**On the regional distribution of research and development in the UK**
*A briefing note for a Foundation for Science and Technology event: "Should R&D policies and budgets be devolved to English Regions?"*

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21 October 2024

## 1. Introduction

R&D in the UK is highly geographically concentrated in the most prosperous, highest productivity parts of the country – the Greater Southeast (defined as London, South East, and East of England). With 36% of the UK's population, the Greater Southeast accounts for 55% of total R&D spending.

This note presents the latest data on the regional distribution of different kinds of R&D – that carried out in the public sector, and that carried out by businesses. It discusses why this distribution has arisen, and why, and to what extent it matters. Finally, it presents some possible ways in which the imbalance might be addressed.

## 2. How is R&D activity geographically distributed?

Figure 1 presents the latest data from the ONS on the distribution of R&D spending by nation and ITL1 region across the UK.

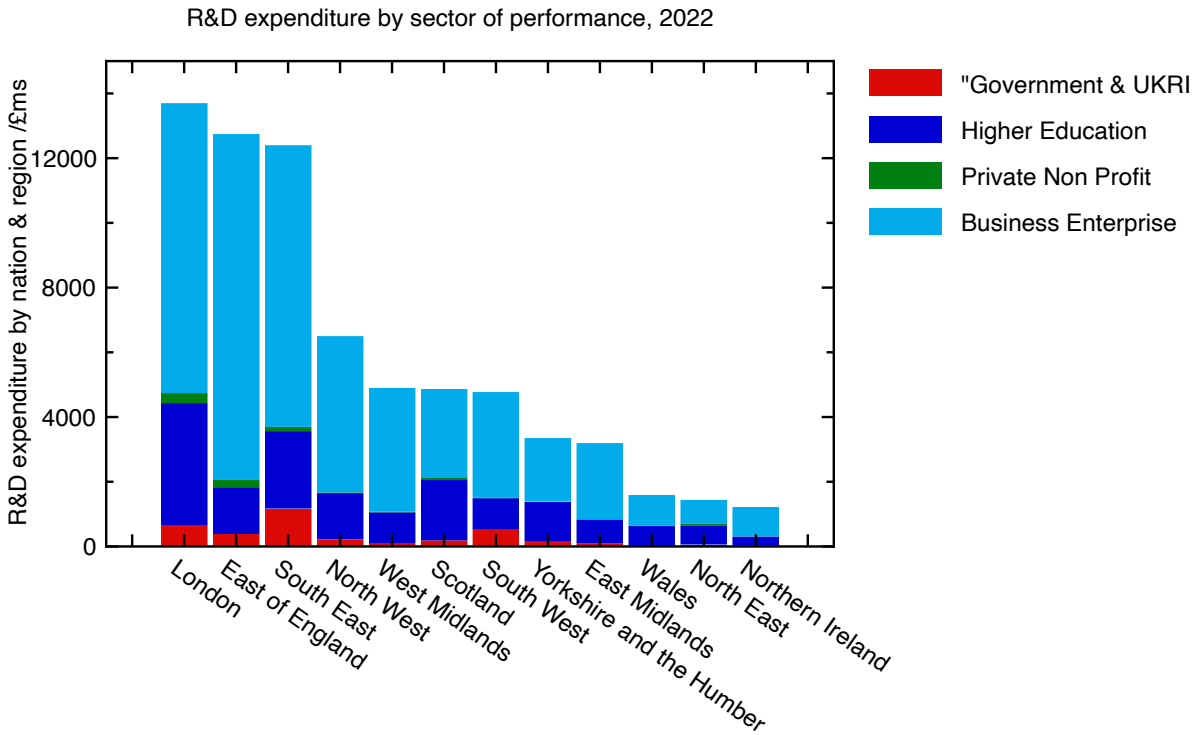


*Figure 1. Distribution of R&D spending across the UK in 2022, classified by sector of performance. ONS[1], released August 8 2024.*

[1] https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/ukgrossdomesticexpenditureonresearchanddevelopment/2022

Overall, business R&D dominates, though the relationship between business R&D and public sector R&D varies between regions. I will return to this point below.

Figure 2 presents the same data, focusing entirely on the non-business component of R&D. This emphasises that most public sector R&D in the UK is carried out in universities – in this respect the UK is an international outlier (see Jones [2022] for a comprehensive overview of the UK's R&D landscape). However, there is a substantial component of R&D being carried out in government owned laboratories in London and the Southeast.

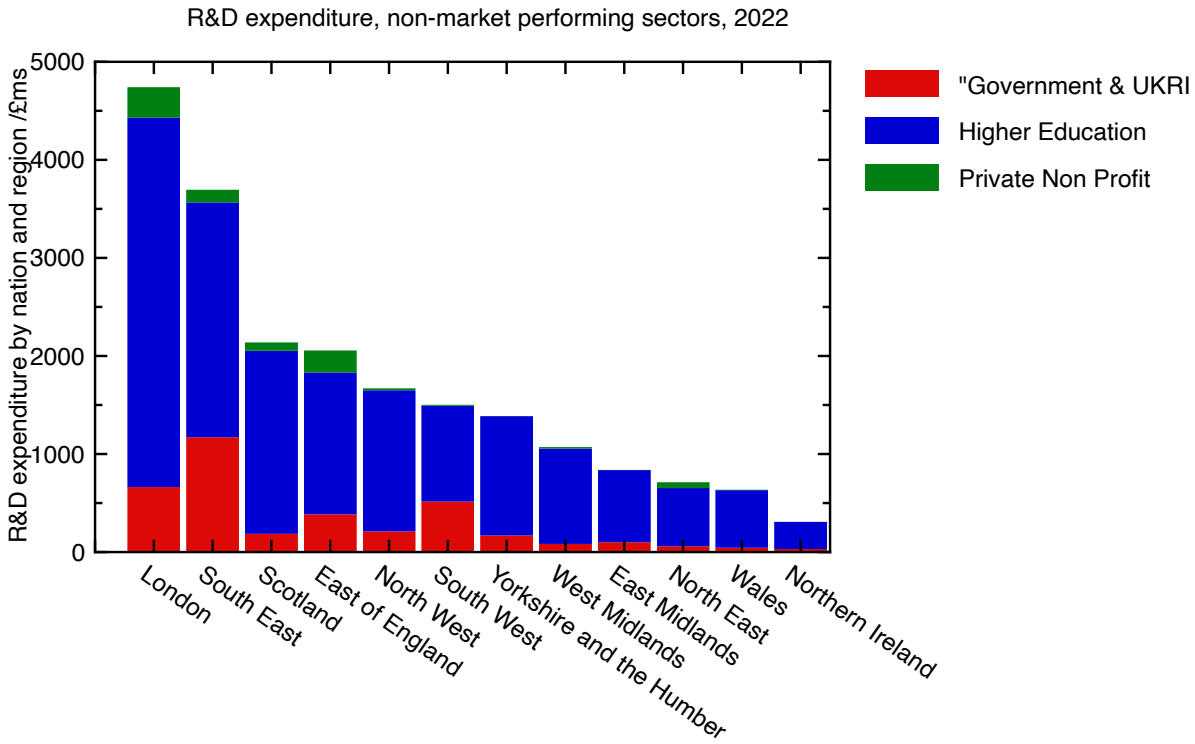


*Figure 2. Distribution of R&D spending across the UK in 2022 in non-market sectors. ONS[1], released August 8 2024.*

Forth and Jones (2020) quantified the regional distribution of R&D. Those results are not completely comparable with the current data, as the ONS has recently made substantial changes to the way R&D data is collected.

These changes have had the effect of significantly increasing the total R&D expenditure assigned to the UK. One key change was to increase the amount of R&D recorded in higher education, by accounting for the degree to which R&D is supported by the universities' own resources (whether from endowments or cross-subsidies from surplus generating activities such as teaching overseas students).

The other change arises from the way business R&D is recorded, prompted by an increasing divergence between business R&D recorded in the ONS's survey and the (substantially larger) value implied by claims of R&D tax credits. ONS believes there has

been significant under-sampling and have changed their methodology to produce upwardly revised figures, with significantly greater coverage of R&D in SMEs[2].

It's worth noting that currently, regional breakdowns of R&D funding, whether public or private, are only available at ITL1 level. It would obviously be very helpful to have data at a finer level of geographical granularity – the innovation economy of, say, Cambridgeshire, is very different from that of North Norfolk.

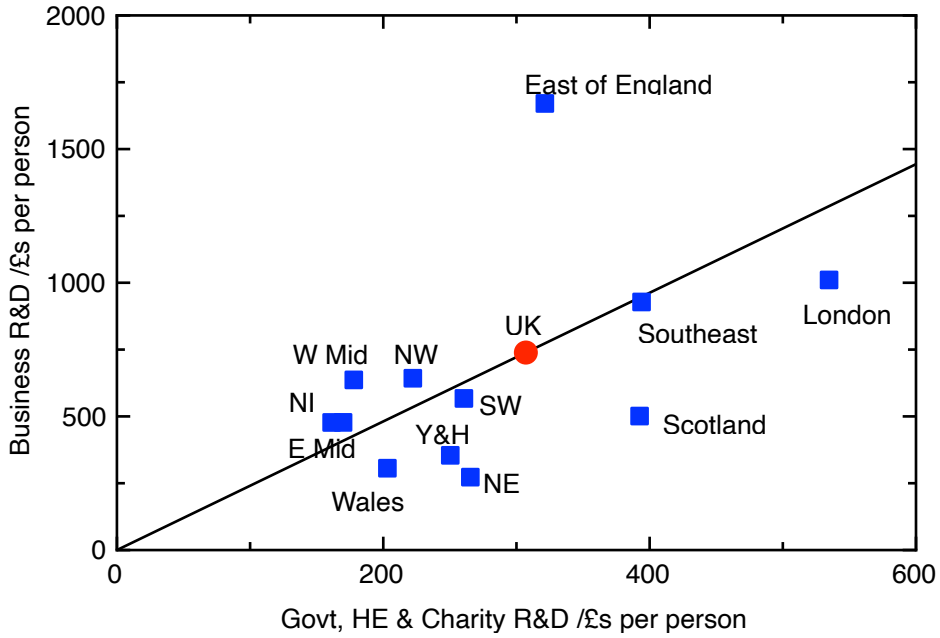


*Figure 3. Relationship between business and non-market sector R&D, expressed in per capita terms using ONS 2022 mid-year population estimates.*

The relationship between business and non-market sector R&D is shown in figure 3. For the UK as a whole, there is 2.4 times as much business R&D as non-market R&D. It is believed that public sector R&D "crowds-in" private sector R&D, so one reading of this graph is to provide a sense of the return on public investment in R&D, in the form of the private sector R&D that leads to economic value.

In this interpretation, the position of the East of England represents an exceptionally effective innovation ecosystem, where a slightly above average public investment in R&D yields a very high return in business innovation activity.

Scotland and London, on the other hand, are regions in which rather high public investments in R&D yield below average proportionate returns in business R&D.

The rest of the country is much less R&D intensive. In regions like the East and West Midlands, the North West and Northern Ireland, below average public investment in

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[2] https://www.ons.gov.uk/economy/governmentpublicsectorandtaxes/researchanddevelopmentexpenditure/bulletins/businessenterpriseresearchanddevelopment/2022

R&D yields above average proportionate returns, possibly suggesting that these regions already have the absorptive capacity to grow their innovation economies with further public investment.

On the other hand, the Northeast, Wales and Yorkshire and Humberside are characterised by rather weak private sector innovation economies, where careful systematic interventions are likely to be needed to increase business R&D.

### 3. Why have these imbalances arisen?

Jones and Forth [2020] discuss the historical reasons why regional imbalances in public sector R&D have arisen. Until very recently, funding bodies such as research councils have taken a "place-blind" approach to funding. Nonetheless, as figure 4 illustrates, even on a per-capita basis more research council funding goes to the Greater Southeast than other regions and nations.

This reflects, in part, a well-known tendency in science funding policy, the so-called "Matthew effect", in which scientific excellence is self-reinforcing. Places with an existing concentration of high quality science facilities and personnel attract the best scientists to work in them, who in turn are successful in attracting further funding.

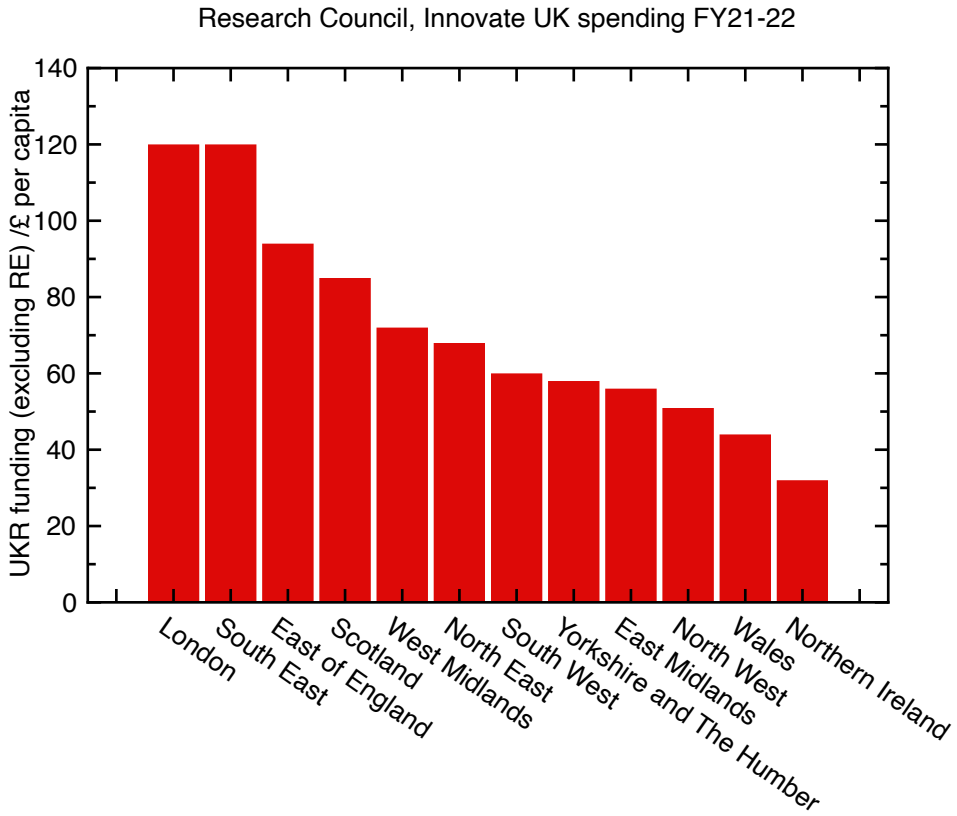


*Figure 4. UKRI funding, excluding Research England, (i.e. research councils, cross-council programmes and Innovate UK) by region. Data: UKRI.*

In addition, this distribution must reflect research capacity – the scale of scientific infrastructure in each region, itself reflecting history and policy decisions. One example of the ripple effect of major location decisions for scientific infrastructure is provided by

the Diamond Light Source. The Diamond Light Source is a £380m synchrotron built in Oxfordshire, which replaced an existing facility in Northwest England. Helmers and Overman [2017] showed that this caused a significant geographic concentration of relevant research within 25 km of the facility, substantially reinforcing concentration of public R&D in the Southeast.

There has been a similar concentration of other scientific infrastructure in the Greater Southeast. Jones and Forth [2020] show that, of capital investments made by the Department for Business, Innovation and Skills (BIS) between 2007 and 2016, nearly 71% by value were made in the Greater Southeast.

**4. Why, and to what extent, do the imbalances matter?**

The UK Government has placed a return to economic growth as its highest priority. The UK's weak growth in GDP per capita since the global financial crisis largely reflects a period of stagnant productivity growth, exacerbated by regional differences in economic performance that make the UK an outlier amongst developed nations (McCann 2020). There is wide agreement that poor productivity growth reflects a long period of insufficient capital investment, including investment in intangibles of which R&D is an important part (Coyle, van Ark & Pendrill 2023).

A more detailed analysis of the cause of the productivity slowdown ascribes it largely to a slowdown in innovation (Goodrich 2022), defined in broad economic terms as the contributions of intangible capital and growth in total factor productivity. These slowdowns have been most pronounced in knowledge, technology and digital intensive activities, such as pharmaceuticals and telecommunications.

The products of research are widely available and their benefits can be felt worldwide, so why does it matter where it is done? The crucial issue is not so much where fundamental science is done, but how knowledge is diffused and converted into economically valuable new products and improved processes. For this, access to the skills and research infrastructure that come with public research funding may be as important as early access to new scientific results.

The argument for dispersing public R&D facilities and investments arises because knowledge spillovers are localised; knowledge intensive clusters arise from formal R&D collaborations, agglomeration effects (large companies relocating to be near public R&D centres), entrepreneurial activity, informal knowledge exchange and the benefits to innovation-intensive firms of having high densities of skilled workers. The spatial scale of these localised effects is roughly defined by a commuting distance (see e.g. Hausman 2022).

It's important to qualify this with a recognition that geographical proximity is not the only type of proximity that matters. In particular, multi-site and multi-national technology intensive firms offer another powerful route for dispersing knowledge (Crescenzi et al, 2016). Interregional collaborations may also be important and effective (Ortega-Argilés and Yuan 2024), so improving connectivity with London and other centres of public R&D may yield benefits.

Nonetheless, a recent, influential analysis of the weak growth of economically lagging parts of the UK (Stansbury, Turner, & Balls 2023) identifies a failure of public policy to support innovation clusters outside the Greater Southeast as one of four binding constraints on growth, together with poor transport infrastructure, a relative shortage of STEM degrees, and the suppression of internal mobility due to a dysfunctional housing market.

## 5. Recent place based funding interventions

As the UK's regional imbalances in economic performance have become more politically salient, there have been some experiments in place-based R&D funding.

The "*Strength in Places Fund"* was announced in 2017 in the Industrial Strategy White Paper. This was a competitive fund administered by Research England, which allocated £316m in two funding rounds to 12 projects. UKRI has decided not continue this scheme.

The 2022 Levelling Up White Paper announced targets for increasing public R&D outside the Greater Southeast, and introduced a pilot programme for *"Innovation Accelerators"*, with £100m to be divided between West Midlands, Greater Manchester and Glasgow, to support innovation programmes aligned with those city regions' economic strategies. These programmes will come to an end in April 2025, with no continuation yet announced.

Innovate UK has assigned £80m for its *"Launchpad"* programmes, focused on developing regional clusters of sectoral strength. EPSRC has allocated £45m for *"Place based Innovation Acceleration Accounts"*, for programmes bringing together small scale interventions that promote commercialisation or adoption of new technologies in specific locations.

Although it is not in itself a funding mechanism, it's also worth mentioning the DSIT Clusters Map[3], which is a data-driven exercise to identify geographical innovation clusters across the UK. This is a useful data source for identifying areas of existing sectoral strength.

Although these represent some interesting experiments, it is worth stressing that the quantities of funding involved are not material in the context of the overall UK science budget – UKRI's 24/25 budget was £8.9 bn. In addition, there has been a recurring tendency to run programmes for too short a period for there to be a realistic expectation of achieving anything substantial.

## 6. What next?

In thinking about the future of place-based research funding, it's important to clarify the goal. For some, the priority will be to raise the productivity of the UK's lagging regions by

[3] https://www.innovationclusters.dsit.gov.uk

supporting R&D-intensive, high value businesses. For others, questions of fairness and inclusivity may carry greater weight.
A non-exclusive list of possible actions might include:

- No significant change to current funding arrangements, perhaps with small measures to increase connectivity between regions.
    - Here, the reality is that doing the same thing will produce the same result, with no significant impact on regional economic imbalances.
- Create and scale-up new place based funding instruments in UKRI
    - Here there will be inevitable tensions to be managed between place based funding and preserving a focus on "excellence" – perhaps with some reconsideration needed of the different dimensions of that slippery term.
- Build regional capacity with new capital investments
    - This may be difficult in a fiscally constrained environment, and in any case there needs to be careful consideration of the match between the aims of new institutions and the needs of regional economies.
- Devolve some innovation funding to cities and regions
    - This needs to cope with the patchy nature of the English devolution settlement, in which the capacity to make good spending decisions on innovation funding varies widely, and to ensure mechanisms to avoid unnecessary duplication and ensure that investments contribute optimally to the overall UK R&D landscape.

As an overarching principle, I believe that there is a strong case for more co-creation, with UKRI, government departments and regional government working together to design programmes at a scale appropriate for different places.

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