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Compendium

Economic review: April 2018

An analysis of economic statistics related to the performance of the regional economy. The economic review is a quarterly publication, usually published in January, April, July and October.

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Chapters in this compendium

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Introduction

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1 . Authors

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2 . Introduction

This edition of the economic review is the fifth following the introduction of economic statistics theme days in January 2017. Each economic review in this new format will have an overarching analytical theme and follow a quarterly publication timetable. The theme of this edition is the regional economy with analysis covering regional gross value added (GVA) growth in the UK, regional firm-level productivity analysis for the non-financial business economy, and regional and sub-regional productivity comparisons for the UK and selected EU countries.

3 . Acknowledgements

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Compendium

Examining regional gross value added growth in the UK: 1998 to 2016

Analysis of the impact on regional growth of industrial sectors based on the level of technology (manufacturing) and level of knowledge intensity (services).

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1 . Main points

London and the West Midlands had the strongest economic growth in real terms during the economic recovery from 2010 to 2016, while Northern Ireland and regions in the north of England have had the slowest growth. This differs from the decade prior to the economic downturn (1998 to 2007) when London and Northern Ireland had the highest growth and West Midlands the lowest.

Economic growth in the decade prior to the economic downturn was dominated by knowledge-intensive service sectors. Growth in manufacturing sectors was low during this period. In the post-economic downturn period (2010 to 2016), growth continued to be high in high-tech and market-knowledge intensive services. There were also improved growth rates in the low-tech, medium-low-tech and medium-high-tech manufacturing sectors and in the less knowledge-intensive market sector.

Gross value added (GVA) growth for 40 Nomenclature of Units for Territorial Statistics (NUTS2) subregions is examined in the report for the pre- and post-economic downturn periods by type of industry. The analysis brings to light how some areas have had different economic performance during these two periods. For example, medium-high tech manufacturing in the West Midlands NUTS2 area declined by an average 3% per year from 1998 to 2007 but grew by 9% per year from 2010 to 2016, helping to drive the improved GVA growth in the wider region.

Many of the fastest-growing subregions since 2010 have been relatively more specialised, or have seen their specialisation increase, compared with other subregions. This specialisation is typically in either knowledge-intensive services or medium-high tech manufacturing.

To investigate which subregions specialise in particular types of industry, location quotients have been calculated for the 40 NUTS2 subregions, including changes over time since 1998. As an example, the data show that the Outer London South subregion has been getting relatively less specialised in both knowledge-intensive service sectors and medium- to high-tech manufacturing, while becoming more specialised in the real estate sector.

A final analysis used a type of shift share approach (known as multi-factor partitioning). This allows growth in an area to be analysed in terms of a national effect, an industry-mix effect and a regional effect. For example, it shows that from 2010 to 2016, in the Herefordshire, Worcestershire and Warwickshire subregion, both the region and industry-mix effects were positive. This reflects that the subregion has had an industry structure aligned to faster-growing UK industries over this period and has also outperformed the growth levels that would have been expected given this structure.

2 . Things you need to know about this release

Our latest annual estimates of regional and subregional economic output were published in December 2017. For the first time, these estimates included data presented in "real" terms in chained volume measures, with the effect of inflation removed. These estimates are available for the 12 Nomenclature of Units for Territorial Statistics NUTS1 regions and 40 NUTS2 subregions of the UK. Furthermore, data were provided with additional industry detail, with an 80-industry breakdown for NUTS1 regions and a 71-industry breakdown for NUTS2 subregions.

These newly released data increase the opportunities to analyse regional economic growth in the UK since 1998. This article therefore seeks to utilise these new data to provide additional insight into how economic growth has differed across the UK and analyses the impact on regional growth of industrial sectors based on the level of technology (for manufacturing) and the level of knowledge intensity (for services).

A number of analytical tools and techniques are used in the article to describe how the industry composition of the NUTS2 subregions has changed over time and its impact on growth. This includes the Krugman specialisation index, location quotients and a modified shift-share analysis. Brief details of each of these are provided in the following sections. Data are also available to view in the accompanying dataset, allowing closer examination of the results for each subregion. To be able to keep the regional totals consistent, the various measures were computed using nominal GVA estimates.

Industry aggregation

Analysis in this article is based on an aggregated industry structure classification that combines the two-digit level industries breakdown of the 2007 Standard Industrial Classification (SIC) into 11 groups according to their technological or knowledge intensity (see Appendix). Manufacturing sectors were aggregated according to technological intensity (research and development expenditure or value added) and based on the Statistical classification of economic activities in the European Community (NACE) at two-digit level. The level of research and development (R&D) intensity served as a criterion of classification of economic sectors into high, medium-high, medium-low and low technology industries. Services were mainly aggregated into knowledge-intensive services (KIS) and less knowledge-intensive services (LKIS) based on the share of tertiary-educated persons at NACE two-digit level. For more information visit the Eurostat website.

Real gross value added for industry groups

To calculate real GVA for the 11 industry groups, weighted deflators were applied to the aggregation of the published GVA in current prices.

Not all two-digit level industries contributed the same amount of GVA to the industry group. For this reason, the published implied deflators for each two-digit level industry were weighted, using the amount of output it contributes to the industry group total. This weighted average ensures that the real GVA reflects the relative importance of the various two-digit level industries in the group.

Krugman specialisation index

There are a vast number of indicators that can be used to measure an area's degree of specialisation and compare it with other areas. These measures of specialisation quantify the differences between the distribution of economic activity (employment, value added) across regions observed from the data and a reference distribution.

The choice of the reference distribution is determined by what is considered to represent no specialisation, which can be a uniform distribution of industries (absolute measures) or the industry structure of a reference group of areas (relative measures). With absolute measures of specialisation an area is considered as being specialised if a small number of industries exhibit high shares of the overall economic activity of the country. With relative measures of specialisation, an area is considered to be specialised if its industry structure differs from the average industry structure of the reference group of areas (which can be the country).

This article uses a measure of relative specialisation, the Krugman specialisation index (KSI), to compare sectoral specialisation across NUTS2 subregions of the UK. The index is defined as follows:

$$KSI_j = \sum ABS \left[\frac{x_{ji}}{x_j} - \frac{(x_i - x_{ji})}{(x - x_j)} \right]$$

where X_{ji} is the output of region (j) in industry (i), X_j is the total output of region (j), X_i is the total output of industry (i) and X is the national output.

The KSI takes value zero if region (j) has an industrial structure identical to the rest of the UK, indicating that region (j) is not specialised. Higher KSI values indicate increased specialisation or deviation away from the UK norm. The KSI takes a maximum value of 2 if it has no sectors in common with the rest of the UK, reflecting strong sectoral specialisation. The indicator can only be seen as a relative specialisation compared with a benchmark, which here is the UK; no absolute degree of specialisation can be assessed with this measure.

Location quotients

The location quotients are a simple and very common measure used to assess relative specialisation of regions in a specific industry. The location quotient for region (j) industry (i) measures the level of relative specialisation of region (j) in industry (i), and it is given by the expression:

$$LQ_{ji} = \frac{x_{ji}/x_j}{x_i/x}$$

where X_{ji} is the output of region (j) in industry (i), X_j is the total output of region (j), X_i is the total output of industry (i) and X is the national output. A location quotient of 1 indicates that the share of industry (i) in the regional output is comparable with the contribution of that industry to the national output. In this article, the location quotients were calculated for the NUTS2 subregions of the UK, the 11-industry aggregation breakdown described above. A location quotient greater than 1.25 indicates a high level of relative specialisation of subregion (j) in industry (i), and location quotients below 0.75 indicate a low level of specialisation.

Multi-factor partitioning model (MFP)

This article adopts the MFP approach to analyse changes in regional output, considering the distribution of industries in each region. The MFP was developed by Ray (1990) and Lamarche and others (2003) and considered as an important theoretical development of the traditional shift-share analysis, as it corrects the conceptual errors in the mathematical formulation of the traditional shift-share. The shift-share model is a decomposition technique widely used in regional studies to determine what portions of regional economic growth or decline can be attributed to national, economic industry and regional factors.

In the traditional version, regional economic growth is decomposed into three components: a national component, an industry-mix effect and the residual component. The national component is the change in a region that would have occurred if the region had grown at the national rate. It measures the effects of macroeconomic fluctuations on change. The industry-mix measures the change that occurs if all industries in each region had grown at the national industry rate (conditional on the national share effect). A region with a concentration of fast-growth industries will show in the data a positive industry-mix effect. And, the residual component is the difference between the actual change in the region and the sum of the other two components. It is designed to capture regional characteristics such as externalities arising from agglomeration effects, local labour characteristics, the presence of other sophisticated inputs, such as superior suppliers, local policy environment, and so on. The residual component is often referred to as regional competitiveness effect.

Two main flaws of the traditional shift-share model have been identified in the literature. One flaw has to do with the choice of weights. In the static version of the model, the level of the output (or any other variable of choice) in the first period is used to weight each component for the entire period of analysis. This means that changes in industry structure of the area are not considered. The second flaw derives from the use of crude regional growth rates that creates a problem of interwoven effects. The model acknowledges that regional growth is affected by the industry-mix in each region, but fails to account for the effect that regional distribution of industries has on the national industry growth rates.

The MFP uses standardised regional growth rates for industry-mix effects and standardised industry growth rates for their regional-mix effects, allowing the decomposition of regional growth into two components that are not dependent on each other. In this article, a dynamic version of the MFP is used, allowing both the growth rates and industry-mixes to vary over time, and therefore solve the problem of using static weights. The MFP components are defined according to the following equation:

$$X_j^t \times g_j = \underbrace{X_j^t \times g_n}_{(national\ effect)} + \underbrace{\left[\sum_i X_{ij}^t \left(\hat{g}_{in} - g_n\right)\right]}_{(industry-mix\ effect)} + \underbrace{\left[\sum_i X_{ij}^t \left(g_{ij} - \hat{g}_{in}\right)\right]}_{regional\ effect}$$

where X^j_t is output in region (j) at time (t), g_j is the crude region growth rate, g_n is the crude national growth rate and g_{in} is the standardised industry growth rate.

3 . Results

Results: Regional growth

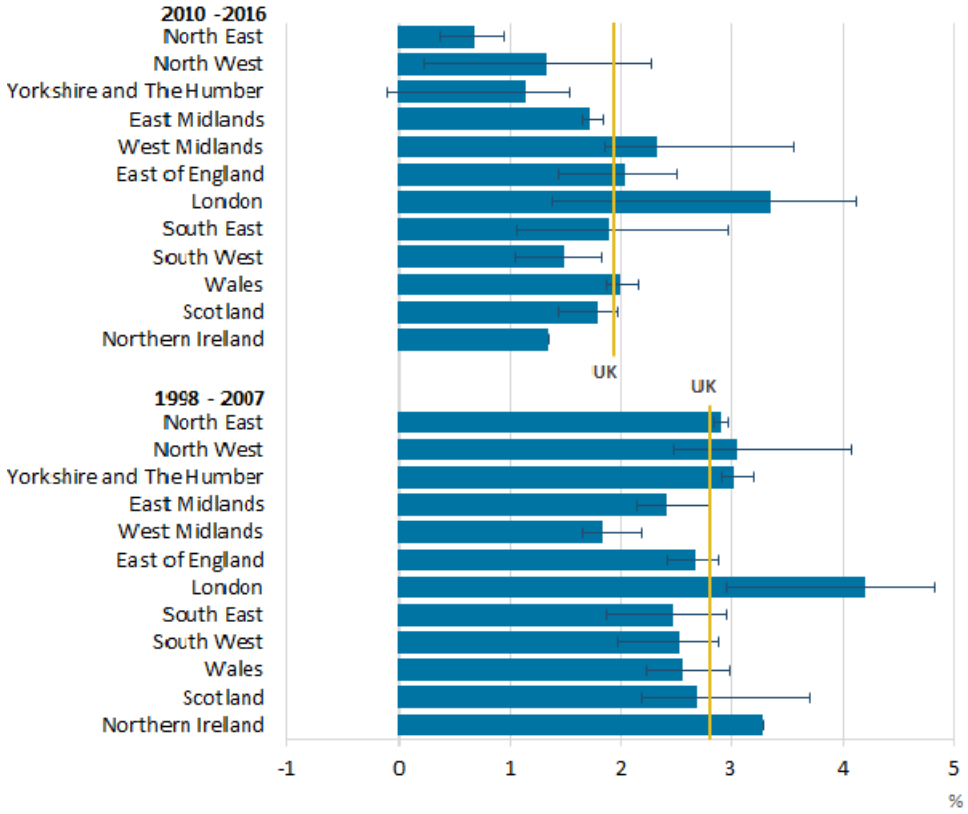
During the decade prior to the 2008 to 2009 economic downturn, the UK's real output was growing at an average annual growth rate of 2.8%. Over that period, while most of the regions had an increase of around 24% (UK average), London's output grew by almost 45% and the West Midlands by no more than 18%. The observed increasing growth disparities across the UK regions started raising concerns over the high dependence of the UK economy on the economic growth of the high-tech and knowledge-intensive market and financial services in London and its neighbouring regions.

The economic downturn in 2008 had a substantially uneven impact across the UK, not only in terms of output loss but more importantly in terms of growth in the years that followed. While some regions were back to pre-economic downturn levels of output as early as 2010, other regions took longer to recover. Latest gross value added (GVA) data shows that, in 2016, most of the regions were at least 6% above pre-economic downturn levels, with London and the South East pulling further ahead and the North East, Yorkshire and The Humber and Northern Ireland lagging behind.

Figure 1 compares the regional average annual growth rate in the pre-economic downturn period with that of the post-economic downturn period. Three main features stand out. Firstly, at national level, the average annual growth rate dropped from of 2.8% to 1.9%. The slower growth of the UK economy is a result of a sustained stagnation of labour productivity since the economic downturn, only partly compensated by an increase in the level of labour input (hours worked and employment).

Secondly, there was a turnaround in the average annual growth differential of the northern regions of England and Northern Ireland relative to the national rate. These regions grew at an average annual growth rate above national average for most of the pre-economic downturn decade but have had the lowest growth in the post-economic downturn period. By contrast, West Midlands had above-average growth during 2010 to 2016, having had the lowest growth rate in the period from 1998 to 2007.

Figure 1: Annual growth rates of real gross value added by NUTS1 regions, UK, 1998 to 2007 and 2010 to 2016



Source: Office for National Statistics

Notes:

1. The horizontal lines for each NUTS1 region show the range of growth rates for the NUTS2 subregions.

2. As well as being a NUTS1 area, Northern Ireland also has the status of a NUTS2 area, therefore there is no range for Northern Ireland.

The third feature that stands out from Figure 1 is the increase in the gap in the intraregional growth rates (the range of growth rates for NUTS2 areas within each region is shown by the lines in Figure 1). In the post-economic downturn period, this is most evident in the North West, London and in the South East regions, where some subregions experienced average rates above national average while other subregions grew much slower than the UK average for the period. The differences between growth in the subregions in West Midlands and in Yorkshire and The Humber region is also particularly noticeable.

Figure 2 compares the average annual growth rate of the 40 NUTS2 subregions in the pre-economic downturn and post-economic downturn periods and how they relate to the UK average. The top-right quadrant shows the regions that grew at above the national average in both the pre- and post-economic downturn period. The bottom-left quadrant shows the regions that grew at below the national average in both periods.

Figure 2: Annual growth rates of real gross value added by NUTS2 regions, UK, 1998 to 2007 and 2010 to 2016

By grouping the subregions this way, a number of features emerge. Firstly, the output growth perfomance of most of the London NUTS2 subregions exceeded the national growth rate in both periods, but not in the case of Outer London – South, which experienced an average growth rate of almost 1 percentage point below the UK average since the economic downturn.

Secondly, it is clear that only a small number of areas were able to keep above national average growth in both periods (top-right quadrant). Most of the areas growing above or close to the UK average in the pre-economic downturn period fared poorly in the post-economic downturn period (shown in the top-left quadrant). This applies foremost to North East, North West and Yorkshire and The Humber NUTS2 subregions.

Some areas experienced an improvement in their relative growth performance (when compared with the national average) as well as an absolute increase in the average annual growth rate between the two periods. This is true for all the NUTS2 subregions in West Midlands; in particular for Herefordshire, Worcestershire and Warwickshire, which was the fastest growing NUTS2 subregion outside of London from 2010 to 2016.

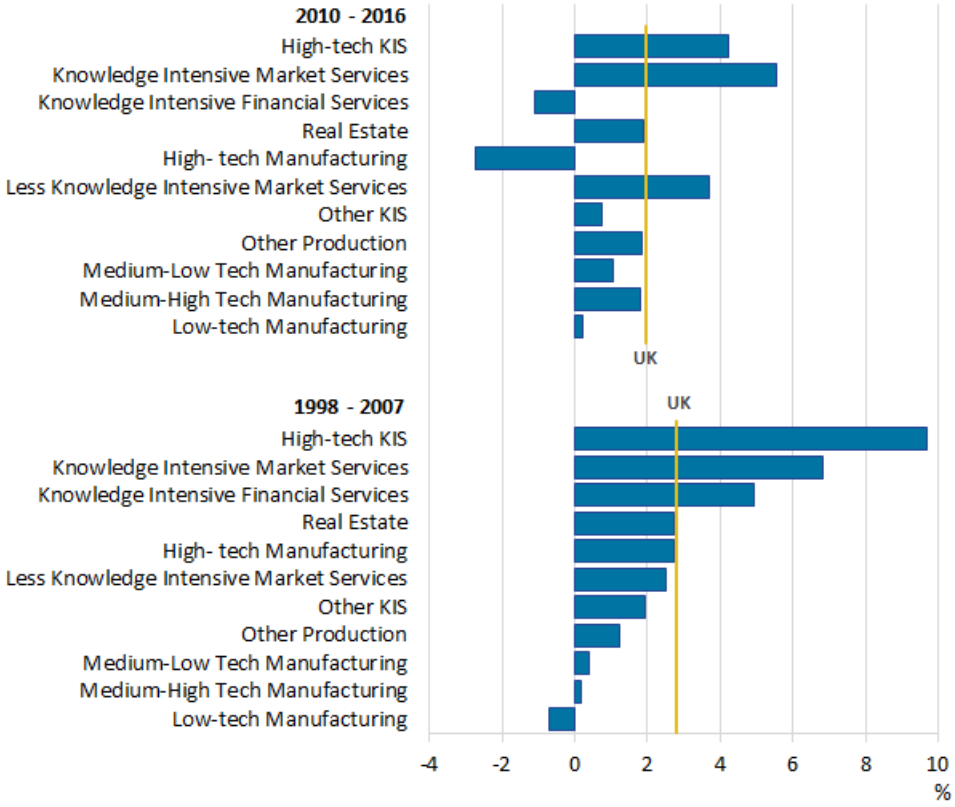
Note that this article does not focus on the impact of productivity on relative growth rates. However, Figure 13 in the recent Regional and sub-regional productivity in the UK publication showed that, in common with the national picture, most NUTS2 subregions had relatively little change in productivity levels between 2011 and 2016. Instead, changes in relative growth levels generally reflected differences in the levels of labour inputs (that is, hours worked or employment levels) over this period. In other words, differences in growth of hours worked and employment across subregions were responsible for the different output growth levels rather than any significant changes to relative productivity levels.

Results: Regional growth by industry

The UK economy has been through a great structural change for the past five decades, characterised by a relative decline of the manufacturing sector and an increasing share of the service sector in the national output. Just in the decade prior to the economic downturn, the share of manufacturing in national (nominal) output went from 16% down to 10%. Since the economic downturn, however, there has been little change in the relative contribution of the manufacturing and the services industries to the national nominal output.

Figure 3 shows that most of the manufacturing industries grew at a higher rate in the post-downturn period compared with the decade to 2007, except for the high-technology manufacturing. Real output growth in high-technology manufacturing was close to 2% in between 1998 and 2007 but negative between 2010 and 2016. Simultaneously, there was a slowdown of the annual growth rate of all the knowledge-intensive types of services, in particular the high-tech and financial services.

Figure 3: Annual growth rates of real gross value added by industry groups, UK, 1998 to 2007 and 2010 to 2016



Source: Office for National Statistics

Notes:

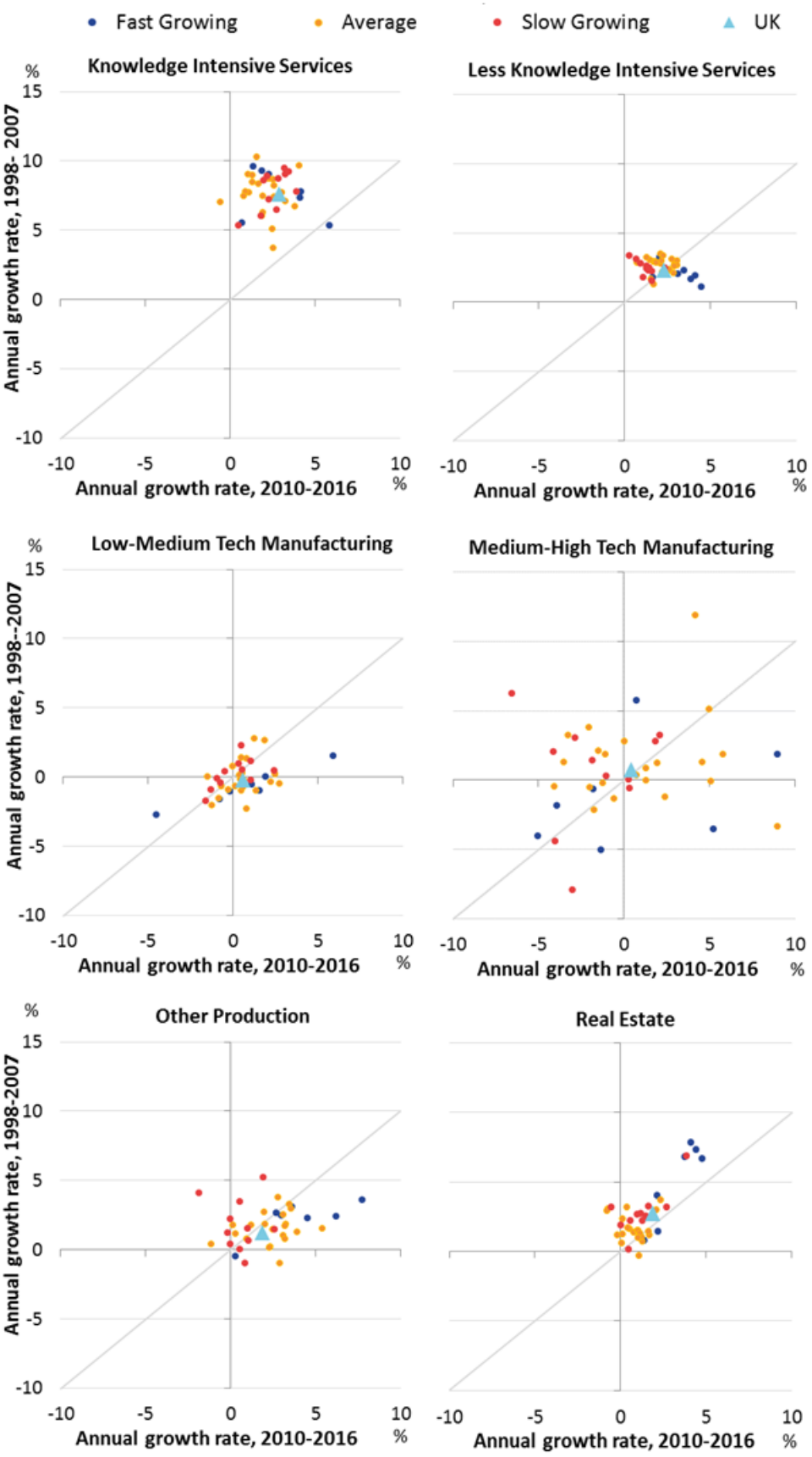
1. These data use approximate real gross value added (GVA), therefore the UK average growth rate is not the same as the real GVA growth rate.

2. To calculate approximate real GVA for the 11 industry groups, weighted deflators were applied to the aggregation of the published GVA in current prices. Not all two-digit level industries contributed the same amount of GVA to the industry group. For this reason, the published implied deflators for each two-digit level industry were weighted, using the amount of output the two-digit level industry contributed to the industry group total. This weighted average ensures that the approximate real GVA reflects the relative importance of the various two-digit level industries in the group.

Most NUTS2 subregions have seen a relative decline in the manufacturing sector and an increase in the share of the service sector in the national output between 1998 and 2007, in particular in the high-tech and knowledge-intensive services. Meanwhile, only the London NUTS2 subregions saw a small decline in the share of the less knowledge-intensive services with the share rising in most other regions.

Moving towards the analysis of the industry growth differences between the two periods at a subregional level, Figure 4 shows the NUTS2 annual growth rates in both periods. For simplicity of the analysis, the 11 industry groups were combined into six broader aggregations. Services were combined into two major groups based on the knowledge intensity, and the manufacturing industry groups combined into two groups based on the technology intensity (real estate and other production were not grouped and are shown separately). To assist the analysis, the NUTS2 subregions are also differentiated in Figure 4, according to their growth differential relative to the UK average. The fastest-growing NUTS2 subregions (in blue) had a cumulative growth that exceeded the national growth by 3 percentage points or more between 2010 and 2016. The slowest-growing subregions (in red) had a cumulative growth of 3 or more percentage points below the national average for the same period.

Figure 4: Annual growth rates of real gross value added in NUTS2 subregions by broad industry group, UK, 1998 to 2007 and 2010 to 2016



Source: Office for National Statistics

The comparison of the industry growth rates between the two periods at subregional level unveils very distinct patterns in each of the six broad industry groups. The output growth of the knowledge-intensive service declined considerably between the two periods in all NUTS2 subregions (except in Outer London West), in line with the national trend for each of the three types of knowledge-intensive services.

With regards to the less knowledge-intensive services, there is a distinct pattern between the fastest-and the slowest-growing subregions. In the slowest-growing regions, output growth in less knowledge-intensive services was stronger in the first period compared to the second period. In most of the fastest-growing regions, less knowledge-intensive services grew faster in the second period. Given the high share of this type of services in the national economy and in most of the subregions (often more than 50%), even a small increase in output growth in this industry group can have a relatively large impact in the output growth of the region.

Comparing the patterns of the two manufacturing industry groups, there are also some distinct differences. For low- to medium-tech manufacturing, most of the regions are clustered around the negative 2% to 2% interval, meaning that there were no great changes in annual growth rates between the two periods. In contrast, there is a greater variation in annual growth rates of the medium- to high-technology manufacturing among the NUTS2 subregions in each period. The annual growth rates for the 2010 to 2016 period varies from negative 7% in East Yorkshire and Northern Lincolnshire to 9% in Herefordshire, Worcestershire and Warwickshire, and in West Midlands. There is also a greater variation in annual growth rates between the two periods in some NUTS2 subregions. For example, the annual growth rates in the two aforementioned subregions of West Midlands increased by 7 and 12 percentage points respectively.

Most of the subregions have experienced a slowdown in real estate activities output growth, in particular those areas that have a relatively stronger growth during the 1998 to 2007 period, that is, the five London NUTS2 subregions.

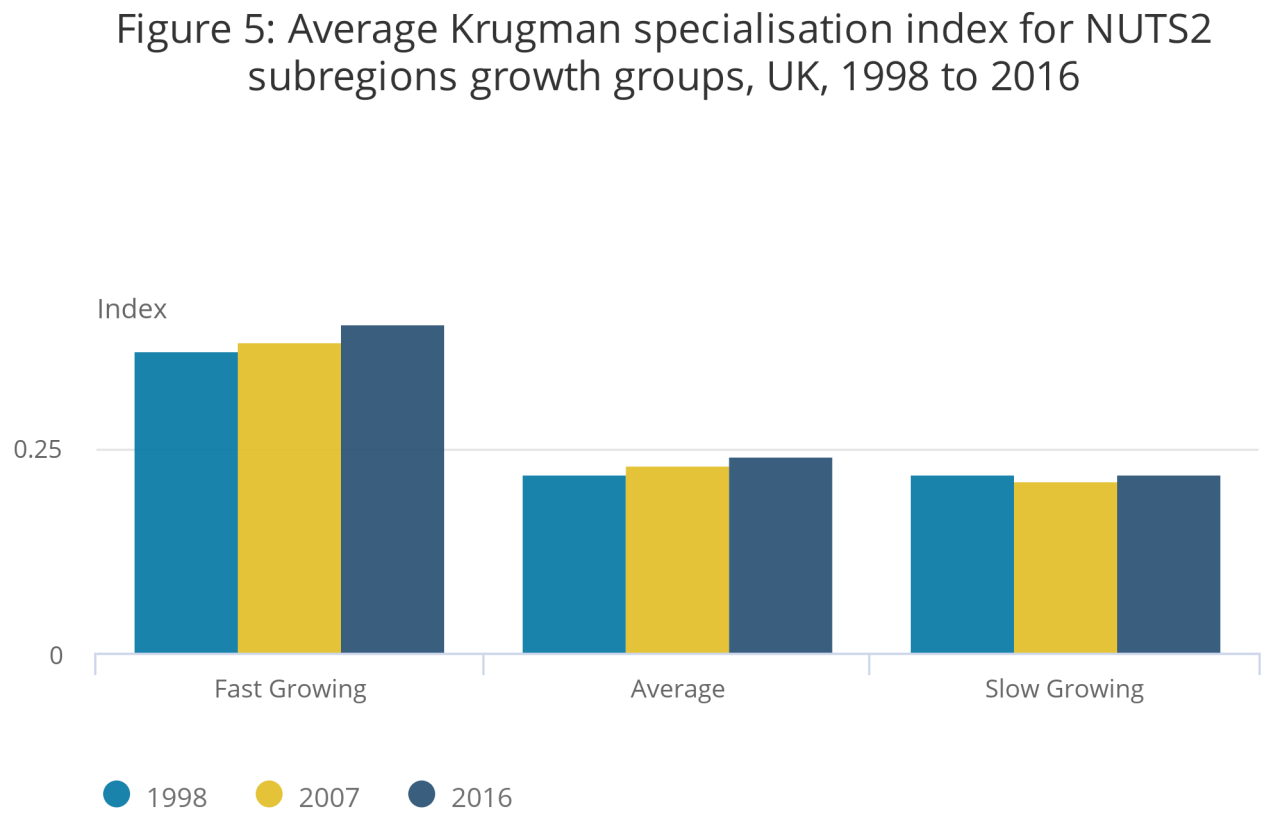
Results: Relative specialisation

The relationship between specialisation and economic growth goes back to the classical argument that economies focus their activities on the most competitive sectors and/or are more inclined to increase gains in efficiency. There is a vast literature on growth explaining the theoretical arguments and presenting empirical evidence that differences in specialisation patterns can then affect growth rate across areas owing to the existence of differences in the growth potential of each sector. An area is said to be more specialised when some of its economic sectors provide larger shares of output (or employment) relative to the other areas in the country.

To capture the level of specialisation of the NUTS2 subregions across the UK and compare its dynamics, the Krugman specialisation index (KSI) was computed on an annual basis for the entire period, using the Eurostat aggregation approach.

Figure 5 shows that the fastest-growing NUTS2 areas are, on average, more specialised than the other areas and show an increasing trend in specialisation over the past two decades. In contrast, the slowest-growing subregions show a much lower and relatively constant level of specialisation throughout the entire period.

Figure 5: Average Krugman specialisation index for NUTS2 subregions growth groups, UK, 1998 to 2016



Source: Office for National Statistics

Notes:

1. Fast-growing NUTS2 subregions are those that had a cumulative growth that exceeded the national growth by 3 percentage points or more between 2010 and 2016. Slow-growing subregions are those that had a cumulative growth of 3 or more percentage points below the national average for the same period.

2. The Krugman specialisation index (KSI) takes value 0 if a region has an economic structure similar to the UK structure, indicating that the region is not specialised. It takes a maximum value of 2 if a region has no sectors in common with the rest of the UK, reflecting strong sectoral specialisation.

3. For the computation of the KSI, nominal gross value added (GVA) by industry was used instead of real GVA, because real GVA by industry should not be added up to regional totals.

Within the fastest-growing regions, there are two different types of areas: those that show a very high level of specialisation with little change between 1998 and 2016; and those that, not being highly specialised before the economic downturn, showed an increase in specialisation in the post-economic downturn period to levels above the 0.26 average level of the KSI. The first group includes Inner London subregions, Outer London West and North West, and North Eastern Scotland. The second group includes Berkshire, Buckinghamshire and Oxfordshire; Herefordshire, Worcestershire and Warwickshire; and Outer London East and North East.

For the remaining regions, although there is also an upwards trend in relative specialisation, particularly in the post-economic downturn period, very few areas reached a level of specialisation above 0.3, the minimum level among the fastest-growing NUTS2 subregions in 2016.

The following section will show how location quotients can provide a more detailed picture of the sectoral structure of NUTS2 subregions. The use of location quotients can show, for example, in which industries have some subregions became more specialised over time.

Results: Location quotients analysis

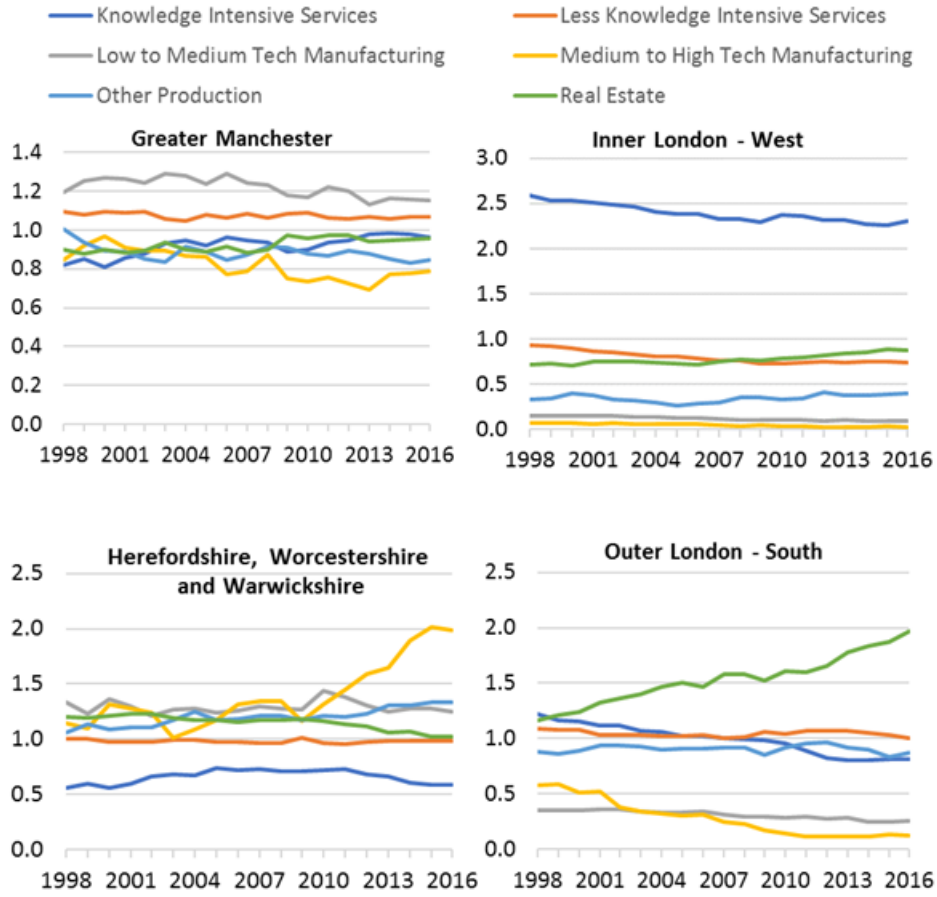
Location quotients (LQs) are a simple and very common measure used to assess the relative specialisation of regions in an industry. A location quotient of 1 indicates that the region's share of an industry in its regional output is the same as the share of that industry to the national output.

As shown earlier, the different types of industry explored in this article have grown at different rates since 1998 with some of the sectors performing differently pre- and post-economic downturn. The location quotient analysis allows us to examine in more detail the relative industrial specialisations of each subregion and the degree to which this has changed over time.

Note that location quotients are a relative measure. If an industry is declining sharply in share of output across the UK overall, but only slightly in a particular region, then that region will have an increasing location quotient for that sector despite the fact its output in the sector is declining. This is because in this case it is becoming relatively more specialised in that sector when compared to the rest of the country.

Figure 6 shows the location quotients of four NUTS2 subregions that have either shown considerable growth improvement or decline in the post-economic downturn period compared with the decade to 2007, or have very different industry compositions.

Figure 6: Location quotients by broad industry groups, UK, 1998 to 2016



Source: Office for National Statistics

Notes:

1. A location quotient greater than 1.25 indicates a high level of relative specialisation of subregion (j) in industry (i), and location quotients below 0.75 indicate a low level of specialisation.

The top two charts show two subregions with very different levels of relative specialisation. Greater Manchester was, in 2016, the subregion with an industry structure most similar to the UK overall, which is shown by none of the six industry sector groupings having a location quotient of more than 1.2.

By contrast, Inner London West displays a clear specialisation in the knowledge-intensive services. While the extent of this relative specialisation has fallen slightly over time, it remains high, and this focus on the knowledge-intensive services in Inner London has been an important determinant of its strong growth since 1998.

The bottom two charts in Figure 6 show two subregions that have moved in opposite directions since the economic downturn: Herefordshire, Worcestershire and Warwickshire, and Outer London South. In the case of Herefordshire, Worcestershire and Warwickshire, Figure 6 shows clearly that there has been an increasing relative specialisation in the medium- to high-tech manufacturing sector since 2009. This is supported by the strong improvement in output growth, post-economic downturn, in this sector, which was shown earlier in Figure 4. A similar pattern has also taken place in the West Midlands NUTS2 subregion.

In the case of Outer London South, the location quotients show that the subregion has been getting relatively less specialised in both knowledge-intensive service sectors and also in medium- to high-tech manufacturing. By contrast, its specialisation in the real estate sector has been increasing through the period.

Results: Shift-share analysis

This article adopts the multi-factor partitioning model, developed by Ray (1990), to analyse changes in the NUTS2 subregions' gross value added (GVA), considering the distribution of industries in each region. Multi-factor partitioning is a technique, similar to shift-share analysis, that decomposes the observed changes in economic growth into three components: a national component, an industry-mix effect and a regional effect.

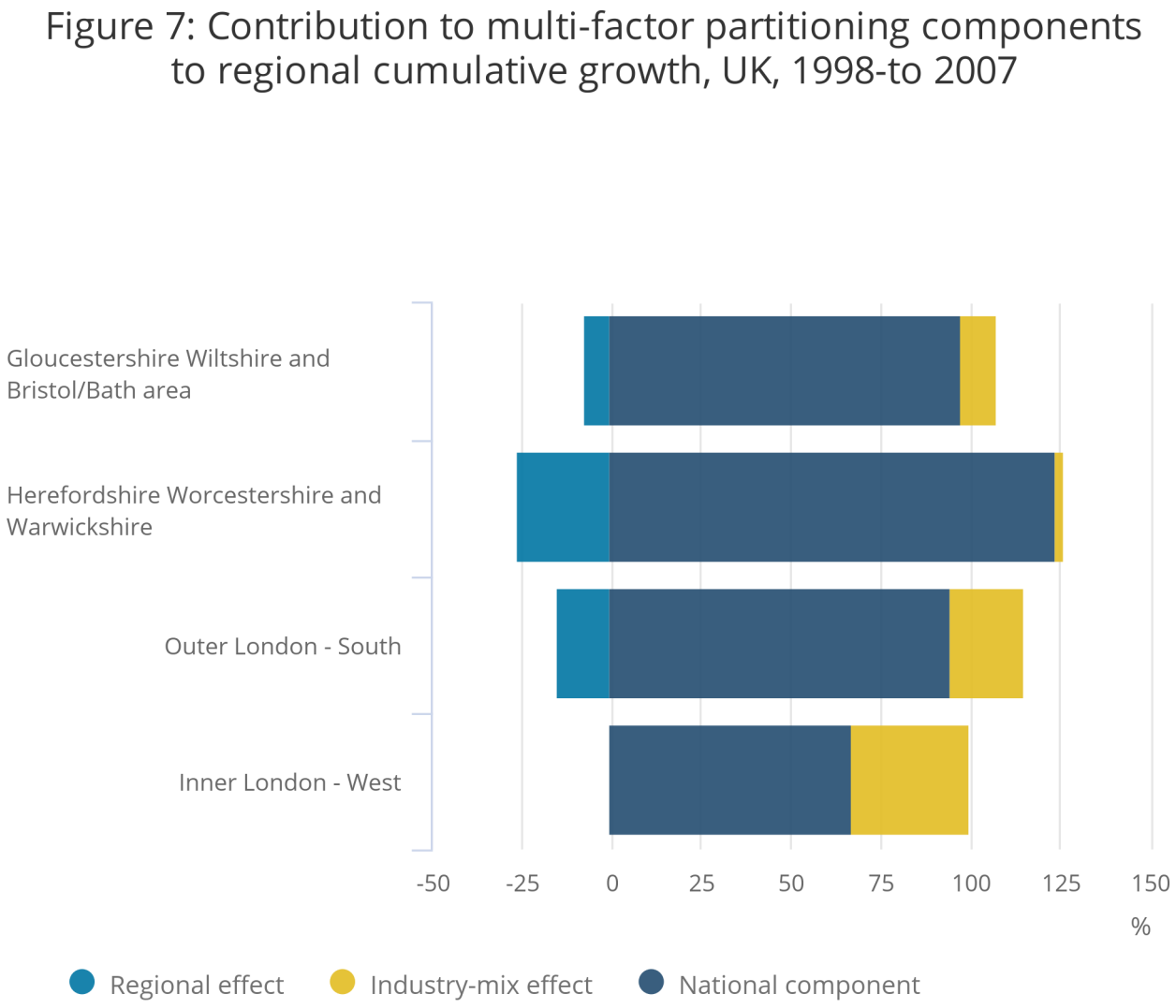
The national component is the share of regional growth had the regions grown at the national rate and it measures the effects of macroeconomic fluctuations on the described regional growth. The industry-mix effect is the share of regional growth that is due to the industrial structure of the regions and it determines whether a region has an expanding or contracting industrial structure. The regional effect is the difference between the regional growth and the growth that would have occurred in the region if industries were proportionally distributed across regions.

Figures 7 and 8 illustrate the results pre- and post-economic downturn for a number of subregions. For Inner London West, the industry-mix effect was positive in the 1998 to 2007 period, reflecting that the subregion specialised in many of the industries that were growing in the UK during this period (for example, knowledge-intensive service sectors). However, from 2010 to 2016, this effect turned negative, likely caused by the fall in output in London's main specialisation of financial services over this period (see Figure 3). Instead, Inner London West has a positive "region effect" during this latter period, reflecting that the subregion has outperformed the growth level that would be expected based on the national performance of its industries only.

For Outer London South, the regional effect was negative for both periods covered, showing the area has not been performing as well as might be expected, particularly as the industry-mix effect has had a negative contribution to the regional growth. There is a similar story for the Gloucestershire, Wiltshire and Bristol/Bath subregion.

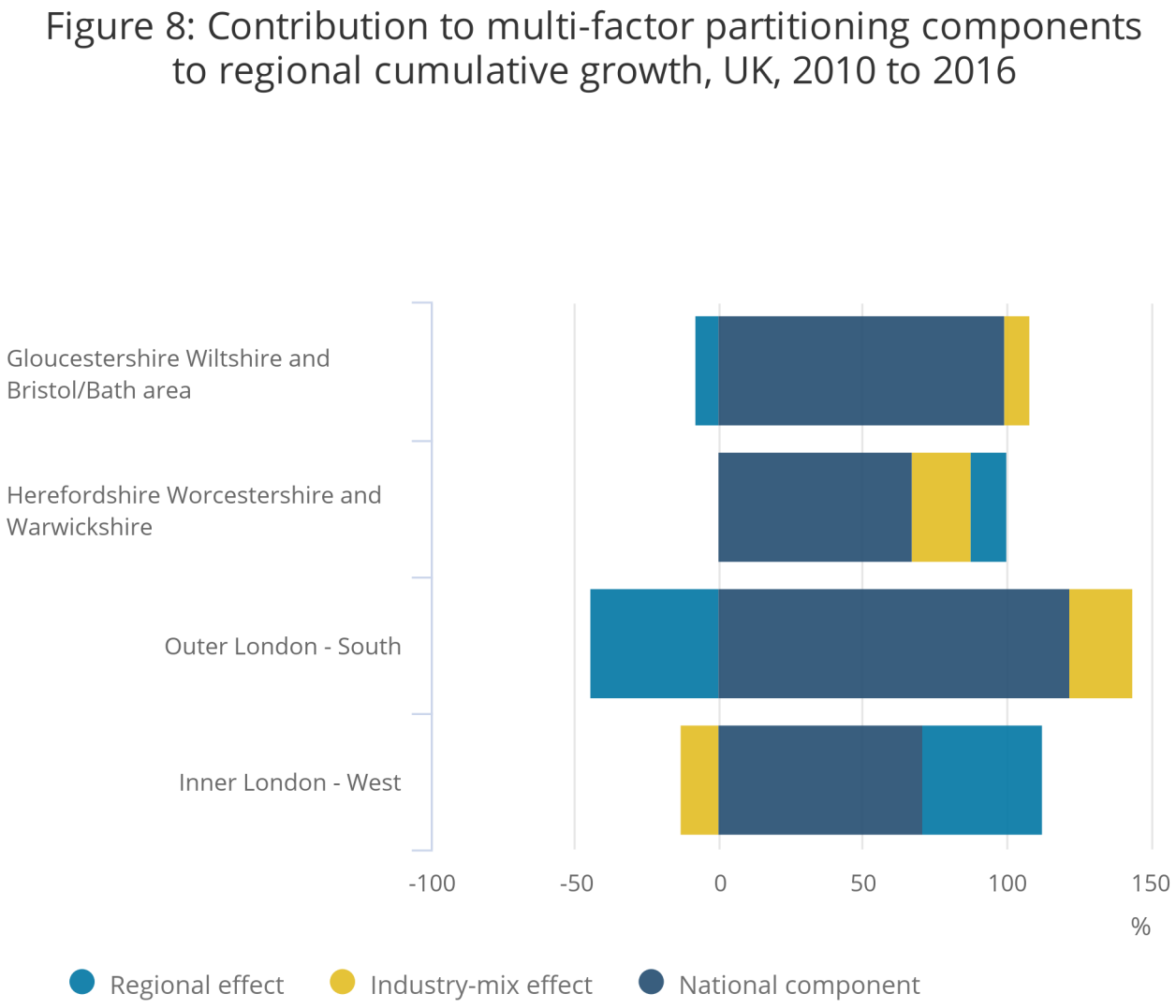
For Herefordshire, Worcestershire and Warwickshire, the data reconfirmed analysis elsewhere in this article showing a different performance pre- and post-economic downturn. From 1998 to 2007, the regional effect was negative in the subregion. However, both the region and industry-mix effects have been positive over the 2010 to 2016 period, reflecting that the subregion has had an industry structure aligned to faster-growing industries over this period and has also outperformed the growth levels that would have been expected given this structure.

Figure 7: Contribution to multi-factor partitioning components to regional cumulative growth, UK, 1998-to 2007



Source: Office for National Statistics

Figure 8: Contribution to multi-factor partitioning components to regional cumulative growth, UK, 2010 to 2016



Source: Office for National Statistics

Note that the “regional effect” is generally just as important as the industry-mix effect in most cases. This is an important point to note. While this article has focused largely on the effects of industrial structure and specialisation on growth performance, other factors can play an equally important role. Firms within the same industry do not always grow at the same rate across all regions. Instead, some areas are often able to achieve faster growth within sectors, whether through increases in productivity or inputs. For this reason, while industry structure can play a role in the growth of an area, policy will also focus on seeking to increase the general productivity potential of an area across all industries through improvements in skills, infrastructure and entrepreneurship. Indeed, in the Firm level regional productivity analysis release published in the economic review alongside this one, it is shown that for most areas, relative productivity levels across different areas of the country are more dependent on average firm productivity within industries than on differences in industrial structure.

Conclusion

Regional growth rates during the economic recovery (2010 to 2016) differed from those in the decade prior to the downturn (1998 to 2007). Northern Ireland and regions in the north of England all fared less well during the more recent period, while West Midlands jumped from having the lowest average growth rates pre-downturn to having the second-highest average growth rates post-downturn. The highest growth rates in both periods occurred in London.

Data for the 40 NUTS2 subregions add further detail to the trends. Subregions that had above-average growth both pre- and post-economic downturn include four of the five London NUTS2 areas, along with Cheshire, and Berkshire, Buckinghamshire and Oxford. Meanwhile, many subregions in the north of England had above-average growth in the earlier period but below-average growth in the latter period while the opposite was true of Herefordshire, Worcestershire and Warwickshire NUTS2 area.

Areas that had relatively high growth levels since 1998 have tended to experience a high level of relative industrial specialisation (compared with the average UK industry structure). For example, Inner London West and Inner London East have a long-standing specialisation in knowledge-intensive services and have benefitted from the strong growth in these sectors over the period.

Areas that have significantly improved performance in the 2010 to 2016 period have also benefitted from increasing specialisation relative to the UK industry structure. For example, West Midlands, and Herefordshire, Worcestershire and Warwickshire NUTS2 areas have benefitted from increasing specialisation in medium- to high-tech manufacturing.

However, while growth in sectors such as knowledge-intensive services and medium- to high-tech manufacturing can be an important aid to strong regional growth, it is also worth noting that there was a close correlation over the 2010 to 2016 period between areas that have increased output most in the less knowledge-intensive service industries and those that have had the highest gross value added (GVA) growth overall. This partly reflects the importance of these sectors in terms of their overall size and contribution to the economy. Less knowledge-intensive services typically account for between 40% and 50% of economic output in each subregion.

Finally, as shown in the shift-share multi-factor partitioning analysis, it is not only industrial structure that can impact regional economic growth. Additionally, there are a range of other factors that can contribute to the “regional effect” component of growth that allows firms within the same industry to outperform in some subregions. For this reason, while industry structure, and specialisms in fast-growing sectors, can play a role in the growth of an area, policy typically also focuses on seeking to increase the general productivity potential of an area for all its industries through achieving improvements in factors such as skills, infrastructure and entrepreneurship.

4 . Appendix

11 Industry Groups	SIC07 two-digit level code included in group
High-tech Knowledge Intensive Services	59, 60, 61, 62, 63, 72
Knowledge Intensive Financial Services	64, 65, 66
Knowledge Intensive Market Services	50, 51, 69, 70, 71, 73, 74, 78, 80
Less Knowledge Intensive Market Services	45, 46, 47, 49, 52, 53, 55, 56, 77, 79, 81, 82, 94, 95, 96, 97-98
Other Knowledge Intensive Services	58, 75, 84, 85, 86, 87, 88, 90, 91, 92, 93
Low Technology Manufacturing	10, 11-12, 13, 14, 15, 16, 17, 18, 31, 32
Medium-Low Technology Manufacturing	22, 23, 24, 25, 33
Medium-High Technology Manufacturing	19-20, 19-21, 27, 28, 29, 30
High Technology Manufacturing	21, 26
Other Production	1, 2, 3, 9, 5-8, 5-9, 35, 36-37, 38, 39, 41, 42, 43
Real Estate	68
6 Broad Industry Groups	11 Industry Groups
Knowledge Intensive Services (KIS)	High-tech Knowledge Intensive Services
	Knowledge Intensive Financial Services
	Knowledge Intensive Market Services
Less Knowledge Intensive Services	Less Knowledge Intensive Market Services
	Other Knowledge Intensive Services
Low to Medium Tech Manufacturing	Low Technology Manufacturing
	Medium-Low Technology Manufacturing
Medium to High Tech Manufacturing	Medium-High Technology Manufacturing
	High Technology Manufacturing
Other Production	Other Production
Real Estate	Real Estate

Source: Office for National Statistics

Regional firm-level productivity analysis for the non-financial business economy, Great Britain: April 2018

Analysis on the sources of regional differences in labour productivity in the non-financial business economy.

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Table of contents

1 . Main points

- Aggregate average productivity level of the non-financial economy varies by NUTS1 (Nomenclature of Territorial Units for Statistics) regions and by NUTS2 subregions in Great Britain.
- All NUTS1 regions and NUTS2 subregions in Great Britain have a mix of high and low labour productivity (as measured by gross value added (GVA) per worker) firms; however, in the South East, and particularly in London, there is a greater share of high productivity firms in comparison with other regions and countries of Great Britain.
- The analysis of the non-financial business economy suggests that with occasional exceptions, a region's industry structure appears to only play a relatively small role in productivity differences between regions.
- Instead, it is the differences between average firms' productivity within industries that has the most significant effect on aggregate regional productivity differences; for example, firms in London have higher median levels of productivity in most industry sectors when compared with other regions and it is these differences that are the larger factor in its higher overall labour productivity.
- In general, labour productivity in knowledge intensive services sectors is twice as large as productivity in less knowledge-intensive services sectors; however, in most regions, employment in less knowledge-intensive services sectors is over three times larger than employment in the knowledge-intensive services sectors.
- Local plants in the less knowledge-intensive services sectors accounted for the majority of the plants in the bottom 20% of the productivity distribution; while the top end was generally dominated by local plants in the knowledge-intensive services, manufacturing and non-manufacturing production and construction sectors.
- Local plants that are attached to micro enterprises (1 to 9 employees) and young enterprises (less than five years old) are more likely to be in knowledge-intensive services sectors than is the case for local plants that are attached to enterprises that are larger (over 250 employees) and older (over 20 years old), with most of the local plants in the latter categories falling in less knowledge-intensive services sectors.
- In considering these results, it should be noted that the analysis in this article uses a special version of the Annual Business Survey (ABS) that apportions firms' output to their various sites (also known as plants or local units) across geographic locations where the economic activities take place.
- The results are based on nominal terms such that any local variation in price level has not been considered; additionally, the analysis does not include the finance or agriculture sectors and also excludes the public sector.

2 . Things you need to know about this release

Background

Understanding the economic performance of different areas is important to developing policies aimed at economic growth and welfare improvement. The aggregate productivity data in our regional and subregional productivity article shows labour productivity varies both within a region and between regions.

These differences can reflect differences in both relative firm performance within industries (where firms in a given industry and region are more productive than firms in the same industry located elsewhere), or in the industries which are found in different locations (industry composition). In January 2017, we published an article, Regional firm-level productivity analysis for the non-financial business economy: January 2017 , providing experimental analysis on the sources of regional differences in labour productivity in the non-financial business economy. An important conclusion of the report was:

“With an occasional exception (for example, Aberdeen, which has a large oil and gas production sector), a region’s industry structure appears to only play a relatively small role in productivity differences between regions. Instead, it is the differences between firms’ productivity within industries that has the most significant effect on aggregate regional productivity differences. For example, firms in London have higher median levels of productivity in most industry sectors when compared with other regions and it is these differences that are the larger factor in its higher overall labour productivity.”

A subsequent article in April 2017 then explored similar data comparing rural and urban areas and different sized urban centres.

The aim of this article is to update the analysis using the latest available Annual Business Survey (ABS) data and to provide additional analysis to expand on the existing work.

Data sources: use of the ABS local unit dataset

The calculations in this article make use of a tailored micro-dataset constructed from the Annual Business Survey (ABS)[1] that provides coverage of Great Britain. It includes all the local units of the firms and their plants registered in the Inter-Departmental Business Register (IDBR), the postcode of their location and the approximate gross value added (aGVA)[2] they have produced over a period of 12 months[3]. A firm or enterprise may have more than one plant in different locations. These are referred to as local units. Local units of an enterprise may be engaged in different parts of the business such as production, accounting or head office. Therefore, each local unit is assigned its own Standard Industrial Classification 2007: SIC 2007 code, which corresponds to the local unit’s principal activity. Note that this dataset apportions aGVA across the "LU universe" rather than the ABS LU sample.

The survey excludes the agricultural and financial sectors as well as some small firms, the self-employed and the public sector. As such, the ABS results represent approximately two-thirds of the UK economy in terms of gross value added.

Employment is used as the measure of labour input in calculating labour productivity. Employment includes employees and working proprietors and was obtained from the IDBR at the time of sample selection of the ABS. It should be noted that employment from the IDBR is derived from several different sources (such as the Business Register Employment Survey (BRES), HM Revenue and Customs (HMRC) records or imputed), and some of the employment information, especially for small businesses, may be several years old. Despite this limitation, the IDBR is at present the most comprehensive source of employment information for firm-level analysis due to its coverage.

For the analysis of firm characteristics – size and age – the local unit ABS dataset is linked with the enterprise dataset in IDBR. Therefore, the size and the age of the local unit reflects the size and the age of the enterprise to which the local unit is attached.

Note that the use of the local unit version of the ABS means this analysis may produce different results from analysis carried out using the reporting unit version of the ABS more commonly used for investigating national productivity issues. The advantage of using the local unit version of the dataset is that this is the dataset used for compiling regional accounts data by ONS as it allocates output to the site of each local plant or site (unit) operated by an enterprise, rather than simply allocating output to the location of the head office of the enterprise or to its reporting unit. The local unit version of the dataset should therefore provide better geographical accuracy for analysis.

It should be noted, however, that a degree of modelling of output data is necessary to produce the local unit version of the ABS. For this, reporting unit data are apportioned amongst the constituent local units in line with a regression model. The covariates used in this model are industry, geography and employment size bands. The model parameter estimates are obtained by fitting the model that best predicts the data gathered from reporting units with very few local units. More information can be found under regional apportionment in section 5.8.2 of the ABS Technical Report. A recently published article also provides related information on the issue by exploring the impact of modelling in the production of ONS regional GVA estimates.

In considering the results in this article, it should be noted that these data are based on nominal terms such that any local variation in price level has not been considered.

Industry mix

This analysis uses an aggregated industry structure[4] classification, which aggregates Standard Industrial Classification (SIC) 2007 two-digit level industries according to their technological or knowledge intensity. In our previous analysis, industry composition for each area is calculated as the employment share of 85 groups of two-digit SIC industries in each region's or subregion's employment. In this analysis, manufacturing sectors are aggregated according to technological intensity (research and development (R&D) expenditure and value added) and based on the Statistical classification of economic activities in the European Community (NACE) at two-digit level. The level of R&D intensity served as a criterion of classification of economic sectors into high-technology, medium high-technology, medium low-technology and low-technology industries.

Services are mainly aggregated into knowledge-intensive services (KIS) and less knowledge-intensive services (LKIS) based on the share of tertiary educated persons at NACE two-digit level. The sectoral approach is used for all indicators except data on high-tech trade and patents. Knowledge-intensive services include high-tech knowledge-intensive sectors such as telecommunication or information service activities; market services such as architectural and engineering activities, technical testing and analysis; or legal and accounting activities and other services such as veterinary activities. Less knowledge-intensive services sectors include accommodation and food service activities or wholesale and retail trade sectors. For more detailed information, please visit the Eurostat website.

Notes for: Things you need to know about this release

1. The Annual Business Survey (ABS), formerly the Annual Business Inquiry part 2 (ABI/2) is the main structural business survey conducted by Office for National Statistics (ONS), which collects business and financial information of firms in the production, construction, distribution and services industries, representing approximately two-thirds of the UK economy. More information on ABS quality and methods including a technical report is available.

2. aGVA from ABS is known as approximate gross value added (aGVA). The ABS provides detailed information on the turnover and intermediate consumption of firms in the non-financial business economy and turnover minus intermediate consumption is called approximate value added. The ABS is also the main source for GVA data in national accounts. However, several other data sources are added and some adjustments performed to obtain the final published regional and national accounts GVA numbers.

3. ABS allows firms to report data for different 12-month periods. Most of them report for the calendar year. However, some firms report for the financial year and a few for other 12-month periods.

4. There are two widely-accepted methods of defining industry composition. These are either using output such as shares of gross value added or inputs such as the shares of employment of each industry. The focus of this article is on labour productivity in industry. Defining the industry structure in terms of the inputs such as employment, therefore, appears to be more appropriate than using the output definition.

3 . Results: sources of labour productivity in the Great Britain regions and countries and subregions

Observed average aggregate productivity in an area derives from two main sources:

- firm productivities within the industries in the area
- industry mix in the area

Therefore, differences in average labour productivity between regions can reflect differences in both firm characteristics in the areas and industry composition of an area. This section uses a decomposition technique to investigate these sources of productivity and how they relate to differences in aggregate productivity between regions. The full technique is explained in the methodology section in the Annex. In brief, the technique allows the decomposition of aggregate average labour productivity in each region into three indices, of which the following two are particularly relevant:

- the Firm Productivity Index, which shows the average level of productivity in a region (relative to the national average) assuming the industry composition in that region is the same as for the economy as a whole; this is designed to demonstrate the effect of the firm level productivities on the region's estimated average aggregate productivity

- the Industry Composition Index, which shows the average level of productivity in a region (relative to national average) assuming the productivity of each industry in that region equals nationwide average productivity for that industry; this is designed to demonstrate the effect of the industry composition on the region's estimated average aggregate productivity

Therefore, a higher value of the Firm Productivity Index in a given region shows that productivity of the firms (hence industries in general) in that region are higher than firms in equivalent industries elsewhere. A higher value of Industry Composition Index implies that the more productive industries in Great Britain have larger industry shares in that region.

The third index – the residual covariance term – provides a link between industry shares and industry productivity in an area. As an example, if an area has a high share of industry employment relative to Great Britain in the industries to which it has productivity advantages, then it would likely have a large positive residual covariance. In reality, the residual covariance column is relatively small in most regions and subregions.

Table 1 shows the firm productivity, industry composition and residual covariance indices for Great Britain regions and countries. Each cell in the table has been divided by the average aggregate productivity level for Great Britain in 2015 to provide results on a Great Britain equals 100 basis. Note that in the following analysis firms are defined as the local plants of a business enterprise and not the enterprise overall.

This analysis uses an aggregated industry structure classification, which aggregates Standard Industrial Classification 2007: SIC 2007 two-digit level industries according to their technological or knowledge intensity (see Things you need to know about this release section for more information). In our previous article, industry composition for each area was calculated as the employment share of 85 groups of two-digit SIC industries in each region’s or subregion’s employment.

Table 1: Sources of aggregate labour productivity (gross value added (GVA) per worker)

Great Britain regions and countries, 2015, Great Britain=100

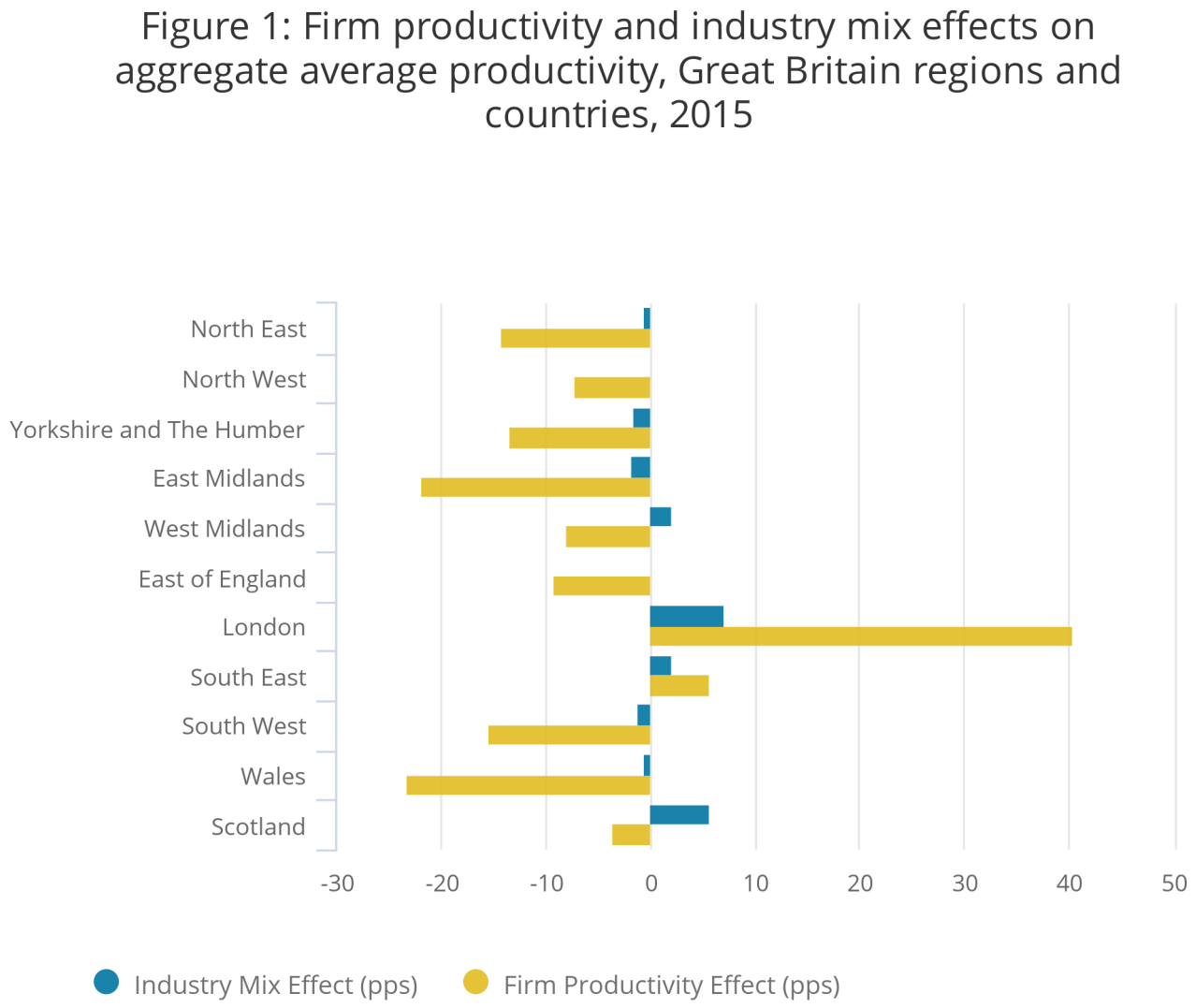
	Aggregate Average Labour Productivity Index	Firm Productivity Index	Industry Composition Index	Aggregate Average Labour Productivity, Great Britain	Residual Covariance
North East	85	85	99	100	1
North West	91	91	99	100	1
Yorkshire and The Humber	84	85	97	100	1
East Midlands	78	80	100	100	-1
West Midlands	91	89	99	100	3
East of England	91	91	100	100	0
London	143	136	102	100	5
South East	107	105	101	100	1
South West	82	83	98	100	1
Wales	74	75	98	100	2
Scotland	99	93	103	100	3

Source: Annual Business Survey

This change in industry categorisation has not affected the overall results obtained. The indices show that the differences in aggregate labour productivity for the non-financial business economy (shown in the first column of the tables) in most NUTS1 regions appear to be more closely related to individual firm productivities than to the industry composition in the regions. For example, in the North East region, the Firm Productivity Index equals 85 (on a Great Britain equals 100 basis). This is the productivity (15 percentage points below the Great Britain average) that would exist if the North East had a Great Britain industry structure whilst maintaining local average industry productivities. By contrast, the Industry Composition Index for the North East is 99 (a 1 percentage point difference from Great Britain). This is the productivity that would exist if we kept the North East industry structure, but applied average UK industry productivities within each industry.

Figure 1 shows the contribution of average firm productivity in industries and the industry mix to the regions' productivity gap with Great Britain.

Figure 1: Firm productivity and industry mix effects on aggregate average productivity, Great Britain regions and countries, 2015



Source: Annual Business Survey, Office for National Statistics

Both Table 1 and Figure 1 illustrate that a low average aggregate productivity level in most of the regions is due mostly to low firm productivities within industries relative to the Great Britain average and only slightly impacted by local industry structure. For example, the case of the North East is typical of most of Great Britain regions, in that the average aggregate productivity level is most closely related with the level of the Firm Productivity Index. This reflects that differences in productivity across the regions are more closely related to different firm-level productivities within industries and less impacted by the local industry structure.

Table 1 shows Scotland to be the one clear exception to this pattern. For Scotland, its industrial composition is shown to be the major source of its relatively strong overall labour productivity performance. Industry structures of London and the South East also have a positive impact on their overall average productivity levels; however, the higher average productivity of the firms in these regions play a more significant role than their industry structures on their overall average aggregate productivity levels. In the West Midlands, the industry structure also plays a positive role, however, it is not large enough to compensate for the effect of the relatively low average productivity levels of the firms located in this region.

The foregoing analysis suggests that changes to the Firm Productivity Index have a much larger scope than changes to industry mix for improving a region's average productivity.

Sources of productivity in NUTS2 regions

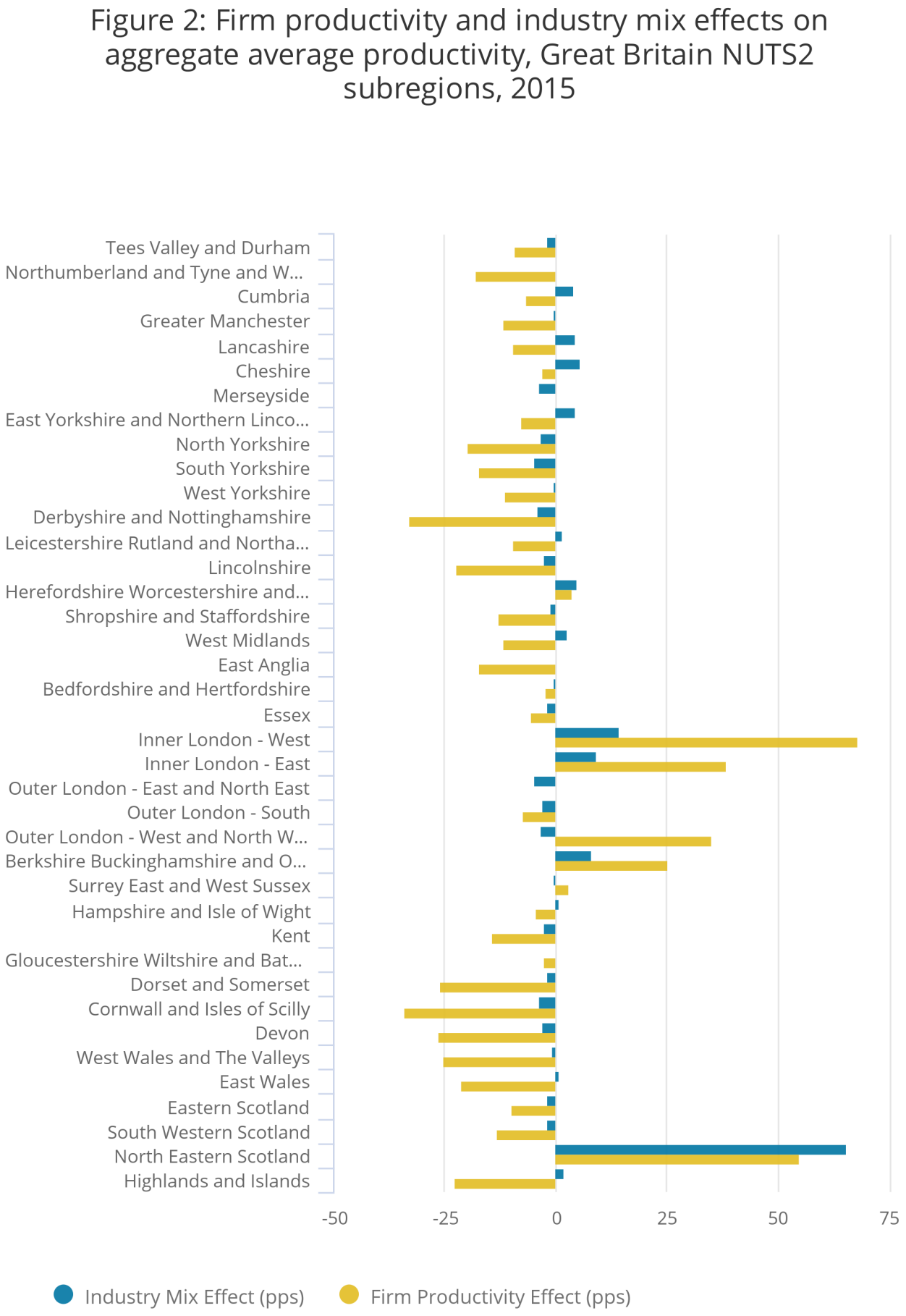
Our regional and subregional productivity article shows that differences in economic performance among regions mask significant variations within regions. In this section, the decomposition analysis is carried out to explore the sources of productivity differences between NUTS2 regions.

Figure 2 shows the firm productivity and industry composition indices for NUTS2 regions in Great Britain. Each cell in the table has been divided by the average aggregate productivity level for Great Britain in 2015 to provide results on a Great Britain equals 100 basis.

Figure 2 shows the contribution of average firm productivity in industries and the industry mix to the NUTS2 regions' productivity gap with Great Britain. It shows that differences in aggregate labour productivity for the non-financial business economy within the NUTS2 regions also appear to be more closely related to individual firm productivities within the industries in that region than to their industry composition.

There was only a small number of NUTS2 regions where the industry structure had a more significant effect on aggregate productivity than the firm productivities: North Eastern Scotland, Herefordshire, Worcestershire and Warwickshire, Cheshire (all with a positive effect) and Outer London – East and North East subregions (with a negative effect). In these subregions, industry mix appears to play a more prominent role in explaining the region' s average aggregate productivity.

Figure 2: Firm productivity and industry mix effects on aggregate average productivity, Great Britain NUTS2 subregions, 2015

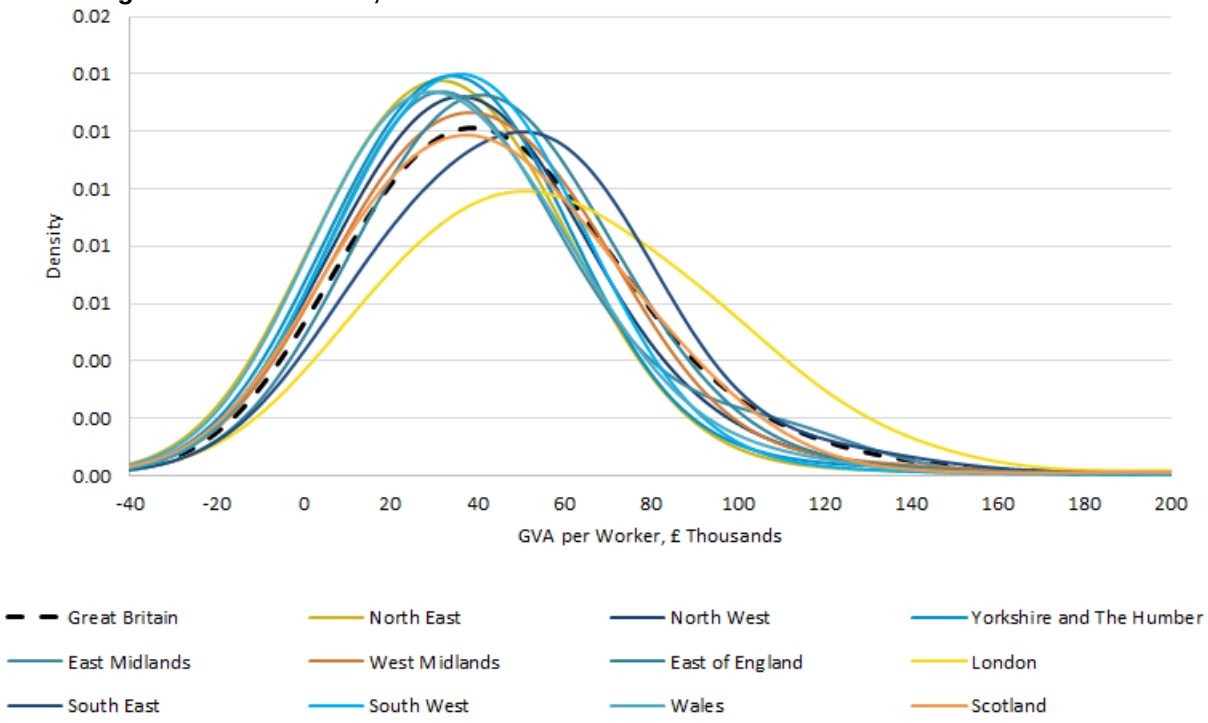


Source: Annual Business Survey, Office for National Statistics

4 . Results: distribution of firms (local plants) by productivity

This section explores the distribution of the firm productivities in the Great Britain regions and countries to investigate further the average firm productivity levels obtained in the previous section.

Figure 3: Distribution of firm-level (local plant) productivity (gross value added (GVA) per worker), Great Britain regions and countries, 2015



Source: Annual Business Survey, Office for National Statistics

Notes:

1. Kernel density, bandwidth size equals 20.

2. Firms can have negative levels of value added per worker in specific periods when they report larger values of purchases than their total turnover.

Figure 3 displays the distribution of firms (local plants) by their productivity (gross value added (GVA) per worker) for all the regions and countries in Great Britain. In 2015, most regions and city regions in Great Britain had a large proportion of the firms with GVA per worker around £20,000 to £50,000. However, South East England and London had a larger proportion of firms with higher levels of GVA per worker compared with the rest of the Great Britain countries and regions. This can be seen particularly in the very different shape of the distribution for London compared with other regions and countries in Figure 3.

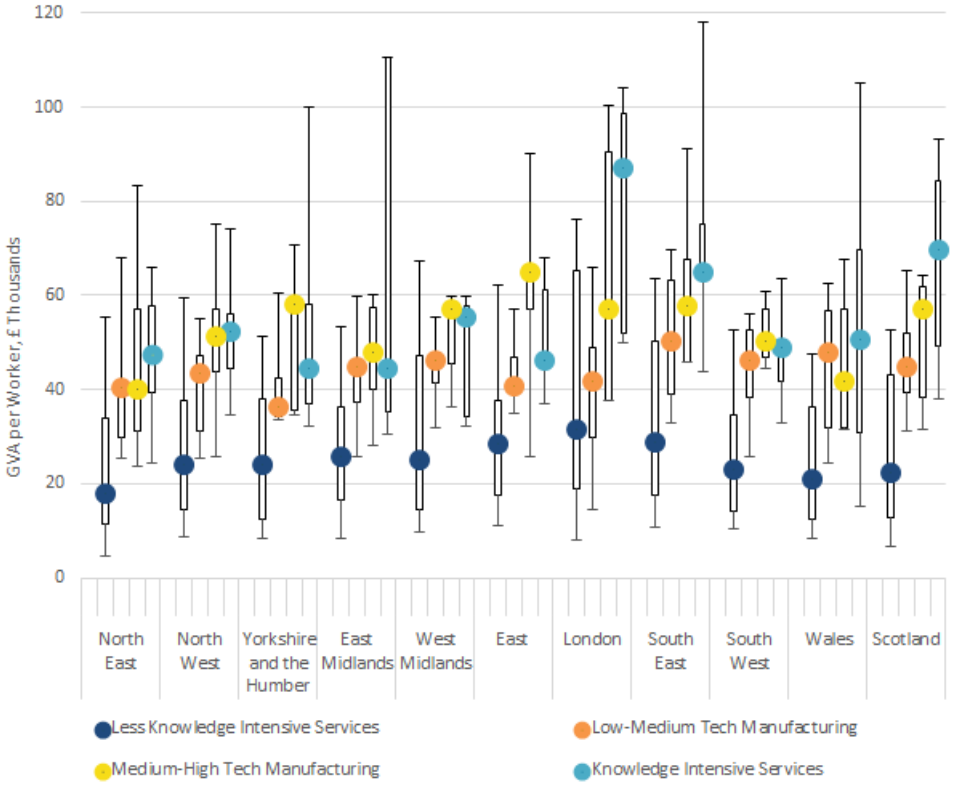
In every region there are firms with very low and very high productivity performance. However, the skewed distributions illustrate that there are more firms in all the regions with productivity clustered at lower levels and few with productivity clustered at higher levels. However, in some regions such as London and the South East, the average firms have higher productivity than in other regions and there are more firms at the top tail of the distribution.

5 . Results: firm-level (local plant) productivity by industry groups

Figure 4 shows firm-level (local plant) productivity distributions within selected aggregated industry groups in Great Britain regions and countries. It shows the median level of gross value added (GVA) per worker (the dot) and the inter-quartile range (the bars) and the 10th and 90th deciles (the lines). Note that each local plant is assigned a single Standard Industrial Classification 2007: SIC 2007 code, which corresponds to the plant's principal activity.

Firms in manufacturing sectors and knowledge-intensive services sectors have generally higher productivity levels than firms in less-knowledge intensive services sectors throughout the Great Britain regions. In London, firms generally have higher GVA per worker in all the services sectors compared with their counterparts in Great Britain. This figure illustrates the importance of firm-level productivity within industries in explaining the differences in aggregate labour productivity between the regions.

Figure 4: Distribution of local plant productivity (gross value added (GVA) per worker) by industry groups, Great Britain regions and countries, 2015



Source: Annual Business Survey, Office for National Statistics

Notes:

1. Knowledge-intensive services includes Knowledge-intensive high-tech services, Knowledge-intensive market services and Other knowledge-intensive services.

2. Medium-high tech manufacturing includes Medium-high tech manufacturing and High-tech manufacturing.

3. Low-medium tech manufacturing includes Low-tech manufacturing and Medium-low tech manufacturing.

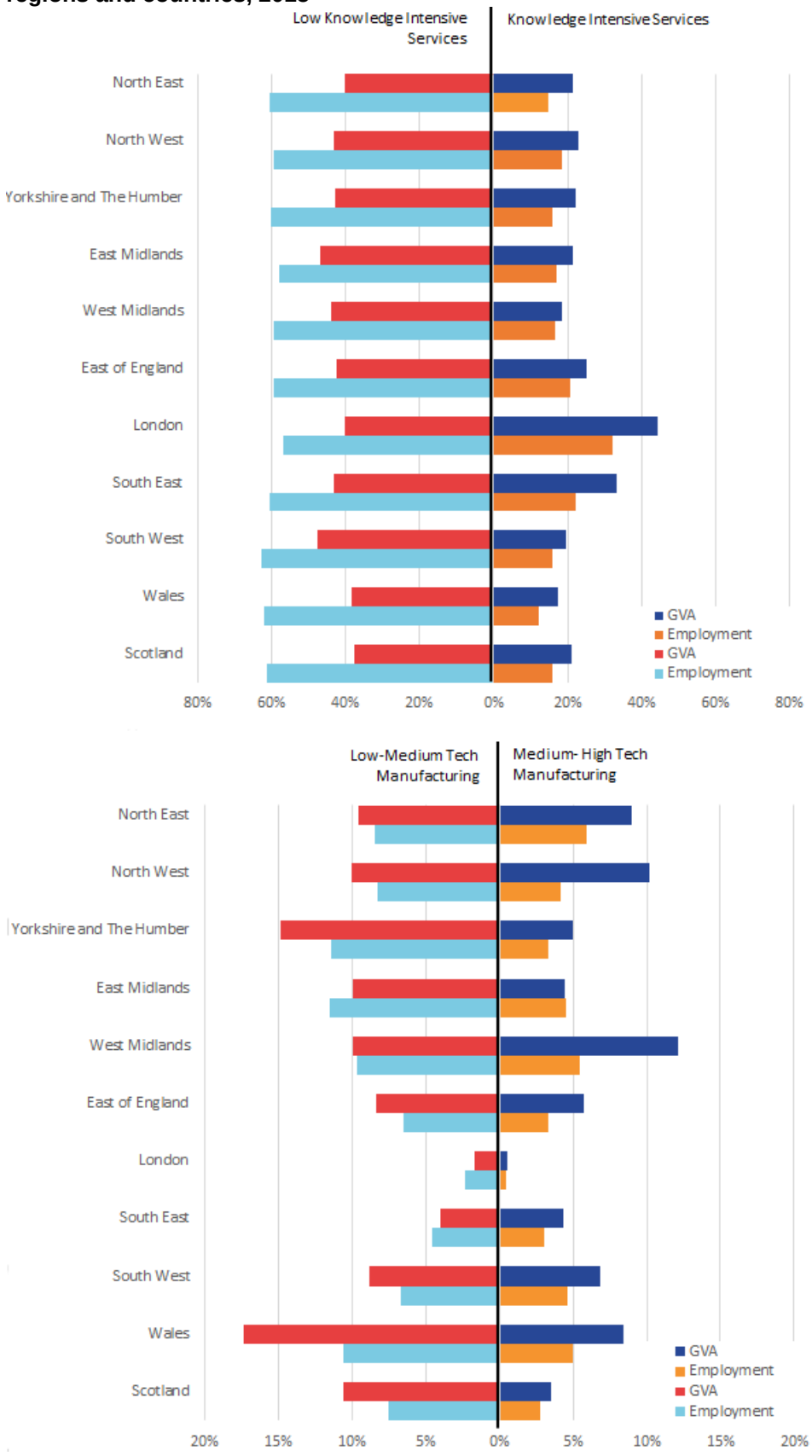
Figure 5 shows that in 2015, less knowledge-intensive services sectors generated around 60% of the employment and 42% of the GVA; while knowledge-intensive services sectors generated 20% of the employment and 29% of the GVA in the non-financial business economy across the Great Britain regions and countries. The distribution of employment in these sectors is similar in most of the regions. The notable exceptions are that London has a higher than average share of employment in knowledge-intensive services and high-tech services.

Both manufacturing sectors accounted for a smaller share of employment in Great Britain regions and countries than services; however, their impacts on GVA, particularly the high-tech manufacturing sectors, were among the highest of all the sectors in the non-financial business economy in 2015. It can be seen in Figure 4 that these sectors had generally the highest GVA per worker in most of the regions. Note that, the capital intensive non-manufacturing production sector (not shown in Figure 5) also had very high labour productivity, however, except for North Eastern Scotland, the share of employment of these sectors in the business economy is small.

Figure 4 also indicates that average GVA per worker in the knowledge-intensive services sectors is twice as large as the GVA per worker in less knowledge-intensive services sectors. However, across the regions, around two-thirds of the employment in the non-financial business economy is in relatively low productivity and less knowledge-intensive services sectors.

The aggregate average productivity of the less knowledge-intensive services sectors in London is around 40% more than the national aggregate average productivity of these sectors. This contributes significantly to the overall productivity gap between London and other regions. The large share of employment that exists in these relatively low productivity services, and the spatial productivity differences within them, present an important policy challenge for improving regional economic performance and reducing the regional economic disparities in Great Britain.

Figure 5: Share of employment and gross value added (GVA) by selected industry groups, Great Britain regions and countries, 2015



Source: Annual Business Survey, Office for National Statistics

Notes:

1. Knowledge-intensive services includes Knowledge-intensive high-tech services, Knowledge-intensive market services and Other knowledge-intensive services.

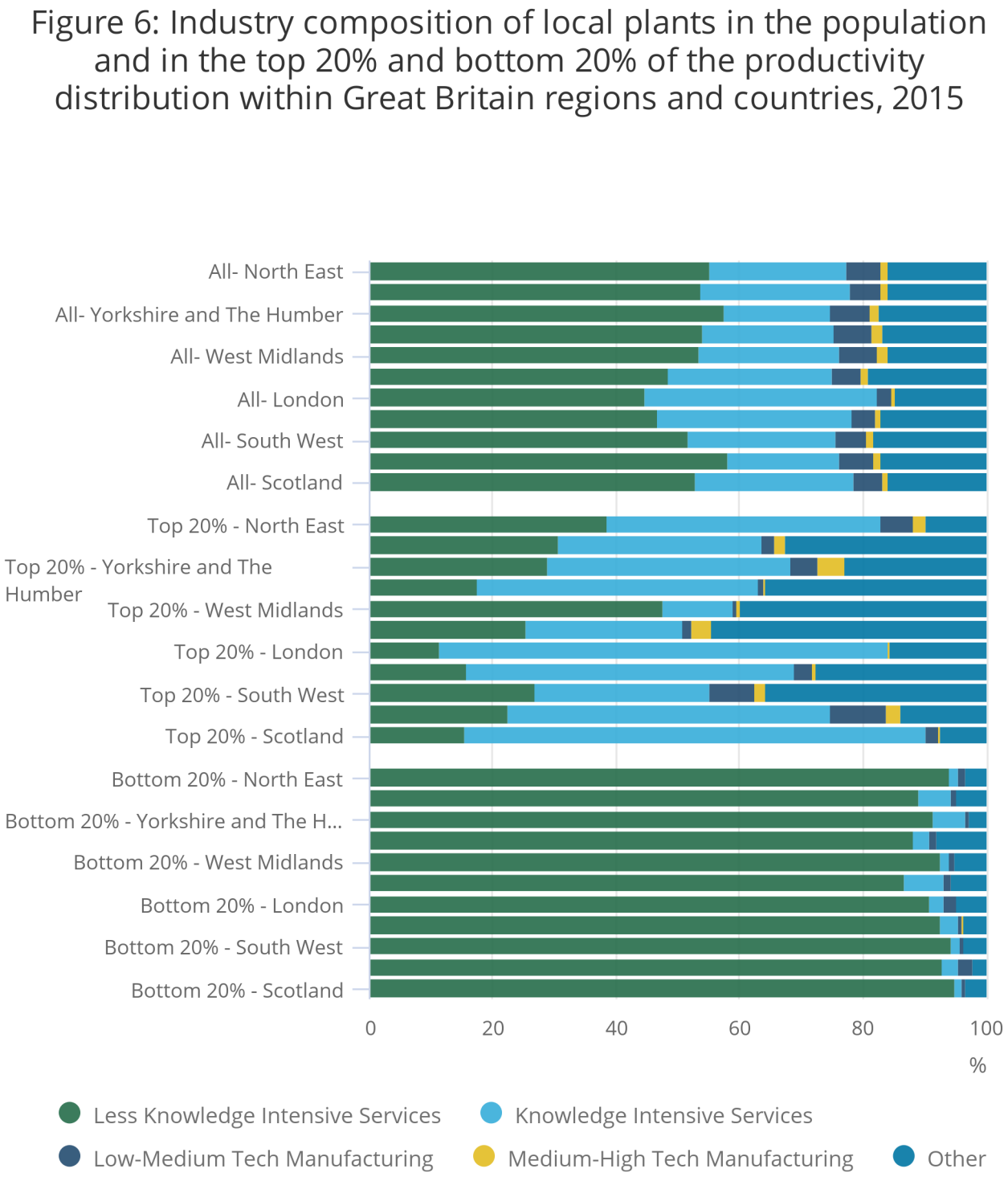
2. Medium-high tech manufacturing includes Medium-high tech manufacturing and High-tech manufacturing.

3. Low-medium tech manufacturing includes Low-tech manufacturing and Medium-low tech manufacturing.

Analysis of firms (local plants) by industry at the bottom 20% and top 20% of the productivity distribution

Figure 6 shows that firms (local plants) in the top 20% and bottom 20% of the productivity distribution can be found in a broad range of industry sectors. However, throughout the Great Britain regions and countries, local plants in the less knowledge-intensive services accounted for the majority of firms in the bottom 20%. The top end was generally dominated by local plants in the knowledge-intensive services, manufacturing and non-manufacturing production and construction sectors.

Figure 6: Industry composition of local plants in the population and in the top 20% and bottom 20% of the productivity distribution within Great Britain regions and countries, 2015



Source: Annual Business Survey, Office for National Statistics

Notes:

1. Knowledge-intensive services includes Knowledge-intensive high-tech services, Knowledge-intensive market services and Other knowledge-intensive services.

2. Medium-high tech manufacturing includes Medium-high tech manufacturing and High-tech manufacturing.

3. Low-medium tech manufacturing includes Low-tech manufacturing and Medium-low tech manufacturing.

4. Other include Construction, Real estate and Non-manufacturing production.

6 . Results: firm demography and aggregate average productivity in the regions

Firm productivity can reflect characteristics of the firms such as production technology, capital intensity, investment, firm size, firm age, innovation, foreign ownership, managerial capability, extent of market power, as well as characteristics of product and factor markets they operate in or consumer tastes and preferences for the firms' products. Firm productivity may also be influenced by local factors such as infrastructure, agglomeration and pricing.

To explore the relationship between firm characteristics and productivity, the following analysis focuses on two firm characteristics[1] – size and age – with an emphasis on the "best" and "worst" performing firms [2] and the role of these characteristics on productivity.

This analysis has been carried out by linking the local unit ABS dataset with the Inter-Departmental Business Register (IDBR), which includes several firm characteristics. It should be noted that due to the potential lag in updating employment data, especially for small firms on the IDBR, the firms (local plants) may not have been allocated to correct size groups. Developments in the use of timelier administrative data will help improve this allocation.

The productivity analysis in this article uses nominal gross value added (GVA), which does not by definition take account of any regional or local price difference or different factor prices faced by the firms.

Distribution of local plants by firm size and productivity

Previous Office for National Statistics (ONS) analyses (for more information see Labour productivity measures from the Annual Business Survey: 2006 to 2015 and Understanding firms in the bottom 10% of the labour productivity distribution in Great Britain: "the laggards", 2003 to 2015) of firm-level productivity in Great Britain have explored GVA per worker by (employment) size of firms and found that in general, larger firms have higher productivity levels on average compared with smaller firms. These analyses were undertaken at the level of the reporting unit of a firm. However, there are other levels at which it is possible to analyse the firm size and productivity, such as at the enterprise level or local plant level. These differences in measuring the firm size need to be borne in mind when comparing results across studies.

For the remainder of the article, analysis continues to be carried out on a local plant basis, but the size category each plant is allocated to is taken as the size of the enterprise to which the local plant is attached. This can be helpful for analysis because being a part of a large business enterprise may have different effects on productivity levels for a small plant compared with a similar size single plant establishment. For example, a small store of a large supermarket chain may benefit from more efficient administrative systems or supply chains (hence a cost advantage) compared with their single plant counterparts.

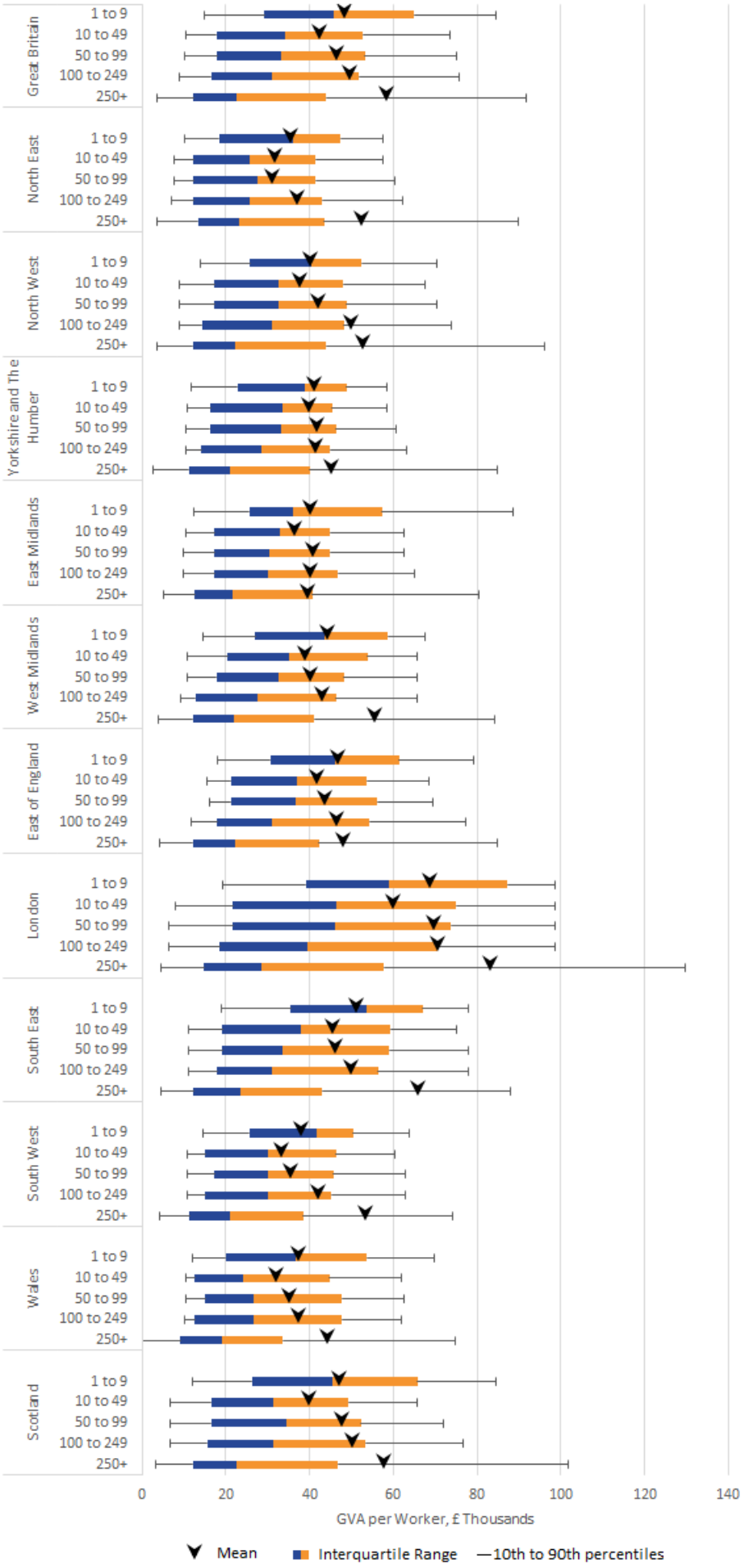
In most cases, local plants, reporting units and enterprises are one and the same. On average, around one-quarter of the local plants across the regions belonged to a multi-plant enterprise in 2015, with the North East having the highest (31%) and London having the lowest (21%) proportions. The larger the enterprise, the more likely they are to have more than one plant. In the dataset, over 95% of the enterprises with 250 or more employment were multi-plant enterprises and over 90% of the micro-plants were single establishments across the regions and countries in Great Britain.

Figure 7 shows that the median GVA per worker in micro-plants (1 to 9 employment) is generally higher than in local plants of larger firms. However, Figure 10 also shows that the top tail of the distribution of the local plants, which are part of the largest firms (250 or more employees), is very long suggesting on average there are productivity advantages of large firms.

Note that this finding partly reflects the fact that the local plants of large firms are counted as “large” if they belong to a large multi-plant enterprise. A multi-plant enterprise may have local plants that are engaged in different types of activities ranging from low to high productivity. Equally, it should be noted that each local plant is included when compiling these distributions – so the local units within the 250 or more employment section will include some very large local plants belonging to large enterprises with only one or a few sites, but will also include the many smaller local units belonging to some large enterprises, for example, the many different retail sites belonging to large retail chains.

Figure 7 also shows that, except for micro-plants, average GVA per worker in a region generally appears to increase with the size of the enterprise. Further analysis suggests that this result holds in each of the industry groups being considered. As mentioned in other ONS articles, such as Labour productivity measures from the Annual Business Survey: 2006 to 2015, this finding is consistent with the expectations that the large businesses may have more scope to benefit from specialisation of functions and economies of scope and scale.

Figure 7: Distribution of local plant productivity (gross value added (GVA) per worker) by firm size, Great Britain regions and countries, 2015



Source: Annual Business Survey (ABS), Office for National Statistics and Inter-Departmental Business Register (IDBR)

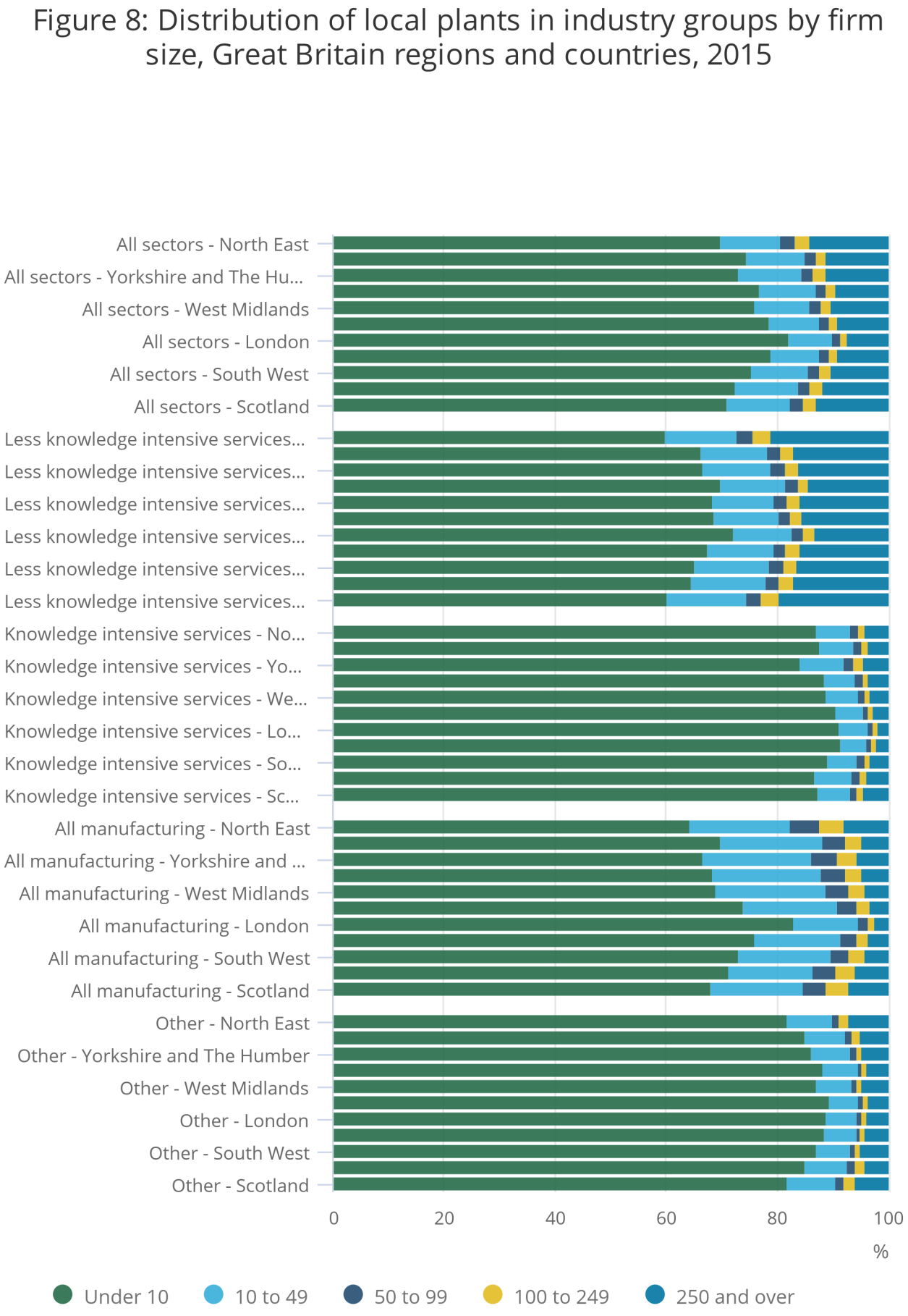
Industry groups by firm size

This section explores whether the relationship between productivity and firm size partly reflects the industry composition of the local plants. The upper panel of Figure 8 shows that micro-plants (1 to 9 employment) generally accounted for more than 70% of the non-financial business population as a whole in 2015. London had the highest share of micro-plants amongst its local units (around 80%), while Scotland and the North East region of England had the highest share of their local unit business population made up of plants associated with the largest enterprises (250 or more employment).

The lower panels show that all the industries have a mix of plants attached to both small and large enterprises, however, there are notable differences in different industries. For example, across the regions there was a higher proportion of knowledge-intensive services firms among the micro-plants (1 to 9 employment) compared with the distribution of micro-plants in the business population. However, there was a higher proportion of plants belonging to large firms (250 or more employment) in the less knowledge-intensive services compared with their distribution in the business population.

The relatively high median productivity level of the plants that are attached to micro-plants (shown in Figure 7) can be explained partly by their heavier representation in the knowledge-intensive sectors than in the rest of the non-financial business economy as a whole, as shown in Figure 8.

Figure 8: Distribution of local plants in industry groups by firm size, Great Britain regions and countries, 2015



Source: Annual Business Survey (ABS), Office for National Statistics and Inter-Departmental Business Register (IDBR)

Notes:

1. Knowledge-intensive services includes Knowledge-intensive high-tech services, Knowledge-intensive market services and Other knowledge-intensive services.

2. Other include Construction, Real estate and Non-manufacturing production.

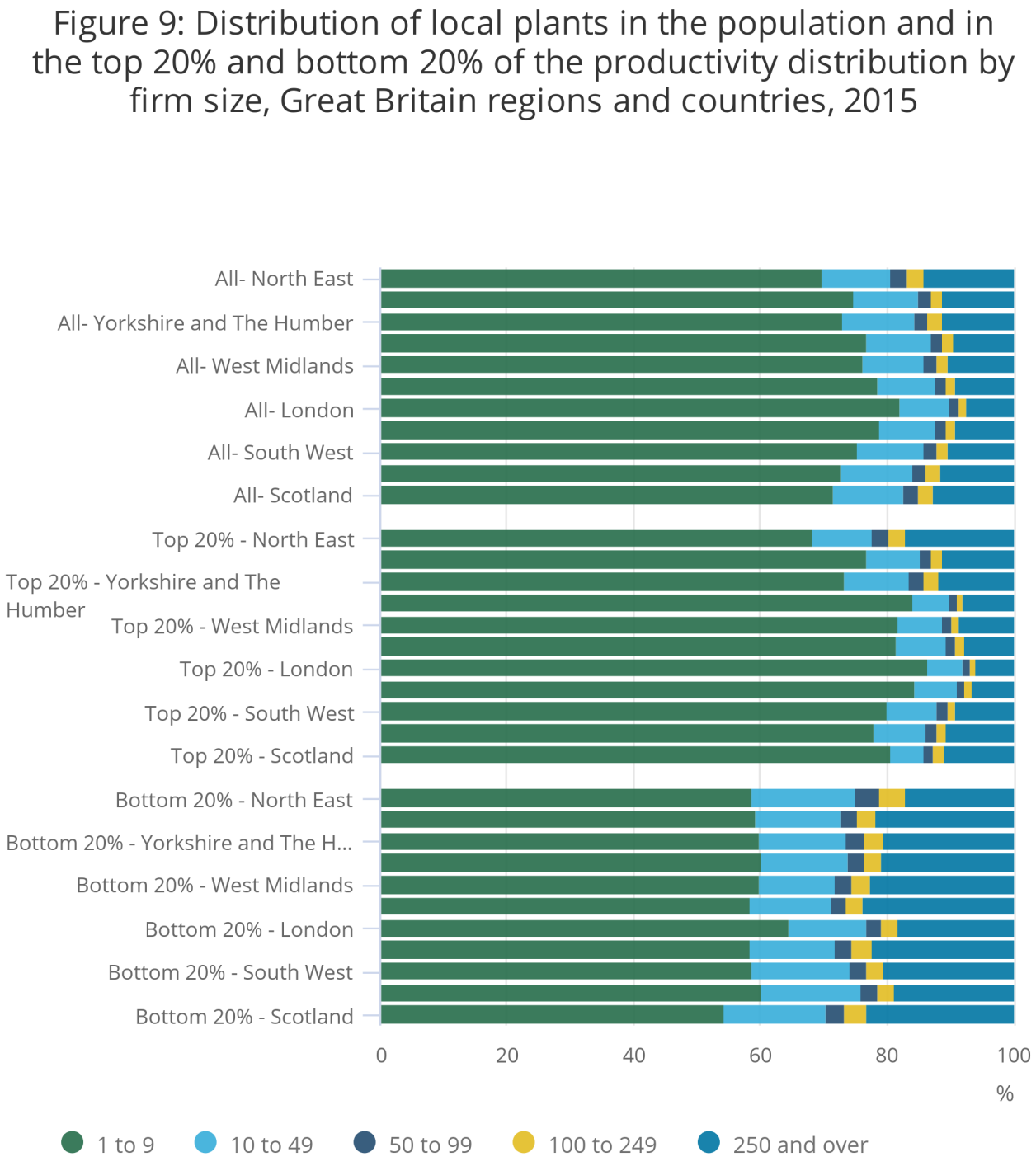
Analysis of local plants by firm size at the bottom 20% and top 20% of the productivity distribution

To explore the role of the firm size in regional average aggregate productivity further, the upper panel of Figure 9 shows the distribution of local plants by size of the enterprise to which they are attached in regions; whereas the bottom panels show the distribution of local plants by enterprise size among the top 20% and the bottom 20% of the productivity distribution.

The bottom panels of Figure 9 show that, throughout the regions, there were proportionately more plants that are attached to micro-firms (1 to 9 employment) among the top 20% compared with their population in the business economy in 2015. For example, in the South East region, the share of the plants in the best performing group accounted for by small firm size was around 6 percentage points larger than in the business population as a whole.

On the other hand, the plants associated with small- to medium-sized enterprises (10 to 49 employment) and with the largest enterprises (250 or more employment) appeared to account for a larger share of the plants in the bottom 20% of the labour productivity distribution than in the business population as a whole.

Figure 9: Distribution of local plants in the population and in the top 20% and bottom 20% of the productivity distribution by firm size, Great Britain regions and countries, 2015



Source: Annual Business Survey (ABS), Office for National Statistics and Inter-Departmental Business Register (IDBR)

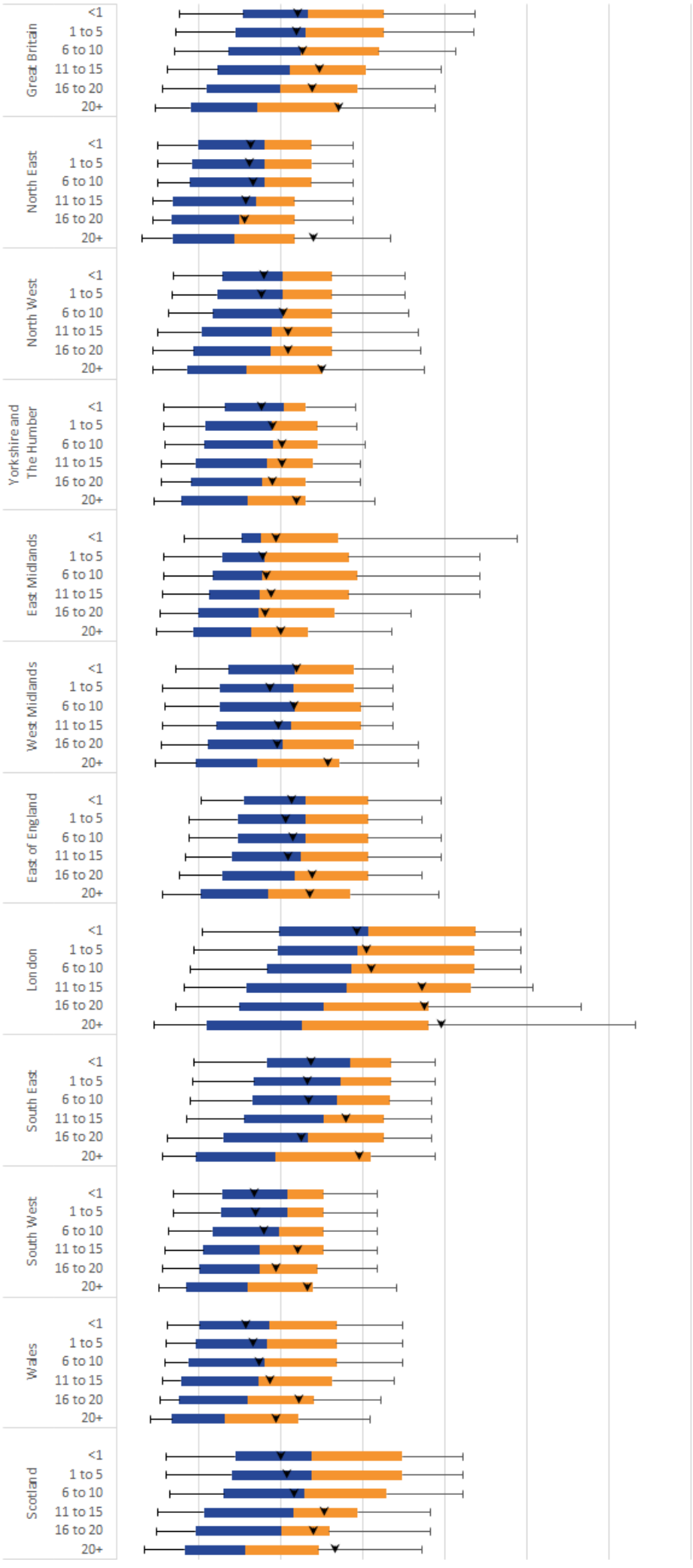
Distribution of local plants by enterprise age and productivity

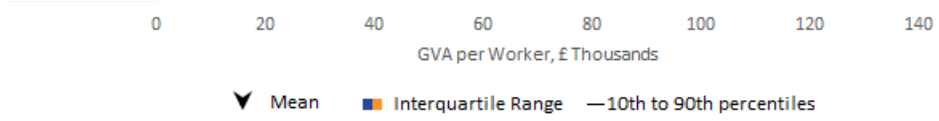
One of our previous publications analysing the characteristics of firms at the bottom of the productivity distribution in Great Britain suggests that the productivity of a firm can also be related to its age.

To examine the relationship between productivity and firm age, the local plant dataset is linked with the IDBR, which includes the birth date of the enterprises. Therefore, in this analysis the age of the local plant reflects the age of the enterprise that the local plant is attached to. As previously, for over three-quarters of the cases the local plants, reporting units and enterprises are one and the same.

Figure 10 shows that median GVA per worker in local plants which are associated with younger enterprises is generally higher than in local plants which are associated with older firms. However, the long top tail of the distributions of the local plants which are attached to enterprises aged 21 years or older makes the average GVA per worker in this group the highest among the age groups analysed.

Figure 10: Distribution of local plant productivity (gross value added (GVA) per worker) by firm age, Great Britain regions and countries, 2015


Great Britain
North East
North West
Yorkshire and The Humber
East Midlands
West Midlands
East of England
London
South East
South West
Wales
Scotland
<1
1 to 5
6 to 10
11 to 15
16 to 20
20+



Source: Annual Business Survey (ABS), Office for National Statistics and Inter-Departmental Business Register (IDBR)

Industry groups by firm age

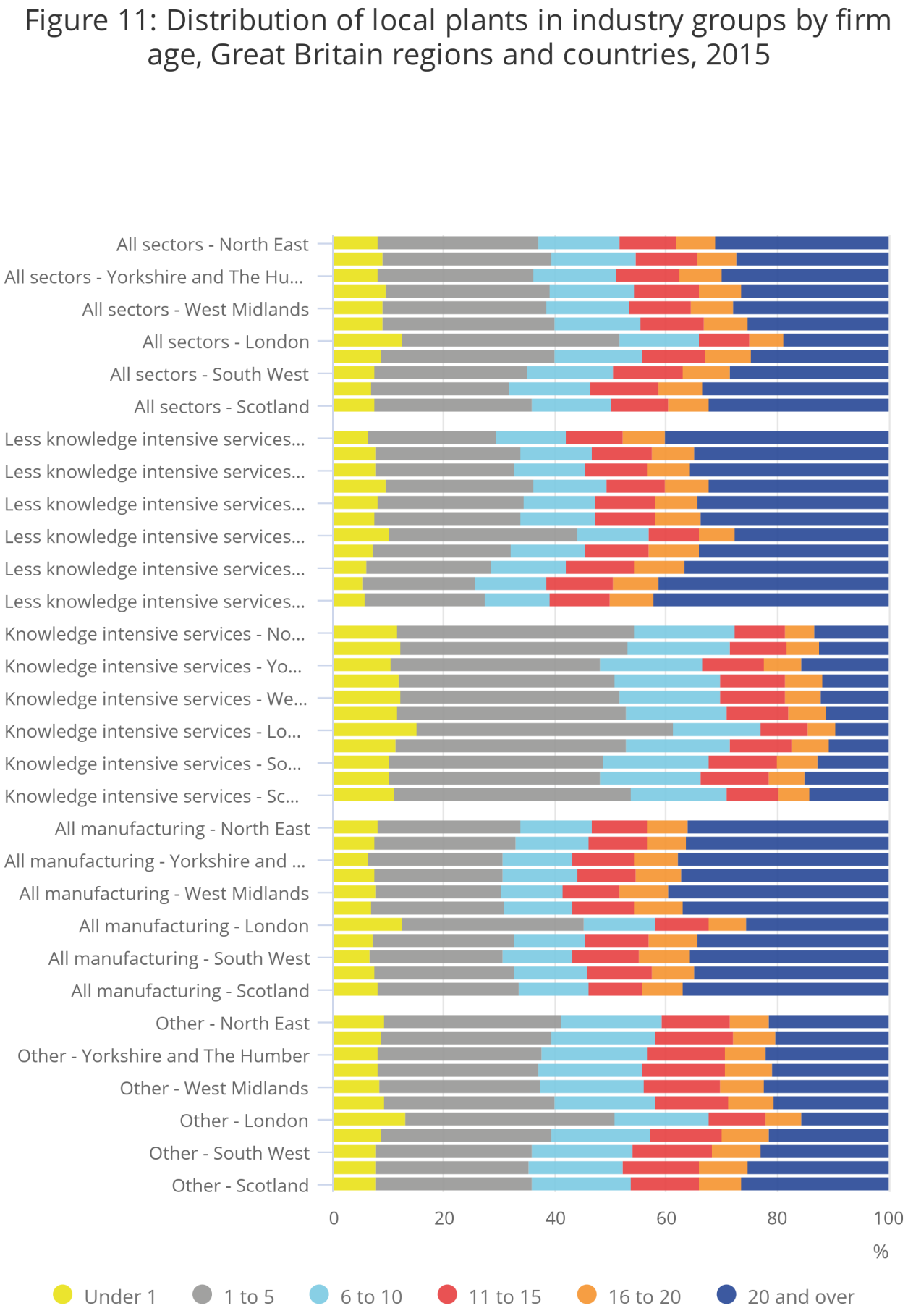
This section explores whether the relationship between productivity and firm age partly reflects the industry composition of the local plants.

The upper panel of Figure 11 shows that in most of the regions, local plants that are attached to young firms (five years old or less) accounted for typically around 40% of the business population as a whole in 2015, with London having the highest share of younger firms compared with other regions.

The lower panels of Figure 11 display the distribution of local plants by the age of enterprise to which they are attached in different industry groups. It shows that all the industries have a mix of local plants belonging to both young and old firms, however, there are notable differences in different industries. It suggests that across the Great Britain regions and countries, knowledge-intensive services sectors tended to have more local plants that are associated with younger firms (less than five years old) compared with the distribution of the similar plants in the business population. However, local plants that are attached to older firms, particularly firms 20 years or older, had a larger representation in the less knowledge-intensive services sectors compared with their distribution in the business economy as a whole.

Figure 11 also suggests that the relatively high median productivity level of the local plants that are associated with young firms (shown in Figure 10) can be partly explained by their heavier representation in the knowledge-intensive sectors than their distribution in the non-financial business economy as a whole.

Figure 11: Distribution of local plants in industry groups by firm age, Great Britain regions and countries, 2015



Source: Annual Business Survey (ABS), Office for National Statistics and Inter-Departmental Business Register (IDBR)

Notes:

1. Knowledge-intensive services includes Knowledge-intensive high-tech services, Knowledge-intensive market services and Other knowledge-intensive services.

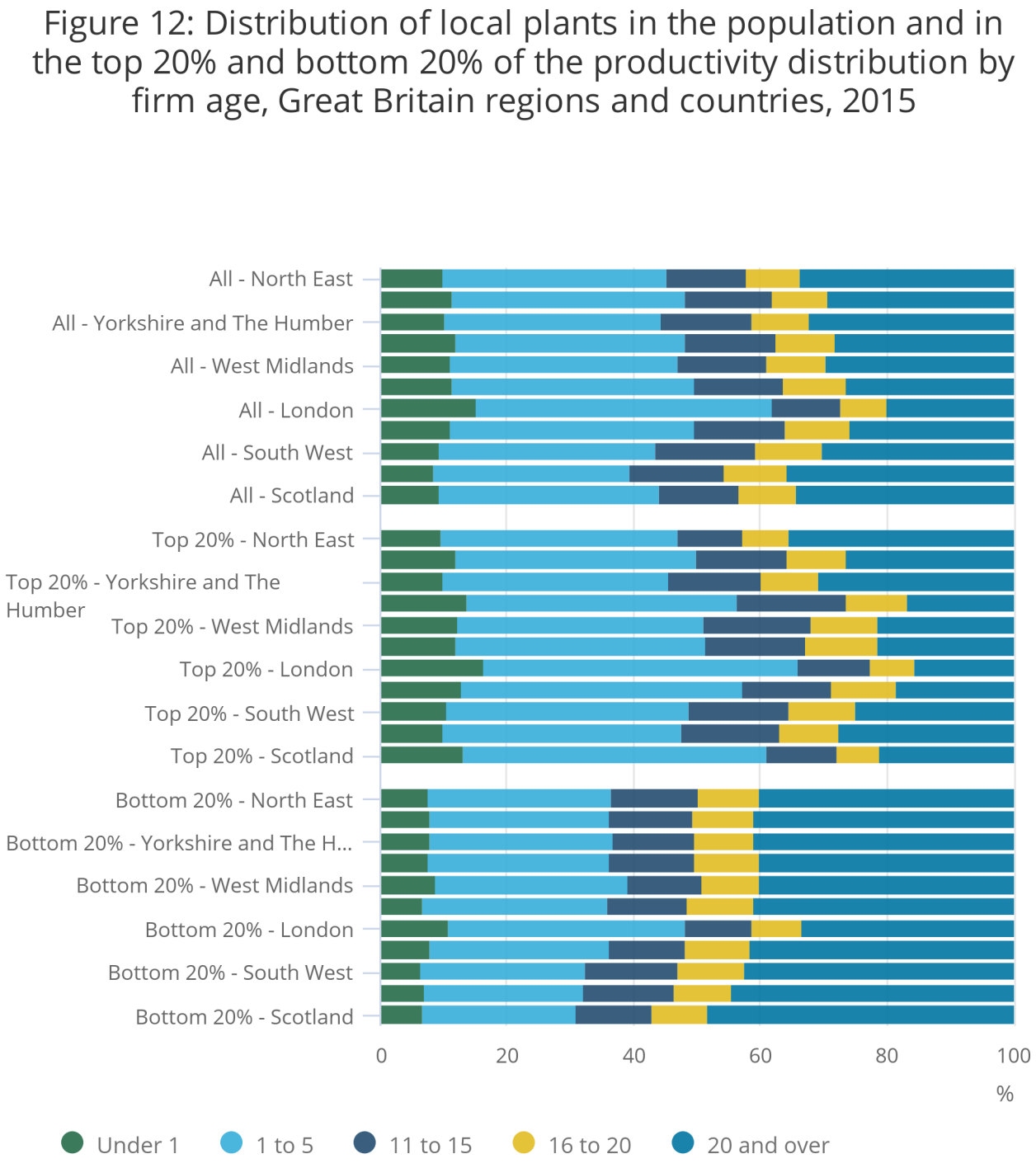
2. Other include Construction, Real estate and Non-manufacturing production.

Analysis of local plants by firm age at the bottom 20% and top 20% of the productivity distribution

To explore the role of firm age in regional average aggregate productivity further, the upper panel of Figure 12 displays the distribution of local plants by firm age in Great Britain regions and countries. The bottom panels show the distribution of local plants by age groups among the top 20% and the bottom 20% of the productivity distribution.

It suggests that throughout the Great Britain regions and countries in the top 20% of the productivity distribution, there were proportionately more local plants that are attached to enterprises less than 15 years old, with the majority being in the one- to five-year-old age group compared with their distribution in the business population as a whole. The least productive (bottom 20%) plants tended to be in the older age group enterprises.

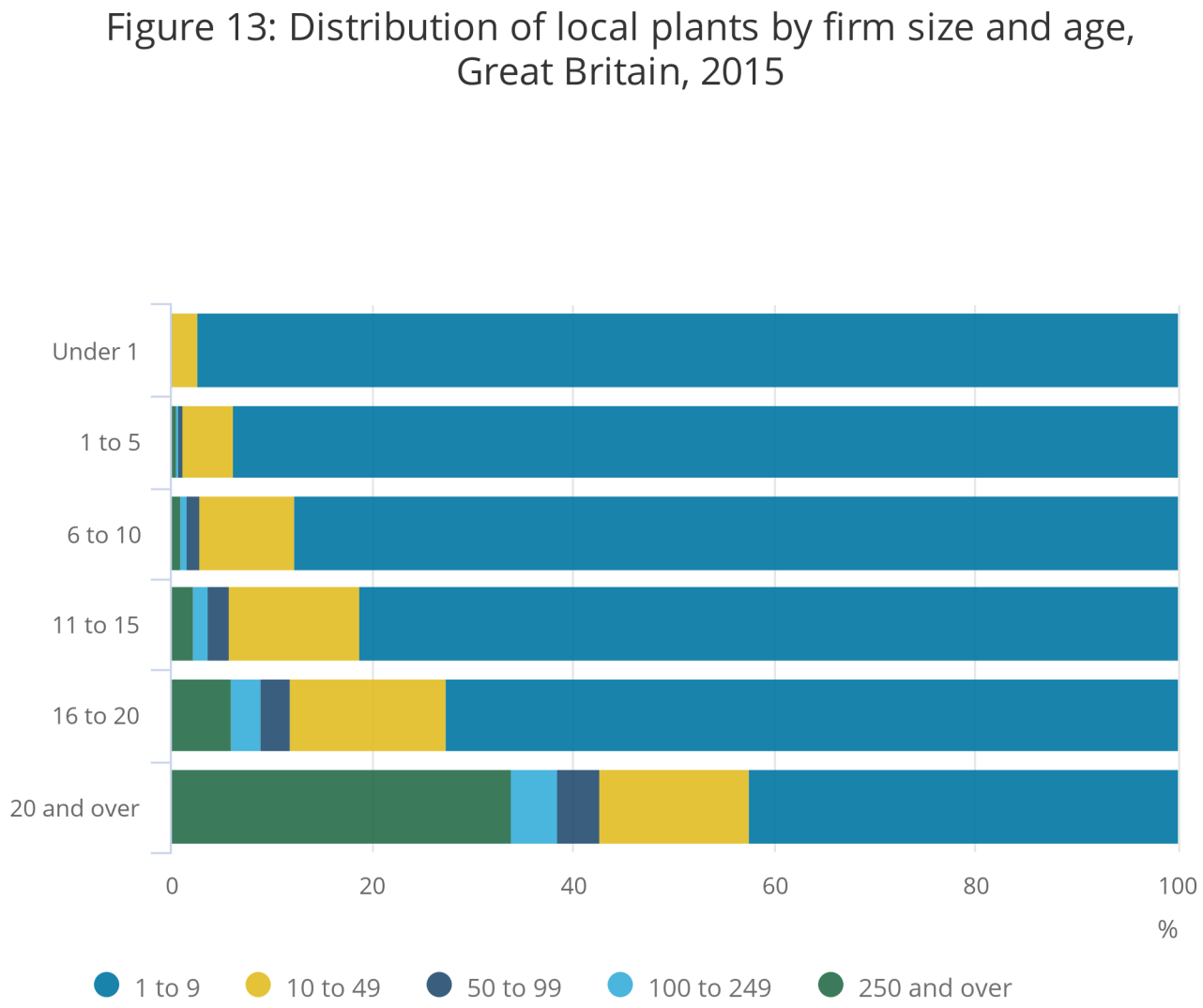
Figure 12: Distribution of local plants in the population and in the top 20% and bottom 20% of the productivity distribution by firm age, Great Britain regions and countries, 2015



Source: Annual Business Survey (ABS), Office for National Statistics and Inter-Departmental Business Register (IDBR)

Finally, Figure 13 shows that most of the plants that are attached to younger firms do also belong to micro-firms (1 to 9 employment) and there is a positive relationship between age and size, that is, older firms tended to be larger firms. The relationship between firm size and age follows the same pattern in all the regions. The findings in Figures 7 and 10 show that the relatively high median productivity of plants that are attached to small firms and young firms are partly reflecting this relationship.

Figure 13: Distribution of local plants by firm size and age, Great Britain, 2015



Source: Annual Business Survey (ABS), Office for National Statistics and Inter-Departmental Business Register (IDBR)

This analysis by size and age in the latter half of the article has shown some interesting results based on analysis of the local plants. For example, median productivity was highest amongst local plants associated with young and small enterprises, most likely due to the higher than average share of such plants found in the knowledge-intensive services sectors. By contrast, except for micro-plants, average GVA per worker in a region generally appeared to increase with the size or the age of the enterprise, suggesting that very high productivity plants must exist within the top tail of the productivity distribution for these size and age groups.

Overall, therefore, the local unit analysis has provided an interesting extra dimension to consideration of these topics. However, further analysis will be required to more fully understand the results from the local unit analysis and how the results compare with, and add to, productivity analysis carried out on a reporting unit basis.

Notes for: Results: firm demography and aggregate average productivity in the regions

1. The Annual Business Survey (ABS) includes other factors that can affect firm productivity such as foreign ownership and whether the firm is an exporting business or not, however, data on other factors were either not complete or not available at the enterprise level for linking with the local unit dataset.

2. Definition: firms in the bottom 20% and in the top 20% of the labour productivity distribution in 2015.

7 . Discussion

The main aim of the article is to provide some information on the sources of spatial differences in labour productivity.

The main finding of the analysis is that in nominal terms, labour productivity differs considerably between and within different industries. Productivity differences within industries appears to play a more prominent role than the industry structure in explaining overall spatial differences in productivity in the non-financial business economy in Great Britain. For example, the data in this article have highlighted that London's labour productivity advantage over other regions is not just about having more firms in certain industries. Rather, they reflect that within certain industries (and particularly in the services industries), London firms display a significantly higher level of labour productivity on average than firms in equivalent industries elsewhere in the country.

Therefore, this question of why are firm-level productivities different within a particular industry between the regions is a vital one to consider. One explanation may be the firm characteristics affecting firm-level labour productivity such as production technology, capital intensity, investment, firm size, firm age, innovation, foreign ownership, managerial capability, extent of market power, as well as characteristics of product and factor markets they are operating in, or consumer tastes and preferences for the firms' products.

This article does not aim to provide a full analysis of all the drivers of firm productivity. The analysis explored two firm characteristics – firm size and age – which previous Office for National Statistics (ONS) articles have found to be correlated with firm productivity. The findings in this article also suggest that there is some correlation between firm size, firm age and productivity. However, their role on the productivity of the firm is at best a partial one and these characteristics do not appear to have a large effect on the spatial differences in aggregate average productivity, as the distributions of local plants by these two characteristics are very similar across the regions.

Based on this analysis, however, it is possible to make a few observations on the factors behind the observed differences between the local plants located in different regions. For example, across the Great Britain regions and countries, local plants that are attached to micro-plants (1 to 9 employment) have relatively high median productivity levels. This can be explained partly by their heavier representation in the knowledge-intensive services sectors than their distribution in the non-financial business economy as a whole. It is important to note that the analyses of productivity and firm size and/or age cannot be compared directly with other ONS analyses (such as Labour productivity measures from the Annual Business Survey: 2006 to 2015 and Understanding firms in the bottom 10% of the labour productivity distribution in Great Britain: "the laggards", 2003 to 2015), which were undertaken at the reporting unit level of an enterprise.

Another factor is that firm-level productivity may be influenced by agglomeration effects. There is a body of evidence that clustering economic activity (agglomeration) makes a city or region more productive. For example, businesses have access to a larger pool of potential customers, suppliers and workers in the same city. Similarly, knowledge spillovers are likely to occur when many similar firms are located close to each other. This can either be because firms collaborate or because workers move from one company to another, bringing their knowledge with them.

However, some sectors benefit more than others from knowledge spillovers with knowledge-intensive services businesses having the most to gain from a central location. Firm-level productivity may also be influenced by local factors such as infrastructure, economic mass or distance to economic mass. Some of these factors were discussed in last year's rural urban productivity analysis.

Another point to note is that even within a narrow industry sector, this article used broad industry groupings for the Industry Mix Index, however, they are based on 85 two-digit industry groupings. They could still cover a range of slightly different types of firms. More broadly, the results in this section are likely to reflect the fact that even within a particular industry sector, there can be differences in the types of outputs and the skills of workers involved, which may explain productivity differences. For example, a multinational law firm in London may have a different specialisation (hence different labour productivity levels) to a small local law firm elsewhere, but both will have the same two-digit industry grouping.

Finally, productivity indicators also depend on pricing. The productivity analysis in this article uses nominal gross value added (GVA), which does not by definition take account of any regional or local price difference [1] or different factor prices faced by the firms. Therefore, there is a possibility that if we were to control for regional price differences, this may either strengthen or weaken these findings.

Further analysis on the sources and determinants of labour productivity differences between regions and city regions will follow in our subsequent productivity bulletins.

Notes for: Discussion

1. Local price effects may be particularly significant if the goods and services are not tradeable (that is, they are produced and consumed locally).

8 . Annex: Calculation of the productivity and industry composition indices

This decomposition analysis technique is based on the original work of Olley and Pakes (1996) [1].

Equation 1 shows the calculation of the indices that break down the aggregate productivity into two components. This can be calculated as follows:

$$qr \equiv \sum_r q_r^i \lambda_r^i = \sum_r q_r^i \bar{\lambda}^i + \sum_r \bar{q}^i \lambda_r^i - \sum_r \bar{q}^i \lambda_r^i + \sum_r (q_r^i - \bar{q}^i)(\lambda_r^i - \bar{\lambda}^i)$$

where :
$\text{r} = \text{region}$
$\text{i} = \text{industry}$
$\lambda = \text{share of industries in the region (defined as share of industry i employment in the total employment of the region)}$
$\bar{\lambda} = \text{share of industries in Great Britain (defined as the national share of industry i employment in the total nation employment)}$
$\text{qr} = \text{aggregate productivity in the region, that is weighted average of industry productivities in region r, using lab share of the firm as weight}$
$\bar{q} = \text{aggregate productivity in Great Britain}$

First term = Productivity Index, which shows the average level of productivity in region r assuming the industry composition in that region is the same as for the economy as a whole.

Second term = Industry Composition Index, which shows the average level of productivity in region r assuming the productivity of each industry in that region equals nationwide average productivity for that industry.

Term 3 = average labour productivity in Great Britain.

Term 4 = Residual covariance between industry productivities and industry shares in region r. It shows the link between industry shares and productivity.

Notes for: Annex: Calculation of the productivity and industry composition indices

1. For more information see Olley GS and Pakes A (1996), 'The Dynamics of Productivity in the Telecommunications Equipment Industry', Econometrica, Volume 64, Issue 6, pages 1,263 to 1,297.

Compendium

Regional and subregional productivity comparisons, UK and selected EU countries: 2014

Compares labour productivity and economic performance of UK and selected EU countries.

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Table of contents

1 . Main points

- This article compares regional labour productivity in the UK, Germany, Italy, France, Spain and the Netherlands and also provides additional context on regional economic performance via data on employment rates and household incomes.
- Île-de-France, which includes the city of Paris, is the region with the highest labour productivity, 54 % above the UK average, followed by London at 39% above the UK average.
- Four of the next 10 ranked regions are to be found in Germany and two each in the Netherlands, Italy and Spain.
- Of the UK's 12 regions, 8 are amongst those with the lowest productivity levels; they make up 8 of the 14 lowest ranked regions alongside regions of eastern Germany and southern Italy.
- UK regions rank more favourably when comparing disposable household incomes across regions, rather than productivity, with average household incomes per head in southern regions of Spain and Italy around 15% below those in the lowest ranked UK region; low employment rates in these southern regions of Spain and Italy are an important influencing factor.
- The regions with the highest disposable household incomes per head are typically those that combine high productivity levels and above-average employment rates; this includes London, the South East and East of England regions in the UK alongside many regions in Germany.

2 . Things you need to know about this release

To make valid international comparisons of economic performance across European countries, it is important that appropriate metrics of economic performance and comparable geographies are used and comparable geographies are used. This section outlines the metrics and geographies used in this article and provides the rationale behind these choices. It also notes why some alternative metrics and geographies risk providing misleading results.

What is labour productivity?

Labour productivity is defined as the quantity of goods and services produced per unit of labour input, for example, per hour worked, per filled job or per worker. It is one of the most widely used measures of economic performance of a nation or an area. Productivity matters because increasing productivity is critical to increasing economic growth in the long-run. This follows from the fact that economic output can only be increased by either increasing the amount of inputs or by raising productivity. Furthermore, changes in labour productivity are also related to changes in real wages. Increasing productivity is, therefore, an important aim for both national and local economies.

As shown in our Regional and subregional productivity publication, there is currently a wide spatial divergence in levels of productivity between different UK subregions. This article provides further context to those results by comparing UK regions with regional productivity levels in France, Germany, Italy, Netherlands and Spain.

Productivity metric (GDP per worker)

Labour productivity in this article is measured as gross domestic product (GDP) per worker where GDP is measured at current prices and expressed at the purchasing power standard (PPS) to avoid distortions arising from different price levels across countries. Note that gross value added (GVA) per hour worked would also be an appropriate measure of labour productivity to use in such an analysis. In this case, however, we have chosen GDP per worker as GVA per hour worked data are currently unavailable for every country in our sample. Differences between productivity based on GVA per hour worked and GDP per worker calculations are negligible.

Note that the labour market data used in the productivity calculations have been based on the area of workplace of each worker. This means the labour input is being measured on the same geographical basis as the economic output (GDP).

Choosing comparable geographies

The Nomenclature of Territorial Units for Statistics (NUTS) classification is a geographical classification for statistical production across Europe. There are three levels of the geography and in the UK, this equates to 12 NUTS1 regions, 40 NUTS2 regions and 173 NUTS3 regions. In this article, the NUTS1 geography is used to show data for regions, while a combination of NUTS2 and NUTS3 areas is used to show data for subregions. This combination of NUTS2 and NUTS3 subregions consists of all the UK NUTS2 areas along with all the NUTS2 areas from the other countries, provided the subregion's population is less than 5 million inhabitants. For those NUTS2 areas where the population exceeds 5 million, the NUTS2 area has been replaced by its constituent NUTS3 subareas. This means the mix of NUTS2 and NUTS3 regions continues to provide full geographic coverage for all countries included but avoids comparing very differently sized areas.

The examples of London and Paris help to explain why we have chosen to conduct the subregional analysis on a mix of NUTS2 and NUTS3 regions. The guidance for NUTS2 geographies suggests, amongst other factors, that they should follow a population range between 800,000 and 3 million people. The majority (including all UK NUTS2 areas) do so. However, there are some important exceptions, such as Île-de-France, covering the Greater Paris area, which has a population of over 12.0 million but is counted as just one NUTS2 area. London by comparison is split into five NUTS2 areas each with a population between 1.1 million and 2.2 million. Comparing the whole of Île-de-France with separate areas of London is not ideal for statistical analysis. By replacing Île-de-France in the analysis with its eight constituent NUTS3 areas, which have populations between 1.2 million and 2.2 million, it allows for far more meaningful comparisons of the Paris and London data. Other NUTS2 areas that have been replaced with their constituent NUTS3 areas in this analysis include Lombardy, Andalusia and Dusseldorf.

The above mix of NUTS2 and NUTS3 areas has some clear benefits for analysis purposes over using NUTS2 areas alone, particularly in ensuring a more valid comparison across some of Europe's largest cities. However, the method used is only one possible choice. A downside, for example, is that by introducing extra NUTS3 regions, there are several areas with small population levels introduced into the analysis. Overall, however, we view the benefits of the approach as outweighing the downsides.

For future analysis, alternative approaches could include setting a different threshold, or including a minimum population threshold (although that would mean full geographical coverage would be lost), or combining some of the NUTS3 areas within a large NUTS2 area to create new areas.

Additionally, for urban areas, it might be possible to base a future analysis on the Functional Urban Area geography developed by Eurostat, albeit this excludes rural areas. We would be happy to receive feedback on the approach we have taken in this report and ideas for how best to address these issues of comparability in future.

Data sources and comparability

Regional data for France, Germany, Italy, the Netherlands and Spain are taken from the Eurostat website, where comparable data are collated from all the EU countries. For the UK, the data are designed to be comparable to the data published in the annual Regional and subregional productivity release, although it should be noted the metrics used differ. In this publication, and on the Eurostat website, data are based on GDP per worker, as compared with GVA per job filled in the regular ONS publication. Both definitions fit the definition of labour productivity as the quantity of goods and services produced per unit of labour input.

The country data used in Figures 5 and 7 are also taken from the Eurostat website. Please note that the data in this publication are not an exact match with the data for European countries as reported in our International comparisons of productivity publication. Those data are compiled from Organisation for Economic Co-operation and Development (OECD) sources and there are some differences between those data and the data collated in this output. In this article, we have used the Eurostat data for countries to provide consistency with the regional data presented in the article. As such, the country data in this publication are only provided for indicative purposes to provide context to the regional data provided. For national comparisons of productivity data, the recommendation is to refer to and use the ONS International comparisons of productivity publication.

Net disposable income of private households per head

As well as providing data on productivity, this article also examines data on household incomes. This is to provide some additional context on economic performance. Unlike productivity, which is a workplace measure (it compares the output from workplaces with the labour input at the location of the workplace), household incomes are measured on a residence basis.

The definition used by Eurostat is:

“The disposable income of private households is the balance of primary income (operating surplus/mixed income plus compensation of employees plus property income received minus property income paid) and the redistribution of income in cash. These transactions comprise social contributions paid, social benefits in cash received, current taxes on income and wealth paid, as well as other current transfers. Disposable income does not include social transfers in kind coming from public administrations or non-profit institutions serving households.”

For the UK, these data are supplied to Eurostat to be comparable with the Regional gross disposable household income dataset published annually by Office for National Statistics (ONS).

Note on GVA (or GDP) per head

This article explores economic performance across regions through the deliberate use of a workplace productivity measure (GDP per worker) and a residence-based household income measure (net disposable household income per head). By contrast, GDP per head (or GVA per head) is not used and this omission is deliberate because GDP per head can provide misleading estimates of economic performance and disparities at the regional and subregional level, particularly for areas such as Inner London that have high net-commuting flows.

The problem is that the GDP per head gets heavily influenced by these commuting flows because it compares a workplace measure of economic output (GDP) with a residence-based measure of population. As an extreme example, consider the City of London (the local authority area of the City of London Corporation, often known as the square mile). A large share of its GDP is produced by commuters. A good productivity measure will take account of this and divide the output produced in the City of London by all the labour input involved including that from all the 300,000 plus in-commuters. However, GVA per head takes all this GDP, ignores all the net in-commuters, and just divides output by the small population (9,000) who live there. As such, GVA per head for the City of London is extremely high and provides neither an accurate proxy for productivity or household incomes for its inhabitants. Furthermore, analysis using GVA per head in this manner risks significantly over-estimating actual regional economic disparities that exist between areas.

GDP per head analysis for European NUTS2 geographies that shows Inner London West having vastly higher GDP per head than any other region is an example of this misleading over-estimation of regional disparities in action. The Inner London West data are highly influenced by in-commuting and as such should not be regarded as a valid estimate of its economic performance. To get a valid comparison between areas it is instead necessary to compare either productivity (as measured, for example, by GVA per worker) where both the numerator and denominator are measured on a workplace basis, or household incomes (as measured, for example, by gross disposable household income (GDHI) per head) where both the numerator and denominator are measured on a residence basis. This article provides data on both these measures.

3 . Results – labour productivity

Figure 1 shows labour productivity for the 52 NUTS1 regions of France (Blue), Germany (Grey), Italy (Green), the Netherlands (Orange), Spain (Yellow) and the UK (Red). Each region is shown in comparison with the average productivity level for the UK. Île-de-France, which includes the city of Paris, is the NUTS1 region with the highest productivity, at 54% above the UK average. This is followed by London at 39% above the UK average.

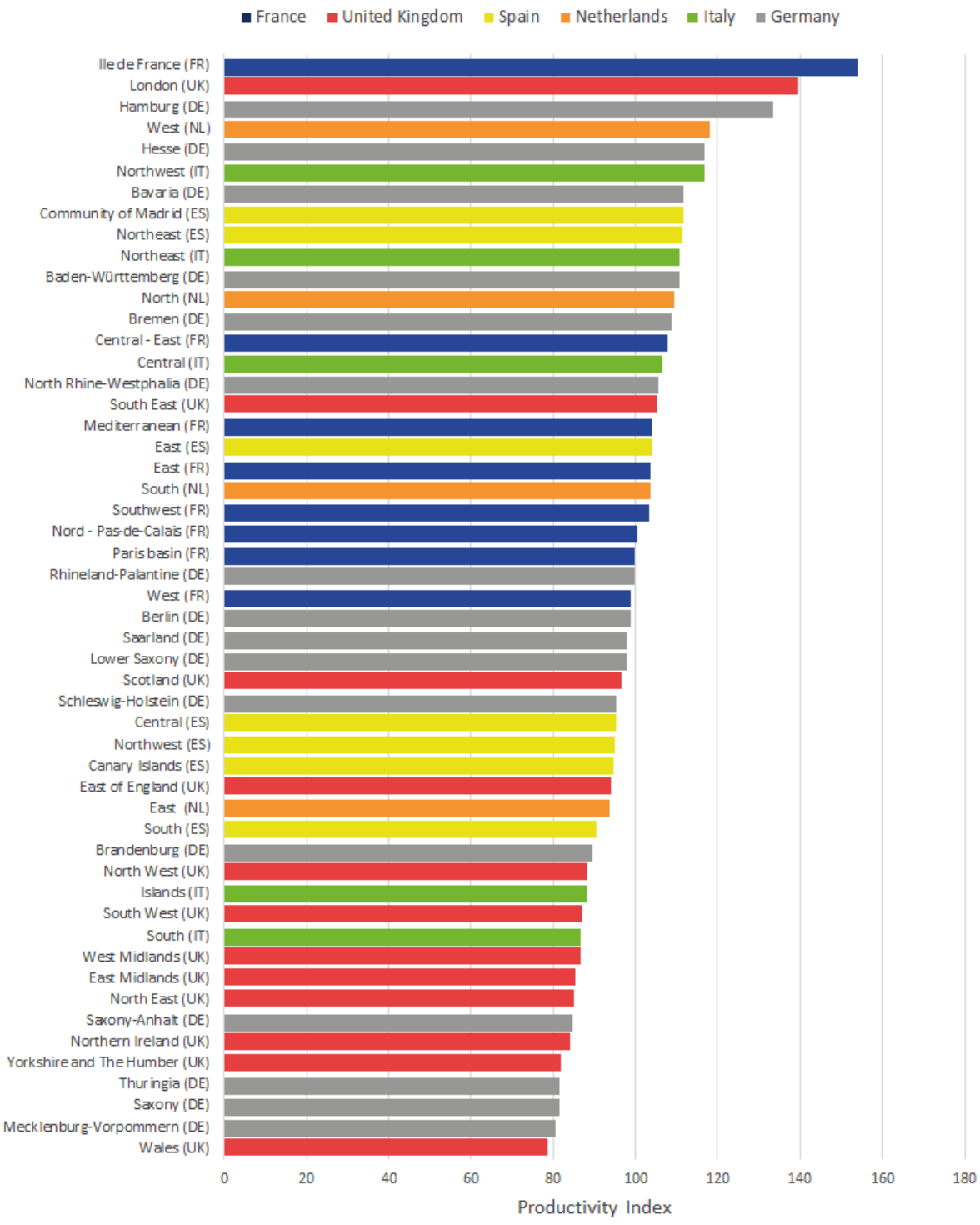
Following Île-de-France and London, 4 of the next 10 ranked regions are to be found in Germany and two each in the Netherlands, Italy and Spain. In the case of Germany, these four regions are Hamburg, Hesse, Bavaria and Baden-Württemberg, which include the cities of Hamburg, Frankfurt, Munich and Stuttgart respectively. In the Netherlands, the West region (including Amsterdam, The Hague and Utrecht) has the highest productivity followed by the North region (which includes Groningen). In Italy, productivity is highest in the Northwest region including Milan, Turin and Genoa followed by the Northeast region including Bologna. In Spain, productivity is highest in the NUTS1 regions of Community of Madrid and Northeast, which include the cities of Madrid and Bilbao respectively.

Aside from London, the only UK region amongst the top half of regions shown in Figure 1 is the South East (ranked 17 of the 52 regions). By contrast, UK regions dominate amongst those with the lowest productivity levels, alongside subregions of eastern Germany and southern Italy. Wales is the region with the lowest productivity, with an index of 78.5.

In the case of France, similar to UK, there is a large gap between the productivity of its capital city compared with the next highest-ranking region (the Central East region, which includes Lyon). However, unlike the UK, the rest of the French NUTS1 regions are then clustered at close to the UK average.

Figure 1: Labour productivity by NUTS1 regions in 2014

UK and selected EU countries, Index UK=100



Source: Office for National Statistics, Eurostat

Figure 2 shows the distribution of labour productivity at a more disaggregated geographical level encompassing 221 NUTS2 and NUTS3 subregions covering the same countries of the UK, Germany, France, Spain, Italy and the Netherlands. The subregions with the highest and lowest labour productivity are then shown in greater detail in Figures 3 and 4.

Figure 2 shows that the majority of regions have labour productivity within 20% of the UK average, with only a relatively low share having productivity outside this range. The 40 UK subregions are shown as red dots in Figure 2. The majority of UK subregions are amongst the subregions with lower levels of productivity, with a large cluster at around 15% to 20% below the UK average (see Figure 4 for further details).

Figure 2: Labour productivity by selected NUTS2 and NUTS3 subregions in 2014

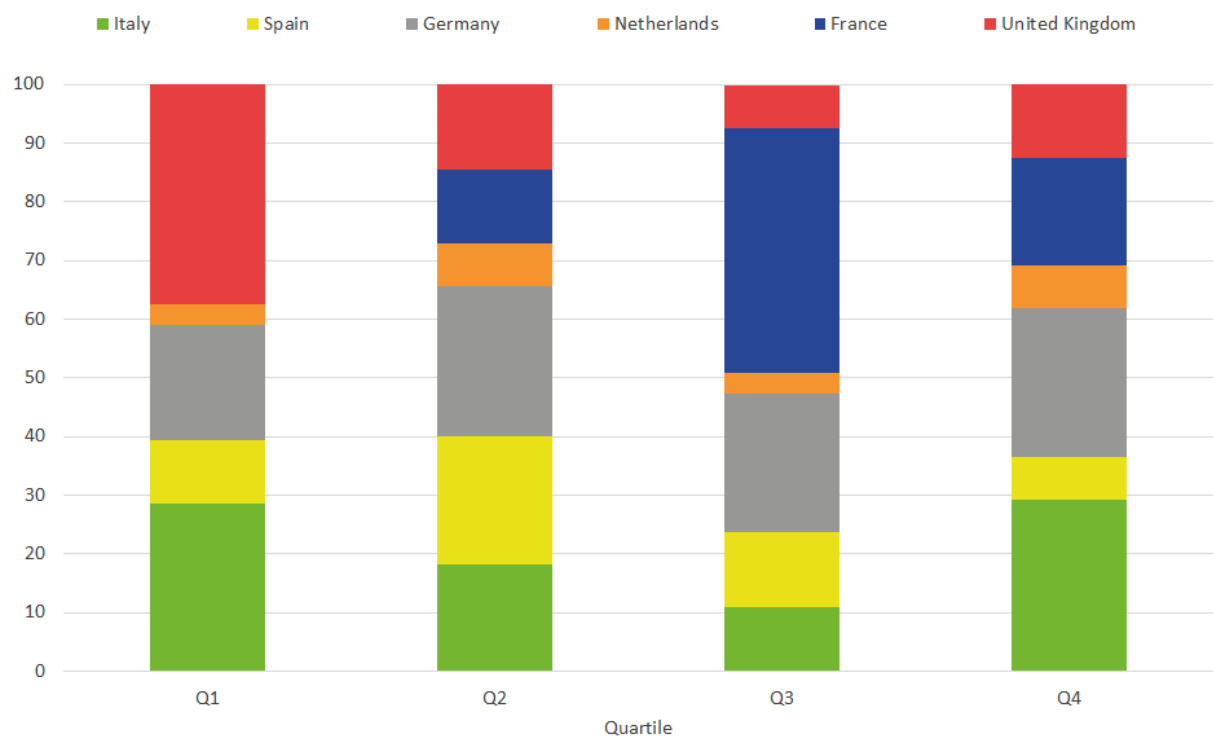
UK and selected EU countries, Index UK=100

Figure 3 distributes the subregions into four quartiles (with equal numbers of regions in each) based on the labour productivity values. It shows 37.5% of the lowest productivity regions within Quartile 1 (Q1) belong to the UK (with productivity between 12% to 26% below the UK average). Italian subregions amount to 28.6% of the NUTS2 and NUTS3 regions in Q1, the next highest share in this quartile. No French subregions fall into this category.

By contrast, French NUTS2 and NUTS3 regions amount to 18.2% of the total composition of Quartile 4 (Q4) and 41.8% of the total composition of Quartile 3 (Q3). Germany has a relatively homogenous distribution comprising 19% to 25% of each quartile.

Figure 3: Productivity quartile distribution of selected NUTS2 and NUTS3 subregions in 2014

UK and selected EU countries, %

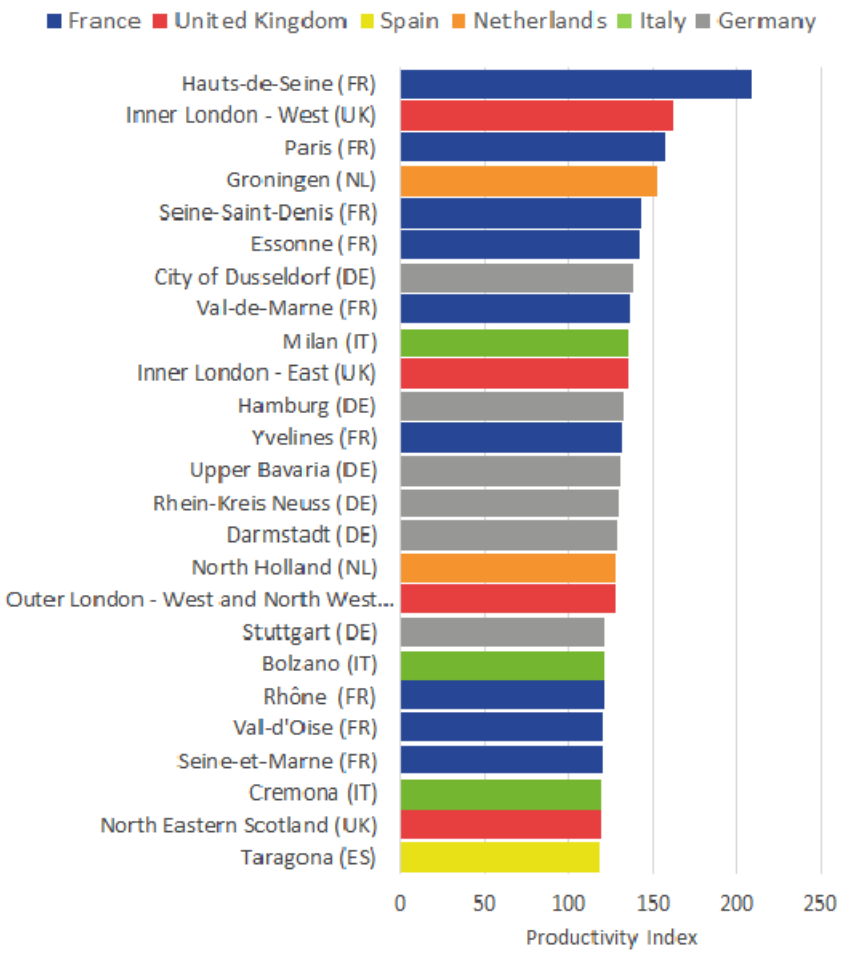


Source: Office for National Statistics, Eurostat

Figure 4 shows the 25 subregions with the highest levels of labour productivity. Hauts-de-Seine, which includes the La Défense area of Paris, and Inner London West, which includes the City of London, are the subregions with the highest productivity (seven other subregions of Île-de-France and two other subregions of London are also included in Figure 2). The only other UK subregion included is North Eastern Scotland, which includes Aberdeen with its focus on the oil industry.

Figure 4: Labour productivity in the 25 highest-ranking selected NUTS2 and NUTS3 subregions in 2014

UK and selected EU countries, Index UK=100

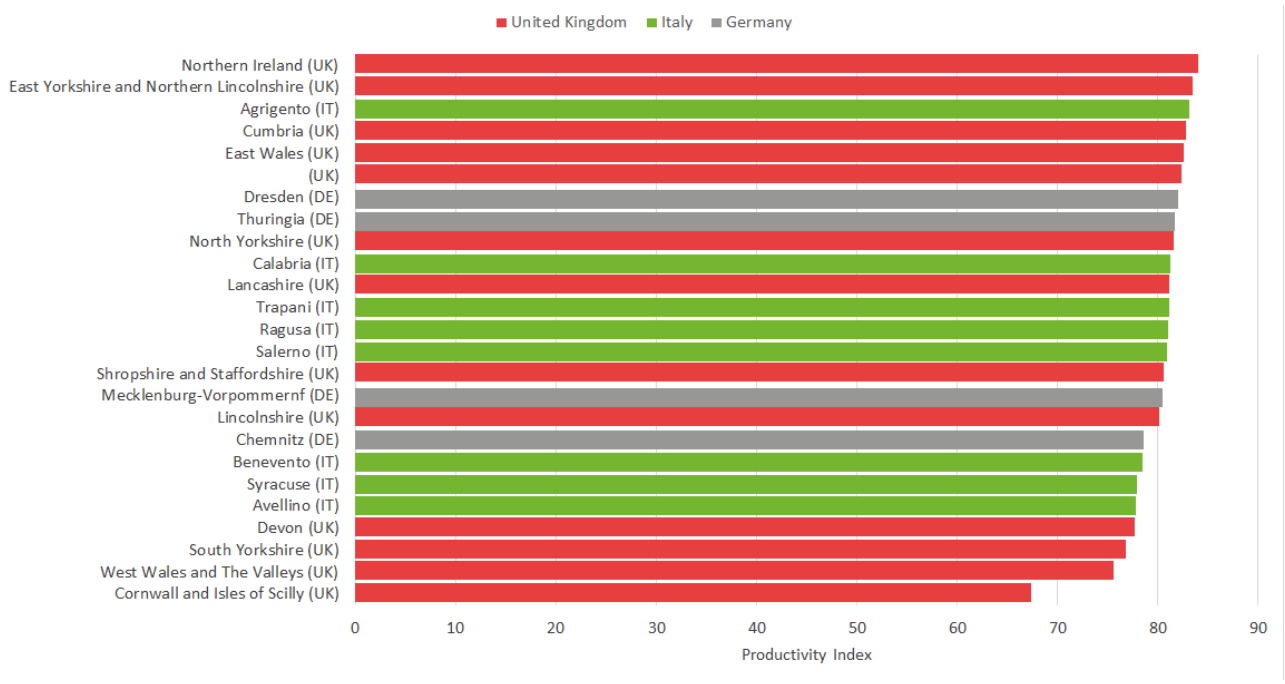


Source: Office for National Statistics, Eurostat

Figure 5 shows the 25 subregions with the lowest labour productivity. The subregions shown are all located either in the UK, southern Italy or eastern Germany, with no subregions of France, the Netherlands or Spain included.

Figure 5: Labour productivity in the 25 lowest-ranking selected NUTS2 and NUTS3 subregions in 2014

UK and selected EU countries, Index UK=100

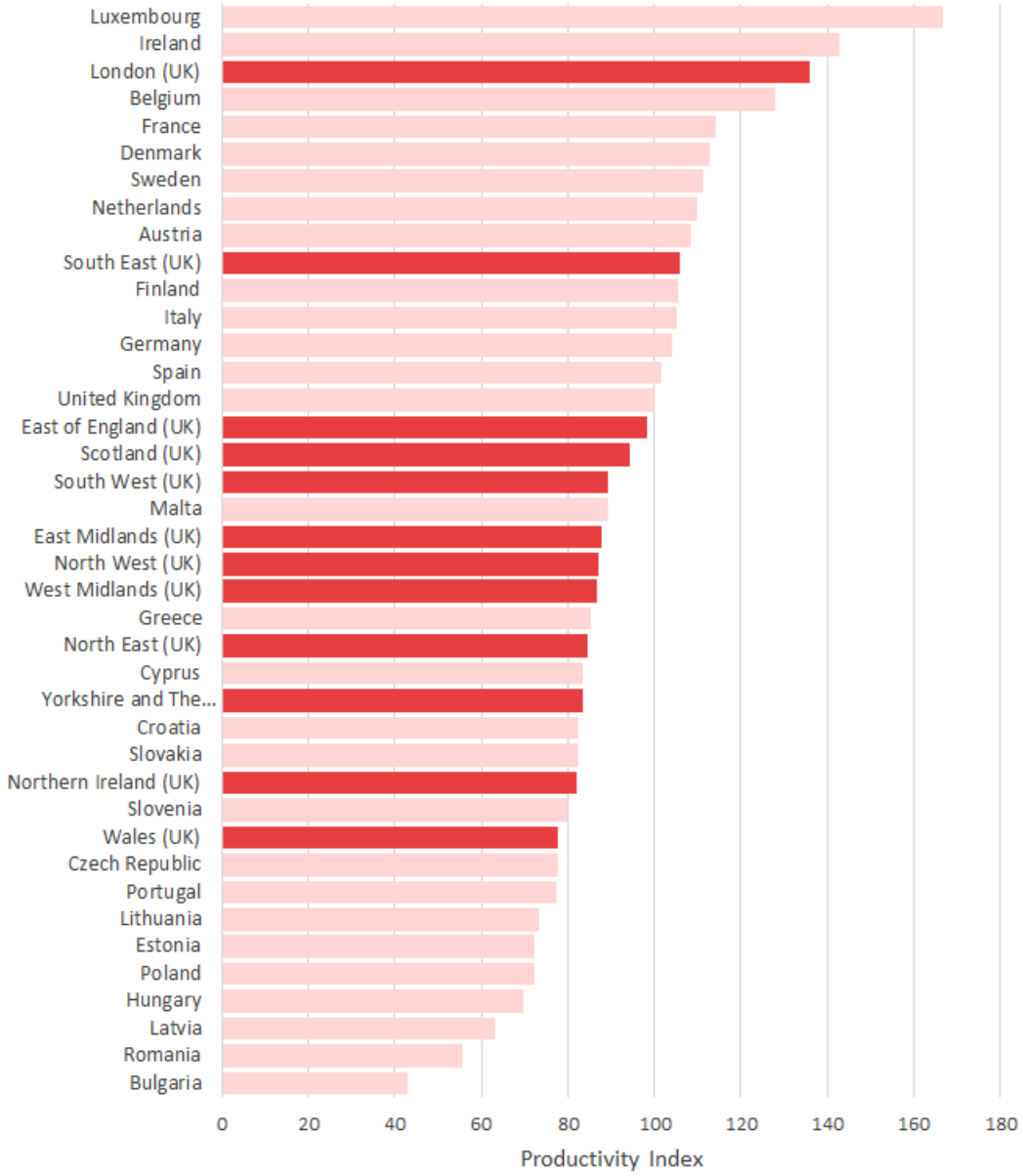


Source: Office for National Statistics, Eurostat

Overall, the aim of this article has been to provide data on a comparable basis to compare similarly-sized regions. However, Figure 6 provides one alternative treatment of the data that may help provide some extra context in considering UK regional productivity performance. It shows the 12 UK NUTS1 regions alongside country averages for each of the EU28 countries. The population of these countries can vary substantially, so care should be taken when comparing countries with the UK regions (whose populations range from around 1.8 million to 8.8 million). The data show the Republic of Ireland and Belgium as having comparable productivity levels to London, while at the lower end of the scale, the UK subregions with the lowest productivity (Northern Ireland and Wales) have similar productivity levels to Slovenia, Slovakia and the Czech Republic.

Figure 6: Labour productivity by UK NUTS1 regions and selected EU countries in 2014

Index UK=100



Source: Office for National Statistics, Eurostat

4 . Results – employment rates and household incomes

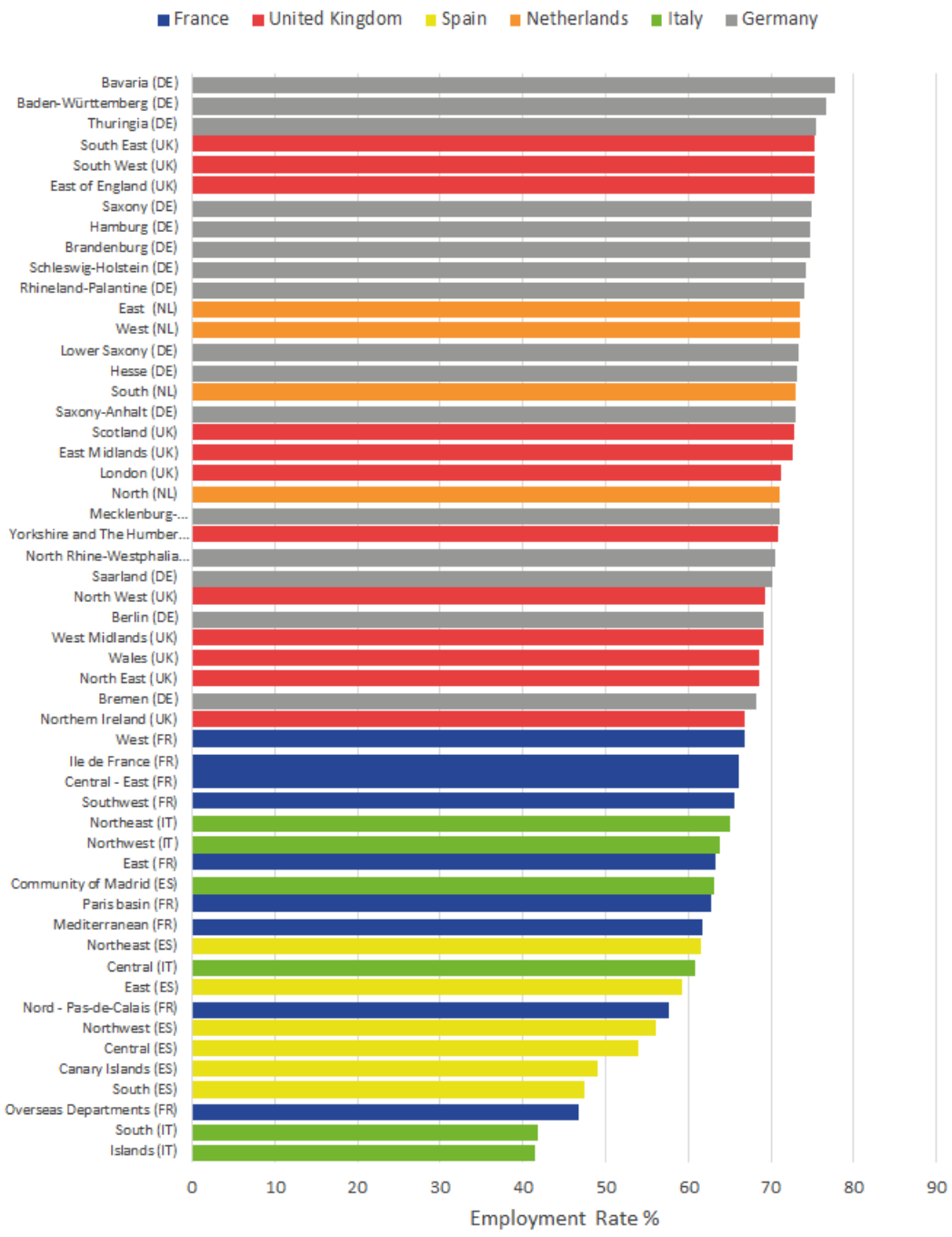
Figures 1 to 6 show that the productivity performance of many UK regions is relatively poor compared with regions across France, Germany, Italy, the Netherlands and Spain. Productivity performance is an important metric in assessing the economic performance of a region and over time growth in productivity is an important element towards increasing incomes and wealth in an economy. However, it is not the only metric to consider when assessing regional economic performance. This section provides some additional context to the productivity analysis by providing data on employment rates and household incomes, on both of which UK regions are ranked more highly.

Figure 7 shows regional employment rates[1] across the six countries included in the analysis. A general pattern emerges whereby regions in the UK, Germany and the Netherlands cluster towards the upper end of the distribution, whilst regions in France and, in particular, Spain and Italy congregate at the lower end. Furthermore, the differences in employment rates between countries are quite large.

The employment rate in 2014 (note data are shown for 2014 to be consistent with other figures in this article) in the Islands region of Italy was 41.4%, in the South region of Spain it was 47.4%, and in the Nord-Pas-de-Calais region of France it was 57.6%. These employment rates were all much lower than the lowest ranked UK region, which was Northern Ireland, with an employment rate of 66.8%.

Figure 7: Employment rates by NUTS1 regions in 2014

UK and selected EU countries, %



Source: Office for National Statistics, Eurostat

Figure 8 ranks NUTS1 regions[2] according to their household disposable income per head[3]. When compared with the similar chart (Figure 1) showing productivity comparisons, several differences are apparent, with regions in Germany and UK ranked relatively higher in terms of incomes than for productivity, while the opposite is true for Spain and Italy.

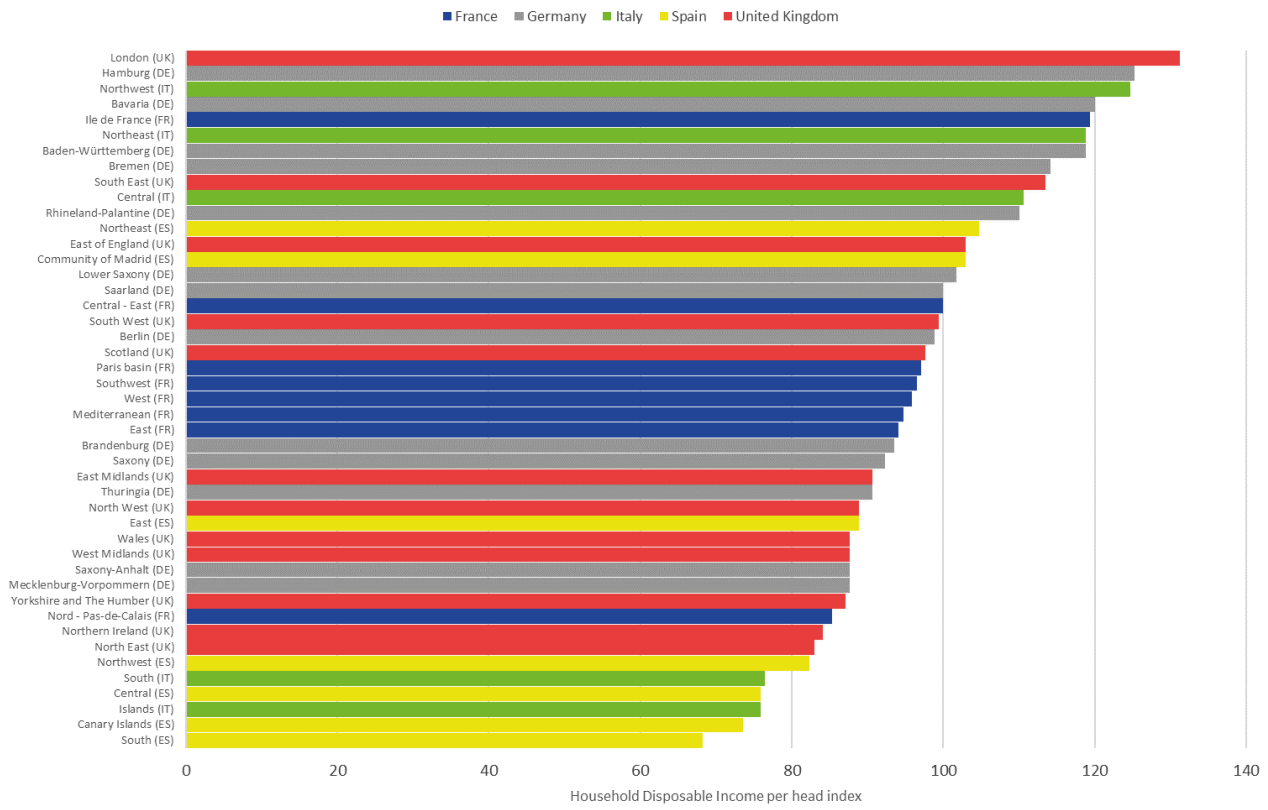
Figure 8 shows that it is regions in Spain and the south of Italy that have the lowest household incomes (by comparison, Figure 1 showed that the UK had the region with the lowest productivity). In the South region of Spain and the South region of Italy, household incomes per head are over 30% below the UK average and around 15% below the average for the lowest ranked UK region, Northern Ireland.

These data suggest therefore that while productivity (which measures output produced per worker) is relatively high in many Spanish and Italian regions compared with many in the UK, the much lower employment rates in those two countries, particularly in the regions in the south of each country, mean that the amount of household income per person in some of these regions is quite a bit lower than is the case in the UK.

At the other end of the distribution, the highest average household income per head is in London, closely followed by three German regions, Hamburg, Bavaria and Baden-Württemberg. Overall, 7 of the top 10 ranked regions are in Germany, reflecting the mix of strong productivity and high employment rates across much of the country. The other regions within the top 10 ranking are Île-de-France, covering the Greater Paris area, and the South East region of England.

Figure 8: Net disposable household income per head (PPS) by NUTS1 regions in 2014

UK and selected EU countries, Index UK=100



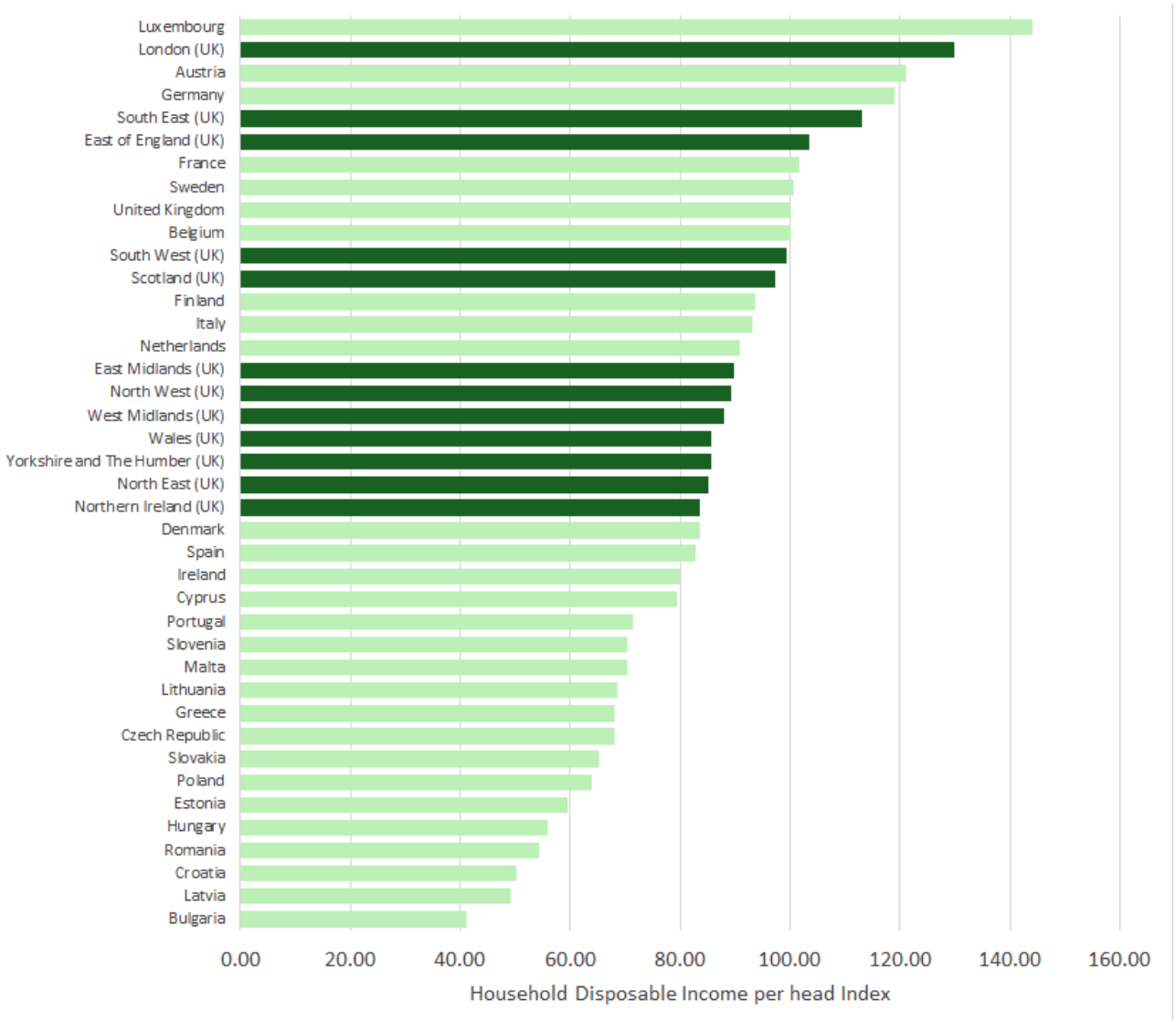
Source: Office for National Statistics, Eurostat

Data on household incomes are not available via Eurostat for all NUTS3 areas, so it is not possible to provide an equivalent NUTS2 and NUTS3 analysis to compare with Figures 2 to 4 on productivity. However, Figure 9 provides an equivalent chart to Figure 6 in ranking UK NUTS1 regions against EU countries (net disposable household income data are not available for Croatia and Luxembourg). Care should be taken when comparing regions with countries given the very different sized populations in some cases. However, it provides some indicative context.

London and the South East of England are shown to have household incomes per head broadly similar to Germany and Austria, while the UK regions with the lowest average household income per head have similar values to the country averages for Spain and Denmark and the Republic of Ireland. UK regions are ranked higher on this incomes comparison than was the case for productivity. Figure 6 shows that productivity in the lowest-ranked UK regions is equivalent to productivity in Slovenia, Slovakia and the Czech Republic. However, Figure 9 shows that the lowest-ranked UK regions have household incomes per head around 11% higher than these three countries.

Figure 9: Net disposable household income per head index by UK NUTS1 regions and selected EU countries in 2014

Index UK=100



Source: Office for National Statistics, Eurostat

Notes for: Results – employment rates and household incomes

1. The source for the employment rate data is the EU Labour Force Survey (EU-LFS). This is a quarterly household sample survey conducted in all Member States of the EU. The EU-LFS survey follows the definitions and recommendations of the International Labour Organisation (ILO).

2. Data for the Netherlands have not been included due to concerns about the comparability of the data. Additionally, net disposable income data are not available for the following NUTS1 German regions: Hesse, North Rhine-Westphalia, Schleswig-Holstein.

3. According to Eurostat, the disposable income of private households is the balance of primary income (operating surplus divided by mixed income plus compensation of employees plus property income received minus property income paid, social benefits in cash received, current taxes on income and wealth paid, as well as other current transfers). Disposable income does not include social transfers in kind coming from public administrations or non-profit institutions serving households.

5 . Conclusion

This article has compared indicators of economic performance in regions and subregions of the UK with those in France, Germany, Italy, the Netherlands and Spain. Both the choice of metric and geography are important when making such comparisons, and an aim of the article has been to ensure a good degree of comparability between the geographical areas included as well as providing guidance on the most appropriate metrics for such an analysis.

The labour productivity comparisons show that London is close to the top of the rankings alongside Paris. However, the majority of UK regions and subregions have relatively low productivity with levels similar to those in eastern Germany and southern Italy.

Productivity performance is an important metric in assessing the economic performance of a region and, over time, growth in productivity is an important element towards increasing incomes and wealth in an economy. However, it is not the only metric to consider when assessing regional economic performance. The article, therefore, also provides data on employment rates and household incomes. UK regions are ranked higher on these two metrics.

Compendium

Recent releases

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Release date:
26 April 2018

Next release:
July 2018

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1 . Recent releases

This section highlights some of the ONS releases on the economy over the last quarter.

Shortcomings of the Retail Prices Index as a measure of inflation

Analysis of Office for National Statistics's current understanding of the drawbacks of the Retail Price Index (RPI).

Economic well-being, UK: October to December 2017

Presents a rounded and comprehensive basis for assessing changes in economic well-being through indicators that adjust or supplement more traditional measures such as gross domestic product (GDP).

Trade in goods, country-by-commodity experimental data: 2011 to 2016

Introduction of a new trade in goods country-by-commodity experimental dataset produced as part of planned improvements to our trade statistics.

UK input-output analytical tables

The 2014 edition, consistent with the Blue Book 2017 dataset.