Industry in Britain – An Atlas

Sandra Bernick, Richard Davies and Anna Valero

Special Paper No. 34

September 2017

Centre for Economic Performance Special Paper

Sandra Bernick is an Occasional Research Assistant with the Centre for Economic Performance, London School of Economics and Economics PhD candidate at Imperial College Business School. Richard Davies is a Policy Fellow at the Centre for Economic Performance, London School of Economics. Anna Valero is a Research Officer at the Centre for Economic Performance, London School of Economics and is also a PhD candidate in the Department of Economics, London School of Economics.

All views are the author’s own. The Centre for Economic Performance and the ESRC has no political affiliation or institutional view and the author writes in a personal capacity.
Abstract

Living near a productive company can have considerable economic benefits. It means the chance of well-paid jobs, creates opportunities for suppliers of goods and services, and can be a boost to local retailers. This common-sense economic logic explains why policymakers consistently worry about the uneven spread of industry in Britain and, from time to time, conclude that it inefficient and unfair and that something new must be done. Now is one of those moments, with the government shortly set to launch a new “Industrial Strategy” which looks likely to include a new approach to regional policy. But while there is agreement across Britain’s political parties that the distribution of industry is a problem, little new analysis on the location and performance of British firms with an explicitly regional focus has been published recently. This paper, part of ongoing work on the economics of British industry at the LSE’s Centre for Economic Performance, starts to fill that gap. We present maps and charts setting out the latest data on firm location, together with geographic measures of employment, productivity, and innovation. Ten stylised facts emerge from our analysis, many of which challenge the prevailing wisdom: Finance is far less London-centric than the creative industries; the South-East is not the country’s productivity engine, rather a band stretching west from the capital towards Bristol is; the East of England stands out in terms of R&D intensity; and in addition to the North-South divide, disparities between coastal and inland areas are concerning. This clarification of the starting point is just the first step in a data-driven approach to industrial policy. Bigger questions—in particular analysis of the ideal spread of industry that policy should target, and the best tools to get there—loom large and also require new analysis.

JEL Classifications: R12, O25, O52

Keywords: productivity, business performance, regional disparities, UK economy, industrial strategy

Acknowledgements

We would like to thank Steve Machin, Max Nathan and Nigel Rogers for their helpful comments. The Economic and Social Research Council have given financial support through the Centre for Economic Performance. The CEP and ESRC have no political affiliation or institutional view and all co-authors write in a personal capacity.
INTRODUCTION

Britain is a place where people worry about the geographic spread of industry. Take the following two quotes:

[1] A policy of balanced distribution of industry and the industrial population throughout the different areas or regions in Great Britain; and of appropriate diversification of industries in those areas or regions would tend to make the best national use of the resources of the country.

[2] The maldistribution of the industrial population has been and is being still further intensified. Unemployment throughout the country is no real problem to-day. The most urgent problem is the attainment of full development, of the maximum use of our resources and the achievement of the fullest efficiency.

Anyone that has followed the UK economy in recent years understands what these writers refer to. Employment is at record levels, but there are concerns about the productivity of British workers, wages, job security and the spread of economic activity and opportunity across the country. In fact, both statements are over 60 years old. The first is from the 1940 “Barlow Report” which identified the unequal patterns of industry across the UK; the second is from a Parliamentary debate in 1957, which asked what had changed since 1940, concluding that little had. Concerns that some regions of the UK are falling behind others, and that the location of companies helps explain this, are longstanding.

Agreement that something should be done about it is rarer. Determination to adopt policies that address regional disparities has ebbed and flowed over the past 50 years. There are signs that the 2017 Parliament could see an intensification of efforts to seek a more even spread of industry in Britain. Chancellor Philip Hammond has said that a new “hands on” industrial

---

1 See Costa and Machin (2017) for a recent summary of the data on real wages and living standards at the national level in the UK.

2 The Barlow Report (1940) was formally “The Report of the Royal Commission on Distribution of Industrial Population” one of its findings was that “The continued drift of the industrial population to London and the Home Counties constitutes a social, economic and strategical problem which demands immediate attention”. The Commission suggested regional imbalance was of national concern, recommended the decentralisation of industry away from congested areas, and proposed a central authority to tackle the problem; a board for industrial location which would be responsible to the Board of Trade. See: http://discovery.nationalarchives.gov.uk/details/r/C8722.

3 Examples include the Distribution of Industry Acts of 1945 and 1950; geographic policies of the 1970s (known as Regional or Urban Policy) which attempted to shift industry away from cities seen as ‘declining’ including inner-city Glasgow (see Smith and Wannop, 1985), and, most recently the “Northern Powerhouse” agenda, a series of policies pursued by HM Treasury seeking to create an economic hub including Greater Manchester and the major cities of Yorkshire and Lancashire.
strategy will help left-behind areas; shadow chancellor John MacDonnell has promised a “comprehensive” industrial strategy that would “spread wealth across the country”, and a new industrial strategy with a regional focus is a large part of Liberal Democrat leader Vince Cable’s economic strategy. Reflecting this political interest Britain’s main business department and finance ministry are working on a new “Industrial Strategy” which looks set for launch over the coming months.

**Summary of this paper**

Despite the rising interest in addressing the UK’s uneven economic performance, no one has published a comprehensive analysis setting out the latest facts on Britain’s business geography. This paper begins to fill that gap. We use data on firms as the basis of a comprehensive mapping of UK Industry. The full set of maps is presented as a separate document, including measures of industrial specialisation across sectors (at the SIC section level). This paper presents the most striking maps and findings together with some tentative conclusions.

Ten stylised facts stand out, many of which challenge the prevailing wisdom in the UK. We summarise these here, and expand in the next section.

1. **The three patterns of industry.** Using measures of industrial specialisation based on employment, we find that the location of business activity in Britain varies considerably by industry, and follows three broad patterns:

   - **Uniform.** Some industries are fairly evenly spread around the country, with a similar concentration of activity in most locations. Often, these industries provide products or services that must be sold locally: for example, retail services includes firms such as hairdressers and gyms. Outside large cities, agriculture is spread relatively evenly across the UK. More surprisingly, manufacturing is relatively evenly spread outside London.

   - **Scattered.** In these industries, activity is concentrated in a number of locations, creating a scatter of strong dots across the country. This includes firms operating in science and technology sectors and mining and quarrying. The fact that finance is scattered across multiple hubs is a challenge to the belief that banking only occurs in the South East.

---

4 See Phillip Hammond, interview on the local economy of Stoke on Trent (January 23rd 2017) and John MacDonnell speech (26th September 2016).

5 See e.g. BEIS Building our Industrial Strategy, January 2017.

6 See the Data Appendix for a description of key datasets, which are useful for analysing businesses in the UK.
• **Single hub.** In these industries there is one location where activity seems to be concentrated. The creative sectors and information and communication technology are examples: in both activity is focused in London and the South East, though there are also pockets in cities such as Manchester and Edinburgh. Given the expectation that creative industries and “tech” are potential growth industries, this will concern those seeking a more even spread of opportunity in Britain.

2. **Firm size distribution.** Firm size matters for industrial performance: larger firms tend to invest more and have higher productivity. However, UK industry is dominated by small firms with around 99% of firms being classed as “small” (0-49 employees). So-called “non-employing” businesses (firms where the owner-manager is the only worker) are the largest category making up around three-quarters of firms in all regions. Our maps show that mid-sized firms (50-249) are relatively evenly spread across the UK; large firms are very sparsely spread: currently, only 55% of local authorities have 10 or more large firms. More encouragingly, maps showing the increase in mid-sized firms show that this growth is relatively evenly spread.

3. **Business demography.** The rate at which firms start up and go bankrupt is relatively evenly spread, with maps showing that these “births” and “deaths” are equally likely across UK regions. This suggests that the ease with which a company can be established and wound up are unlikely to be explain regional productivity differences.

4. **The spread of productivity.** The output per hour of a British worker varies considerably by location. At the bottom of the productivity scale is mid Wales; the countryside around Brecon is an area with little industry and agriculture as the main employer. At the other end of the scale there are three high-productivity hubs: the oil industry around Aberdeen, the area around Greater Manchester and a band of productivity in the South. Contrary to popular belief the high productivity of London does not spread into the South East but rather spreads west along the M4 towards commuter towns like Reading and Slough which have their own high productivity companies.

5. **Leader and laggard sectors.** The highest productivity sectors—real estate, mining and utilities—are small employers and so play little role in aggregate performance. Of the high employment sectors that drive national productivity the leading sectors are finance, information and communications, construction and manufacturing. Professional, scientific and technical services vary within and across regions—this sector houses some very high productivity firms.
together with much weaker ones. However, it is important to consider high employment sectors with weak productivity, such as retail and wholesale trade, administrative services and accommodation and food services. Raising average productivity in these sectors could have a large aggregate effect due to their high employment shares.

6. **Innovation in the regions.** We use data on research and development (R&D) expenditure and patents to gauge innovation by region. In absolute terms, London and the South East dominate, accounting for nearly a third of business spending on R&D. However, in terms of R&D as a percentage of GDP, the East of England stands out. At a more disaggregated level, Britain’s most innovative NUTS2 regions (equivalent to counties/groups of counties) are East Anglia, Cheshire and Hertfordshire; reflecting the impact of Cambridge University, chemicals firms located along the River Mersey and pharmaceuticals and life sciences firms located in and around Hertfordshire.

7. **Unbalanced exporting.** Britain has a sizeable current account shortfall at 3.4% of GDP (Q1 2017). Only 11% of firms export and those that do export are most likely to be based in London, the South East or the East of England. The North East has the lowest share of exporters at fewer than 6%. A poor and unbalanced export performance has long been of concern, but Britain’s exit from the EU will create new challenges in this area. It is estimated that all local authorities are likely to become worse off following Brexit, but that the largest impacts are expected to be in cities that specialise in finance and business services. Understanding the local impacts of Brexit through changes to trade (together with immigration, FDI and innovation) will be crucial for policymakers developing an industrial strategy with region-specific elements.

8. **The UK’s coastal malaise.** A number of maps outline concern about the economic performance of Britain’s coastal towns. Maps of survival rates show that firms located near the coast are more likely to go out of business than those further inland. These areas also tend to specialise in accommodation and food services, which tend to be low productivity industries with a high churn of businesses. Other research shows that skills are particularly weak in these areas, perhaps reflecting the demands of the local labour market.

9. **The power of a single firm.** Some of the patterns in the regional data indicate local domination by single firms. For example, the high productivity in north Lancashire, Derby and

---

7 See Dhingra et al. (2017).
Brentwood is influenced by the major plants of BAE Systems, Rolls Royce and Ford, respectively. Further examples are Tata Steel in Port Talbot and Airbus in Broughton (Flintshire), both in Wales. The same can also be true for service sector firms, for example Sky in parts of Scotland. The local impact of losing or gaining a large company can be large.

10. **The German benchmark.** It is well-known that the UK’s aggregate productivity is far behind that of its key comparator countries: Germany, France and the US. We compare the economic performance of British regions to those in Germany. The resulting maps are concerning, showing that Britain’s best performing regions (with the exception of Central London) are far behind the German average. Germany stands out as a multi-hub country, with around ten identifiable high-productivity areas: by contrast in the UK the South East dominates. Whilst Germany also faces regional challenges, with longstanding poor performance in East Germany, these poor performing regions are catching up. Whereas in Britain, the laggard regions appear to be falling further behind.

**Next steps**

The UK has good quality firm-level data, and it is crucial that this is put to best use in guiding policy. The LSE Growth Commission made a series of recommendations to strengthen the institutions governing industrial strategy. A key component here would be the publication of an annual “Industrial Strategy Report” on the state of British business akin to the UK’s other regular publications such as the *Inflation Report* and *Financial Stability Report* and the *Economic and Financial Outlook* which help guide and explain monetary and fiscal policy. This paper provides some of the types of analysis that could be usefully included and built upon in such a report. Further work is needed at more spatially and sectorally disaggregated levels, and there could be scope for more standardisation of ONS datasets, for example to provide detailed sectoral GVA for local areas on an annual basis allowing comparisons over time. Further improving the processes for accessing and linking the micro-data would help researchers to conduct more detailed analyses.

This paper provides a snapshot of the current state of play, but it remains unclear what the optimal distribution of industry is, and therefore what the ultimate goal of regional policy should be. While this paper does not consider this question in detail, any industrial policy has to proceed cautiously and in full knowledge of facts on the ground. Broadly, the evidence suggests that area-based initiatives can lead to displacement rather than aggregate gains, though
it is possible to design policies that deal with these issues. Moreover, there are tensions between “jam-spreading” (spreading resources across locations) and the ability to build up successful hubs that exploit network effects. It is increasingly recognised that greater local control is important: more space for local authorities to experiment with different types of policy. This, together with improved data collection and evaluation should help increase policy effectiveness.

Policies targeted at particular regions and/or sectors are likely to involve trade-offs and claims from competing stakeholders. The UK needs a new institutional framework to help make these tough decisions. The guiding principle should be the elimination of market failures, and the new framework should inject some form of independent oversight, perhaps borrowing from the structures and processes used by the Bank of England, the Office for Budget Responsibility and the UK’s highly-regarded independent competition authorities.

---

9 See for example Einiö and Overman (2016) and Criscuolo et al. (2017).
10 See Overman (2013).
11 See Nathan and Overman (2013) for discussion of the appropriate spatial scale for industrial policy interventions, including the delivery of horizontal policies in specific places, or in a decentralised fashion.
TEN STYLISED FACTS ON UK BUSINESS

FACT 1 – Three Patterns of Industry

There are a number of reasons that the location and type of business activity matter. In all countries productivity varies considerably by industry—manufacturing is more productive than retail services in every OECD country for example—so it may be the case that regional productivity differences are driven by industrial patterns. Moreover, where an industry exhibits significant “network externalities” (that is, if it pays to be in an area where competitor firms are located) then the presence of an agglomeration or a “cluster” of companies has been shown to be an important driver of firm and regional economic performance. The challenge for policymakers however is that explicit cluster policies have generally been found to be ineffective, and a key question is to consider the appropriate spatial scale for more horizontal interventions to address market failures (for example in the supply of skills or access to finance) which might stimulate or enable agglomerations to grow.12

There are a number of ways that business activity can be measured in spatial terms:

- **Firm numbers.** A basic measure of business activity is a simple count of businesses in a given area. For detailed spatial analysis, it is usually more appropriate to use the “local unit” or “plant” which reflects the location of activity, rather than the business enterprise – for which the location reflects the company’s headquarters (many companies have numerous plants). It might be that certain areas have more firms or employment due to their higher population, therefore it is often more relevant to consider the number of firms normalised by population, a measure of business “density”. We consider those of working age.

- **Employment data.** Businesses vary in size, so looking at employment can give a better measure of the extent of economy activity. Again, it is useful to consider employment as a percentage of the local population. Another interesting measure for understanding the nature of local economic activity is the share of a particular sector’s employment in total local employment.

- **Industrial specialisation.** The location quotient (LQ) gives a measure of industrial specialisation in a particular region. The LQ compares a sector’s local share of employment with that sector’s share in national employment. A location quotient

---

12 See Nathan and Overman (2013).
greater than one for a particular area suggests that the area is specialised for a particular industry. This measure can also be calculated based on number of firms.\textsuperscript{13}

- **Geographical concentration of industries.** There are a number of measures that can be used to understand whether specific industries are geographically concentrated in a small number of areas, or more evenly spread around the UK. One simple index is the Herfindahl-Hirschman index (HHI) for geographical concentration. For each sector, this is calculated as the sum of the squared shares of that sector’s national employment in each region. The index takes a value of 1 where all employment is concentrated in one region.\textsuperscript{14}

**Facts and maps**

The most comprehensive data for understanding the population of businesses in the UK is BEIS BPE, as this includes unregistered, non-employing businesses which tend to be sole proprietors and sometimes partnerships. In the latest data, it was estimated that there were 3 million such businesses in the UK, which together with the registered population of around 2.5 million puts the total number of businesses in the UK at 5.5 million. However, the data on unregistered businesses are not reliable at geographical levels more disaggregated than the UK “region” (e.g. North East or London), so it is preferable to use IDBR based data on the population of registered businesses when considering the measures above. Because we are looking at local business activity, plants or “local units” are more relevant than business enterprises or “reporting units”.\textsuperscript{15}

Figure 1.1 plots firms and employment per 10,000 working-age population. It shows that there are some local authorities with over 1,000 plants per 10,000, or 1 for every 10 people. Some of these are rural locations including mid-Wales, where the density on this measure is driven by

\textsuperscript{13} The location quotient for industry “i” in region “r” is $LQ_{ir} = \frac{E_{ir}}{E_r} \times \frac{E_i}{E}$, where $E_{ir}$ are employee jobs in industry i in region r, $E_r$ is the total number of employee jobs in region r, $E_i$ is total employee jobs in industry i and $E$ is the national total of employee jobs. A firms based LQ can be calculated by substituting employment with the number of firms.

\textsuperscript{14} The HHI for a given industry (i) is given by $HHI_i = \sum_{r=1}^{R} S_r^2$. Where $S_r$ is the share of national employment in that sector in region r, and R is the total number of regions. When all the employment for that industry is concentrated in one region, the HHI takes a value of 1. When employment is evenly spread across region, HHI takes a value of 1/R.

\textsuperscript{15} Based upon the IDBR (as extracted from NOMIS), which covers registered businesses only, in 2016, there were 2.5 million reporting units and 3 million local units. The reporting unit and local unit are equivalent for most firms in the UK (around 95%, see discussion at http://doc.ukdataservice.ac.uk/doc/7989/nirdoc/pdf/7989_ardx_userguide.pdf).
a high share of micro businesses (see Fact 2). The areas with the highest employment rates tend to be in London, followed by Cambridge, Aberdeen City and Oxford (Figure 1.2).

Notes: Business Counts (2016) and employment (2015), per 10,000 local population aged 16+ at local authority level. Business data for “local units”. Source: IDBR, BRES, APS (ONS).

Maps of industrial specialisation (LQ) at the broad sector level reveal three distinct patterns. Some industries are evenly spread around the country. In these uniform industries there is a similar concentration of firms in all locations. For many of the industries that follow this pattern a uniform spread is intuitive: often they provide products or services that must be sold locally: for example retail and wholesale trade services have a uniform pattern (Figure 1.3). The sector includes hairdressers, gyms and shops – these are all businesses that are likely to be present in most UK towns. Outside large cities agriculture is spread relatively evenly across the UK (see

16 Here we use the standard SIC 2007 “section” level, for an outline of the SIC2007 hierarchy see https://onsdigital.github.io/dp-classification-tools/standard-industrial-classification/ONS_SIC_hierarchy_view.html.
maps Appendix). More surprisingly, manufacturing is also quite evenly spread across the regions, but is relatively absent in some areas including and around London (Figure 1.4).

![Figure 1.3. Location quotient: retail and wholesale trade](image1.png) ![Figure 1.4. Location quotient: manufacturing](image2.png)

*Source: Calculations based on employment data at local authority level, BRES 2015.*

In some industries, activity is restricted to a number of locations, dotted across the country. In these scattered industries, the maps show a number of specialist hubs in the UK. This includes firms in “science and technology” sectors\(^\text{17}\) (Figure 1.5), professional, scientific and technical services, and mining and quarrying. The fact that there are over 15 identifiable financial hubs outside London is a challenge to the common belief that banking only occurs in London and the South East (Figure 1.6).

---

\(^{17}\) We grouped 4-digit SIC codes into “science and technology” sectors using the definition in NESTA (2015), which is based on Eurostat classifications.
Some industries have a single hub. In these industries, there is only one location with significant activity. The most striking examples are information and communication technology and the “creative” sectors\(^\text{18}\): in both of these areas activity is focused in London and the South East (Figure 1.7 and Figure 1.8).

The maps of the “science and technology” (Figure 1.5) and “creative sectors” (Figure 1.8) are particularly interesting as these are considered to be the key parts of the “knowledge economy”.

\(^{18}\) Again, as defined in Nesta (2015). See Chapain et al. (2010) for discussion of creative clusters and innovation.
As discussed, it is also possible to calculate a summary statistic of industrial concentration, by sector. One example is the HHI, which we summarise at the aggregate sector level in Appendix Table A1. Mining and quarrying is the most concentrated industry, which is unsurprising as these activities are driven by the suitability of the area, chiefly the availability of resources. However, finance and insurance activities and the “creative” sectors also show high levels of geographical concentration. Agglomeration is important for activities with returns to density – be it from access to a common skill pool, shared amenities and supply chains or knowledge spillovers.\textsuperscript{19}

However, the aggregate industry level in many cases also masks differences at more detailed aggregations. For example, in finance some parts of the sector are highly concentrated (such as fund management and reinsurance) but there are also much less concentrated subsectors

\textsuperscript{19} Kline and Moretti (2013) consider the effects of a largescale regional (largely infrastructure) development programme in the US, and provide evidence of lasting gains in manufacturing due to agglomeration economies which were not present in agriculture. Interestingly, they find that these programmes created a displacement of economic activity, so that there was little gain at the national level. For a review of the research frontier on agglomeration economies using firm level data, see Duranton and Kerr (2015).
including support activities, leasing and non-life insurance (see Figure A1 for HHI across 4 digit subsectors in finance).

FACT 2 – Firm Size Distribution

The size distribution of British firms is important because of longstanding differences in the way that the typical firm of various sizes operates. Large firms tend to be more productive as they are able to benefit from economies of scale and economies of scope, and they also tend to be better managed\textsuperscript{20}, use better technologies and are more likely to export. In general, larger firms invest much more than small ones relative to their size: for example the top 400 firms accounted for approximately £15.7 billion in R&D spend in 2015, 75% of the UK’s total. Small firms, on the other hand, tend to be more labour intensive. These differences will tend to mean that a location where there are many small firms may have high employment, but low productivity and low pay. Areas where large firms co-locate may drive investment and productivity.

It is common in the data to consider the following categories:

- **Micro (0-9).** This category includes sole proprietors, partnerships and other firms with a small number of employees. Zero employee businesses make up nearly 80\% of this category. Examples of this type of company include tradesmen, and the new on-call service industries in which owners operate a personal services company; this could include Uber and Deliveroo, for example. A large portion (73\%) of such businesses are unregistered for PAYE or VAT.

- **Small (10-49).** This category includes firms with between 10 and 49 employees. While firms of this size are small in employment terms, they can be very large on other measures. Investment firms, for example, will often be in this category but could manage very large balance sheets. Around 4\% of UK businesses are classed as “small”. In some datasets, micro and small businesses are together classed as “small”.

- **Medium (50-249).** There were around 40,000 of these mid-sized firms in 2016 (less than 1\% of total firms). As above, these firms could be considered large on other measures. British Land, for example, has fewer than 200 employees, but has a market cap of over £6 billion. As a share of its total business population Britain is sparse in this

\textsuperscript{20} See, for example, Bloom et al. (2014) and Awano et al. (2017).
group relative to Germany, where this stands at 1.8%\(^{21}\) of total firms and which is famous for its “Mittelstand”, the specialist and export oriented medium sized companies.

- **Large (>250).** Firms with over 250 employees are relatively rare—there are around 10,000 of them in the UK on the latest data (0.2% of total firms). They are usually companies, but there are also a small number of partnerships in this size band. Public data show that the top private sector employers are Tesco, Compass Group and Intercontinental hotels—between them these three companies employ over 1m Britons. The sectors that have the highest shares of large firms are mining and quarrying, manufacturing and finance.

**Facts and maps**

The dominance of small firms applies across the UK. Non-employing and small businesses dominate in all regions making up around 99% of firms (Table 2.1). This share has risen in recent years, driven by the rise in self-employment and zero employee businesses which has been the most rapidly increasing category of firm (Figure A2).

**Table 2.1. Firms by size band - percentage of total firms by region**

<table>
<thead>
<tr>
<th>Region</th>
<th>None</th>
<th>1-49</th>
<th>50-249</th>
<th>250+</th>
</tr>
</thead>
<tbody>
<tr>
<td>London</td>
<td>78%</td>
<td>21%</td>
<td>0.6%</td>
<td>0.2%</td>
</tr>
<tr>
<td>South East</td>
<td>78%</td>
<td>22%</td>
<td>0.5%</td>
<td>0.1%</td>
</tr>
<tr>
<td>South West</td>
<td>77%</td>
<td>23%</td>
<td>0.5%</td>
<td>0.1%</td>
</tr>
<tr>
<td>East of England</td>
<td>76%</td>
<td>23%</td>
<td>0.6%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Wales</td>
<td>76%</td>
<td>24%</td>
<td>0.6%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Yorkshire and the Humber</td>
<td>75%</td>
<td>24%</td>
<td>0.7%</td>
<td>0.1%</td>
</tr>
<tr>
<td>East Midlands</td>
<td>75%</td>
<td>24%</td>
<td>0.6%</td>
<td>0.1%</td>
</tr>
<tr>
<td>North West</td>
<td>75%</td>
<td>25%</td>
<td>0.7%</td>
<td>0.1%</td>
</tr>
<tr>
<td>West Midlands</td>
<td>74%</td>
<td>25%</td>
<td>0.7%</td>
<td>0.1%</td>
</tr>
<tr>
<td>North East</td>
<td>73%</td>
<td>26%</td>
<td>0.7%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Northern Ireland</td>
<td>73%</td>
<td>26%</td>
<td>0.7%</td>
<td>0.1%</td>
</tr>
<tr>
<td>Scotland</td>
<td>71%</td>
<td>28%</td>
<td>0.8%</td>
<td>0.2%</td>
</tr>
</tbody>
</table>

*Source: BPE (2016), total economy.*

\(^{21}\) Figure based on calculation using 2015 data on number of businesses by size band from Destatis [https://www.destatis.de/DE/ZahlenFakten/GesamtwirtschaftUmwelt/UnternehmenHandwerk/Unternehmensregister/Tabellen/UnternehmenBeschaeftigungsgroessenklassenWZ08.html](https://www.destatis.de/DE/ZahlenFakten/GesamtwirtschaftUmwelt/UnternehmenHandwerk/Unternehmensregister/Tabellen/UnternehmenBeschaeftigungsgroessenklassenWZ08.html).
Turning now to the private sector (for which detailed firm size splits are available in the BPE and therefore including unregistered businesses), small firms account for around 99% of firms across sectors (see Appendix Figure A3), though the split between non employing businesses and those with 1-49 employees varies: accommodation and food services has a relatively lower share of non-employing businesses (30%) and a higher share in the 1-49 bracket (68%). In education, 94% of businesses are non-employing – these types of businesses include personal tutors, sport or music instructors or other educational businesses.

Again, for detailed spatial analysis we use data on local units from the IDBR, which excludes unregistered businesses. We plot maps of the share of local authority firms in different size bands. Figure 2.1 shows that micro-businesses make up a high share of local businesses throughout the UK, even though unregistered businesses are not included in this map. Small and medium sized businesses (Figure 2.2 and Figure 2.3) are also quite evenly spread, but large businesses show more of a patchwork (Figure 2.4).
Notes: Calculations based on local units at the local authority level (2016), excludes unregistered businesses. Source: IDBR, ONS.
Figure 2.5 shows that there are a number of local authorities where the share of medium sized businesses has grown. This can be either due to entry of new medium-sized plants, or due to growth in existing businesses – we turn to analysis of firm entry and exit in the next section. Analysis of the distribution of “high growth” firms across space and sectors is an area for future work.  

Notes: Calculations based on local units at the local authority level (2016), excludes unregistered businesses.
Source: IDBR, ONS.

22 There are a number of different ways to define “high growth” businesses. A common definition is firms that report more than 20% in turnover or employment growth in the most recent year (Brown and Lee, 2014). The OECD classifies businesses as high growth if they have more than 10 employees, and are growing in either turnover or employment at a rate of 20% or higher over three years. Eurostat’s definition is the identical but uses a lower threshold of only 10%.
FACT 3 - Business Demography

When headline numbers are used in isolation the number of active firms in an area or category might appear stable. Across the UK, for example, the share of large firms to total private sector firms has remained at around 0.1% since 2000. The stability of such numbers can mask the extent to which business populations are fluid or sticky. One observation made by economists following the 2008 crash was that the number of bankruptcies was surprisingly small. A subsequent worry arose that inefficient or unproductive firms may be hanging on (often aided by their banks). An economy in which this happens risks a kind of economic ossification. The concern, in productivity terms, is that factors of production—everything from bank loans and market capital, workers, and software and patents—could be misallocated or “stuck” in outdated companies, unable to flow to new and innovative ones. Looking at the flow of companies—the extent to which existing companies wind up, and new ones are started up—is one way to examine these concerns.

- **Birth rates.** This is the number of new firms established divided by the existing active business population. “Birth” is defined as an enterprise registering for VAT or PAYE. Active business are defined as those that had either turnover or employment at any time during the reference period.
- **Death rates.** This is the number of firms that go out of business, divided by the active business population at the start of that year. It includes businesses that have ceased trading and are identified as those that deregister for VAT or PAYE.
- **Survival rates.** This is the share of firms that survive for a specified number of years after their “birth”.

**Facts and maps**

The ONS business demography dataset gives detailed breakdowns of company births, deaths, active enterprises and survival rates, and also includes data for Northern Ireland in its aggregates. Across the UK, there were 383,000 company births in 2015, 252,000 deaths and 2.6 million active enterprises. The birth rate is therefore higher than the death rate (at 14%

---

23 Figures for the private sector only, using BEIS BPE which is a consistent source of information for a time series of businesses by size band. Note that figures are rounded.
24 Forbearance refers to the practice of banks granting companies with interest payment holidays. Most analysis to date has estimated a limited impact on productivity.
25 There is a growing body of literature on resource misallocation and productivity in the UK, with a particular focus on capital market frictions, see for example Riley et al. (2015), Barnet et al. (2014) and Besley et al. (2017).
versus 9% respectively). The number of births has exceeded the number of deaths since 2011: as birth rates have grown steadily in all regions and death rates fallen after an initial rise to 2012 following the financial crisis.\footnote{ONS analysis at the Local Enterprise Partnership level using data from 2004-2011 showed that the financial crisis had a negative effect on birth rates, and positive effect on death rates, but that effect on death rates was slower to materialise.}

Figure 3.1 shows that most local authorities in Britain have birth rates over 10%. In some areas, such as Bolsover, Barking and Dagenham and Newham, over 25% of active businesses were registered in the previous year. Conversely, Figure 3.2 shows that for most of Great Britain, death rates are below 10%, and peaks are close to this with 17% in North East Lincolnshire and 14% in Spelthorne and Lambeth being the three highest values.

\begin{figure}[h]
\centering
\begin{tabular}{cc}
\includegraphics[width=0.45\textwidth]{birth_rates.png} & \includegraphics[width=0.45\textwidth]{death_rates.png} \\
Figure 3.1. Company birth rates, 2015 & Figure 3.2. Company death rates, 2015
\end{tabular}
\caption*{Notes: Company births as \% of active population and company deaths as \% of active population by local authority. Source: ONS Business Demography.}
\end{figure}
However, in all three of these birth rates outstrip death rates, meaning the number of businesses in these local authority areas grew overall. In fact, there are only two areas where business numbers are in decline – North Kesteven and Eden. This is in stark contrast to figures for 2010, when 285 areas registered a decline (Figure 3.3). Yet, overall, these maps reveal that firm “births” and “deaths” are spread relatively evenly across the UK, and therefore do not appear to be a key explanatory factor of spatial differences in performance.

**Figure 3.3. Net rate of change, 2015**

Notes: Calculations based on company births and deaths by local authority. Source: ONS Business Demography.

This does not change when we consider 3- and 5-year survival rates. Figure 3.4 shows that 5-year survival rates are quite evenly spread, but there appears to be a pattern of lower 3-year survival rates in coastal areas, in particular in the South West, North East and West of England (Figure 3.5).
FACT 4 - The Spread of Productivity

It is well known that UK average productivity levels lag our main comparators (in the latest data, UK productivity was around 30 percentage points lower than that in France and the US, and 36 percentage points less than in Germany) but this overall headline masks significant variation across space. There is large variation in performance across the regions of the UK, but there is also substantial variation within regions. These differences are longstanding, and there has been little progress towards reducing them despite a number of policy initiatives over the years.²⁷ Understanding these patterns and the reasons underlying them is crucial for policy makers developing an industrial strategy for the UK.

At its most basic, productivity gives a measure of output produced per unit of input, and labour productivity is the most common measure of this type. The standard measure of output is “Gross Value Added”, this is the value of goods and services produced in an area. It is calculated as output minus intermediate consumption. Dividing GVA by the number of

²⁷ For recent discussion, see Overman (2017).
workers, or the total hours worked, gives two alternative measures of labour productivity. GVA per hour is more directly comparable as workers in different regions or sectors might work different hours on average. In some cases, GVA per worker is easier to calculate as it requires employment data (which are recorded in the BRES firm level survey data or the IBDR), rather than additional estimates of average hours worked (which tend to be based on Labour Force Survey or Annual Population Survey data).

The ONS produces regional and sub-regional estimates of productivity that are as consistent as possible with the national accounts. It is important to note that such measures are produced on a nominal basis only and do not correct for differences in prices between different areas of the UK. 

**Facts and maps**

Figure 4.1 illustrates the spatial variation in GVA per hour for NUTS3 regions – which are equivalent to counties, unitary authorities or districts. At the bottom of the productivity scale is “West Wales and the Valleys”; an area with little industry and agriculture as the main employer. Here, productivity is 21 percentage points lower than the UK average.

---

28 The ONS are working on producing productivity data using the “production approach” which does correct for differences in regional prices. For more discussion see: [https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/regionalandsubregionalproductivityintheuk/jan2017#methodology](https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/regionalandsubregionalproductivityintheuk/jan2017#methodology).
At the other end of the scale there are three high-productivity hubs: the oil industry around Aberdeen, the area around Greater Manchester and a band of productivity in the South. Contrary to popular belief the high productivity of London does not spread into the South East but rather spreads west along the M4 to commuter towns like Reading and Slough. Productivity in London overall is 30 percentage points higher than the UK average, the figure for “Inner London-West” is 45 percentage points and this the highest productivity sub-region in the UK. Figure 3.2 shows that the situation of many of the low productivity regions (most of Wales and the North of England) in 2015 has worsened over time.

The ONS has recently published some analysis of productivity distributions within sectors and regions.\(^{29}\) This is based on the ABS, and therefore excludes certain sectors and unregistered businesses.\(^{30}\) This analysis shows that there is a wider dispersion in high overall productivity regions like London and the South East than in lower productivity regions like Wales and the North East (Figure A4). London shows the highest dispersion and also a higher proportion of

\(^{29}\) ONS (2017a)
\(^{30}\) The ABS excludes agriculture, finance, the public sector.
high productivity businesses. Interestingly, this analysis shows that productivity differences between regions are not primarily driven by a different sectoral mix (at least at the broad sector level), but rather differences in productivity within the same sector across regions.\(^{31}\) For example, London’s higher productivity is not simply due to its sectoral make-up, but largely reflects the fact that within certain industries (and particularly in the knowledge intensive service industries) London firms are more productive than firms in the same sector in other regions. We discuss sectoral differences in more depth in the next section.

The types of factor underlying spatial differences in productivity between firms in the same sectors include differences in factor markets (for example access to skills, capital, infrastructure, technology and R&D or management practices) or in product markets (competition, regulation or other factors that affect demand conditions).\(^{32}\) They could also reflect the differential clustering and associated spillovers. In the UK, recent CBI analysis suggests that the most important factors based on correlations with local area productivity are skills, transport links, management practices and export/innovation intensity (CBI, 2017).

**FACT 5 - The Leading and Lagging Sectors**

Building on the existing sectoral support in the coalition’s industrial strategy, the current government’s approach is most likely to continue to include a strong element of sectoral support for strong and growing sectors that possess international comparative advantage. It is important to understand which sectors are likely to benefit from government intervention, and also whether there are cases where a broader “missions” approach might be more appropriate.\(^{33}\) However, consideration of the productivity performance across sectors reveals that some of the sectors with the highest share of employment have particularly low levels of productivity (Figure 5.1). Industrial policies specific to these sectors might generate large aggregate gains.

**Facts and maps**

We begin with a simple aggregate calculation of sectoral GVA per worker. The benefit of this measure is that it can be calculated using ONS GVA and employment aggregates for the whole economy including sectors excluded from the ABS (in particular finance, agriculture and the

\(^{31}\) In similar analysis at a more spatially disaggregated level, the CBI also concludes that sectoral mix is not the primary driver of differences in productivity (CBI, 2017), but it does identify some NUTS3 areas that do either appear to lose or gain due to their sectoral mix.

\(^{32}\) See Syverson (2011) for a review.

\(^{33}\) See Davis, Martin and Valero (2017) for a response to the government’s January 2017 Green Paper on industrial strategy and more discussion on these issues.
public sector). Figure 5.1 plots sectoral productivity relative to the UK average, and also the employment share of each sector. Real estate and mining have very high relative productivities\(^{34}\) and are excluded from the chart for scaling reasons - but these sectors both have low employment shares (1.8% and 0.2% respectively). Similarly, electricity and gas and water and waste have high productivity but represent a very small employment share in the UK.

High productivity sectors with higher employment shares include finance, ICT, construction and manufacturing. Professional, scientific & technical services is an area where the UK has experienced strong productivity growth in recent years (Figure A11), and possesses strong comparative advantage in global trade (see discussion in Fact 7), yet overall its productivity is just below the UK average. This can be explained by the fact that this sector has a high degree of dispersion both within and across regions in the UK (see discussion below) – there are some very high productivity firms within this sector, but also some less productive firms.

Lower productivity sectors with a high employment share are a particular concern with respect to holding back average UK productivity: these include wholesale and retail trade, accommodation and food and administrative services. These sectors are commonly referred to as “low-wage” or “low-productivity” sectors. Given their high employment share, large aggregate gains could be made by raising their productivity performance: if the productivity in these sectors rose to that of the average UK firm, aggregate productivity would rise by 13%\(^{35}\).

It is important for policymakers to understand these differences, since the policy prescriptions for raising productivity in these different types of sector vary. In higher productivity sectors, high-end skills and policies to stimulate innovation are likely to be important. In lower productivity sectors, investment in existing technologies, better management practices, and improved basic or technical skills appear more relevant.\(^{36}\)

\(^{34}\) At 726% and 521% of the UK average respectively.

\(^{35}\) This figure is based on a simple calculation whereby the productivity in these three sectors is set at the UK average level, a new total UK GVA is then calculated based on multiplying GVA/worker by the number of workers by sector, and then adding up the sectoral totals. This is then divided by total employment to get the new UK average productivity level.

\(^{36}\) For more discussion of policy prescriptions for the “low-wage” sectors, see Thompson et al. (2016).
Figure 5.1. Sectoral productivity relative to average for Great Britain

Notes: Analysis excludes Northern Ireland (2% of UK GVA) as consistent employment data by sector is not available; non-market economy sectors (education, human health not included on chart). Mining and real estate excluded. Source: ONS GVA income approach - all sectors, and employment from BRES, NOMIS.

Now focusing on the sectors covered in the ABS, we can look in more detail at productivity by firm size band, and the distribution of firms within sectors. Figure 5.2 shows that in most sectors, the smallest firms (those in the 1-9 size bracket37) have lower than average productivity. Notable exceptions are administrative services and retail and wholesale trade, where large firms seem to have relatively low productivity on average.

37 This includes registered non-employing businesses as firms with an employment of 1 - the sole proprietor.
More work is needed to understand the dispersion of firms within sectors and regions. Recent ONS analysis has begun to address this. Patterns differ between and across regions between “low” and “high” productivity sectors. In both wholesale and retail trade and accommodation and food service industries, the distribution of firms is quite similar across regions, though London does perform marginally better than other regions (see Figure A5). By contrast, in professional, scientific and technical activities, there is a much bigger spread in London (and in other regions too), and median productivity in London is much higher than in other regions (Figure A6).

It is useful to consider a more granular disaggregation of sectors to understand what is driving these patterns. As an example, we examine the distribution of NUTS3 regional productivity at the 2-digit level for professional, scientific and technical services (Figure 5.3). This shows that the regional dispersion in this sector is in fact driven by scientific research and development, this is likely to reflect the fact that in many cases, and by its nature, the payoffs from investments in R&D are uncertain.
Figure 5.3. GVA per worker in professional, scientific and technical services

Notes: Output per worker at the NUTS3 level, for 2 digit subsectors of the professional, scientific and technical services industry. Source: ABS and BRES, ONS.

FACT 6 – Innovation in the Regions

Innovation is an important source of growth in the long term, and is crucial for enabling certain sectors to stay on the global technology frontier. It is also an area where market failure is well-understood – since innovations tend to generate spillovers which are not always internalised by the firm producing the innovation, the market left to its own devices tends to underinvest in R&D. This is a key justification for government subsidy of innovative activity, and efforts to encourage spillovers. Key measures of innovation include:

- **Research and development (R&D) expenditure.** This is the standard measure of innovation input. Often this is expressed as a share of GDP, to give a measure of R&D intensity. Data are recorded by source of R&D expenditure, often split between government, business or higher education institutions.
• **Patents.** Patents are a standard measure of innovation output. Patent quality can be determined by linking to subsequent citations in future patents or academic papers.

• **Intangible assets.** Traditional measures of innovation do not always capture all the innovative activities of firms, particularly in the service sector. Intangible assets such as branding and organisational practices, together with more traditional R&D, have been shown to be important for a number of sectors. Yet, intangible assets tend to be treated as intermediate consumption, rather than investment in the national accounts, and the UK’s investment performance is substantially better once intangibles are accounted for.  

**Facts and maps**

In absolute terms, London and the South East (combined) dominate R&D spending, accounting for nearly a third of total business R&D (Figure A7). But over 20% of UK business R&D is carried out in the East of England, and there it accounts for over 3% of GDP. At a more disaggregated level, Britain’s most innovative regions are East Anglia, Cheshire and Herefordshire; reflecting the impact of Cambridge University, chemicals firms located along the River Mersey and a clustering of the life sciences and pharmaceuticals industry in Hertfordshire (Table 6.1 and Figure 6.1).

We observe a broadly similar pattern across the regions in patents filed to the European Patent Office (EPO) per million of active population (Figure A8). London does better on this measure than the previous measure, which looked at only business R&D, reflecting research institutes and universities (both prevalent in London) filing patents. Zooming in further (Figure 6.2), the top five performers are again not surprising. At NUTS 3 level, the top five performers are all well-known, large technology clusters: Cambridgeshire CC (strong in pharmaceuticals and life sciences), Coventry, Oxfordshire (pharmaceuticals, Harwell cluster and UK national research facilities) and Wiltshire CC plus Swindon (home to Intel as well as air and space industry). Areas in England generally do better than areas in Scotland and Wales (four of the five worst performing areas are here, only one is in England).

---

38 See, for example, Goodridge et al (2014).
Table 6.1. Business R&D as % GDP

<table>
<thead>
<tr>
<th>Top 10 NUTS2 regions</th>
<th>%</th>
<th>Bottom 10 NUTS2 regions</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>East Anglia</td>
<td>3.33</td>
<td>South Western Scotland</td>
<td>0.4</td>
</tr>
<tr>
<td>Cheshire</td>
<td>3.29</td>
<td>Devon</td>
<td>0.39</td>
</tr>
<tr>
<td>Herefordshire, Worcestershire and Warwickshire</td>
<td>3.13</td>
<td>Greater Manchester</td>
<td>0.38</td>
</tr>
<tr>
<td>Bedfordshire and Hertfordshire</td>
<td>2.89</td>
<td>South Yorkshire</td>
<td>0.35</td>
</tr>
<tr>
<td>Berkshire, Buckinghamshire and Oxfordshire</td>
<td>2.32</td>
<td>Lincolnshire</td>
<td>0.29</td>
</tr>
<tr>
<td>Derbyshire and Nottinghamshire</td>
<td>2.19</td>
<td>Highlands and Islands</td>
<td>0.28</td>
</tr>
<tr>
<td>Gloucestershire, Wiltshire and Bristol/Bath area</td>
<td>1.81</td>
<td>Inner London - East</td>
<td>0.26</td>
</tr>
<tr>
<td>Hampshire and Isle of Wight</td>
<td>1.69</td>
<td>Outer London - South</td>
<td>0.26</td>
</tr>
<tr>
<td>Essex</td>
<td>1.48</td>
<td>Cornwall and Isles of Scilly</td>
<td>0.22</td>
</tr>
<tr>
<td>West Midlands</td>
<td>1.21</td>
<td>Outer London - East and North East</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Notes: Total intramural R&D expenditure by business enterprise sector (2014), as a percentage of GDP. Source: Eurostat.

Figure 6.1. Business R&D as % GDP

Figure 6.2. Patents per million 16+ population, 2012

Notes: Left: Total intramural R&D expenditure (GERD) by sectors of performance and NUTS 2 regions for 2014. Right: Patent applications to the EPO by priority year by NUTS 3 regions for 2012 (latest year available). Source: Eurostat.
Given the dominance of services in the UK economy, and the fact that traditional measures of R&D fail to account for many of the innovative activities in the service sector, more work is needed to calculate intangibles across space.

**FACT 7 – Unbalanced Exporting**

Exports are an important potential source of growth for businesses. This is not only due to the direct impact of increasing sales through access to new international markets, but also due to the long-run effects of trade on productivity. Trade can have positive effects through increasing competition, making firms seek efficiencies and stimulating innovation.\(^\text{39}\) Yet, in aggregate, the UK runs a trade deficit, exporting substantially less than it imports, and this has been the case since the late 1990s. This is largely driven by a trade deficit in goods overall - in fact the UK runs a trade surplus in services, but the volume of services trade is much smaller than that in goods.\(^\text{40}\)

The relatively poor aggregate export performance of the UK has long been a concern for policymakers, and today the UK faces significant new risks in this area due to Brexit (discussed in more detail at the end of this section). The EU is the UK’s largest trading partner, and reduced access to the Single Market is the likely outcome whatever form Brexit takes.\(^\text{41}\)

Research points to a number of factors explaining the UK’s existing export shortfall. One explanation is the size distribution of UK firms, as we have seen UK business is dominated by smaller firms but it is larger businesses that are more likely to be exporters. Limited access to finance can hold back exports too. Recent research into what explains firms’ propensity to export suggests that financial factors – including the availability of equity finance – play an important role. Exporting can imply fixed start-up costs, meaning that entrepreneurs unable to access capital cannot finance their exports.\(^\text{42}\)

It is useful to consider the following measures of export performance:

- **Exporter status.** The ABS is a good source of information on whether or not businesses export, and allows regional, sectoral and size-band analysis of the share of firms that export both goods and services.

---

\(^{39}\) See for example, Bloom et al (2014) or Sampson (2016).

\(^{40}\) See LSE Growth Commission (2017), Chapter 4 for a summary of the UK’s trading position.


\(^{42}\) See Manova (2013) and Chaney (2016).
- **Export intensities.** The value of exports per worker at a local level can be calculated using regional estimates of goods (obtained from the HMRC regional trade database) and services exports (from ONS experimental export statistics).

- **Revealed comparative advantage.** This is a measure of a country’s specialisation in a particular sector in trade. It is calculated by comparing the sector’s share in a country’s exports to that sector’s share in global exports. If the ratio of these two measures is greater than 1, a country is said to have a revealed comparative advantage in a sector. It is useful to bear RCA in mind when assessing the share of firms in different sectors that engage in export activity.

**Facts and maps**

Figure 7.1 illustrates the stark relationship between firm size and export activity. This is actually more pronounced for goods than for services, but in both cases, the share of business exporting increases as firm size increases.

**Figure 7.1. Exporters by size band, per cent of total firms (2015)**

![Exporters by size band, per cent of total firms (2015)](image)

*Source: ABS, ONS.*
Spatial patterns of exporting are uneven at the regional level (Figure 7.2). London and the South East host the highest number of exporting firms, and they represent around 12% of total firms in both regions. The lowest share of exporting firms for any region stands at fewer than 6% in Wales, only marginally higher than in the North East.

**Figure 7.2. Regional exporters**

![Graph showing regional exporters](image)

*Notes: Exporters of goods and/or services total count and as a share of total reporting units. Source: ABS, IDBR, ONS.*

It is also useful to consider a more comparable measure of export activity: export intensity gives the average value of exports per worker. Regional data on total exports are available for goods exports from HMRC’s regional goods database and for service exports from the ONS experimental regional statistics for the services trade. We apportion this data to NUTS3 regions, for a more spatially disaggregated picture.43

---

43 The most granular level export statistics are currently released at the NUTS1 level. We model NUTS3 goods and service exports. For this, we use the existing regional HMRC goods exports statistics and the ONS experimental service exports statistics. Both are at NUTS1 level, splitting exports out by broad sectors. To meaningfully apportion regional exports to NUTS3 regions we obtain, at the two digit level, export intensities from the Input Output tables and employment figures, also at two digit level, for each of the NUTS3 regions. These are used as factors to allocate a share of regional exports to its respective NUTS3 regions.
We have seen in Figure 7.2 that the North East has a low share of exporting firms. The more granular data on goods (Figure 7.3) also point to the North East performing particularly badly on the export intensity measure - with the exception of Northumberland, which has higher export intensity than the rest of the region. However, we cannot make any inference whether a few or many firms are responsible for this. Generally, areas with higher exports per worker are concentrated in the higher productivity areas of London and the South East and in pockets of Scotland. This concentration is even more pronounced for services exports per worker (Figure 7.4).

Examining these two maps further suggests that high export areas are also areas of high productivity. Figure 7.5 examines the correlation for service exports, where it appears strong. For goods exports, however, the relationship is less clear (Figure 7.6).
Notes: Data at NUTS3 level. Sources: ONS service trade experimental statistics, HMRC regional goods exports database, BRES, ONS Regional and Subregional Productivity (Jan 2017). Data for 2015.
Table 7.1 shows that there is also large variation by sector. The sectors are ordered by the share of firms that export goods and/or services. As we would expect, manufacturing has the largest share of goods exporting firms, at around 22%. There are large shares of service exporting firms in mining and quarrying, ICT, arts and entertainment and professional, scientific and technical services. These shares are related to areas where the UK has global comparative advantage. In goods, 18 out of 110 traded sub-sectors have an RCA larger than one; the highest RCA being in Aerospace. In services, RCA is calculated at a more aggregated level; in 5 sectors the UK has an RCA larger than one, including insurance, finance, other business and cultural/recreational services.44

Table 7.1. Sectoral exporters

<table>
<thead>
<tr>
<th>Section</th>
<th>Goods and/or services</th>
<th>Goods</th>
<th>Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining &amp; quarrying</td>
<td>27%</td>
<td>9%</td>
<td>18%</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>25%</td>
<td>23%</td>
<td>9%</td>
</tr>
<tr>
<td>Wholesale &amp; retail, repairs</td>
<td>17%</td>
<td>15%</td>
<td>4%</td>
</tr>
<tr>
<td>Information &amp; Communications</td>
<td>14%</td>
<td>3%</td>
<td>13%</td>
</tr>
<tr>
<td>Arts &amp; entertainment</td>
<td>14%</td>
<td>3%</td>
<td>12%</td>
</tr>
<tr>
<td>Professional, scientific &amp; technical</td>
<td>14%</td>
<td>2%</td>
<td>13%</td>
</tr>
<tr>
<td>Water &amp; sewerage</td>
<td>13%</td>
<td>11%</td>
<td>4%</td>
</tr>
<tr>
<td>Education</td>
<td>12%</td>
<td>3%</td>
<td>9%</td>
</tr>
<tr>
<td>Administrative &amp; support</td>
<td>9%</td>
<td>3%</td>
<td>7%</td>
</tr>
<tr>
<td>Transport &amp; storage</td>
<td>6%</td>
<td>2%</td>
<td>5%</td>
</tr>
<tr>
<td>Other service</td>
<td>6%</td>
<td>3%</td>
<td>4%</td>
</tr>
<tr>
<td>Health &amp; social work</td>
<td>3%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>Real estate</td>
<td>3%</td>
<td>0%</td>
<td>2%</td>
</tr>
<tr>
<td>Construction</td>
<td>2%</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Accommodation &amp; food</td>
<td>1%</td>
<td>0%</td>
<td>1%</td>
</tr>
<tr>
<td>Agriculture, forestry &amp; fishing</td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>Electricity &amp; gas</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

Notes: ABS exporters of goods and/or services (2015), ONS. Sectors in order according to overall share of exporters of goods and/or services.

Recent CEP analysis has estimated the local impacts of Brexit due to the increases in trade barriers under differing assumptions for “soft” and “hard” Brexit. Dhingra et al. (2017) find that all local authorities would see a loss in GVA following Brexit, but the most affected areas in both scenarios are those in the South of England and urban areas which are specialised in certain sectors where trade with the EU is most prevalent. Specifically, cities that specialise in financial and business services, which are predicted to experience the largest rise in tariff and non-tariff barriers following Brexit. Understanding the local impacts of Brexit through changes

44 For more detail, see the chapter on “Openness” in the LSE Growth Commission.
to trade, together with immigration, FDI and innovation will be crucial for policymakers developing an industrial strategy with place based elements.

**FACT 8 - The UK’s Coastal Malaise**

Regional imbalances are a long-standing weakness of the UK’s economy, most prominently those between the North and South.\(^4\) Like the North, the UK’s coastal areas have also long been considered to lag behind the more productive Southern mainland but present a different challenge. As a group, coastal areas generally are geographically isolated and have more unbalanced, low skill low productivity economies. They tend to depend on single, and often declining, sectors creating greater exposure to economic shocks in some places (tourism in former seaside towns, but also former agricultural and mining hubs).

**Facts and maps**

Figure 8.1 illustrates the previous point - UK coastal areas are relatively more intense in the accommodation and food service sector than the rest of the country, a sector that is at the core of tourism activities.

\(^4\) Recent analysis of mortality rates has shown that North-South disparities have risen since the 1990s, see Buchan et al. (2017).
This is also evident in a slightly dated analysis of 121 seaside towns, which provides some evidence that many seaside towns are still almost fully dependent on tourism for employment, with the employment in tourism in 21 towns even at above 50% (Beatty et al, 2014). As tourism is a highly seasonal activity, shocks and generally the economic cycle will be felt much more strongly in these areas. While low skill low productivity sectors are large employers, higher productivity sectors are underrepresented, for example the professional, scientific and technical services (Figure 8.2).

Their current low skill base (ONS, 2014) will likely make a move to more productive sectors difficult. At the same time, coastal areas’ population dynamics present further challenges to their economies. As illustrated by Figure 8.3, mortality rates are much higher in and around the British coasts than inland, in particular the capital region. An older, sicker and more rapidly ageing population will mean rising demand for health and care services, a sector already
accounting for a large share of employment in many areas, and generally will exert additional strain on local economies and in particular local governments that commission and fund care.

Figure 8.3. Crude death rate per 1,000

Source: ONS, data for 2015.

The maps in this section are based on local authorities, which clearly illustrate a difference between coastal and inland areas. However, of the development of industrial policies to address such disparities requires more detailed analysis, with a clear definition of “coastal” versus “inland”. Different definitions are currently applied to analysis at the local authority level - from simple distance to the coast measures or grouping all coastal communities with a sea border as coastal if 50% of its population is within 50 kilometres of the sea (used by Eurostat) to highly detailed area classifications used by the ONS in their analysis of census data (ONS, 2014).
FACT 9 - The Power of a Single Firm

Our “bottom-up” approach to mapping business in the UK produces some striking results. Ribble Valley and Hyndburn appear as a centre for wholesale and retail trade, and Salford appears as an important location for real estate activities outside of London; South Dorset as an important location for finance.

Patches of high productivity in north Lancashire, Derby and Brentwood are influenced by the major plant of BAE Systems, Rolls Royce and Ford, respectively. Further examples are Tata Steel in Port Talbot and Airbus in Broughton (Flintshire), both in Wales. The same can also be true for service sector firms, for example Sky in parts of Scotland.

This also occurs in other European countries. For example, in Germany Volkswagen drives the strong productivity performance of the Wolfsburg area – its residents largely depend on Volkswagen and its suppliers for employment. VW alone employs 60,000, in a city with a working age population of only 77,000. Elsewhere, BMW, which is headquartered in Munich and produces nearby in Milbertshofen, is of lesser importance to the immediate area.

It is reasonable to assume that the smaller the geographic area, the more likely it is that a single firm drives its economic performance. Over and above their direct impact on local GVA, large firms can also generate spillovers. In fact, research based on the US has shown how the performance of single large firms can help explain fluctuations at the national level.

The implication that individual companies can be hugely important for local or regional economies is clearly a risk—if the company fails the region will be in trouble—but it is also an opportunity and shows that attracting just a few successful companies to a small area can transform its economy.

Facts and maps

The companies mentioned above are all listed companies, and the location of their major sites are public knowledge allowing us to map them precisely. Maps can be drawn for any given sector, as an example we choose the car industry.

In Figure 9.1 we plot all the 19 car manufacturing plants in Britain, and their employment. Figure 9.2 shows their share of local authority manufacturing employment (the underlying data for these charts is summarised in the Appendix (Table A2)). These data show that Mini’s

---

46 See Greenstone et al. (2010) for evidence that “million dollar” plants generate local spillovers in US counties. Bloom et al (2016) use a similar methodology to find evidence that such plants generate spillovers in terms of better management practices in nearby plants.

47 See for example Gabaix (2011).

48 We map these companies’ plants rather than their headquarters, information on which is available from a mix of Bureau van Dijk, company websites and other sources and which we triangulate with each other.
Cowley plant makes up 89% of manufacturing employment in Oxford, though it only represents 3% of total employment (excluding public administration) there. Toyota in South Derbyshire makes up the highest share of total non-public administration employment, at 10%.

**Figure 9.1. Car companies, employment**  
**Figure 9.2. Share of manufacturing employment**

*Source:* Car manufacturing plants obtained from SMMT, and employment data from Bureau Van Dijk. Local authority employment from NOMIS. Notes: Two Rolls Royce plants are excluded as they do not manufacture cars but focus on defence and civil engineering.
FACT 10 - The German Benchmark

Germany is an interesting comparator for the UK for a number of reasons. The two economies are neighbours in a global ranking of countries by GDP, ranking 4th and 5th respectively. Both have a strong industrial heritage yet have faced economic underperformance with a strong regional dimension: broadly speaking in the UK there has been a division between North and South, whereas in Germany the division is between East and West. Finally, Germany is a good place to examine policy solutions: its economy was seen as the weak link in Europe in the early 2000s, yet since the 2010-12 euro crisis it has outperformed its EU peers, including the UK. In this paper we compare the UK’s regional and sectoral productivity and innovation to Germany, similar exercises can be carried out for other comparator countries such as France and the US.

Facts and maps

A number of points emerge from a comparison of German and British productivity performance on a geographic level:

- **The aggregate gap:** At an economy-wide level there is a large gap between the UK and Germany. In the latest data, UK GVA per hour is 36 percentage points below that of Germany. Most of Britain’s high performing regions (with the only exceptions being in central London) are far behind the German average (Figure 10.1). Likely reasons for the aggregate gap include Germany’s higher investment in both physical capital and R&D, strong export performance, better quality vocational and technical education and management practices in firms. Since the financial crisis, UK productivity performance has been particularly poor and in the latest ONS aggregate data is lower than its pre-crisis level. Comparing the sources of productivity growth pre and post crisis (to 2014) reveals that in Germany, productivity overall, and Total Factor Productivity (TFP) have continued to grow post 2008, while in the UK TFP growth has been negative (see Appendix Figure A9).

---

49 ONS (2017b).
50 TFP is the portion of productivity that is unaccounted for by measurable factor inputs such as capital and labour, and reflects the efficiency or intensity with which inputs are used in the production process. It is therefore a measure of technological progress.
Figure 10.1. NUTS3 GVA per hour versus German average (=100)

Notes: GVA per hour at NUTS3 level in 2014, with Germany’s overall productivity set to 100 (index). Source: UK data from ONS Regional and Subregional Productivity release (Jan 2017), German data from the federal states national accounts (VGRdL).

- **Germany’s regional strengths: multiple productivity hubs.** Germany has many high productivity hubs across the South and West including Bayern, Baden-Württemberg, Hesse and North Rhine-Westphalia. Figure 10.1 shows many spots of the highest productivity: many of these are high-productivity areas around German cities including Cologne, Frankfurt, Stuttgart and Munich—and many of these cities are connected by a hinterland that is itself high productivity. By contrast, the UK’s high productivity regions are few, and are more tightly bunched. The only example of a linking is a high-productivity area that spreads west along the M4 towards Bristol.
Germany’s regional weaknesses: the east. A productivity map of Germany suggests that despite its aggregate higher productivity than the UK, the country’s regional disparities appear more stark than those in the UK. The German Länder that were part of the German Democratic Republic until 1990 are systematically lower productivity; that this has been identified in Germany as a problem since reunification suggests that regional productivity differences can become entrenched and hard to shift even in strongly performing economies.

Catch up growth: Between 2000 and 2014 the low-productivity regions in Germany have caught up with better performing ones. This can be seen in Figure 10.3 - in 2000 the distribution is “bi-modal” with a peak showing the large number of low productivity regions; by 2014 the second peak has disappeared: more regions have caught up with the average region. The UK on the other hand has seen the opposite process and is starting to develop a “thick tail” of poorly performing regions. This suggests that while Germany’s lagging regions may be catching up, the UK’s are falling behind.
Figure 10.3.
A. Distribution of regional productivity, UK

B. Distribution of regional productivity, Germany

Notes: Distribution of GVA per hour at NUTS3 level, with the overall country’s level set to 100 (index). Source: UK data from ONS release (January 2017), German data from the federal states national accounts (VGRdL).
• **Regional innovation.** In 2015, the UK spent 1.7% of GDP on research and development (R&D) while Germany spent close to 3%. Mapping R&D for the UK and Germany (Figure 10.4) shows that this is more heavily concentrated in the South (in Bavaria and Baden-Wurttemberg’s industrial regions) though Lower-Saxony in the North also has two areas with above 2.5% of GDP spending. All these areas are home to Germany’s carmakers as well as other high tech industry.

**Figure 10.4. Business R&D as a percentage of GDP**

<table>
<thead>
<tr>
<th>UK</th>
<th>Germany</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Map showing R&amp;D concentration in the UK and Germany" /></td>
<td></td>
</tr>
</tbody>
</table>

*Notes: Total intramural R&D expenditure (GERD) by sectors of performance and NUTS 2 regions. Data for 2013 (latest year where data are available for both countries). Source: Eurostat.*

• **Gaps across the sectors.** The productivity gap exists in most sectors when the UK is compared against Germany (Figure A10), the only exceptions are mining and finance. The service sectors have driven productivity growth in the UK both before the financial crisis and since, whereas manufacturing has been more important in Germany (Figure A11). Productivity growth in professional, scientific, technical and administrative services has held up relatively well a pattern that differentiates the UK from Germany where productivity in these sectors has fallen.

---

31 The US also spends closet to 3%; the OECD average is 2.4%. This includes government spending. The portion of R&D that is carried out by businesses shows a similar pattern: UK businesses spend around 1% of GDP on R&D, while German ones (and those in the US) spend close to 2%. 

46
REFERENCES


DATA APPENDIX

In this paper we provide a geographic view of British business performance. We use what we consider to be the best available data in each map and chart. There are a number of official sources available and navigating them can be confusing and time consuming. Given the rising interest in UK corporate performance and location across Whitehall and the fact that the ONS is reviewing the way it collects economic data, this section provides a brief overview of the available data, its strengths and weaknesses and ideas for future improvements.

Access to data varies considerably by dataset. First, high-level summaries are available in ONS or other government publications. Often the accompanying spreadsheets to these give more detail, and the ONS also publishes extra analysis in user requests. Second, detailed statistics with more granular breakdowns can be accessed via “NOMIS” (the ONS service for detailed UK labour market statistics). Third, it is also possible to work with the underlying microdata (administrative or survey data) in a secure environment. Where possible in this paper we use disaggregated summary statistics released by the ONS, as this has the advantage that the data have been prepared in a way that is consistent with ONS methods for the National Accounts.

Table 1 summarises the features of key datasets which are useful for understanding British business. An underlying source of business data is the Inter-Departmental Business Register (IDBR). This is a live record of VAT or PAYE registered businesses. Firm-level data, (“microdata”) can be accessed via the Business Structure Database (BSD) which gives an annual snapshot of the IDBR, and detailed summary statistics are available in NOMIS. The IDBR provides information on location, industry, employment, turnover, foreign ownership, legal status, birth and death of the business. Data are divided into “local units” (the plant) and “enterprises” (the overall business organisation, many of which consist of more than one plant or business site).

The ONS publishes two main annual reports based on IDBR data: “UK Business: Activity, size and location”, and the “Business Demography”. Detailed summary statistics are made available on the ONS website or NOMIS. “UK Business: Activity, size and location” is useful for geographical analysis, since it gives data on local units or plants as well as information at the “reporting unit” business level. The “BIS Business Population Estimates” is another source which includes an estimate of the unregistered business population, obtained by combining IDBR data with the ONS Labour Force Survey and HMRC self-assessment tax data.

The IDBR provides the population of firms from which samples are chosen for business survey data. The largest business survey in the UK is the “Annual Business Survey” (ABS), which covers the production, construction, distribution and service industries representing approximately two thirds of the UK economy and contributes to the UK’s National Accounts. Financial and other business data are collected in this survey at the reporting unit level, and for geographic analysis needs to be apportioned to local units. The ONS releases a number of annual publications based on the ABS (for example “ABS: UK non-financial business economy statistical bulletins” or “ABS: Exporters and Importers in Great Britain”) and other resources and summary statistics, often at highly disaggregated levels.

1 Either the ONS Virtual Microdata Laboratory (VML) – a physical location where researchers can work on the data, or the UK Data Service secure lab – a service that allows researchers to work in a separate desktop on their own approved computer.

The microdata are also accessible in the VML or secure lab, and the names of the related datasets have changed over the years. The ABS has been carried out since 2008 and includes only financial data: including variables on turnover, gross value added and investment. It is supplemented with employment survey data from the “Business Register and Employment Survey” (BRES, see below for more detail). The predecessor to the ABS, the “Annual Business Inquiry” (ABI) included an employment survey and was used to create the “Annual Respondents Database” (ARD). Recently, the ONS has developed the “ARDx” combining the ABI (1998-2008) and ABS (2009-2015). Microdata for Northern Ireland are not available.

BRES is the official source of employee and employment estimates by detailed geography and industry, and gives a broader sector coverage than ABS. The BRES sample does not include Northern Ireland, and the UK data archive does not hold equivalent employment data for Northern Ireland. While the ONS conducts other surveys of employment (such as the “Labour Force Survey”), BRES is the recommended source for detailed analysis of geography and industry. BRES summary statistics are available in NOMIS. While discussion of wages is outside the scope of this paper, we note that the Annual Survey of Hours and Earnings (ASHE) is a panel survey of hours of work and wages collected from businesses (rather than individuals, as is the case in the Labour Force Survey). This data can be combined with other business microdata using IDBR reference numbers.

The “UK Innovation Survey” (UKIS) provides the main source of information on business innovation in the UK, and also represents the UK's contribution to the Europe-wide “Community Innovation Survey” (CIS). BIS produces a regular publication summarising the data, and detailed statistics are available in Eurostat at NUTS2 level, and the microdata can also be accessed.

There are also a number of data sources which are useful for considering particular parts of the economy or specific measures of business performance. Orbis is an important source of financial information on companies in the UK (and worldwide), but only covers the subset of larger firms that are required to file company accounts. In addition, since 2011 researchers have been able to gain access to HMRC administrative tax return data, via the HMRC Datalab. This contains all information disclosed on tax returns (including turnover, and investment), but not variables such as employment. There are currently restrictions over the extent to which these data can be merged with other secured datasets.

Disaggregated data on the value of exports can be obtained for goods and services separately. The HMRC regional trade in goods statistics which gives detail on the value of exports/imports and counts of exporters/importers, together with trading partners by region. The ONS “International Trade in Services” dataset does similar for service sectors company trade, and the ONS has recently released some experimental estimates regionalising the value of service (sub-) sector exports.

---


## Key datasets on UK business giving sectoral or regional disaggregation

<table>
<thead>
<tr>
<th>Dataset (underlying source)</th>
<th>Coverage</th>
<th>Key measures</th>
<th>How to obtain?</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONS statistics on population of registered businesses (Inter-Departmental Business Register-IDBR)</td>
<td>VAT and/or PAYE registered businesses and local units</td>
<td>Activity, size, location, legal status, births, deaths, survival</td>
<td>Detailed stats: NOMIS (2010-2016) Key publications: “UK Business: Activity, size and location” and “ONS Business Demography” Summary stats and user requests alongside annual publications Microdata: Annual extract of IDBR in the Business Structure Database (BSD), UK data service secure access (1997-2016)</td>
</tr>
<tr>
<td>BIS Business Population Estimates - BPE (IDBR, ONS LFS, HMRC self-assessment tax data)</td>
<td>VAT and/or PAYE registered businesses plus estimate of unregistered businesses.</td>
<td>Activity, size, location. Employment and turnover summarised by size bands.</td>
<td>Summary stats alongside annual publication</td>
</tr>
<tr>
<td>ONS Business Demography (Inter-Departmental Business Register-IDBR)</td>
<td>VAT and/or PAYE registered businesses and local units.</td>
<td>Births and deaths, &quot;active&quot; population</td>
<td>Summary stats and user requests alongside annual publication Microdata: Annual extract of IDBR in the Business Structure Database (BSD), UK data service secure access (1997-2016)</td>
</tr>
<tr>
<td>Business Register and Employment Survey - BRES</td>
<td>Official source of employee and employment estimates by detailed geography and industry. Broader sector coverage than ABS.</td>
<td>Employment/employee data is available by mode (part/full-time) and gender.</td>
<td>Detailed stats: NOMIS Summary stats and user requests alongside annual publication Microdata: UK data service (2009-2015)</td>
</tr>
<tr>
<td>Orbis (Bureau Van Dijk)</td>
<td>Firms that file company accounts (worldwide coverage). Generally missing information on smaller firms.</td>
<td>Financial, operational and governance information.</td>
<td>Licence required, access via &quot;end user interface&quot;.</td>
</tr>
</tbody>
</table>
### APPENDIX TABLES

#### Table A1: Industrial concentration, HHI (employment)

<table>
<thead>
<tr>
<th>Sector</th>
<th>HHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining &amp; quarrying</td>
<td>0.209</td>
</tr>
<tr>
<td>Financial and insurance activities</td>
<td>0.038</td>
</tr>
<tr>
<td>Creative*</td>
<td>0.019</td>
</tr>
<tr>
<td>Electricity &amp; gas, water &amp; waste</td>
<td>0.015</td>
</tr>
<tr>
<td>Professional, scientific and technical activities</td>
<td>0.011</td>
</tr>
<tr>
<td>ICT</td>
<td>0.012</td>
</tr>
<tr>
<td>Agriculture</td>
<td>0.009</td>
</tr>
<tr>
<td>Real estate</td>
<td>0.009</td>
</tr>
<tr>
<td>Transport &amp; storage</td>
<td>0.006</td>
</tr>
<tr>
<td>Public administration &amp; defence</td>
<td>0.007</td>
</tr>
<tr>
<td>Admin &amp; support services</td>
<td>0.007</td>
</tr>
<tr>
<td>Other service activities</td>
<td>0.006</td>
</tr>
<tr>
<td>Accommodation &amp; food</td>
<td>0.006</td>
</tr>
<tr>
<td>Science and technology*</td>
<td>0.005</td>
</tr>
<tr>
<td>Arts, entertainment &amp; recreation</td>
<td>0.006</td>
</tr>
<tr>
<td>Education</td>
<td>0.005</td>
</tr>
<tr>
<td>Utilities</td>
<td>0.005</td>
</tr>
<tr>
<td>Health &amp; social work</td>
<td>0.005</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>0.004</td>
</tr>
<tr>
<td>Retail, wholesale &amp; motor</td>
<td>0.004</td>
</tr>
<tr>
<td>Construction</td>
<td>0.004</td>
</tr>
</tbody>
</table>

*Note:* Industry definitions: using standard SIC07 sections; *additionally high tech and creative industries as defined by NESTA (2015). Employment data from NOMIS (BRES, 2015).
Table A2: Car manufacturing plants, employment and local authority employment shares

<table>
<thead>
<tr>
<th>Company</th>
<th>Local authority</th>
<th>Plant employees</th>
<th>Share of LA employment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Total (less public admin)</td>
</tr>
<tr>
<td>Nissan</td>
<td>Sunderland City Council</td>
<td>7,458</td>
<td>6%</td>
</tr>
<tr>
<td>Jaguar Land Rover (Halewood plant)</td>
<td>Knowsley Borough Council</td>
<td>5,000</td>
<td>8%</td>
</tr>
<tr>
<td>Mini (Cowley plant)</td>
<td>Oxford City Council</td>
<td>4,000</td>
<td>3%</td>
</tr>
<tr>
<td>Bentley Motors</td>
<td>Cheshire East Council</td>
<td>3,830</td>
<td>2%</td>
</tr>
<tr>
<td>Jaguar Land Rover (Solihull plant)</td>
<td>Coventry City Council</td>
<td>3,200</td>
<td>2%</td>
</tr>
<tr>
<td>Honda</td>
<td>Swindon Borough Council</td>
<td>3,022</td>
<td>3%</td>
</tr>
<tr>
<td>Toyota</td>
<td>South Derbyshire District Council</td>
<td>2,953</td>
<td>10%</td>
</tr>
<tr>
<td>Vauxhall (Luton plant)</td>
<td>Luton Borough Council</td>
<td>2,500</td>
<td>3%</td>
</tr>
<tr>
<td>Ford (Bridgend plant)</td>
<td>Bridgend Council</td>
<td>2,130</td>
<td>4%</td>
</tr>
<tr>
<td>Vauxhall (Port Ellesmere plant)</td>
<td>Cheshire West and Chester Council</td>
<td>2,100</td>
<td>1%</td>
</tr>
<tr>
<td>Ford (Dagenham plant)</td>
<td>Barking and Dagenham Borough</td>
<td>1,830</td>
<td>4%</td>
</tr>
<tr>
<td>Aston Martin</td>
<td>Stratford-on-Avon District Council</td>
<td>1,495</td>
<td>2%</td>
</tr>
<tr>
<td>McLaren Automotive</td>
<td>Woking Borough Council</td>
<td>1,492</td>
<td>3%</td>
</tr>
<tr>
<td>Rolls Royce</td>
<td>Rushmoor Borough Council</td>
<td>1,229</td>
<td>3%</td>
</tr>
<tr>
<td>Lotus</td>
<td>South Norfolk District Council</td>
<td>1,025</td>
<td>2%</td>
</tr>
<tr>
<td>BMW</td>
<td>North Warwickshire Borough Council</td>
<td>1,000</td>
<td>2%</td>
</tr>
<tr>
<td>Mini (Swindon plant)</td>
<td>Swindon Borough Council</td>
<td>850</td>
<td>1%</td>
</tr>
<tr>
<td>Morgan Motor</td>
<td>Malvern Hills District Council</td>
<td>137</td>
<td>1%</td>
</tr>
<tr>
<td>Caterham Cars</td>
<td>Bexley Borough Council</td>
<td>114</td>
<td>0%</td>
</tr>
</tbody>
</table>

Source: Car manufacturing plants obtained from SMMT, and employment data from Bureau Van Dijk. Local authority employment from NOMIS. 2 Rolls Royce plants are excluded as they focus on defence and civil engineering.
APPENDIX 2 – FIGURES

Figure A1: HHI (employment), finance subsectors (at 4-digit SIC level)

Note: HHI calculated for 4 digit sic codes within finance section. Employment data from NOMIS (BRES, 2015); data on SIC 6530, pension funds, was not available for 2015. Central banking activities are excluded (this sector is dominated by the Bank of England – a public sector institution - in London).
Figure A2: Growth in number of firms, by size band (private sector only)

Figure A3: Private sector firms by size band

<table>
<thead>
<tr>
<th>Industry</th>
<th>1-49</th>
<th>50-249</th>
<th>250+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accommodation and Food Service Activities</td>
<td>30%</td>
<td>68%</td>
<td></td>
</tr>
<tr>
<td>Wholesale and retail trade, motor repairs</td>
<td>56%</td>
<td>43%</td>
<td></td>
</tr>
<tr>
<td>Real Estate Activities</td>
<td>61%</td>
<td>36%</td>
<td></td>
</tr>
<tr>
<td>Agriculture, Forestry and Fishing</td>
<td>65%</td>
<td>35%</td>
<td></td>
</tr>
<tr>
<td>Manufacturing</td>
<td>67%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>Mining and utilities</td>
<td>73%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td>Administrative and Support Service Activities</td>
<td>76%</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Financial and Insurance Activities</td>
<td>76%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Other Service Activities</td>
<td>77%</td>
<td>23%</td>
<td></td>
</tr>
<tr>
<td>Information and Communication</td>
<td>78%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Professional, Scientific and Technical</td>
<td>78%</td>
<td>22%</td>
<td></td>
</tr>
<tr>
<td>Human Health and Social Work Activities</td>
<td>82%</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>84%</td>
<td>16%</td>
<td></td>
</tr>
<tr>
<td>Transportation and Storage</td>
<td>87%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Arts, Entertainment and Recreation</td>
<td>90%</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>94%</td>
<td>6%</td>
<td></td>
</tr>
</tbody>
</table>

Figure A4. Distribution of GVA per worker in the non-financial business economy (2014)

Figure A5. Distribution of GVA per worker in selected “low productivity” industries (2014)

Figure A6. Distribution of GVA per worker in selected “high productivity” industries (2014)

Figure A7: Business R&D as % GDP and share of total UK

Figure A8: Patents as a percentage of the active population

Source: Eurostat, Patent applications to the EPO by priority year by NUTS 1 regions [pat_ep_rtot].
Figure A9: Decomposition of GVA per hour growth by factor input

Source: EU KLEMS.
Figure A10: GVA per hour, by sector Germany versus UK (100), 2015

Source: OECD STAN.
Figure A11: Decomposition of GVA per hour growth by sector

Source: EU KLEMS.