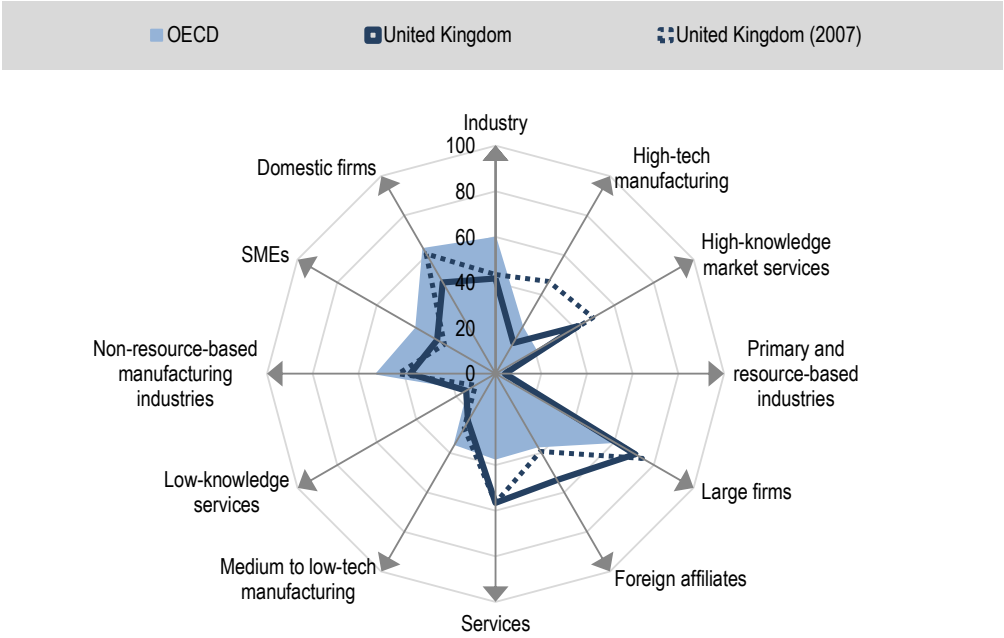
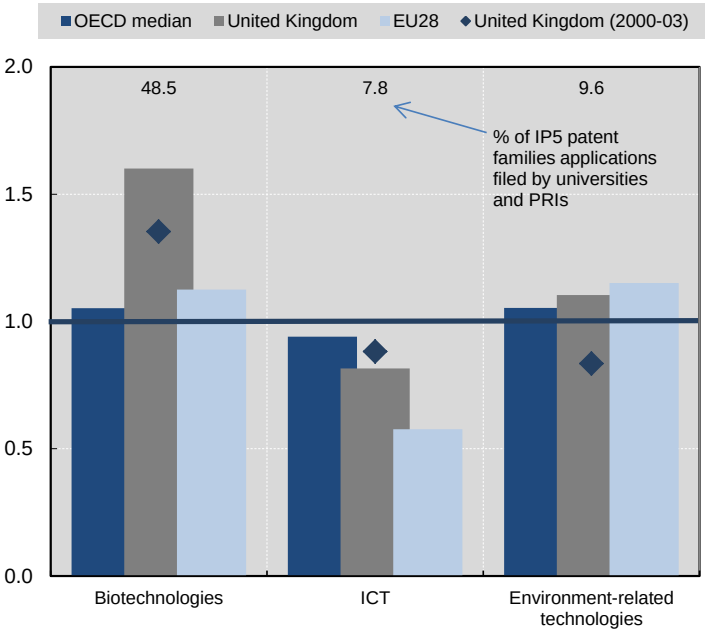


Figure 7. Revealed technology advantage in selected fields, 2011-13

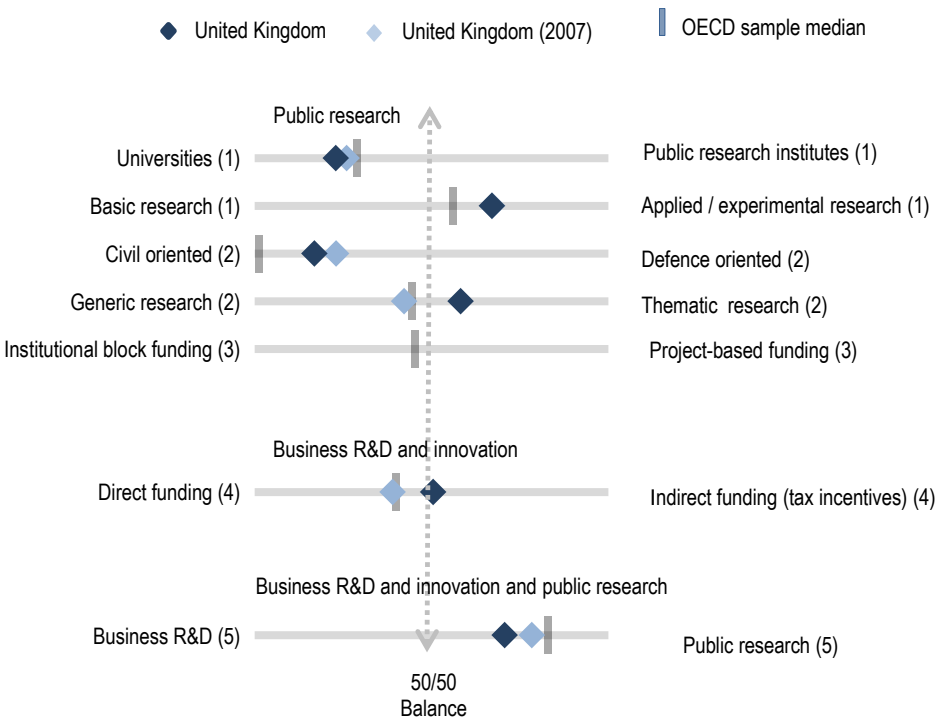
Index based on IP5 patent families applications



National STI policy mix

Figure 8. Allocation of public funds to R&D, 2014 or latest year available

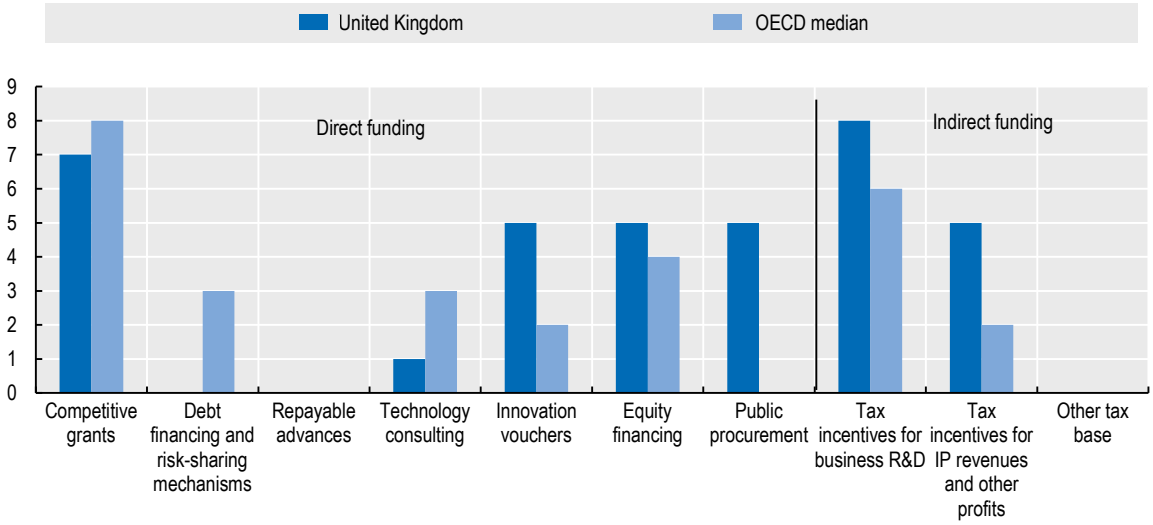
By sector, type of R&D and mode of funding



(1) Balance as a share of both higher education (HERD) and government (GOVERD) R&D expenditure.
(2) Balance as a share of total government budget appropriations and outlays for R&D (GBAORD).
(3) Balance as a share of total funding to national performers.
(4) Balance as a share of both indirect funding (through R&D tax incentives) and direct funding (through grants, procurement, loans, etc.).
(5) Balance as a share of publicly-funded HERD and GOVERD and components of (4).

Figure 9. Most relevant policy instruments of funding for business R&D, 2016

Country self-assessment, index (9 = high and increasing relevance to 0 = not used)



Note: Policy information comes from country responses to the OECD STI Outlook policy questionnaires 2016 and 2014. The United Kingdom's responses are available in the EC/OECD International Database on STI Policies (STIP), edition 2016 at http://qdd.oecd.org/DATA/STIPSurvey/GBR...STIO_2016.

Responses reflect data that has been collected before the United Kingdom EU membership referendum in June 2016. The results of the referendum are set to have a significant impact on the future STI policy environment.

Source: See the reader's guide and methodological annex.

StatLink http://dx.doi.org/10.1787/888933434124

References

General references

Dernis H., Dosso M., Hervás F., Millot V., Squicciarini M. and Vezzani A. (2015), World Corporate Top R&D Investors: Innovation and IP bundles, A JRC and OECD common report, Luxembourg, Publications Office of the European Union.

EC (European Commission) (2015), EU R&D Scoreboard: The 2015 EU Industrial R&D Investment Scoreboard, European Commission, Luxembourg, http://iri.jrc.ec.europa.eu/scoreboard.html, accessed 4 October 2016.

Flanagan, K., E. Uyarra and M. Laranja (2010), "The policy mix for innovation: rethinking innovation policy in a multilevel, multi-actor context", Munich Personal RePEc Archive (MPRA) No. 23567, July.

IEA (2015), CO2 Emissions from Fuel Combustion 2015, OECD Publishing, Paris, DOI: http://dx.doi.org/10.1787/co2_fuel-2015-en

Kergroach, S. (2010), "Monitoring innovation and policies: developing indicators for analysing the innovation policy mix", internal working document of the Directorate for Science, Technology and Industry (DSTI), OECD, Paris.

Kergroach, S., J. Chicot, C. Petroli, J. Pruess, C. van OOijen, N. Ono, I. Perianez-Forte, T. Watanabe, S. Fraccola and B. Serve, (forthcoming-a), "Mapping the policy mix for innovation: the OECD STI Outlook and the EC/OECD International STIP Database", *OECD Science, Technology and Industry Working Papers*.

Kergroach, S., J. Pruess, S. Fraccola and B. Serve, (forthcoming-b), "Measuring some aspects of the policy mix: exploring the EC/OECD International STI Policy Database for policy indicators", *OECD Science, Technology and Industry Working Papers*.

OECD (Organisation for Economic Co-operation and Development) (2016), Education at a Glance 2016: OECD Indicators, OECD Publishing, Paris, http://dx.doi.org/10.1787/eag-2016-en.

OECD (2016), OECD Economic Outlook, Volume 2016 Issue 1, OECD Publishing, Paris, http://dx.doi.org/10.1787/eco_outlook-v2016-1-en.

OECD (2016), OECD Country Reviews of Innovation Policy, www.oecd.org/sti/inno/oecdreviewsofinnovationpolicy.htm.

OECD (2015), Pensions at a Glance 2015: OECD and G20 indicators, OECD Publishing, Paris, http://dx.doi.org/10.1787/pension_glance-2015-en.

OECD (2015), OECD Skills Outlook 2015: Youth, Skills and Employability, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264234178-en.

OECD (2015), OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_scoreboard-2015-en.

OECD (2015), OECD Digital Economy Outlook 2015, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264232440-en.

OECD (2015), Entrepreneurship at a Glance 2015, OECD Publishing, Paris, http://dx.doi.org/10.1787/entrepreneur_aag-2015-en.

OECD (2015), National Accounts at a Glance 2015, OECD Publishing, Paris, http://dx.doi.org/10.1787/na_glance-2015-en.

OECD (2015), The Innovation Imperative: Contributing to Productivity, Growth and Well-Being, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264239814-en.

OECD (2014), Measuring the Digital Economy: A New Perspective, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264221796-en.

OECD (2014), OECD Science, Technology and Industry Outlook 2014, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_outlook-2014-en.

OECD (2011), Towards Green Growth: Monitoring Progress: OECD Indicators, OECD Green Growth Studies, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264111356-en.

OECD (2010), "The Innovation Policy Mix", in OECD Science, Technology and Industry Outlook 2010, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_outlook-2010-48-en.

OECD (2010), Measuring Innovation: A New Perspective, OECD Publishing, Paris, http://dx.doi.org/10.1787/9789264059474-en.

OECD and SCImago Research Group (CSIC), (2014), Compendium of Bibliometric Science Indicators 2014, http://oe.cd/scientometrics.

Van Steen, J. (2012), "Modes of public funding of R&D: Towards internationally comparable indicators", OECD Science, Technology and Industry Working Papers, No. 2012/4, OECD Publishing, Paris, http://dx.doi.org/10.1787/5k98ssns1gzs-en.

Databases and data sources

Academic Ranking of World Universities (2016), "Shanghai ranking academic ranking of World universities", www.shanghairanking.com, accessed 4 October 2016.

Bureau Van Dijk (2011), ORBIS Database, Bureau Van Dijk Electronic Publishing.

EC/OECD (forthcoming), International Database on Science, Technology and Innovation Policies (STIP), edition 2016, www.innovationpolicyplatform.org/ecoecd-stip-database.

Elsevier B.V. (2014), Elsevier Research Intelligence, www.elsevier.com/online-tools/research-intelligence/products-and-services/scival, accessed 4 October 2016.

Eurostat (2016), Education and Training Databases, June, http://ec.europa.eu/eurostat/web/education-and-training/data/database, accessed 4 October 2016.

Eurostat (2016), Total intramural R&D expenditure (GERD) by sectors of performance and source of funds, April, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdfund&lang=en, accessed 4 October 2016.

Graham, S., G. Hancock, A. Marco and A. Myers (2013), "The USPTO Trademark Case Files Dataset: Descriptions, Lessons, and Insights", SSRN Working Paper, http://ssrn.com/abstract=2188621.

IEA (International Energy Agency) (2015), CO2 Emissions from Fuel Combustion Database, www.iea.org/publications/freepublications/publication/name,43840,en.html.

ILO (International Labour Organization) (2016), Key Indicators of the Labour Market database, www.ilo.org/global/statistics-and-databases/research-and-databases/kilm/lang--en/index.htm, accessed 4 October 2016.

IMF (International Monetary Fund) (2016), World Economic Outlook (WEO) Databases, July, www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx, accessed 4 October 2016.

ITU (International Telecommunication Union) (2016), World Telecommunication/ICT Indicators 2016, www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx, accessed 4 October 2016.

OECD (2016), Activity of Multinational Enterprises (AMNE) Database, August. www.oecd.org/industry/ind/amne.htm.

OECD (2016), ANBERD Database, July, www.oecd.org/sti/anberd.

OECD (2016), OECD Annual Labour Force Statistics Database, July, www.oecd.org/employment/labour-stats/.

OECD (2016), Broadband Portal, August, www.oecd.org/sti/broadband/oecdbroadbandportal.htm.

OECD (2016), OECD Education Databases, September, http://gpseducation.oecd.org/

OECD (2016), Entrepreneurship Financing Database.

OECD (2016), Educational Attainment and Labour Force Status Database, https://data.oecd.org/education.htm.

OECD (2016), OECD Income Distribution Database, www.oecd.org/social/income-distribution-database.htm.

OECD (2016), Main Science and Technology Indicators (MSTI) Database, June, www.oecd.org/sti/msti .

OECD (2016), OECD National Accounts Databases, September, www.oecd.org/std/na/ .

OECD (2016), OECD/NESTI data collection on R&D tax incentives, July, www.oecd.org/sti/rd-tax-stats.htm .

OECD (2016), Patent Database, June, www.oecd.org/sti/inno/oecdpatentdatabases.htm .

OECD (2016), Productivity Database, September. www.oecd.org/std/productivity-stats .

OECD (2016), Programme of International Students Assessment (PISA) Database, OECD Education Statistics, June, www.pisa.oecd.org .

OECD (2016) Programme for the International Assessment of Adult Competencies (PIAAC) Database, OECD Education Statistics, June www.oecd.org/skills/piaac/surveyofadultskills.htm .

OECD (2016), Research and Development Statistics (RDS) Database, April, www.oecd.org/sti/rds.

OECD (2016), STI Micro-data Lab: Intellectual Property Database, June, http://oe.cd/ipstats.

OECD (2014), Product Market Regulation (PMR) Database, March, www.oecd.org/economy/pmr.

OECD (2013), "Modes of public funding of R&D: Interim results from the second round of data collection on GBAORD", internal working document of the Working Party of National Experts on Science and Technology Indicators (NESTI), OECD, Paris.

UIS (UNESCO Institute for Statistics) (2016), Education Database, June, http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS, accessed 4 October 2016.

UIS (2016), Science, Technology and Innovation Database, July, http://data.uis.unesco.org/Index.aspx?DataSetCode=SCN_DS, accessed 4 October 2016.

UN (United Nations) (2016), UN e-Government Survey, United Nations, NY. https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2016 (accessed 4 October 2016).

World Bank (2016), World Development Indicators (WDI) Databank, http://wdi.worldbank.org