Sheffield Hallam University

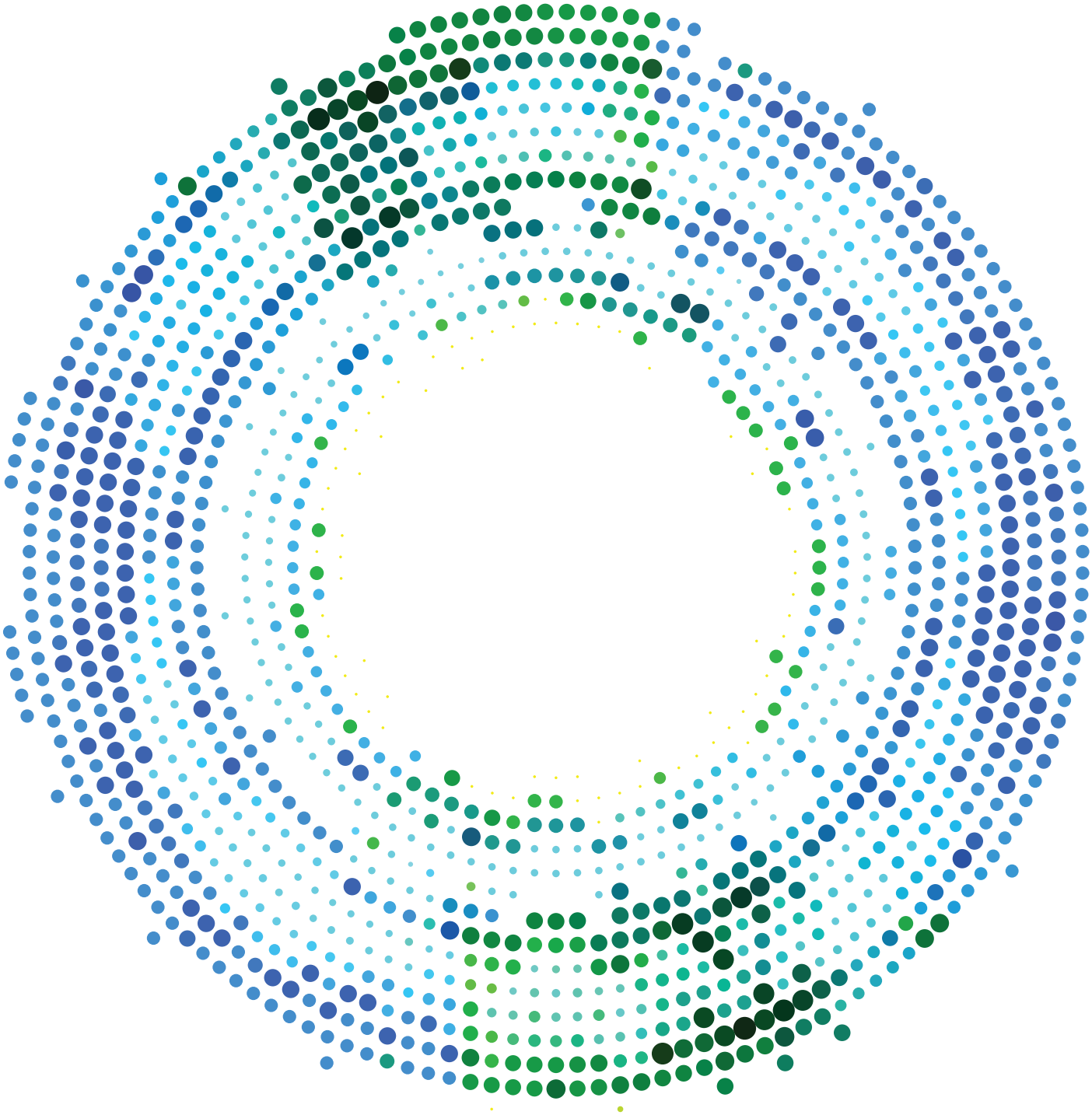
Centre for Regional Economic and Social Research

Celebrating the 30th Anniversary of CRESR at Sheffield Hallam University

Industrial Strategy and the Regions

The shortcomings of a narrow sectoral focus

Steve Fothergill, Tony Gore and Peter Wells

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July 2017

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CRESR at 30: 1987-2017

The Centre for Regional Economic and Social Research (CRESR) at Sheffield Hallam University was established in 1987. Over the last thirty years we have undertaken more than 500 projects for UK government departments, research councils, research charities, devolved administrations, the Organisation for Economic Co-operation and Development (OECD), the European Commission, and many other organisations, exploring relationships across policy, people and places. There are two reasons why we think now is an especially apt time to reflect on that experience.

First, at a time of political, economic and social turmoil there is an inevitable tendency to focus on the here and now. However, creative solutions rarely emerge from short-termism and political expediency. We are witnessing a marked break with long-run post-war trends, the intensification of long-standing issues and problems, and the emergence of new challenges. Now is not the time for collective policy amnesia. It is a time to take stock, reassess and reconsider; to take the long view and reflect on lessons to be drawn from previous policies, strategies and initiatives in order to chart a way forward.

Second, there is an urgent need to discuss the role of evidence in the formulation of public policy. Policy making rooted in evidence and analysis is out of favour. Political debate appears more interested in appealing to emotion, speculation and imagery. Facts are seen as irrelevant and experts as dour pessimists. This rejection of evidence in favour of supposed 'common sense' thinking in practice risks distancing policy from the lived realities of the people and places it should be serving. The result is policy that misunderstands what is going on, does little to make things better and can often make them worse.

Over the last 30 years, we have teased out a rich evidence base, often working in partnership with other researchers. Much of this work has been commissioned directly by government departments and agencies: it is perverse that findings emerging from publicly funded research should be so rapidly discarded. In response, we are publishing a series of themed reviews that reach across CRESR's expertise between November 2016 and the beginning of 2018. Each will address a broad area of policy within which CRESR has operated. The particular slant they take will vary, but the reviews will be united by a commitment to bridge the gulf that has opened up between the ostensibly ambitious rhetoric of many government initiatives and the harsh realities of life for many places and people who are increasingly becoming the 'unconnected'.

We hope readers enjoy these reviews; we welcome comments and feedback on them.

CRESR Directors: 1986-2017

Professor Paul Lawless	1986–2003
Professor Ian Cole	2003–2010
Professor Peter Wells	2010–2013
Professor David Robinson	2014–2016
Sarah Pearson	2016–2017
Professor Ed Ferrari	2017–

An indication of the range of organisations with which we have worked, and the nature of some of these projects, can be found at **www.o www4.shu.ac.uk/research/cresr**

Key Points

- **The new money that the UK government has allocated to support its industrial strategy is targeted at R&D in an exceptionally narrow range of sectors – healthcare & medicine, robotics & artificial intelligence, batteries, self-driving vehicles, materials for the future and satellites & space technology.**

- **Even on a generous definition of the industries that might benefit from the new Industrial Strategy Challenge Fund, these sectors account for little more than 1 per cent of the whole economy (by employment) and 10 per cent of UK manufacturing.**

- **The jobs in the sectors targeted by the Fund are highly unevenly spread across the country. The pattern is more complex than a simple North-South divide but a number of places in southern England have substantially more jobs in these sectors than industrial cities such as Bradford, Leicester, Manchester, Middlesbrough, Nottingham, Stoke and Swansea.**

- **The distribution across the country of research and development establishments – likely along with universities and labs in large companies to be first in line for the new R&D funding – is particularly skewed in favour of an arc to the immediate north, west and south of London.**

- **Even excluding its famous university, the Cambridge area (population just 285,000) has twice as many jobs in scientific research and development establishments as the whole of the Midlands, more than Scotland and Wales combined, and only 2,000 fewer than the whole of the North of England (population 15.2 million).**

- **The report concludes that the government's sectoral focus is exceptionally narrow – too narrow alone to provide a base on which to build a revival of British industry.**

- **The report also concludes that the government's narrow sectoral focus threatens to widen regional divides. It is Cambridge, Oxfordshire, the Thames Valley, Hertfordshire and London itself that may gain most in the first instance.**

Purpose of the report

The Prime Minister's commitment to develop an industrial strategy for the UK has been widely welcomed. For too long the UK economy has depended too heavily on financial services and the contribution of manufacturing has been neglected. Over successive decades, industrial output has stagnated and industrial employment has fallen, and to a far larger extent than in other industrialised nations.

One consequence of the neglect of industry has been a vast trade deficit with the rest of the world, which has meant that the UK economy has come to rely on a debt-fuelled model of growth. The contrast with Germany, where manufacturing's share of GDP is double that in the UK and where there is neither a trade deficit nor a budget deficit, could not be starker. Another more recent consequence has been the stagnation of productivity and real wages because it is in manufacturing, rather than services, that the application of technology offers the greatest scope for the increases in output per head that underpin rising living standards.

But getting an industrial strategy right is challenging. In particular, there is always likely to be tension between on the one hand supporting a narrow range of sectors that seem to offer the greatest opportunities and on the other hand aiming to move forward on a broad front embracing manufacturing of all kinds – old and new, high-tech and more traditional. As we explain, although the government's emerging industrial strategy includes a number of proposals that should in theory be of benefit to a wide range of industries, most of the new funding is actually focussed on an extremely narrow range of sectors clustered at the very highest end of technology.

In this report we question whether such a narrow focus makes sense. In particular, we ask how much this approach really offers to large parts of the UK. Cutting-edge, high technology industries are far from evenly spread across the country. The government's prioritisation of these sectors may be good news for these places, but what about the rest of the country? There is a risk that the new funding behind the government's industrial strategy will simply by-pass much of manufacturing industry and the numerous places where these more routine industries are located. There is a danger, indeed, that the new industrial strategy could serve to widen regional divides.

We begin by detailing the moves the government in Westminster has made to target research and development in a chosen range of sectors. We then deploy official statistics on employment to examine where these sectors are located across the country. We do this at a number of geographical scales – local authority districts, sub-regions (such as Local Enterprise Partnership areas in England) and regions and countries. We also look more closely at the location of research establishments because, along with universities and the R&D functions of companies, these are in the first instance likely to be the prime beneficiaries of the new government funding.

The government's narrow sectoral focus

At first glance, the government's industrial strategy appears broadly based. In the Green Paper published in January 2017[1], the government sets out ten 'pillars':

- Investing in science, research and innovation
- Developing skills
- Upgrading infrastructure
- Supporting businesses to start and grow
- Improving procurement
- Encouraging trade and inward investment
- Delivering affordable energy and clean growth
- Cultivating world-leading sectors
- Driving growth across the whole country
- Creating the right institutions to bring together sectors and places

A closer look, however, reveals that the vast majority of the practical actions detailed in the Green Paper are things the government was doing already or, in a few cases, look to be modest new initiatives already in the pipeline. Under nearly all the headings there is little in the way of new vision, no startling change of direction and nothing in the way of substantial additional funding. As a Select Committee inquiry aptly concluded, "While the government's rhetoric marks a step change, and the creation of a new Department for Business, Energy and Industrial Strategy has significantly raised expectations, the government's approach appears to be evolutionary"[2].

The notable exception is the first of the government's ten pillars – investing in science, research and technology. Here the proposals are indeed backed by substantial new funding. The Chancellor's Autumn Statement in November 2016 had already announced £4.7bn in government funding for R&D through until 2020-21, a bigger increase, the government says, than in any Parliament since 1979. The Spring Budget in March 2017 reaffirmed this commitment. Of course, by the end of this period and following Brexit the UK may be beginning to experience a significant fall in R&D funding from the EU framework programmes targeted at supporting R&D and innovation. There may still be a net fall in funding on science, research and technology.

The new R&D funding is now beginning to take a tangible form. In April 2017, the Business Secretary announced £1bn in funding, to be spent by 2020-21, for its new Industrial Strategy Challenge Fund, intended to boost growth, create jobs and raise living standards by investing in cutting-edge technologies[3]. The Industrial Strategy Challenge Fund is targeted at six sectors:

- Healthcare and medicine
- Robotics and artificial intelligence
- Batteries for clean and flexible energy storage
- Self-driving vehicles
- Manufacturing and materials for the future
- Satellites and space technology

The new money that the UK government has allocated to support its industrial strategy is targeted at R&D in an exceptionally narrow range of sectors – healthcare & medicine, robotics & artificial intelligence, batteries, self-driving vehicles, materials for the future and satellites & space technology.

1. HM Government (2017) *Building our Industrial Strategy*, Green Paper, HM Government, London.

2. Business, Energy and Industrial Strategy Committee (2017) *Industrial Strategy: first review*, Second report of session 2016-17, House of Commons, London.

3. Department for Business, Energy and Industrial Strategy (2017) *Business Secretary announces Industrial Strategy Challenge Fund investments*, press release 21 April.

Two aspects of this list are striking. First, the list of sectors is remarkably narrow. The government is placing huge emphasis on a very small segment of industry. There is nothing in the Fund for the vast majority of manufacturing employers, even in industries that rely heavily on technology in their products and production processes. The rationale of government would be that these new technologies will in time become pervasive across much of the economy.

The second striking feature of the list is that all six sectors are truly at the most exotic, leading edge of technology. It is as if the list has been shaped by research scientists rather than by business leaders grappling with real-world pressures to design, produce and sell to the rest of the world.

The government says it has "worked with businesses and academics to identify core industrial challenges, where research and innovation can help unlock markets and industries of the future in which the UK can become world-leading"[4]. That may have been the aspiration but in practice the identification of target sectors has been led by the government agency Innovate UK and by the academic Research Councils[5]. It is hardly surprising therefore that the priorities of the academic research community have proved so influential.

Furthermore, the six priority sectors the government has identified for funding betray a strong emphasis on fundamental research rather than on product and process development and on the promotion of exports. This is worrying because British industry's shortcoming has often been in transferring innovative products and designs from the laboratory to the market place. Good ideas have not been the British problem. Rather, applying the engineering and managerial nous to manufacture reliable and affordable products has been the UK's traditional failing. Britain developed high-speed tilting trains in the 1970s for example, but it was Italian technology that had to be incorporated into the trains that were finally introduced on the UK network in 2002.

Let us be clear, there is nothing inherently wrong in funding research in these six sectors. They may well prove to offer major commercial opportunities for the future, though of course this cannot be guaranteed. In targeting such a small handful of industries there is more than a whiff of trying to pick winners and it is salutary to remember this approach has not always been a commercial success in the past – think Concorde or Advanced Gas-cooled Reactors for example.

The most serious criticism of the list, however, is that in the context of limited public resources the strong emphasis on a very narrow range of sectors leaves little scope for funding the rest of manufacturing. Much hope rests on an assumption that at some future point the technologies developed in these sectors will become pervasive and shape the wider economy. This is a very large hope.

4. Department for Business, Energy and Industrial Strategy (2017) op. cit.

5. HM Government (2017) op. cit. p.31.

Measuring the sectors

To begin to investigate the scale and location of the six sectors chosen to benefit from the Industrial Strategy Challenge Fund we first have to identify the headings under which they fall in official statistics. This is not straightforward because there tends to be a time lag before new or emerging industries are given their own statistical categories. The match between the six sectors and the government's Standard Industrial Classification is therefore imperfect:

Healthcare and medicine	
21100	Manufacture of basic pharmaceutical products
21200	Manufacture of pharmaceutical preparations
26600	Manufacture of irradiation, electromechanical and electrotherapeutic equipment
32500	Manufacture of medical and dental instruments and supplies
72110	Research and experimental development on biotechnology
Robotics and artificial intelligence	
28990	Manufacture of other special-purpose machinery n.e.c.
Batteries for clean and flexible energy storage	
27200	Manufacture of batteries and accumulators
Self-driving vehicles	
29100	Manufacture of motor vehicles
Manufacturing and materials of the future	
23990	Manufacture of other non-metallic mineral products n. e. c.
72190	Research and experimental development on natural sciences and engineering
Manufacturing and materials of the future	
30300	Manufacture of air and spacecraft and related machinery
51220	Space transport

The numbers in this list refer to categories in the 2007 Standard Industrial Classification – the SIC currently in use and applying to the most recent employment statistics. Two important points should be noted about this match of sectors to statistics.

First, it defines the sectors targeted by the government's Industrial Strategy Challenge Fund very generously. There is no separate statistical category for 'self-driving vehicles' for example so the figures include all motor vehicle manufacturing, though it could be argued that in the long-run the whole of the motor industry might be impacted by driverless technology. Likewise, it is impossible to separate out 'satellites and space technology' from the rest of the aerospace industry, and 'batteries for clean and flexible energy storage' are mixed in with all other battery manufacture. Even within the healthcare sector, the government's initial focus is actually rather narrowly on pharmaceuticals. The effect on all the figures we present is that they substantially overstate the scale of the sectors directly targeted by the new Fund.

Second, there is significant functional overlap between some of the statistical categories. For example, the category 'research and experimental development on natural sciences and engineering' includes many of the labs where new materials for the aerospace and motor industries might be developed and it is certainly the government's aspiration that this sort of cross-over should take place. This suggests that it makes most sense to look at the scale and location of the six sectors as a whole rather than at individual component parts.

Even on a generous definition of the industries that might benefit from the new Industrial Strategy Challenge Fund, these sectors account for little more than 1 per cent of the whole economy (by employment) and 10 per cent of UK manufacturing.

National scale of the sectors

Table 1 shows the number of employees in the industries that match up to the sectors targeted by the Industrial Strategy Challenge Fund (ISCF). The figures here and in all subsequent tables and maps are taken from the government's Business Register and Employment Survey (BRES) which provides the most detailed and reliable breakdown of employment by industry and location. The figures in Table 1 are for Great Britain as a whole in 2015, the most recent year for which BRES data is currently available.

Industry by industry, R&D on natural sciences and engineering accounts for the largest number of jobs (120,000). These are jobs in free-standing research centres rather than university laboratories, which are counted with the rest of the higher education sector. By way of contrast, at the present time there are no recorded jobs in Great Britain in space transport.

The more significant data is in the lower part of the table. This shows that these industries together only account for just over 380,000 jobs, which is only 1.4 per cent of all GB employment. The jobs just in manufacturing (i.e. excluding R&D laboratories, which official statistics class as part of the service sector) are fewer still, at just over 250,000, though they account for a shade over 10 per cent of all manufacturing jobs.

These headline numbers are important because they underline the extent to which the Industrial Strategy Challenge Fund is targeting a tiny sliver of the economy as a whole and even a quite narrow slice of manufacturing. Looking at the same figures from the opposite direction, they mean that 99 per cent of the economy (by employment) and 90 per cent of manufacturing looks likely to be by-passed by this new government initiative.

Of course, it can be argued that through supply chain linkages the sectors targeted by the Industrial Strategy Challenge Fund are likely to have a much wider and larger impact on the economy. These sectors will lead, others will follow and technologies developed may become widespread. This is a reasonable expectation but it also needs to be remembered that the sectors the government is actually targeting are much more tightly defined than the statistical categories used here. It is not the whole of motor vehicle manufacturing that the government is targeting, for example, but only driverless vehicles.

Table 1: Employment in ISCF target sectors, GB, 2015

Basic pharmaceutical products	6,000
Pharmaceutical preparations	29,000
Irradiation, electromechanical and electrotherapeutic equipment	4,500
Medical and dental instruments and supplies	38,000
Research and experimental development on biotechnology	8,000
Other special purpose equipment n. e. c.	9,000
Batteries and accumulators	2,000
Motor vehicle manufacturing	78,000
Other non-metallic mineral products n. e. c.	6,000
R&D on natural sciences and engineering	120,000
Air and spacecraft and related technology	85,000
Space transport	0
Total	**384,500**
as % of all GB employees	**1.4**
of which Manufacturing	**256,500**
as % of GB manufacturing employees	**10.9**

Source: BRES

Location of the target sectors
By local authority

Figures 1 and **2** show the total number of jobs in each local authority district in the sectors targeted by the Industrial Strategy Challenge Fund. These reveal a markedly uneven distribution across the country but also a complex pattern.

The biggest single concentration of jobs in these sectors is in and around Cambridge, hardly renowned as the heartland of UK manufacturing but certainly a major centre for R&D. Cambridge itself has 4,900 jobs in the six sectors but South Cambridgeshire, which wholly surrounds the city, has a further 13,600 – the highest total of any district in Great Britain – bringing the local total to 18,500.

Most of the other large concentrations of jobs tend to be associated with a single large manufacturing plant in the motor or aerospace industries. Anyone familiar with the economic geography of Britain will be able to spot Nissan in Sunderland, BAE Systems in Lancashire, Airbus in Flintshire in North Wales, JLR on Merseyside, Rolls Royce in Derby, a cluster of car plants in and around Birmingham, Airbus (again) near Bristol, further car assembly plants in Oxford and Swindon, engine plants in Dagenham and Bridgend, and Westland helicopters in Somerset.

Although the government's intention is certainly to use the new Fund to support the motor and aerospace industries as a whole the new money that is relevant to these industries is actually being targeted, as we noted, at a very narrow range of technologies – driverless cars, batteries, new materials, robotics and spacecraft. So in practice not all these car and aerospace plants can be expected to benefit from the work supported by the Fund, certainly not directly or immediately, and perhaps not even in the long-run.

At the other end of the spectrum, what is striking is that a large number of local authority districts have barely any jobs in the target sectors:

- 52 districts across Britain have fewer than 100 jobs in the six sectors targeted by the Industrial Strategy Challenge Fund
- 113 districts have fewer than 300 jobs in the six targeted sectors

A number of large, well-known cities and towns have quite modest numbers in the six sectors. These include Bradford (600 jobs), Leicester (500), Manchester (800), Middlesbrough (200), Nottingham (600), Stoke-on-Trent (300) and Swansea (500).

The jobs in the sectors targeted by the Fund are highly unevenly spread across the country. The pattern is more complex than a simple North-South divide but a number of places in southern England have substantially more jobs in these sectors than industrial cities such as Bradford, Leicester, Manchester, Middlesbrough, Nottingham, Stoke and Swansea.

6. There are 380 local authority districts across Britain as a whole.

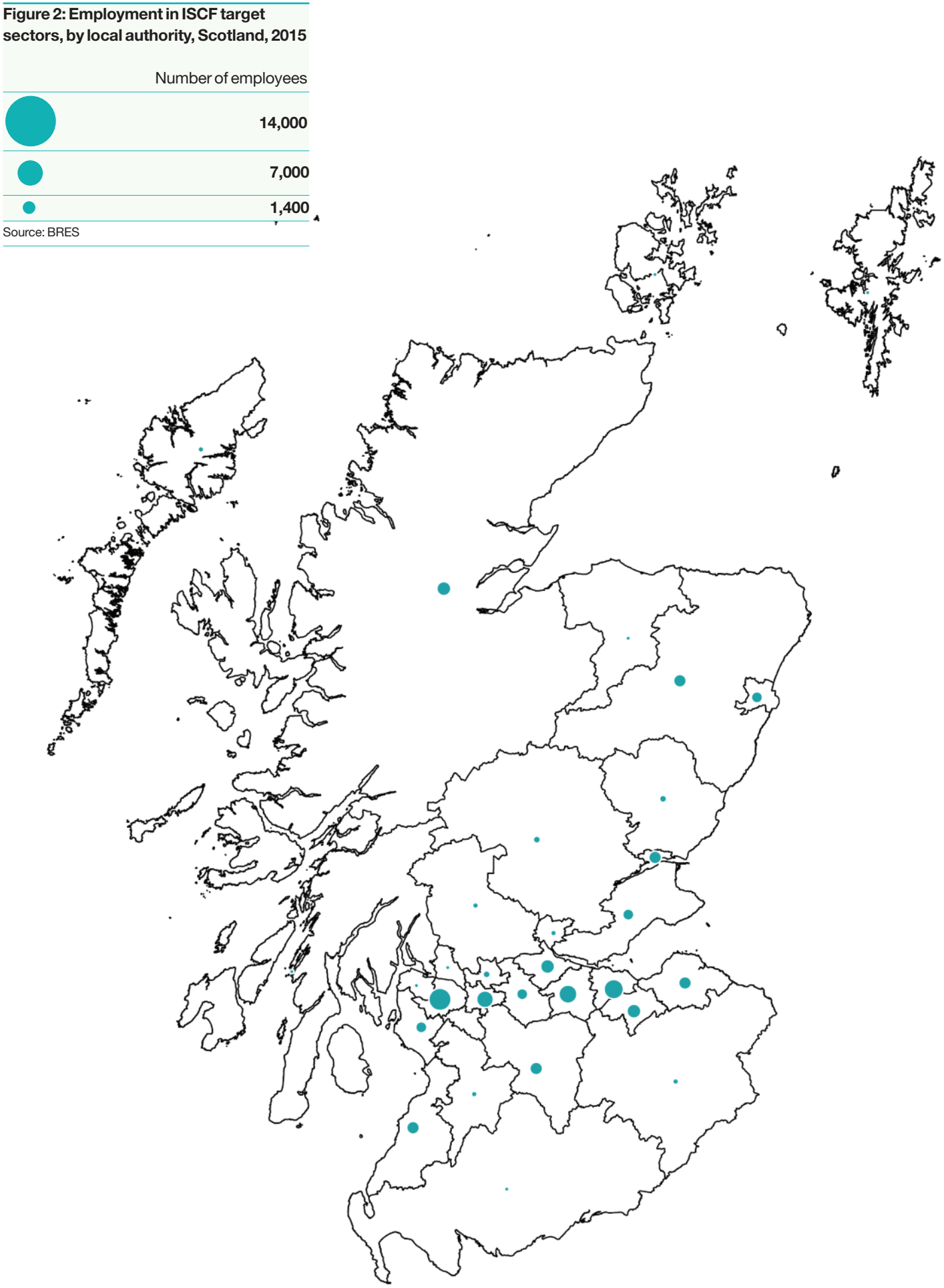
Figure 1: Employment in ISCF target sectors, by local authority district, England and Wales, 2015

Number of employees
14,000
7,000
1,400

Source: BRES

Greater London

Figure 2: Employment in ISCF target sectors, by local authority, Scotland, 2015



Source: BRES

Table 2: Employment in ISCF target sectors, by sub region, 2015

	Number of jobs	as % of manufacturing	as % of all employees
Oxfordshire	14,700	26.2	4.2
Coventry & Warwickshire	17,100	31.6	4.0
North Wales	10,500	23.6	3.9
Greater Cambridge & Greater Peterborough	23,400	9.5	3.6
Swindon & Wiltshire	10,600	17.0	3.4
Thames Valley Berkshire	14,200	8.9	2.9
Lancashire	16,100	19.0	2.6
Cheshire & Warrington	11,900	23.4	2.5
Solent	12,000	19.6	2.3
Gloucestershire	6,500	17.6	2.3
Hertfordshire	13,200	17.8	2.3
Derby, Derbyshire, Nottingham & Nottinghamshire	20,600	14.9	2.3
North East	16,700	14.8	2.1
Greater Birmingham & Solihull	18,400	19.8	2.1
Liverpool City Region	10,800	20.1	1.8
Enterprise M3	12,900	16.6	1.8
Cardiff City Region	10,100	13.6	1.7
Buckinghamshire Thames Valley	3,800	18.2	1.7
West of England	9,100	23.1	1.6
York, North Yorkshire & East Riding	7,800	8.7	1.6
East of Scotland	8,900	6.5	1.4
Heart of the South West	8,900	12.6	1.3
Coast to Capital	10,600	18.3	1.2
Worcestershire	2,800	6.2	1.2
Tees Valley	3,100	5.0	1.2
South East Midlands	10,200	8.7	1.2
Highlands & Islands	8,000	13.6	1.1
Humber	4,000	6.4	1.1
Leicester & Leicestershire	4,500	3.9	1.0
Tayside	1,600	5.0	0.9
New Anglia	5,700	5.3	0.9
South East	12,900	7.4	0.8
Mid Wales	600	4.7	0.8
West of Scotland	8,900	8.1	0.8
Dorset	2,300	6.2	0.7
Leeds City Region	8,900	4.0	0.7
Stoke-on-Trent & Staffordshire	2,800	4.1	0.6
North East Scotland	1,800	2.7	0.6
Sheffield City Region	4,300	3.8	0.6
Black Country	2,400	3.8	0.6
London	25,800	7.6	0.5
Swansea City Region	1,200	3.1	0.5
Greater Lincolnshire	1,900	2.7	0.5
The Marches	1,200	2.4	0.5
Greater Manchester	4,900	4.0	0.4
South of Scotland	300	0.5	0.3
Cumbria	600	1.3	0.3
Cornwall & Isles of Scilly	500	1.0	0.2
Great Britain	**384,500**	**10.9**	**1.4**

Source: BRES

Location of the target sectors
By sub-region

Because of commuting flows, local labour markets mostly function at a sub-regional scale. In labour market terms, therefore, it doesn't really matter if a local authority district has few if any jobs in the target sectors so long as there are plenty of jobs in these industries in neighbouring areas.

Table 2 looks at employment in the target sectors by sub-region. In England, the sub-regions here are Local Enterprise Partnership (LEP) areas[7]. The sub-regions are ranked by the share of all employees in the target sectors. The table also shows the share of manufacturing jobs in the target sectors[8]. The sub-regional distribution of the sectors highlights three points.

First, the share of all employment in sectors targeted by the *Industrial Strategy Challenge Fund* is nowhere very large. On this measure, Oxfordshire has the highest concentration at just over 4 per cent. In the vast majority of sub-regions, the ISCF sectors account for less than 2 per cent of all jobs. This underlines the distinctly narrow sectoral focus.

Second, there is nevertheless big variation between sub-regions. As a percentage of all jobs, or indeed as a percentage of manufacturing jobs, Oxfordshire at the top of the table has twenty times as much employment in the ISCF sectors as Cornwall at the bottom of the table. Or perhaps more pertinently, Oxfordshire has a seven times greater concentration of employment in these sectors than the Sheffield city region. This underlines the extent to which the focus on a narrow range of sector favours some local economies over others.

Third, the pattern of variation between sub-regions is complex. Rather than (say) a North-South divide, the pattern across the country mostly reflects the location of a number of large car and aerospace plants and concentrations of R&D facilities. Apart from Oxfordshire, the sub-regions covering Cambridgeshire, Wiltshire and Berkshire – all parts of southern England not generally thought of as industrial heartlands – all have relatively large numbers in the target sectors but so do Coventry & Warwickshire, North Wales, Lancashire and Cheshire & Warrington.

The lower part of the table includes a number of places worth highlighting. At the very bottom, Cornwall & the Isles of Scilly not only has the smallest share of employment in the target sectors but also has the lowest GVA per head of any English sub-region[9]. It is hard to see how such a narrowly focussed industrial strategy will do much to address Cornwall's economic problems. Greater Manchester also rests near the foot of the table, despite being the focus of the government's Northern Powerhouse. Across the Pennines, the Leeds and Sheffield city regions – two of Britain's traditional industrial heartlands – also rank very low in terms of jobs in the ISCF sectors.

Location of the target sectors
By region and country

Table 3 summarises the data for Scotland, Wales and the English regions. Again, this emphasises the point that the distribution of ISCF sector jobs across the country is not a simple North-South divide, though the South East and East of England do have the largest absolute numbers. London actually has the smallest share of employment in ISCF sectors but is of course a highly prosperous service economy and no longer an industrial centre. Yorkshire & the Humber and Scotland also lag rather badly behind the rest of Britain.

Table 3: Employment in ISCF target sectors, by region and country, 2015

	Number of jobs	as % of manufacturing	as % of all employees
East of England	50,100	10.7	1.9
North East	20,100	12.7	1.9
South East	73,800	14.9	1.8
Wales	22,100	13.9	1.8
West Midlands	42,100	13.2	1.7
South West	37,900	14.0	1.6
East Midlands	27,900	8.9	1.4
North West	43,200	12.2	1.4
Scotland	23,000	6.3	0.9
Yorkshire & the Humber	18,300	4.9	0.8
London	25,800	7.6	0.5
Great Britain	**384,500**	**10.9**	**1.4**

Source: BRES

7. Some of the LEP areas overlap so the number of jobs in Table 2 do not sum to the GB total.

8. R&D establishments are excluded from this calculation.

9. NUTS 2 area.

Location of research and development establishments

In the short-run, most of the money that the government is channelling into R&D to support its industrial strategy is likely to find its way into universities, the R&D parts of companies and into freestanding research and development establishments. The wider sectors that are intended to be the final beneficiaries, such as aerospace and motor vehicle manufacture, only stand to benefit further down the line as new products and processes come on stream. It is worth looking more closely at just where these R&D establishments are located.

Regarding universities, the government notes that 46 per cent of Research Council and Higher Education Funding Council for England (HEFCE) monies are presently spent in Oxford, Cambridge and London. Beyond these three locations, a number of other large, older universities are prominent in industrial R&D. What we do know, however, is that most universities are located in cities. Rural areas, seaside towns and the former coalfields, for example, mostly lack universities of their own and are unlikely therefore to benefit from money flowing into R&D facilities.

Regarding R&D attached to manufacturing plants, the places where ISCF sectors are already located (see **Figures 1** and **2** earlier) are the most likely to be beneficiaries. Pharmaceutical research by commercial companies, for example, may take place alongside pharmaceutical manufacture.

The distribution across the country of research and development establishments – likely along with universities and labs in large companies to be first in line for the new R&D funding – is particularly skewed in favour of an arc to the immediate north, west and south of London.

Figure 3: Employment in R&D establishments, by local authority district, England and Wales, 2015

Number of employees

	9,800
	4,900
	980

Source: BRES

Greater London

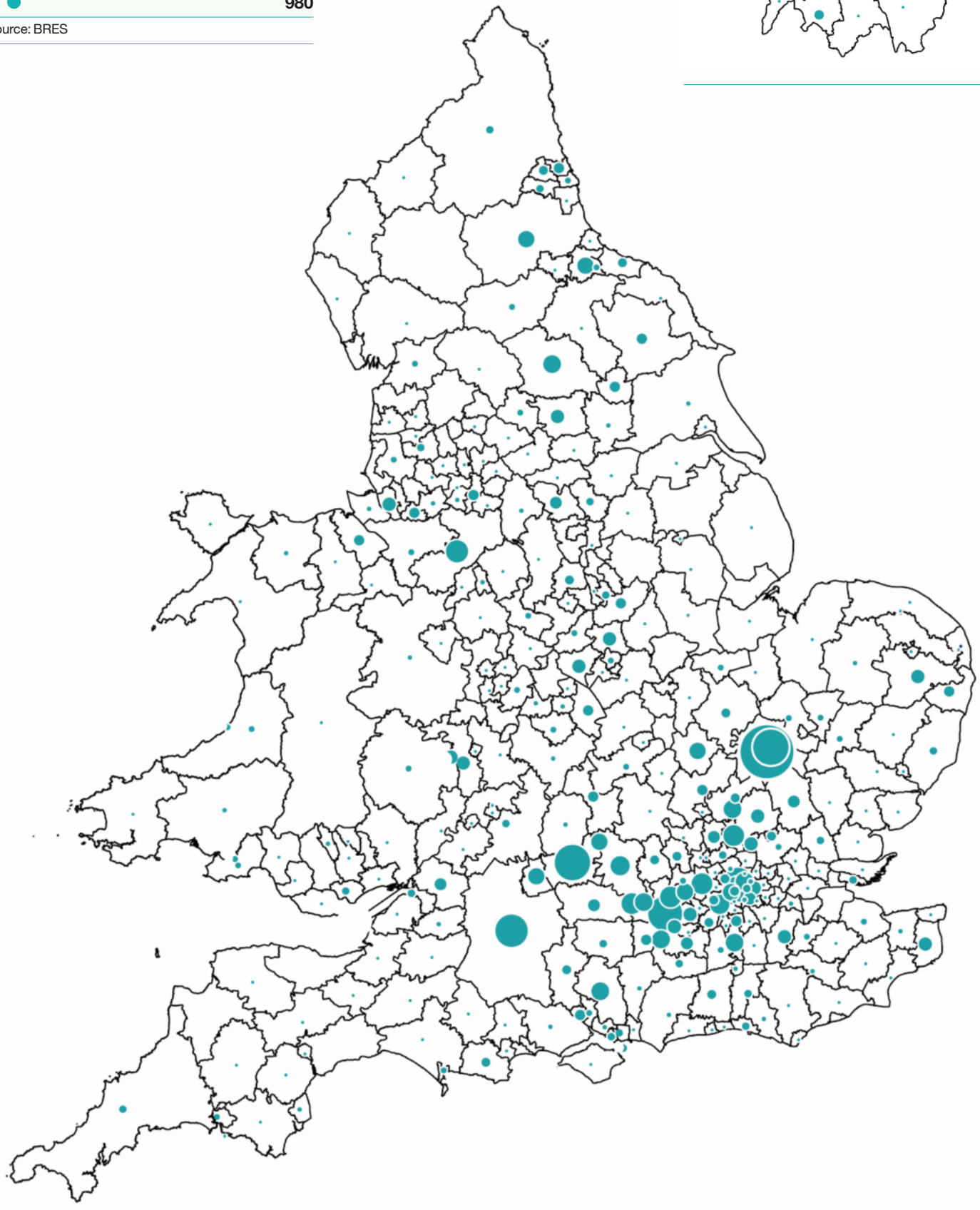
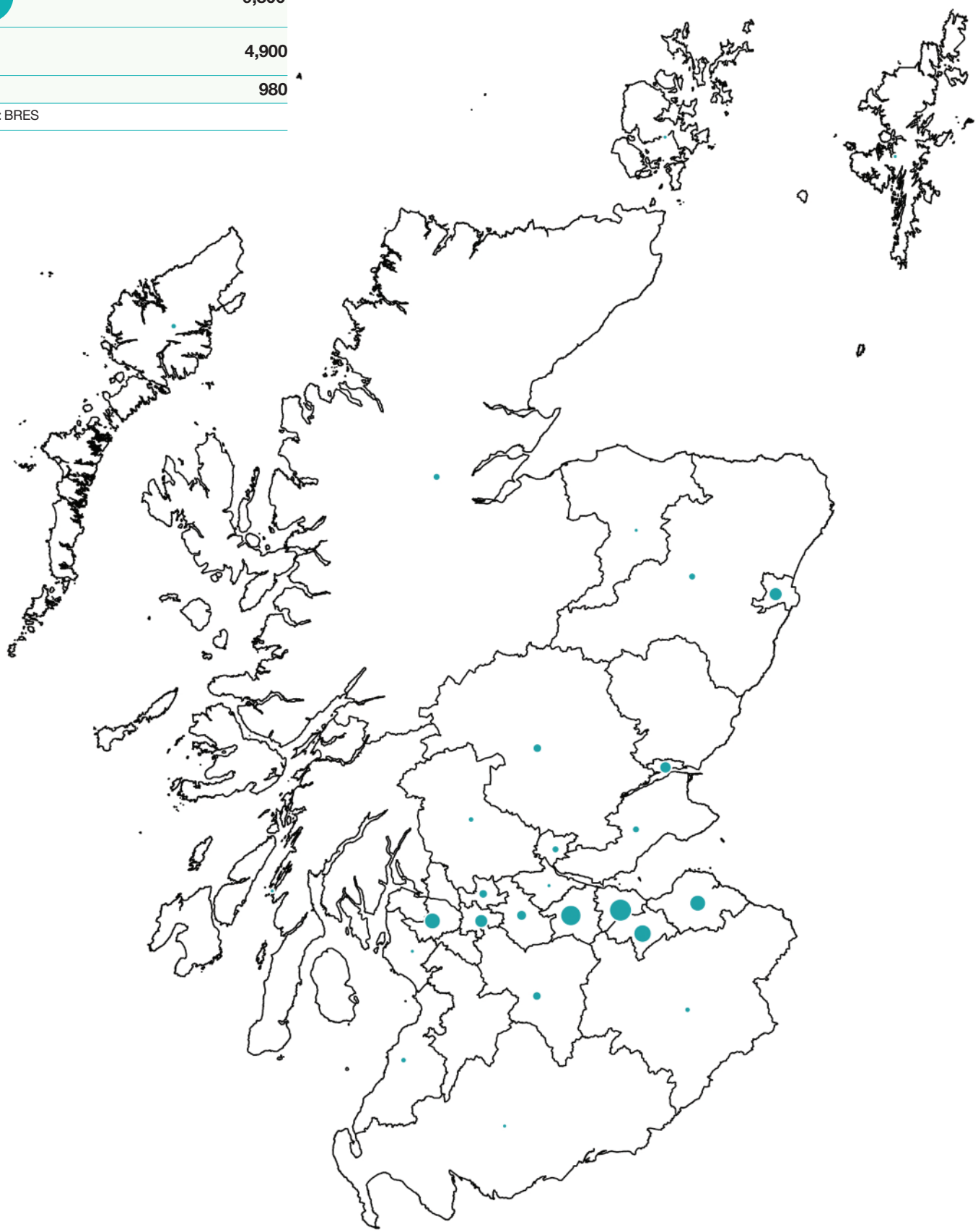


Figure 4: Employment in R&D establishments, by local authority, Scotland, 2015

Number of employees
9,800
4,900
980

Source: BRES



The location of free-standing R&D establishments is easier to pin down using official statistics. **Figures 3** and **4** show the employment, by local authority district, in establishments carrying out 'research and experimental development on biotechnology, natural sciences and engineering'[11]. This includes free-standing R&D units run by companies, trade associations, charitable foundations and the public sector. Many of these are the establishments most likely to benefit directly and immediately from the increase in government spending on R&D.

To underline the locational concentration of R&D of this kind, **Table 4** lists the 20 local authority districts across Britain with the largest number of jobs in these establishments. The dominance of the Cambridge area is striking – in total nearly 15,000 jobs in and around the city, and it is important to remember that this excludes R&D in Cambridge University itself. The Cambridge area alone, which has a combined population of just 285,000 (less than 0.5 per cent of the GB total) accounts for nearly 12 per cent of all GB employment in scientific R&D establishments.

Looking down the list of the top 20 districts for employment in R&D establishments it is also noticeable that industrial areas in the North, Scotland and Wales are conspicuous by their absence. There is no Manchester, Liverpool, Newcastle, Sheffield or Glasgow on this list, let alone a second-tier older industrial town.

Table 4: Employment in R&D establishments, top 20 districts in Britain, 2015*

	Number of jobs
South Cambridgeshire	9,800
Cambridge	5,000
Vale of White Horse	4,700
Bracknell Forest	4,600
Wiltshire	4,300
Camden	3,600
Westminster	2,600
Cheshire East	2,000
Edinburgh	1,900
Reading	1,800
Hillingdon	1,800
Windsor & Maidenhead	1,800
Welwyn Hatfield	1,800
South Oxfordshire	1,600
West Lothian	1,600
Wokingham	1,500
Stevenage	1,500
Harrogate	1,500
Islington	1,500
Rushmoor	1,500
Great Britain (total)	**128,000**

*Research and experimental development on biotechnology, natural sciences and engineering

Source: BRES

11. SIC 2007 classes 72110 and 72190.

The profoundly uneven geography of R&D is underlined by **Table 5**, which looks at employment by region and country. The three regions in the south east corner of Britain (London, South East and East) have a combined total of 82,000 jobs in R&D establishments, or around two-thirds of the GB total. Even within these three regions the jobs are concentrated in just a few places, as the maps earlier demonstrated. By contrast, the three regions of northern England (North East, North West and Yorkshire & Humber) can muster a combined total of just 17,000 jobs in R&D establishments of this kind.

Table 5: Employment in R&D establishments, by region and country, 2015*

	Number of jobs
South East	36,500
East of England	28,500
London	17,300
Scotland	11,700
South West	6,800
North West	6,200
Yorkshire & the Humber	5,400
North East	5,300
East Midlands	4,100
West Midlands	3,100
Wales	2,100
Great Britain (total)	**128,000**

*Research and experimental development on biotechnology, natural sciences and engineering

Source: BRES

The Cambridge area alone, which we noted has just short of 15,000 R&D jobs of this kind, has:

- More than twice as many jobs in R&D establishments as the whole of the Midlands (7,200)
- More jobs in R&D establishments than the combined total in Scotland and Wales (13,800)
- Only 2,000 jobs fewer in R&D establishments than the whole of the North of England, an area with a total population of 15.2 million or fifty times greater than the Cambridge area

Even excluding its famous university, the Cambridge area (population just 285,000) has twice as many jobs in scientific research and development establishments as the whole of the Midlands, more than Scotland and Wales combined, and only 2,000 fewer than the whole of the North of England (population 15.2 million).

Conclusions for industrial strategy

If the Westminster government's industrial strategy had included transformational new policies or introduced several new spending programmes the focus on R&D in a narrow range of sectors would not have mattered so much. In the event, it is the extra funding for research and development that is the flagship of the new industrial strategy. Where this R&D money goes – to which sectors and places – therefore matters a great deal.

Two major conclusions emerge from this report.

First, **the government's sectoral focus really is exceptionally narrow**. As we explained, the new Industrial Strategy Challenge Fund only targets healthcare & medicine, robotics & artificial intelligence, batteries, self-driving vehicles, materials of the future, and satellites & space technology. Even on a very generous definition that includes for example all of aerospace and all of motor manufacturing, these sectors account for only 10 per cent of manufacturing employment and little over 1 per cent of the whole economy. This is an extremely narrow base on which to try to build a revival of British industry.

The second major conclusion is that **the government's narrow sectoral focus threatens to widen regional divides.** There is no guarantee, of course, that the new products and processes developed in one particular place will result in new manufacturing on the same site or somewhere else where the industry already operates. Growing businesses do open new factories and sometimes do move into new places. But if the existing location of the sectors supported by the Industrial Strategy Challenge Fund is a guide to the impact on different parts of Britain, then this impact is likely to be profoundly uneven and in ways that may widen differences in prosperity.

The government's sectoral focus is exceptionally narrow – too narrow alone to provide a base on which to build a revival of British industry.

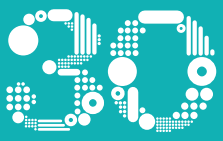
The strong concentration of R&D activity in and around London, in the Cambridge area for instance, provides the clearest example of how an essentially prosperous part of the UK is likely to be a major beneficiary of the new funding. The combination of large concentrations of leading research scientists, of high technology companies and of R&D establishments mean that places such as Cambridge and its surrounding area look set to be the major winners from the new funding. It is therefore Cambridge, Oxfordshire, the Thames Valley, Hertfordshire and London itself that have most to gain in the first instance.

The rest of British industry, and the rest of Britain, therefore has good reason to feel concerned with what is on offer. Hopes have been built up by the new priority attached to industrial strategy but they seem destined to be disappointed. When it comes to financial support for R&D, it is almost as if the rest of British manufacturing does not exist or, perhaps worse still, that it is hopelessly un-technological and not worthy of support. There is little new on offer for the chemical industry, or the steel industry, or oil and gas production, or food & drink manufacturers. The full list of sectors that have been ignored is actually very long indeed.

By implication, for many places the Industrial Strategy Challenge Fund offers very little. Most manufacturing does not produce new high technology products and is removed from exotic leading-edge technologies. Yet this type of industry is no less worth supporting. Moreover, what matters for these sectors is how technology is adopted and that their position in international markets is maintained and strengthened. This often relies on incremental improvements in products and processes, and in selling new products to new markets. Indeed, the fact that these businesses have survived in the face of globalisation and years of neglect by the UK government is an indicator that they cannot be written off as vestiges of a former industrial age. Employers' organisations certainly understand this. So do local authorities working to promote economic growth.

In the light of the Industrial Strategy Challenge Fund, however, it is questionable whether the Westminster government really grasps what industry needs.

The government's narrow sectoral focus threatens to widen regional divides. It is Cambridge, Oxfordshire, the Thames Valley, Hertfordshire and London itself that may gain most in the first instance.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