

LOCAL INVESTMENT AND GLOBAL PERFORMANCE



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R&D investment should be spread more widely across the UK while continuing to support major research clusters.

Government is rightly committed to tackling unacceptable differences in wealth and opportunities across the UK. New regional initiatives featured prominently in the November 2020 Spending Review.¹

R&D investment is an important part of the picture. The UK delivers an extraordinary level of scientific performance, despite modest levels of public spending on R&D. This great national strength already supports local and regional economies across the country. High quality research and innovation create jobs and enable improvements in areas such as transport, healthcare, food safety, business competitiveness and the quality of the natural environment.

The focus on regional inequalities highlights concerns about the geographic distribution of R&D investment. In absolute terms, research funding is concentrated in the greater South East of England and, to a lesser extent, in the central belt of Scotland, the North West of England and the Swansea-Cardiff-Bristol axis. A report from NESTA², prepared by Tom Forth and Richard Jones, included the observation:

“The current situation is the result of a combination of deliberate policy decisions and a natural dynamic in which these small preferences combined with initial advantages are reinforced with time.”

That statement referred to the distribution of R&D within the UK but it also applies to our position relative to cities, regions and nations in other countries.

There is a curious paradox in the behaviour of scientific researchers. On the one hand, knowledge and ideas flow freely between researchers internationally. Meanwhile, many scientists from around the world build careers in large geographic clusters. This allows them to form social and professional networks and:

- move jobs without moving home;
- share expensive scientific infrastructure;
- attract R&D investment from global corporations; and
- present venture capitalists with a large portfolio of opportunities in one place.

The origins of these clusters vary. Some, such as Silicon Valley or Singapore, can be traced to specific decisions or events. Others – in Edinburgh, Oxford or Cambridge, for example – are the products of long histories. Analysis by the Royal Society³ shows that these clusters combine specific research strengths, highly qualified researchers, access to public and private funding, a skilled workforce, business capabilities, and appropriate infrastructure.

Maybe the pervasive use of video-conferencing during the Covid-19 pandemic will create additional types of cluster. In Wales, for example, universities

are exploring new approaches to collaborations.⁴

In the UK, these clusters are magnets for business investment in R&D, not least from companies headquartered overseas, choosing the UK as the place to do R&D. Around half of business R&D investment in this country now comes from firms headquartered overseas.⁵ The USA is the largest source of foreign R&D investment while companies from India, China and the Asia Pacific are growing their UK R&D at the fastest rates.

It is difficult to imagine how the Government’s plan to raise overall R&D investment to 2.4% of GDP could be delivered without attracting more investment from overseas. If the UK does not maintain research clusters that compete with the largest and best in the world, then over time this country will struggle to hold its place against global competitors. Indeed, a recent report⁶ from the National Centre for Universities and Business said:

“The UK must start behaving as a competitor in the global market for R&D investment to retain existing business investment and attract higher levels of globally mobile business research.”

In its March 2020 Budget,⁷ Government promised to

“...examine how R&D funding as a whole can best be distributed across the country to help level up every region and nation of the country.”

The “best” distribution will of course be a matter of political judgement rather than calculation. That judgement may reflect the benefits of large research clusters as well as the benefits of widely dispersed R&D.

Discussions on regional R&D investment often use the cluster of research in London and the South East of England as a reference point. Large research universities in Oxford, Cambridge and London – spanning three regions of the UK – are described collectively as a ‘golden triangle’. R&D investment in other regions does not match the scale of that super-region.

Is this scale of the golden triangle and other UK clusters particularly large by international standards? How does the intensity of geographic concentration in UK cities and regions compare internationally?

Let’s consider individual cities. London has nearly 50 universities and higher education colleges.⁸ It has major research centres such as the Crick, Dementia Research, and Alan Turing Institutes. It has growing communities of research and innovation in White City, King’s Cross and elsewhere. Surely, London must be one of the largest centres of research and innovation in the world.

A recent study by consultants SQW for Research England⁹ presents the sobering picture shown in Figure 1. The combined R&D expenditure in London’s universities falls behind each of the US top ten cities. Even after adding together university R&D spend in Cambridge, Edinburgh, London, Manchester and Oxford, the total is about the same as in Houston, Texas. These five great UK cities include some of the world’s most famous and highly

respected universities whose combined research spending is around half that in either Los Angeles or Boston.

Not all US cities or states have abundant R&D. Like this country, research in the USA is concentrated into a relatively small number of clusters that compete on a world stage. California, home of Silicon Valley, has total R&D investment that is greater than that in the lowest-spending 39 US states combined.¹⁰

Turning to regions, Figure 2 shows the geographic distribution of R&D spending across administrative regions in several major research nations and the EU. Of course international comparisons are complicated but the degree of concentration in the UK and China appears less than elsewhere. This contrasts with the popular rhetoric that research in the UK is highly concentrated.

Research concentration is not only visible in public spending. According to the EU Industrial R&D Investment Scoreboard:¹¹ *“Industrial R&D is highly concentrated. A small subset of companies, industries and countries account for a large share of the total R&D investment.”*

According to that scoreboard, companies from three countries – USA, Japan and Germany – account for 62% of business

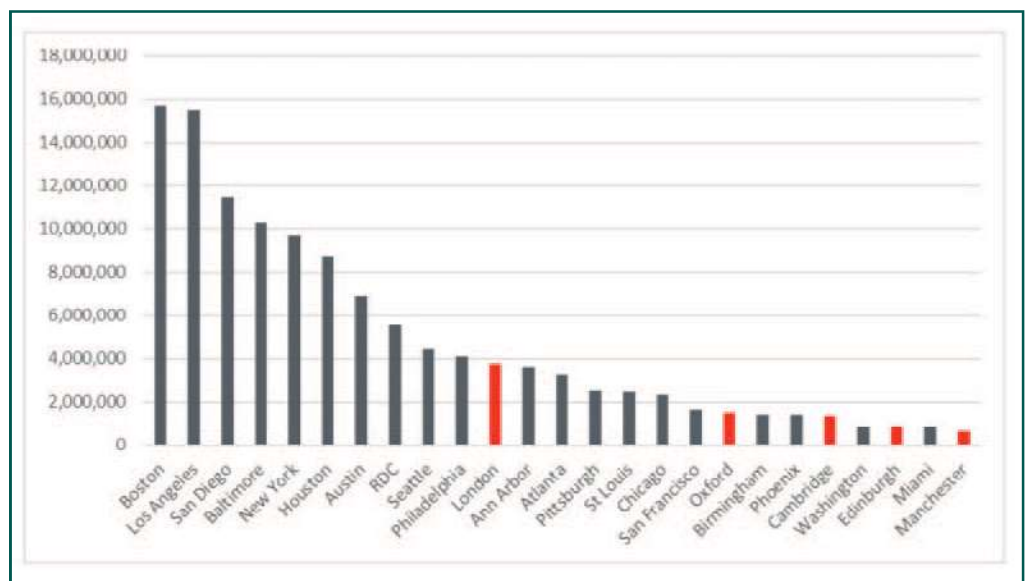


Figure 1 University R&D Expenditure in US and UK cities (£000s, total of 2016-2018)
Source: SQW analysis of data from AUTM and HESA

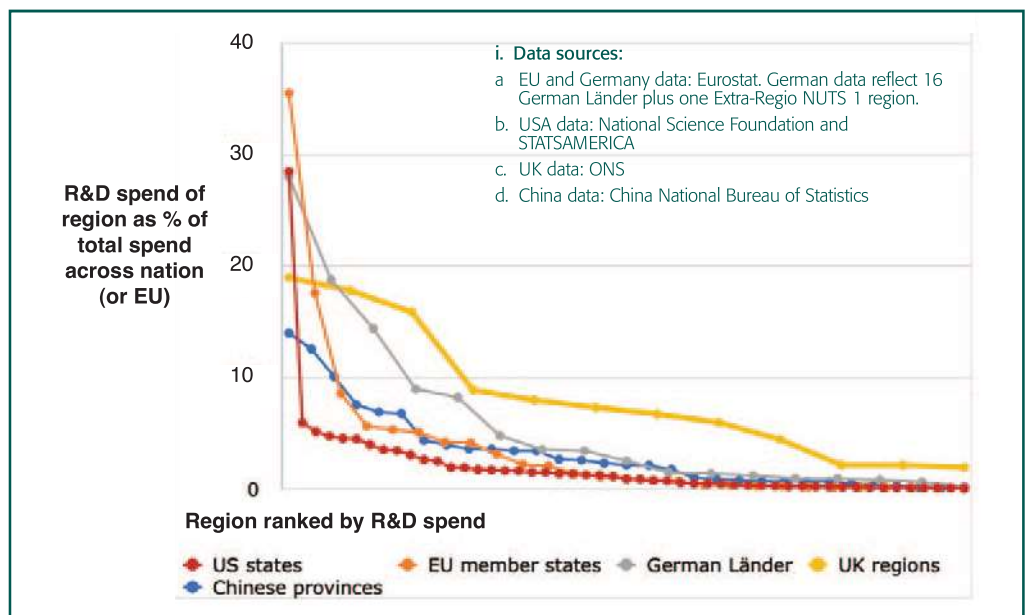


Figure 2: Distribution of total R&D spend across regions of the US^b, EU^a, Germany^a, China^d and the UK^c
Source: UCL analysis of several sources of dataⁱ. Note: Self-evidently, this analysis reflects the number of administrative regions in different countries or territories as well as the distribution between these regions. For example, the USA has more administrative regions than Germany so the proportion of R&D in each German region is correspondingly higher than that in most US states.

investment in R&D globally. Chinese investment in R&D is growing at over 10% per annum¹² so we can expect some jostling for seats at that top table. Indeed, if we look at overall national expenditure on R&D, as shown in Figure 3, China and the USA stand shoulder to shoulder as the largest investors. The UK remains in the top ten but may well need the additional investment promised by Government to retain that position.

What does this mean for the future of research funding in this country? Will the UK be forced

to trade the advantages of large research clusters against the strong arguments for a more even geographic distribution of research?

If, as promised,⁷ the Government raises public spending on R&D to £22bn per annum by 2024-25, then the next few years provide unprecedented opportunities. In principle, the UK could expand research capacity in more parts of the UK while simultaneously enhancing the major research clusters that already exist.

Recent reports from both CaSE¹³ and the Royal Society³

have noted the challenge of creating new clusters of research excellence – as suggested by the 2070 Commission.¹⁴ Sustaining and enhancing research excellence across the UK in the future is likely to require consideration of, amongst other things:

- the longer-term investment in factors necessary to support emerging clusters, from education and skills to physical and digital infrastructure;
- the empowerment of local actors and leaders in decisions on research

investment in order to ensure that it addresses local need; and

- investment in existing centres of excellence to increase research performance across the UK, including through strengthening networks to amplify impact.

In any case, surely universities, businesses and government should aim to bring the benefits of research findings to a wide population – wherever they live – rather than duplicating scarce research capabilities across the UK. That means we should find ways to spread the impact of research across more parts of the UK.¹⁵

Modifying the geographic distribution of research funding may be part of that agenda but it will not be the only lever of change. Investment in the capacity of businesses and local authorities to take advantage of research might have just as great an effect and show results more quickly. Supporting both major clusters and local investment could bring the biggest rewards of all.

Data Sources

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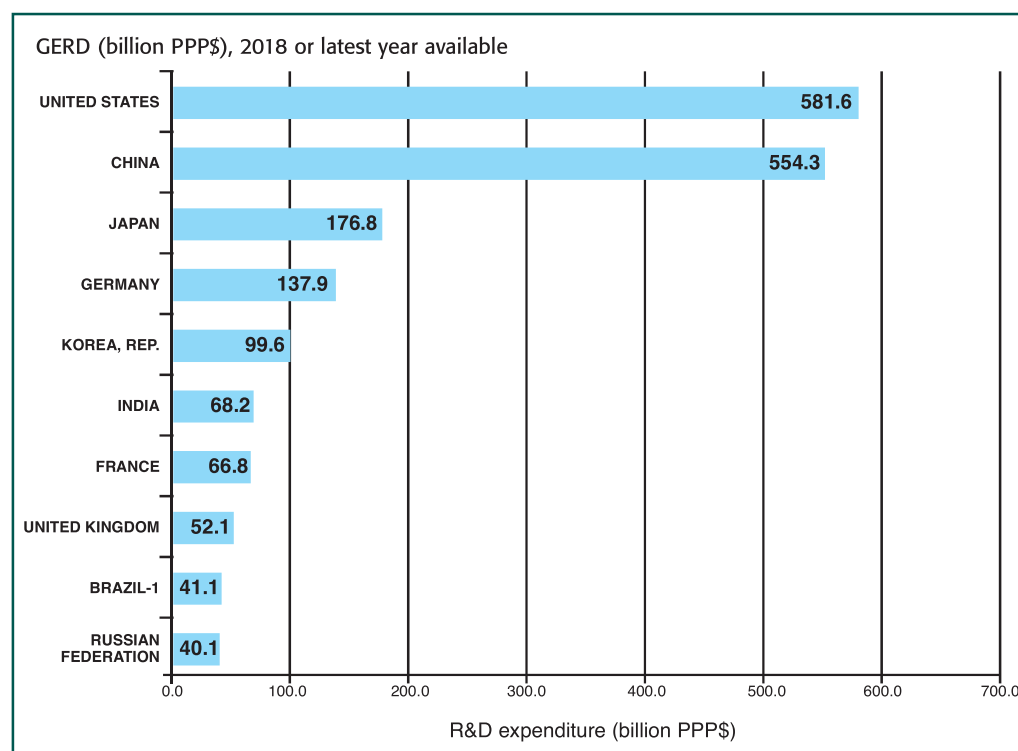


Figure 3: The World's top ten countries by gross expenditure on R&D
Notes: -1 = 2017. Source: UNESCO Institute for Statistics, June 2020.

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