Article

Regional and sub-regional productivity in the UK: February 2019

Estimates for measures of labour productivity using a balanced gross value added (GVA) approach for NUTS1, NUTS2 and NUTS3 subregions of the UK, selected city regions and English local enterprise partnerships (LEPs) up to 2017. Estimates are in both real and nominal terms.

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1 . Main points

- Inner London West had the highest labour productivity in 2017 when the UK is broken down into 41 subregions (NUTS2), at 50% above the UK average, while the highest labour productivity level outside of London was in Berkshire, Buckinghamshire and Oxfordshire (14% above the UK average); the lowest level was in Cornwall and Isles of Scilly (32% below the UK average).

- Wandsworth had the highest labour productivity level when the UK is broken down into 168 subregions (NUTS3) of the Great Britain (excluding Northern Ireland) in 2017, at 76% above the UK average; the lowest level was in the rural subregion of Powys in Wales, with a level 35% below the UK average.

- The English LEP with the highest labour productivity in 2017 was London followed by Thames Valley Berkshire, while Cornwall and Isles of Scilly was the LEP with the lowest productivity.

- London, Aberdeen, Edinburgh and West of England City Regions all had labour productivity above the UK average in 2017, while the city region with the lowest labour productivity was Sheffield City Region.

- In terms of real productivity, 27 out of 41 NUTS2 sub-regions experienced real productivity growth in 2017 compared with 2010 while for the English LEPs, 26 out of 38 LEPs experienced a growth in productivity during 2010 to 2017.

- The statistics in this article have been produced using the "balanced estimates" of regional gross value added (GVA(B)), published on 12 December 2018; the "balanced" GVA data are combined with data on hours worked and jobs filled to provide experimental estimates of regional and subregional productivity.

- The data are published for NUTS1, NUTS2 and NUTS3 UK subregions (according to the Nomenclature of Territorial Units for Statistics (NUTS) classification) as well as for UK city regions and English local enterprise partnerships (LEPs); chained volume "real" data for labour productivity for NUTS1, NUTS2 and NUTS3 subregions as well as LEPs are also included.

2 . Things you need to know about this release

This article provides new experimental estimates for labour productivity measured as gross value added (GVA) per hour worked and GVA per filled job, using a balanced GVA approach for NUTS1, NUTS2 and NUTS3 (Nomenclature of Territorial Units for Statistics) subregions of the UK, selected UK city regions and English local enterprise partnerships (LEPs) up to 2017. The estimates are provided in both real and nominal terms for NUTS1, NUTS2 and NUTS3 subregions and for LEPs. For city regions, estimates are provided only in nominal terms.

Additionally, further detail and information on productivity in NUTS1 regions and countries by industry has been published alongside this article today (6 February 2019).

Experimental Statistics

The data in this release are classified as Experimental Statistics. A National Statistic for regional labour productivity at NUTS1 level based on the nominal gross value added income approach (GVA(I)) method can be found in the January 2019 release of the labour productivity bulletin. It is the intention of ONS to move the National Statistics methodology in line with that used in this article, using balanced GVA (GVA(B)), now this data has itself acquired National Statistics badging.

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 or per filled job. 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 the "Results" sections in this article, there is currently a wide spatial divergence in levels of productivity between different subregions.

In this article, two measures of labour productivity are provided. The first is a ratio of output (measured as gross value added (GVA)) divided by the hours worked to create it. The second measure divides GVA by the number of filled jobs used to create it. In both cases, GVA is an estimate of the total amount of goods and services produced less the value of intermediate inputs.

Availability of data

A number of datasets accompany this release. There is one dataset available covering NUTS1, NUTS2 and NUTS3 geographies, according to the Nomenclature of Territorial Units for Statistics (NUTS) classification (see "UK geographies" for more detail), and two separate datasets covering local enterprise partnerships (LEPs) and city regions. All datasets provide data on levels of current price "nominal" as well as constant price "real" productivity and productivity indices comparing areas with the UK average. The productivity jobs and hours data used in the calculations are also included with these datasets. An alternative calculation of current price productivity excluding imputed rentals is also included for NUTS geographies (see the "Total GVA compared with GVA excluding imputed rental income" part of this section for more detail).

In the previous publication we produced the new chained volume "real" estimates of labour productivity at NUTS1 and NUTS2 regions only. The new "balanced" regional GVA data have now been made available for NUTS3 regions as well as local authority district (LAD) level for the first time. We are therefore able to provide "real" estimates of labour productivity data at NUTS1, NUTS2 as well as NUTS3 regions and for LEPs for the first time in this publication.

Balanced gross value added

Estimates of regional gross value added (GVA) use estimates from the gross value added income approach (GVA (I)) and gross value added production approach (GVA(P)) to produce a balanced measure of regional GVA, known as GVA(B). This gives users a single measure of economic activity within a region. The balanced measure of regional GVA has been granted National Statistics status following a review by the Office for Statistics Regulation. Moreover, the GVA(B) data at current and constant prices have also now been made available not only for NUTS1 and NUTS2 geographies but also for NUTS3 subregions and LADs. This allows us to produce labour productivity estimates at a subregional level in both "real" and "nominal" terms. For further information on the GVA(B) measure, please refer to the Quality and methodology section.

Understanding "real" compared with "nominal" productivity data

The balanced GVA(B) data used in this article are measured both at current basic prices, which includes the effect of inflation, and in "real terms" (constant prices) in chained volume measure (CVM), with the effect of inflation removed. When available, the constant price "real" data are most useful for assessing time series trends. They allow us to understand whether there has been any increase in volumes of goods and services, with the effects of changes in prices removed. By contrast, when using nominal current price data, it is not possible to differentiate between the effects of price changes and quantity changes.

The constant price GVA(B) data have been derived by deflating the current price estimates for 112 industries using national industry deflators obtained from the UK gross domestic product (output) system. These deflators are consistent with the UK National Accounts, Blue Book 2018 and they are used because in most cases, regional price indices are currently not available. The Eurostat Manual on Regional Accounts (2013) recommends that in the absence of regional prices the use of national deflators is acceptable, provided that deflation occurs at a minimum level of 38 industries. However, users should be aware that the "real" data in this publication are mostly based on use of national industry deflators, rather than specifically regional price deflators.

GVA per head compared with labour productivity measures – GVA per hour and GVA per filled job

When assessing regional economic performance, it is recommended to use the productivity measures in this article (GVA per hour worked or GVA per job filled) rather than GVA per head. This is particularly important when there are large net commuting flows into or out of an area.

The reason for this is that the productivity measures (GVA per hour worked or GVA per job filled) provide a direct comparison between the level of economic output and the direct labour input of those who produced that output. This is not the case, however, for GVA per head, as the GVA per head measure includes people not in the workforce (including children, pensioners and others not economically active) in the calculation, and can also be very heavily biased by commuting flows. This is because if an area has a large number of in-commuters, the output these commuters produce is captured in the estimate of GVA, but the commuters are not captured in the estimate of residential population. In this situation, a GVA per head measure would be artificially high if used as a proxy for economic performance or welfare of a region.

For these reasons, the labour productivity measures in this article are recommended for users directly investigating the economic performance of a region. These productivity measures are also recommended as part of a basket of indicators for investigating the wider economic performance or welfare of a region. In this context, they can be used alongside ONS regional gross disposable household income (GDHI) data, which provide "residence-based" estimates of total household incomes in an area.

A further discussion of these issues can be found on a recent ONS blog post titled Mind the Gap.

Difference between GVA per hour worked and GVA per filled job

GVA per hour worked and GVA per filled job can both be used as measures of labour productivity, but these two measures are different. GVA per hour worked divides GVA by the total hours worked by the workforce in the subregion; while GVA per filled job apportions GVA to the number of jobs in the subregion. There will be some small differences between the relative results for the two measures. This occurs because the average number of hours worked per job varies from subregion to subregion because of differences in labour market structure and working patterns. For example, a subregion with high levels of part-time employment will tend to have lower average hours worked per job.

GVA per hour worked is considered a more comprehensive indicator of labour productivity and the preferred measure at subnational level. This is because GVA per filled job does not take into consideration regional labour market structures or different working patterns, such as the mix of part-time and full-time workers, and job shares.

GVA per hour worked data are currently available for the period 2004 to 2017 and GVA per filled job data are available for the period 2002 to 2017. Data are available from 1997 for the NUTS1 regional geography within the ONS Labour productivity bulletin. Due to change in Northern Ireland's NUTS3 geographies, data for Northern Ireland's subregions is available only for the 2014 to 2017 period. A fuller time series for Northern Ireland will follow later in the year. For more information on this, please refer to the Quality and methodology section.

Total GVA compared with GVA excluding imputed rental income

The headline productivity calculations in this article use total GVA as a measure of output. This includes all components of GVA and is in line with national productivity estimates.

However, it can be argued that not all GVA components are equally relevant when assessing labour productivity, as some elements of GVA are not directly related to the input of labour. In particular, imputed rental incomes, such as imputed rental values capturing the value of housing services accruing to owner-occupiers, could be excluded from the total GVA to obtain a measure of output more closely related to the measurable labour input.

Therefore, we have also provided data that exclude imputed rentals from the GVA(B) "nominal" used in the productivity calculations. These data are discussed in the "Alternative results excluding rental income" section of this article and are also available in the datasets for NUTS geographies accompanying the release.

Smoothed compared with unsmoothed data

Ideally, all year-on-year change in the productivity estimates in this release would represent "true" changes. However, it is also possible that the data can reflect volatility due to sampling and non-sampling errors. This is more likely where sample sizes are low, which can occur at smaller geographical areas (for example, NUTS3 areas). Therefore, caution is required when carrying out a change over time analysis of the subregional productivity data at smaller geographies.

For this reason, the current price nominal datasets accompanying this release provide both smoothed and unsmoothed estimates. In this article, the nominal data presented in the charts and tables use unsmoothed data for NUTS1 and NUTS2 geographies, but use the smoothed data series for NUTS3 geographies, LEPs and city regions. However, when the article talks about NUTS3 and LEPs estimates of productivity in "real" terms, we use unsmoothed data series to avoid multiple averaging of data as the GVA(B) data are already chain linked. For more information on the smoothing process, please refer to the Quality and methodology section in this article.

Interpreting data in index form

Data are presented in index form in two different ways in the article. The first of these is in the presentation of constant price "real" labour productivity changes. When used in this way, the indices compare the "real" productivity in any region with its productivity in real terms in a base year. From these indices, year-on-year changes in "real" productivity can be calculated. In the data tables the base year used is 2016. However, in the article a number of charts are shown with the base year re-calculated to 2010 to help make the changes. In both cases the data are calculated in 2016 prices.

The second way in which indexed data are used is to show how the levels of current price productivity differ from the UK average for any region. Such data can show that a region's productivity is 10% higher or 15% lower than the UK average in any particular year. It should be noted that when used in this context, a decrease in the productivity index number of a subregion does not necessarily mean that the subregion's productivity has decreased in actual terms; it rather means that the subregion has performed relatively worse than the rest of the UK over the period. In other words, its actual productivity level may have improved, but at a slower rate than the UK overall, therefore declining relative to the UK equals 100 index. Similarly, an increase in the productivity index number means that the subregion has performed better than the rest of the UK. Data on actual current price GVA per hour worked or GVA per filled job are available in the datasets if you wish to examine the data directly.

UK geographies

Subregional productivity data are published in this article for the NUTS1, NUTS2 and NUTS3 geographies, selected city regions and for LEPs. For the purposes of the European Regional Statistics, geographical distinctions are made according to the European Union's Nomenclature of Units for Territorial Statistics (NUTS) boundary classification that exists to allow comparable economic statistics across Europe. There are three NUTS levels in the UK:

- NUTS1 (12 regions)

- NUTS2 (41 subregions)

- NUTS3 (179 local areas)

LEPs are partnerships in England between local authorities and businesses. They were created in 2011 and their role is to help shape local economic priorities and undertake activities to encourage local economic growth and the creation of jobs. There are currently 38 LEPs. Our geographic definition of the LEPs are as they are currently constituted at the time of publication.

We also present data for selected city regions. City regions are of particular policy interest at the present time. In England, a number of city region areas have been granted increased devolution powers over recent years, while in Scotland and Wales, city deals have been agreed between some city regions and the UK government. Section 6 of this article presents data for the 13 largest city regions, defined where applicable by combined authority boundaries.

3 . Results for NUTS1 regions and countries

Changes in real labour productivity 2010 to 2017

The recent introduction of "real" balanced gross value added (balanced) (GVA(B)) data for UK regions and subregions mean we are now able to estimate real labour productivity data, rather than just nominal data for NUTS1 regions and countries. These real data allow a greater understanding of time series growth in productivity. For example, we can investigate how different regions have fared in the pre- and post-recession periods and produce regional comparisons.

Figure 1 shows the real productivity growth over the 2004 to 2017 period, indexed to the year 2010, for select highest and lowest performing NUTS1 regions. Overall, the productivity in the NUTS1 regions remained relatively constant in the 2010 to 2017 period. The strongest growth between 2010 to 2017, the post-recession period, occurred in the North East, the West Midlands, Northern Ireland and Wales, with productivity increasing from 2010 to 2017 by 4% to 5%. In the South East and East of England, productivity remained similar in 2017 compared with 2010. London's real productivity growth followed a similar path to the UK's (less extra regio) growth path between 2010 and 2017.

Figure 1: Labour productivity (real gross value added per hour worked) by selected NUTS1 regions, 2004 to 2017

Indexed 2010=100

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Indexed 2010=100
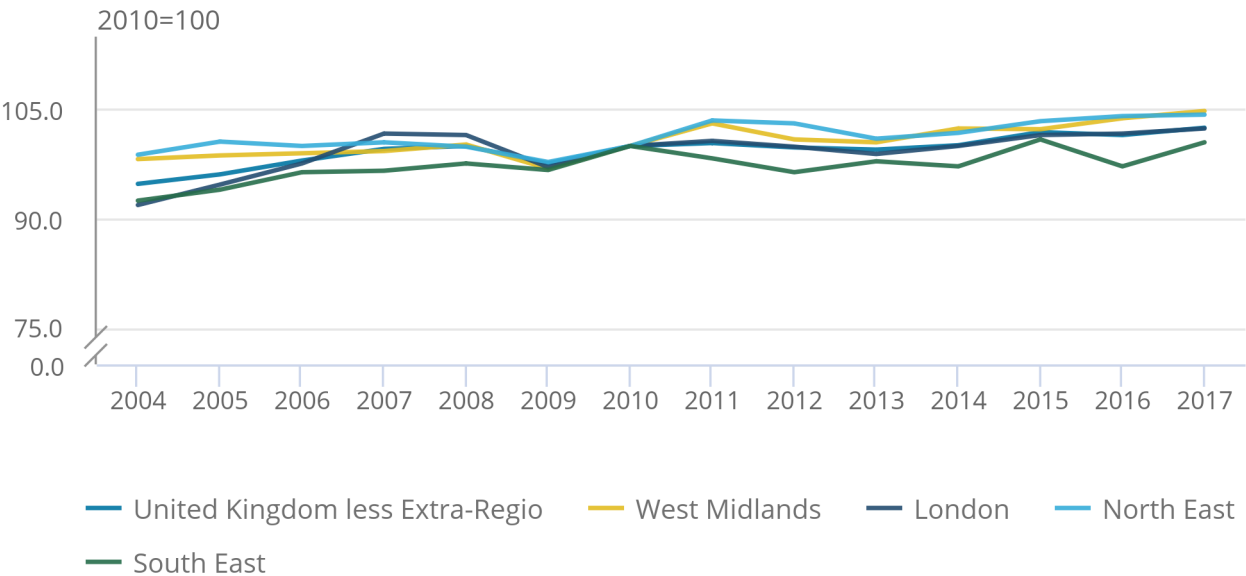
Source: Office for National Statistics

To investigate the data further, we can note that changes over time in labour productivity reflect changes in real output (GVA) growth and changes in hours worked in a region. Table 1 shows how these two factors have influenced the changes in labour productivity between regions between the 2010 and 2017 period. For most regions and countries, the growth in economic output (GVA) has mirrored a similar growth in hours worked resulting in only small changes in real labour productivity.

In the West Midlands, real GVA grew relatively strongly by 18%, while total hours worked increased by 13%, resulting in a 5% growth in real labour productivity as shown in Figure 1. Similarly, in Northern Ireland, real GVA growth totalled 13% during the 2010 to 2017 period while total hours worked increased by 7%. This resulted in a 5% increase in real labour productivity. The North East, on the other hand, experienced a real GVA growth of only 7% and hours worked growth of 2%, resulting in an equivalent 4% increase in productivity.

As stated, for most regions and countries the growth in economic output (GVA) mirrored a similar growth in hours worked, resulting in only small changes in real labour productivity over the 2010 to 2017 period. However, it is worth noting that in these cases the absolute growth of GVA and hours worked often varied quite substantially between different regions. For example, in London, GVA and hours worked grew by 27% and 24% respectively between 2010 and 2017, while in the North West, GVA only grew by 11% while hours worked grew by 9% over the same period. These GVA and hours worked data show that very different economic pathways occurred in the two regions over this period, even though both ultimately resulted in similarly small changes in labour productivity levels.

Table 1: Growth in real gross value added, productivity hours and labour productivity by NUTS1 region, 2010 to 2017

| NUTS1 Region	Real GVA (B)	Productivity Hours	Labour Productivity
United Kingdom less extra region	15%	12%	2%
North East	7%	2%	4%
North West	11%	9%	2%
Yorkshire and The Humber	9%	8%	1%
East Midlands	13%	11%	2%
West Midlands	18%	13%	5%
East of England	16%	16%	0%
London	27%	24%	2%
South East	13%	13%	0%
South West	10%	9%	1%
Wales	13%	8%	5%
Scotland	12%	8%	3%
Northern Ireland	13%	7%	5%

Source: Office for National Statistics

Figure 2 shows the relative labour productivity performance of the 12 NUTS1 regions relative to the UK average for 2017. Gross value added (GVA) per hour worked was highest in 2017 in London, at 33% above the UK average. The only other region with productivity above the UK average was the South East, with productivity 8% above the UK average.

In Wales and Northern Ireland, productivity was 16% to 17% below the UK average. The regions of the north of England and the midlands (the North East, the North West, Yorkshire and The Humber, the East Midlands and the West Midlands) had productivity levels between 7% to 15% below the UK average.

For information, the average labour productivity calculated for the UK excluding London was 7% below the UK average when London was included (that is, the UK excluding London average would read as 93 in various charts in this article, which are calculated and displayed on a UK equals 100 index basis). In Scotland, productivity in 2017 was marginally below the UK average. However, if we take the UK average excluding London, Scotland as well as the East of England performed marginally above the average. The rest of the NUTS1 regions were below the UK average excluding London.

Figure 2: Labour productivity (gross value added per hour worked) by NUTS1 region, unsmoothed, current prices, 2017

Figure 2: Labour productivity (gross value added per hour worked) by NUTS1 region, unsmoothed, current prices, 2017

London

Scotland

North West

North East

Yorkshire and The Humber

Wales

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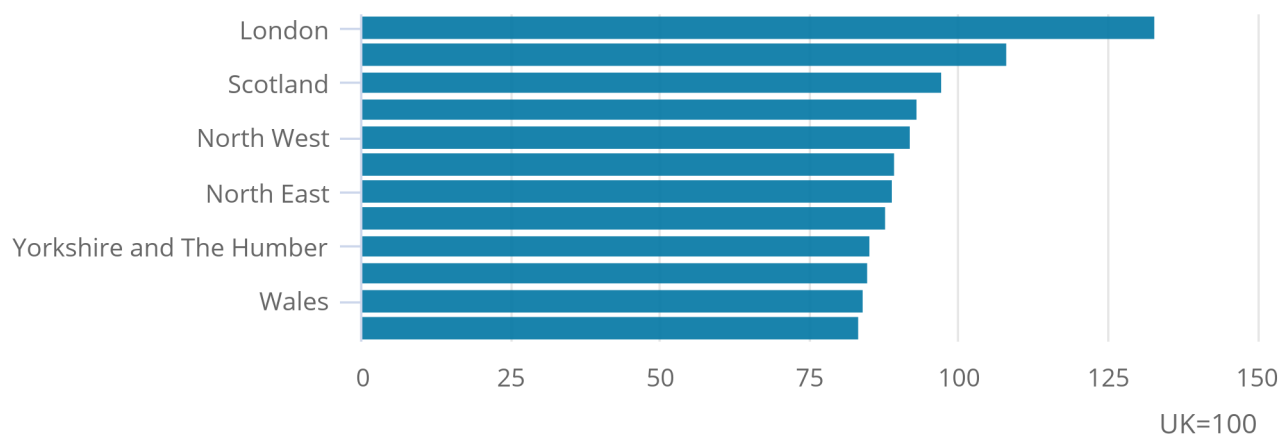
Source: Office for National Statistics

4 . Results for NUTS2 subregions

There are 41 NUTS2 (Nomenclature of Territorial Units for Statistics) subregions of the UK and we have estimated real labour productivity data for these areas. Figure 3 shows the real productivity growth over the 2004 to 2017 period, indexed to the year 2010. The figure shows select NUTS2 regions between 2010 and 2017 along with the corresponding national time series. The subregions of Outer London West and North West, and the West Midlands are examples of two areas that exhibited some productivity growth during the 2010 to 2017 period, while Greater Manchester is one of a number of areas where productivity growth either remained stable through the period or there was a small decline in real productivity.

Figure 3: Labour productivity (real gross value added per hour worked) by selected NUTS2 subregions, 2004 to 2017

Indexed 2010=100

Figure 3: Labour productivity (real gross value added per hour worked) by selected NUTS2 subregions, 2004 to 2017

Indexed 2010=100
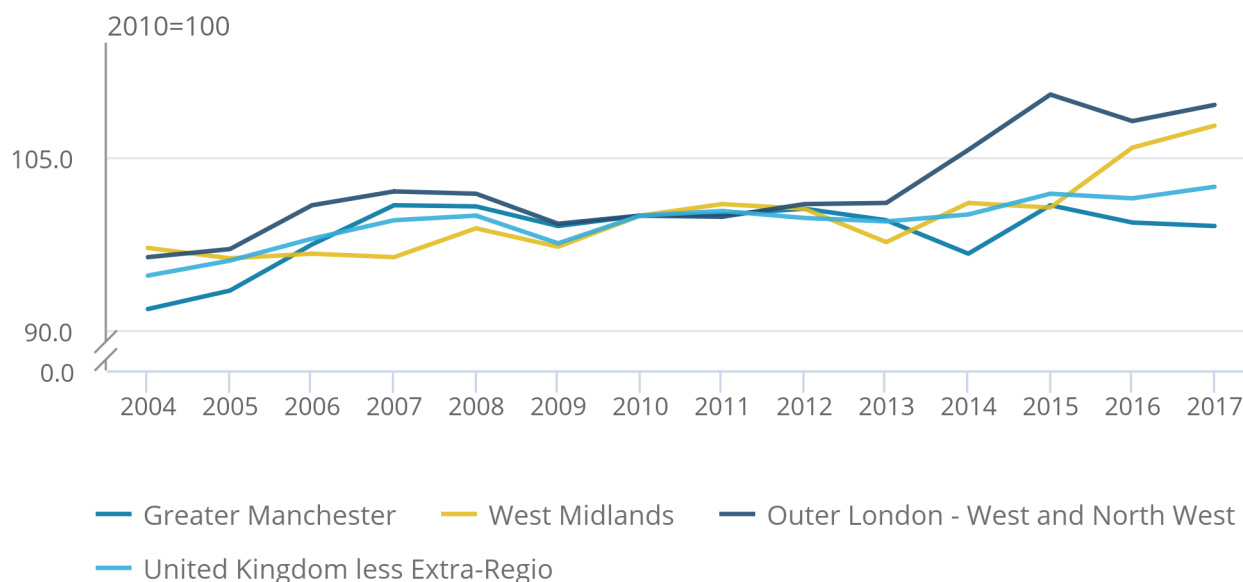
Source: Office for National Statistics

Figure 4 shows real economic output (gross value added (GVA)) growth plotted against changes in total hours worked for each of the 41 NUTS2 areas for the 2010 to 2017 period. The 45-degree line in the figure represents equal GVA growth and hours worked growth, for instance, a 5% GVA growth corresponding to a 5% hours growth results in a 0% change in productivity. Any points above this line represent an increase in productivity, while points below represent a decrease between the 2010 to 2017 period.

Figure 4: Real gross value added growth compared with hours worked growth for NUTS2 areas, 2010 to 2017

The highest growth in economic output over the 2010 to 2017 period occurred in Inner London – West, Outer London – West and North West, and Inner London – East, with GVA growth of 33%, 32% and 23% respectively. However, only the first two areas had an increase in productivity due to a corresponding but lower increase in hours growth. Inner London – East on the other hand, experienced a higher increase in hours growth compared with GVA growth, resulting in a decline in productivity during this period.

The next top two areas with the highest economic growth, which also experienced high labour productivity growth were Herefordshire, Worcestershire and Warwickshire subregions and West Midlands. Only East Yorkshire and Northern Lincolnshire experienced a decline in GVA growth, translating into the highest decline in productivity as well for this period. The Cumbria subregion on the other hand experienced a decline in hours growth, but its GVA growth of 3% resulted in a productivity growth of 6%.

Productivity increased for 27 out of the 41 NUTS2 regions in the 2010 to 2017 period, with the largest improvement in productivity growth in Lancashire, and Outer London West and North West. For the remaining 14 areas, productivity declined between 2010 and 2017. However, if we look at a longer time period of 2004 to 2017, productivity either remained stable or increased for most of the NUTS2 subregions with only five areas seeing a decline in real productivity over this period.

## Nominal labour productivity rankings in 2017 by NUTS2 regions

Figure 5 shows the NUTS2 regions with the highest nominal labour productivity in 2017. Inner London – West had the highest level, at 46% above the UK average. There were three other areas of London in the top five subregions in Figure 5, while the highest labour productivity level outside of London was in Berkshire, Buckinghamshire and Oxfordshire (14% above the UK average). Two of the Scottish NUTS2 regions, Eastern and North-Eastern Scotland, also appear in the highest-ranking subregions of 2017. Overall, 11 out of the 41 NUTS2 areas had labour productivity above the UK average. Out of these, five were in London, three in the South East, two in Scotland and one in the North West. Five of the bottom ten subregions were in the north of England and the midlands, two in the South West and one each in Wales, Scotland and in Northern Ireland.

Figure 5: Gross value added per hour worked – highest ranking UK NUTS2 subregions, unsmoothed, current prices, 2017

UK=100

Figure 5: Gross value added per hour worked – highest ranking UK NUTS2 subregions, unsmoothed, current prices, 2017

UK=100
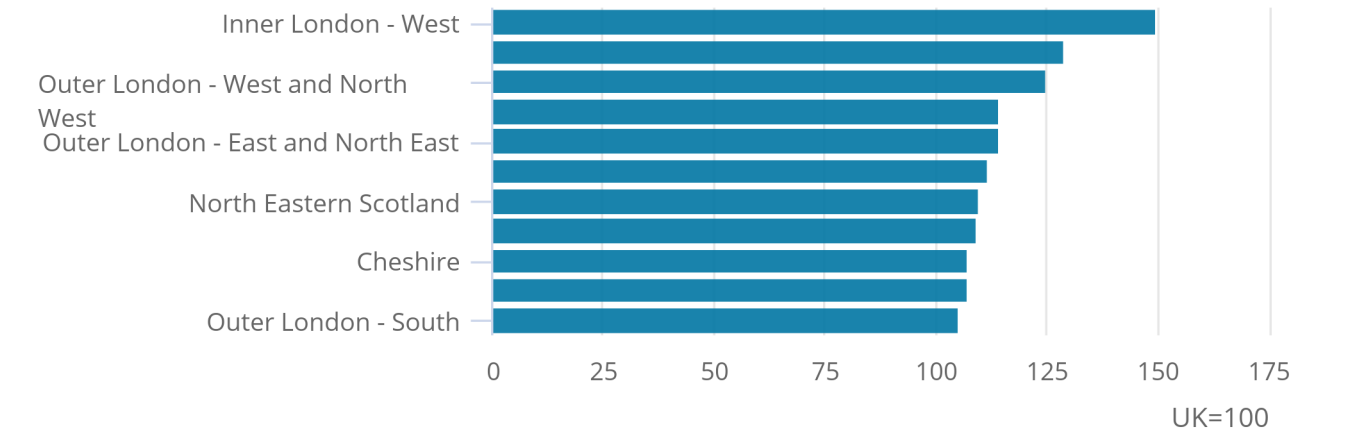
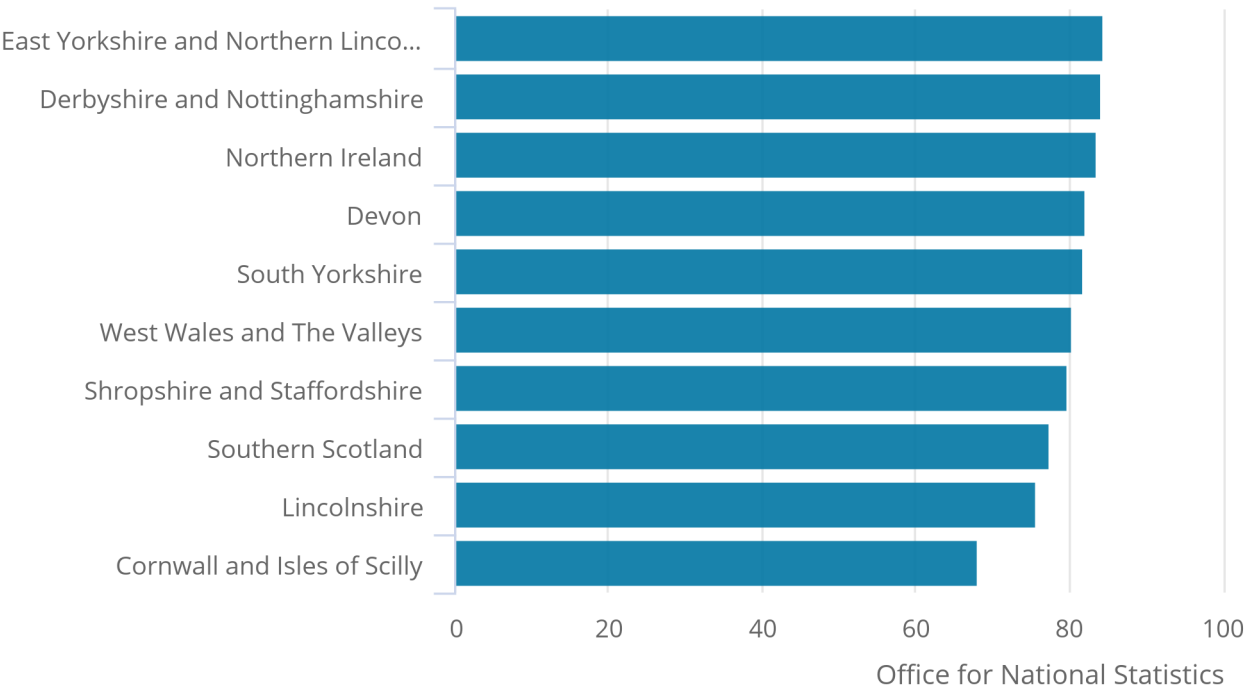**Source: Office for National Statistics**

Figure 6 shows the NUTS2 subregions with the lowest nominal labour productivity levels. Each had productivity at least 15% below the UK average. Most of the places with the lowest productivity levels were relatively rural areas, for example, Cornwall and Isles of Scilly, and Lincolnshire. The lowest productivity in a predominantly urban subregion occurred in South Yorkshire.

Figure 6: Gross value added per hour worked – lowest ranking UK NUTS2 subregions, unsmoothed, current prices, 2017

UK= 100

Figure 6: Gross value added per hour worked – lowest ranking UK NUTS2 subregions, unsmoothed, current prices, 2017

UK= 100

Office for National Statistics

Source: Office for National Statistics

5 . Results for NUTS3 subregions

This is the first time real productivity data are available for UK NUTS3 subregions. The dataset accompanying this article consists of the productivity estimates based on both current price ("nominal") as well as constant ("real") gross value added (GVA) for NUTS3 subregions. In this section, we show top and bottom rankings for subregions in England (presented separately for London, the rest of the south of England, the midlands and the north), Scotland, Wales and Northern Ireland. For Northern Ireland, productivity estimates are only available for GVA per job filled and not GVA per hour for NUTS3 subregions. When assessing time series trends for NUTS3 areas it is useful to note that the volatility in data increases at smaller geography levels and therefore for NUTS3 areas it is advisable to look for longer-term trends in the data rather than concentrate only on single year-on-year changes.

The labour productivity estimates focus on nominal GVA per hour worked as the preferred subregional labour productivity measure. In all cases the data have been smoothed based on a weighted moving average of up to five years (see the Quality and methodology section for more information).

Note that the very high productivity levels in the Greater London region lead to a skewed distribution of productivity levels across the UK, such that relatively few subregions have productivity levels above the UK (mean) average. In 2017, just 49 out of 168 NUTS3 subregions across England, Scotland and Wales had a GVA per hour worked above the UK average. This included all 21 NUTS3 geographies of London. However, if we exclude all the London NUTS3 subregions, 62 out of 147 subregions experienced productivity levels above the UK average excluding London.
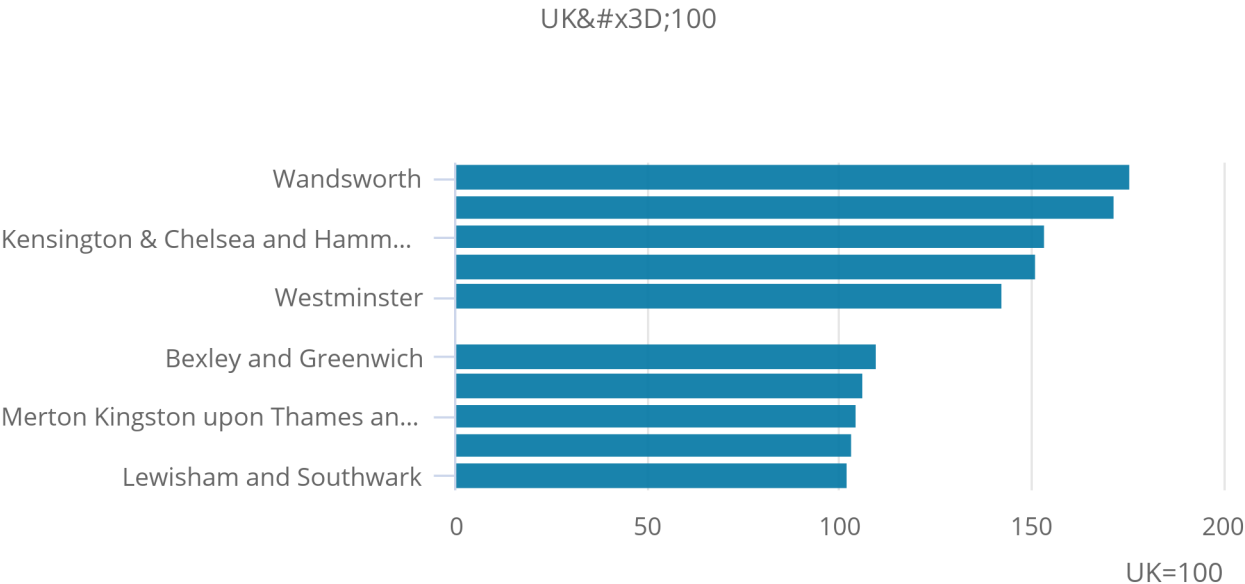
Results for London

Figure 7 shows the NUTS3 subregions in the Greater London area with the highest and lowest productivity levels. Note that for this section on NUTS3 nominal productivity rankings we have used smoothed index of productivity. None of the subregions displayed productivity levels below the UK average in 2017. The highest level was in Wandsworth, with a productivity level 76% above the UK average. However, please note that Wandsworth data are heavily influenced by rental incomes. Results on productivity estimates excluding rental incomes are presented in Section 7 with data showing Tower Hamlets, which includes Canary Wharf, as having the highest productivity level. The lowest levels of labour productivity in London were in Lewisham and Southwark, with labour productivity at 2% above UK average.

Figure 7: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in London, smoothed, current prices, 2017

UK=100

Figure 7: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in London, smoothed, current prices, 2017

UK=100

Source: Office for National Statistics

## Results for the south of England (excluding London)

Figure 8 shows the highest and lowest levels of productivity in the NUTS3 subregions in the south of England (excluding London), which includes subregions in the South East, South West and East of England regions of England. The most productive areas of the south of England outside Greater London had productivity levels well above the UK average. Berkshire and West Surrey respectively displayed productivity levels around 23% and 21% above the UK average, the highest levels outside of London (after the city of Edinburgh). Overall, 15 out of 49 NUTS3 subregions in the south of England had productivity levels above the UK average. The lowest labour productivity levels in 2017 in the south of England (excluding London) were generally in rural or coastal areas. The lowest was in Cornwall and Isles of Scilly, followed by Torbay.

Figure 8: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in the south of England (excluding London)

smoothed, current prices, 2017

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smoothed, current prices, 2017
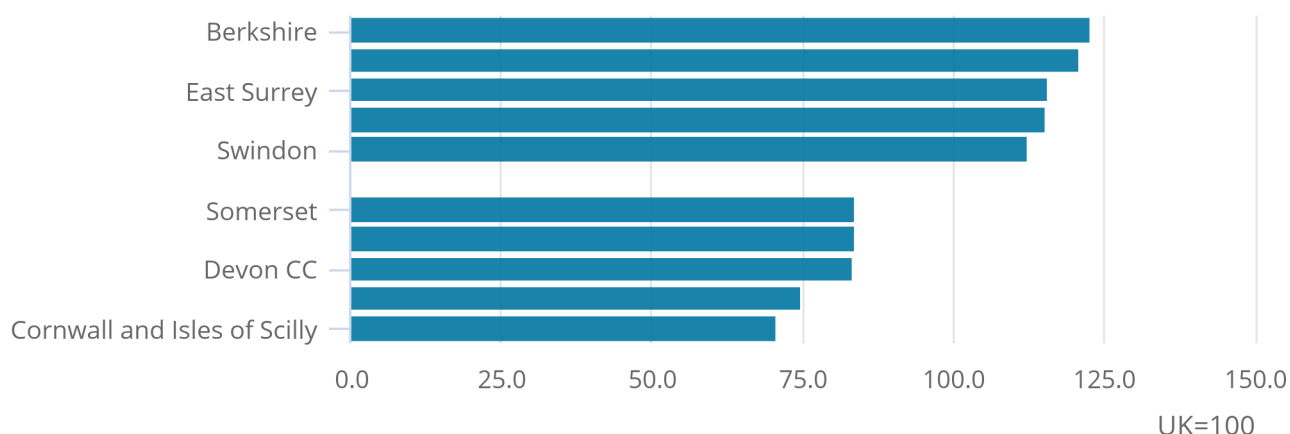
Source: Office for National Statistics

Results for the midlands

Figure 9 shows the NUTS3 subregions with the highest and lowest levels of productivity in the midlands, comprising the West Midlands and East Midlands regions. Solihull was the only subregion out of the 25 NUTS3 subregions in the midlands that had a productivity level above the UK average in 2017 (21% above). Derby had the second-highest productivity level, but at 1% below the UK average.

Only 6 out of the 25 subregions in the midlands had productivity levels above the UK average excluding London. Productivity levels for the bottom five subregions were more than 20% below the UK average, with the lowest productivity levels registered in County of Herefordshire and Nottingham.

Figure 9: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in the midlands, smoothed, current prices, 2017

UK=100

Figure 9: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in the midlands, smoothed, current prices, 2017

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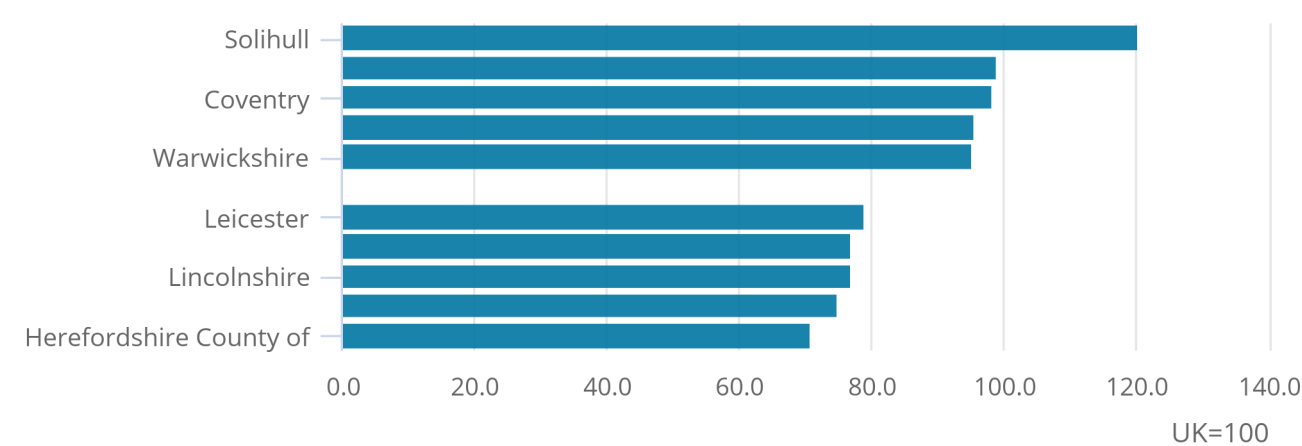
Source: Office for National Statistics

Results for the north of England

Figure 10 shows the NUTS3 subregions with the highest and lowest levels of productivity in the north of England, comprising the North West, North East and Yorkshire and The Humber regions. The highest labour productivity was in Cheshire East, with a productivity level of 16% above the UK average in 2017. This was followed by Cheshire West and Chester, and Mid Lancashire, (encompassing Fylde, Preston, Ribble Valley and South Ribble local authorities) with productivity levels 6% and 2% above the UK average respectively

The lowest productivity performance was recorded in the North West areas of Blackpool and Blackburn with Darwen, with a productivity level 25% and 20% below the UK average respectively (or 18% and 13% below the UK excluding London average). Yorkshire and The Humber areas of Kingston upon Hull, Barnsley, Doncaster and Rotherham, and North Yorkshire also had productivity levels of 19% to 20% below the UK average.

Figure 10: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in the north of England, smoothed, current prices, 2017

UK=100

Figure 10: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in the north of England, smoothed, current prices, 2017

UK=100

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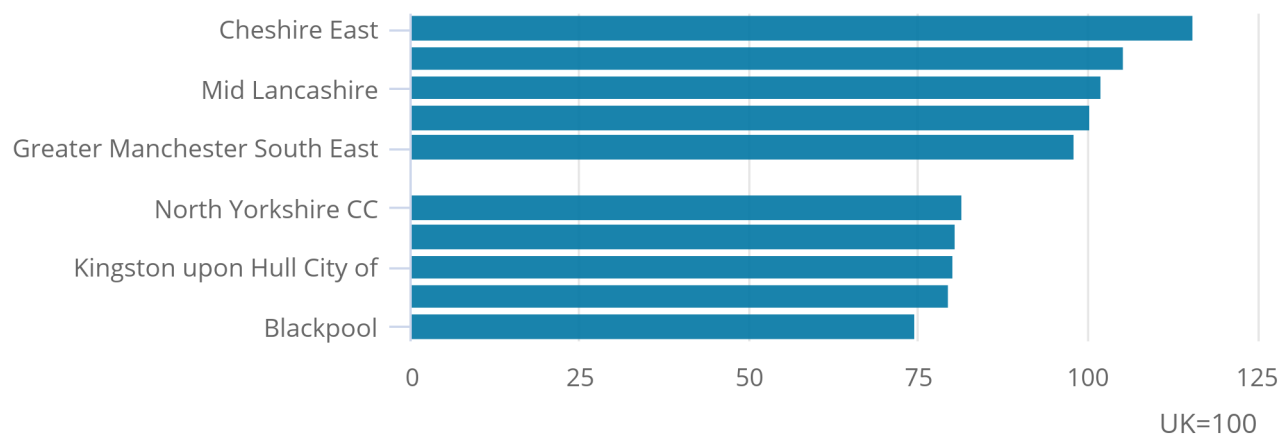
Source: Office for National Statistics

Results for Scotland

Figure 11 shows the productivity rankings of NUTS3 subregions for Scotland, focusing on the subregions with the highest and lowest levels of productivity. City of Edinburgh had the highest labour productivity in 2017 at 24% above the UK average. Aberdeen City and Aberdeenshire, which had higher productivity than Edinburgh previously, is now second in the list, since 2015, with a productivity level 13% above the UK average in 2017.

Eight of the 23 NUTS3 regions in Scotland had labour productivity above the UK average in 2017, while 13 out of the 23 regions were above the UK excluding London average. The lowest productivity levels were found in the southern Scotland areas.

Figure 11: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in Scotland, smoothed, current prices, 2017

UK=100

Figure 11: Gross value added per hour worked – highest and lowest ranking NUTS3 subregions in Scotland, smoothed, current prices, 2017

UK=100

UK=100
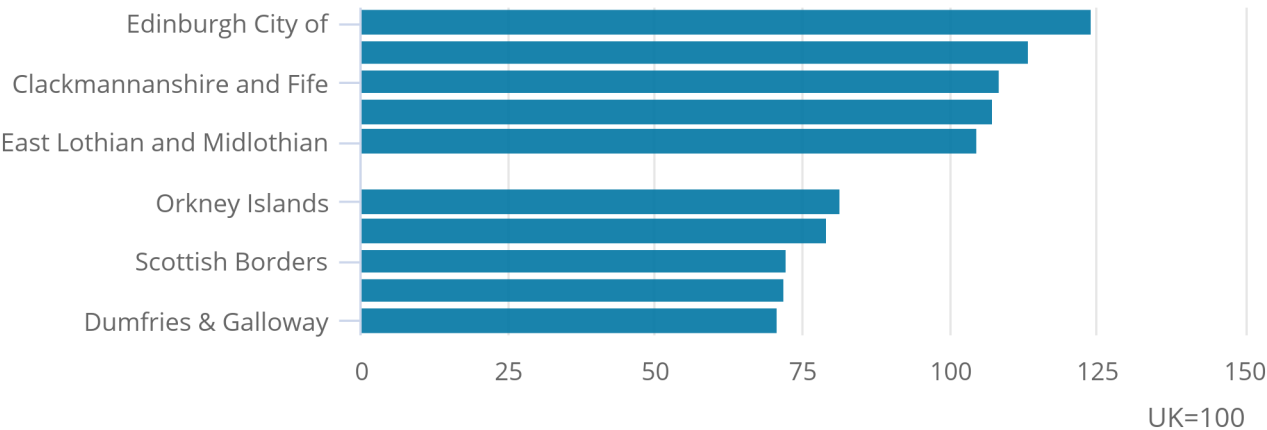
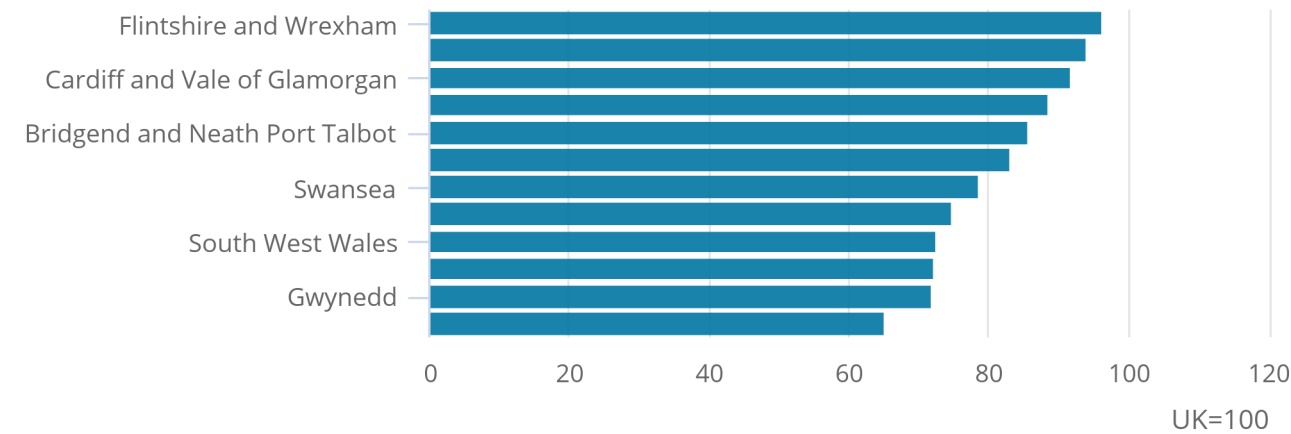**Source: Office for National Statistics**

Results for Wales

Figure 12 shows the rankings of productivity levels for NUTS3 subregions in Wales. Productivity levels in all NUTS3 subregions in Wales were below the average for the UK. The NUTS3 subregion with the highest level of labour productivity was Flintshire and Wrexham in north Wales, with a productivity level of 4% below the UK average, followed by Central Valleys, at 6% below the UK average. The lowest labour productivity performance was in the rural subregion of Powys, with a productivity level 35% below the UK average, the lowest level in the UK.

Figure 12: Gross value added per hour worked – NUTS3 subregions in Wales, smoothed, current prices, 2017

UK=100

Figure 12: Gross value added per hour worked – NUTS3 subregions in Wales, smoothed, current prices, 2017

UK=100

Source: Office for National Statistics

Results for Northern Ireland

Data for Northern Ireland's real or nominal GVA per hour for NUTS3 subregions are not available. In this subsection, GVA per job filled, smoothed productivity figures, at current prices are used to show the highest and lowest rankings for NUTS3 subregions of Northern Ireland[1] .

Figure 13 shows the ranking of productivity levels for all 11 NUTS3 subregions in Northern Ireland. The only subregion to have a productivity level above the UK average was Belfast, which registered productivity at 24% above the UK average. This was followed by Amagh, Banbridge and Craigavon, which had a productivity level at 18% below the UK average. For all other subregions, productivity levels were more than 20% below the UK average, with Fermanagh and Omagh experiencing a productivity level as low as 43% below the UK average.

Figure 13: Gross value added per job – highest and lowest ranking NUTS3 subregions in Northern Ireland, smoothed, current prices, 2017

UK=100

Figure 13: Gross value added per job – highest and lowest ranking NUTS3 subregions in Northern Ireland, smoothed, current prices, 2017

UK=100
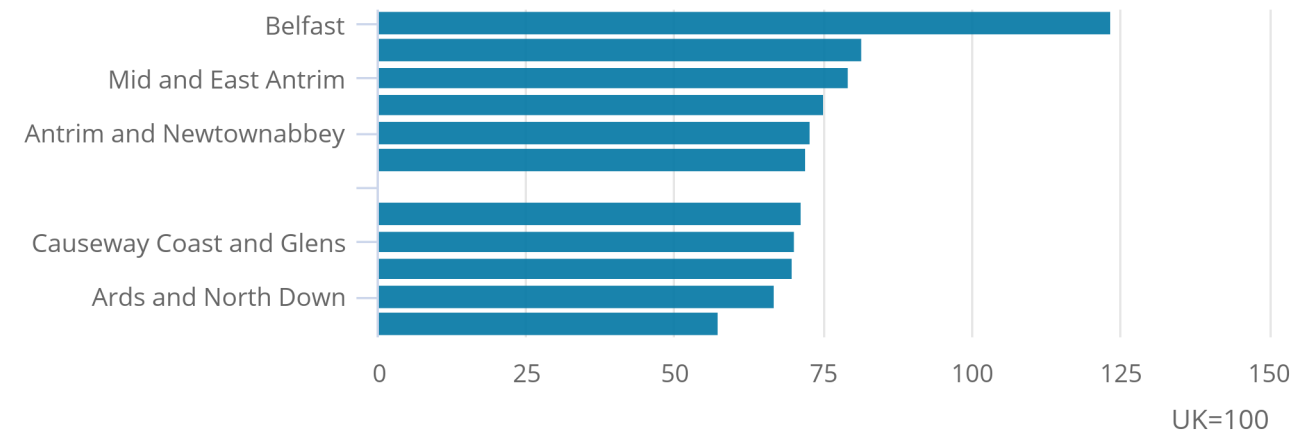
Source: Office for National Statistics

Notes for: Results for NUTS3 subregions

1. Due to the change in NUTS3 boundaries for Northern Ireland, we have only produced productivity data by jobs filled for the 2014 to 2017 period. Work to complete a back series for these data is ongoing and updated data will be published once they are available

6 . Results for local enterprise partnerships and city regions

This section presents real and nominal results for the English local enterprise partnerships (LEPs) and nominal [1] data for 13 UK city regions. For the first time, real productivity data for LEPs are made available in this publication.

Changes in real labour productivity for LEPs in 2010 to 2017

Figure 14 shows the real productivity growth over the 2004 to 2017 period, indexed to the year 2010. The figure shows select LEPs with some of the highest and lowest productivity growths between 2010 and 2017. Humber experienced a significant decline in productivity of 8% in the 2010 to 2017 period. Coventry and Warwickshire LEP, on the other hand, experienced an increase in productivity of over 10% over the 2010 to 2017 period. Meanwhile, productivity for Leeds City Region remained close to England's figures, with productivity remaining fairly stable throughout this period.

Figure 14: Labour productivity (real gross value added per hour worked) by selected local enterprise partnerships (LEPs), 2004 to 2017

Index 2010=100

Figure 14: Labour productivity (real gross value added per hour worked) by selected local enterprise partnerships (LEPs), 2004 to 2017

Index 2010=100
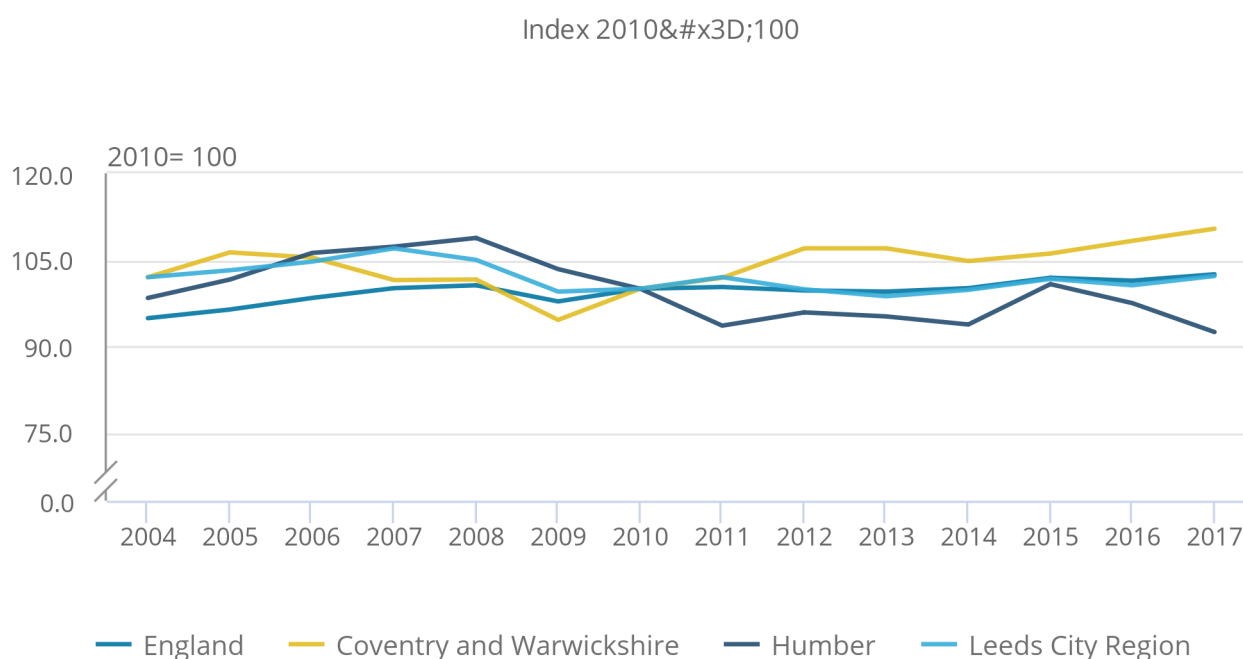
Source: Office for National Statistics

Figure 15 further explores this growth and decline in productivity, showing a scatter plot for real GVA growth and hours worked growth over the period 2010 to 2017 for all 38 LEPs.

Figure 15: Real gross value added growth compared with hours worked growth for local enterprise partnerships (LEPs), 2010 to 2017

Notes

1. The chart excludes Dorset, due to a statistical discrepancy in the underlying data in the mining sector that is affecting the data for this LEP.

The highest growth in economic output over the 2010 to 2017 period occurred in Coventry and Warwickshire (28%), where the hours worked grew by 16% leading to a productivity growth of 10%. However, London and the South East Midlands, which had the second- and third-highest GVA growth of 26% and 24% respectively, only registered a productivity growth of 2% and 5% respectively due to their high hours worked growth. Hertfordshire, on the other hand, experienced a higher increase in hours worked growth compared with 18% GVA growth, resulting in a decline in productivity during this period.

Out of the 38 LEPs in England, only Humber experienced a decline in GVA growth and only Cumbria experienced a decline in hours worked growth. The decline in Humber's GVA growth led to it experiencing the highest decline in productivity. However, for Cumbria, GVA grew by a moderate 5%, leading to productivity growth of 8% despite the decrease in hours worked growth of 3%. Overall, 12 of the 38 LEPs experienced a decline in productivity over the 2010 to 2017 period.

## Nominal labour productivity rankings in 2017 by local enterprise partnerships (LEPs)

In 2017, London was the LEP with the highest productivity level, at 33% above the UK average. The London LEP was followed by Thames Valley Berkshire, with a slightly lower productivity level of about 23% above the national average. The top five performing LEPs shown in Figure 16 were located within the regions of the Greater South East (East of England, South East, and London). In total, there were nine LEPs with gross value added.

Figure 16: Gross value added per hour worked – highest ranking English local enterprise partnerships, smoothed, current prices, 2017

UK=100

Figure 16: Gross value added per hour worked – highest ranking English local enterprise partnerships, smoothed, current prices, 2017

UK=100
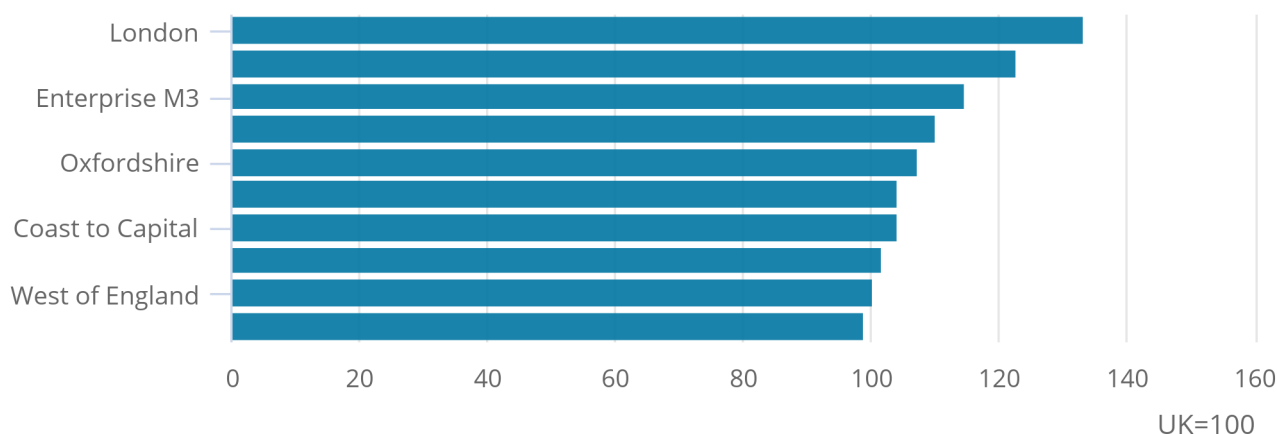
Source: Office for National Statistics

The LEPs with the lowest GVA per hour worked were a mix of rural and urban areas, as shown in Figure 17. The lowest labour productivity among the LEPs in 2017 was in Cornwall and Isles of Scilly. Other largely rural LEPs with relatively low labour productivity included Heart of the South West, Greater Lincolnshire, Dorest, and The Marches.

Meanwhile, Black Country and Sheffield City Region were examples of predominantly urban areas with relatively low productivity levels. All the previously mentioned LEPs, along with Stoke-on-Trent and Staffordshire LEP, had labour productivity levels at least 17% below the UK average in 2017 (or at least 10% below the UK excluding London average).

Figure 17: Gross value added per hour worked – lowest ranking English local enterprise partnerships, smoothed, current prices, 2017

UK=100

Figure 17: Gross value added per hour worked – lowest ranking English local enterprise partnerships, smoothed, current prices, 2017

UK=100
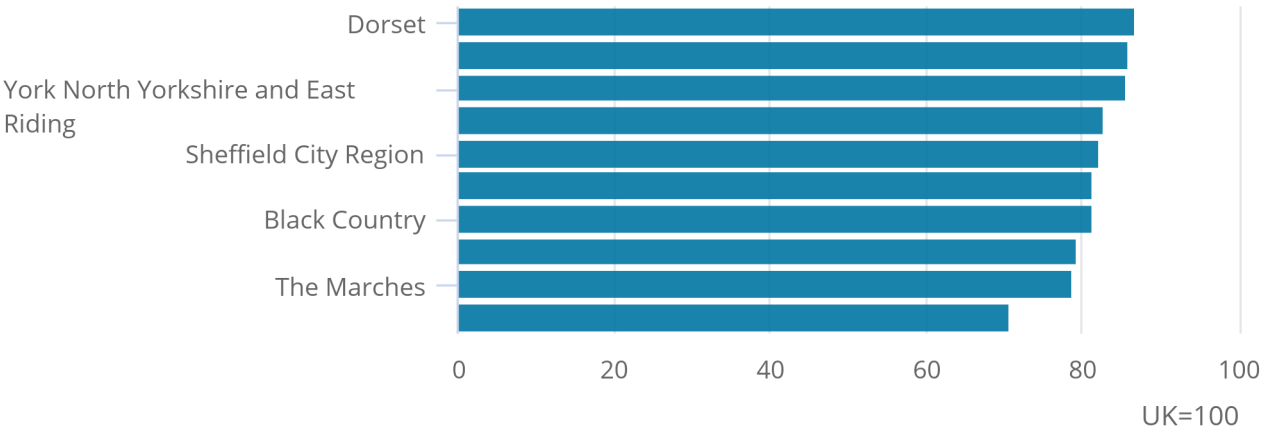
Source: Office for National Statistics

Figure 18 provides labour productivity for 13 of the UK city region areas in 2017. City regions are of particular policy interest at the present time. In England, a number of city region areas have been granted increased devolution powers over recent years, while in Scotland and Wales, city deals have been agreed between some city regions and the UK government. City regions data are for selected areas at present. Further areas will be added once future work to calculate data for local authority areas has been completed, which will then enable the calculation of data for all city region areas.

As with the earlier regional data, London had the highest labour productivity. It was followed by the Aberdeen City Region, with a productivity level 13% above the UK average. Edinburgh and the West of England (Bristol) City Regions both had productivity levels above the UK average, while Cambridgeshire and Peterborough, the West Midlands, and Tees Valley had productivity levels 5% to 9% below the UK average. The next six city regions had productivity more than 10% below the UK average, with lowest productivity in Sheffield City Region.

Figure 18: Gross value added per hour worked – selected city regions, smoothed, current prices, 2017

UK=100
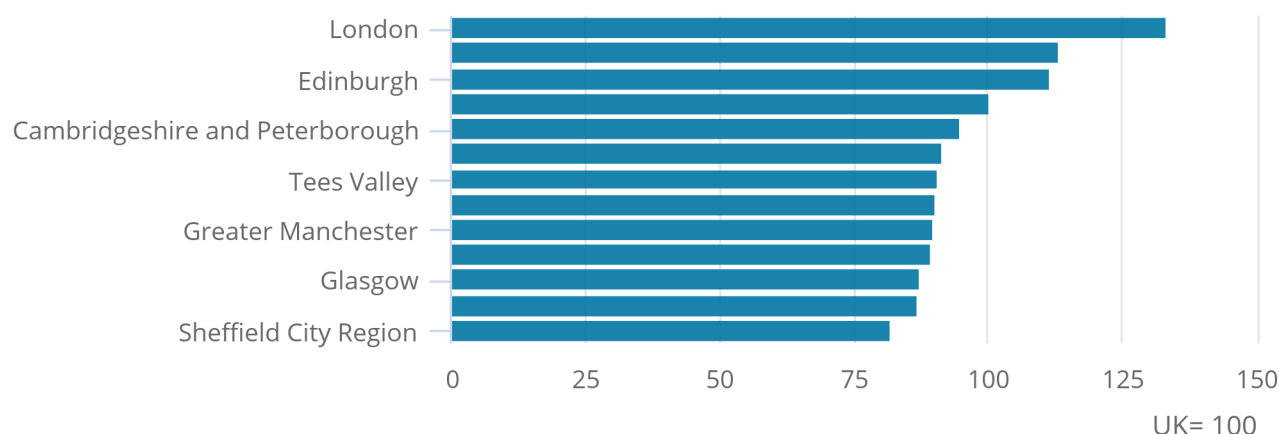
Source: Office for National Statistics

Notes for: Results for local enterprise partnerships and city regions

1. In many cases, city region geographies do not match the NUTS3 boundaries and therefore require local authority data to produce the most comprehensive measure for all city regions. At present, work is underway to publish data on a local authority level. This will allow us to produce more accurate real productivity information on city regions.

7 . Alternative results excluding rental income

This section briefly assesses the impact on the labour productivity data from excluding imputed rental income from the calculations. The reason for including this section is that it can be argued that not all gross value added (GVA) components are equally relevant when assessing labour productivity, as some elements of GVA are not directly related to the input of labour. In particular, imputed rental incomes, such as imputed rental values capturing the value of housing services accruing to owner-occupiers, could be excluded from the total GVA to obtain a measure of output more closely related to the measurable labour input.

Therefore, we have calculated data that exclude imputed rentals from the GVA used in the productivity calculations. These data discuss the impact of this calculation when comparing the results with the data used in the earlier sections of the article (where all components of GVA are included in the productivity calculations). In this section, we use the 2017 data for unsmoothed productivity estimates at current prices for NUTS1 and NUTS2 and smoothed estimates at current prices for NUTS3 subregions.

Table 2 shows the effect of excluding rental incomes on NUTS1 GVA per hour worked, calculated in nominal terms in current prices. It shows that the productivity advantage of London and the South East is slightly reduced if imputed rentals are excluded. The changes are generally moderate; however, there are some larger changes at smaller geographies and these are illustrated in Figures 19 and 20.

Table 2: Labour productivity (gross value added per hour worked) including and excluding imputed rental incomes, 2017 (UK equals 100), current prices

NUTS1 Region	GVA per hour (including Rent)	GVA per hour (excluding Rent)	Difference
North East	89.2	90.6	1.4
North West	92.2	93.4	1.2
Yorkshire and The Humber	85.2	86.6	1.3
East Midlands	84.8	85.9	1.1
West Midlands	88.1	89.4	1.3
East of England	93.4	93.2	-0.1
London	133.0	131.7	-1.3
South East	108.2	105.9	-2.3
South West	89.5	88.7	-0.9
Wales	84.2	84.8	0.6
Scotland	97.5	98.9	1.3
Northern Ireland	83.5	85.0	1.5

The largest NUTS3 changes are in London, where the exclusion of imputed rental incomes increases levels of relative labour productivity in some areas (for example, Camden and City of London, Westminster and Tower Hamlets), while reducing relative labour productivity in other areas (for example, Wandsworth, Redbridge and Waltham Forest and Bromley). These changes make quite a large difference to the relative productivity values.

Figure 8 earlier in the article showed Wandsworth as having the largest labour productivity in London followed by Tower Hamlets when total GVA is used in the calculations. However, Wandsworth drops down the rankings if imputed rental incomes are removed, with Tower Hamlets taking its place as having the highest productivity, followed by Camden and City of London.

Figure 19: Impact of excluding imputed rental incomes on gross value added per hour worked – London subregions with largest index change, 2017

UK=100

Figure 19: Impact of excluding imputed rental incomes on gross value added per hour worked – London subregions with largest index change, 2017

UK=100
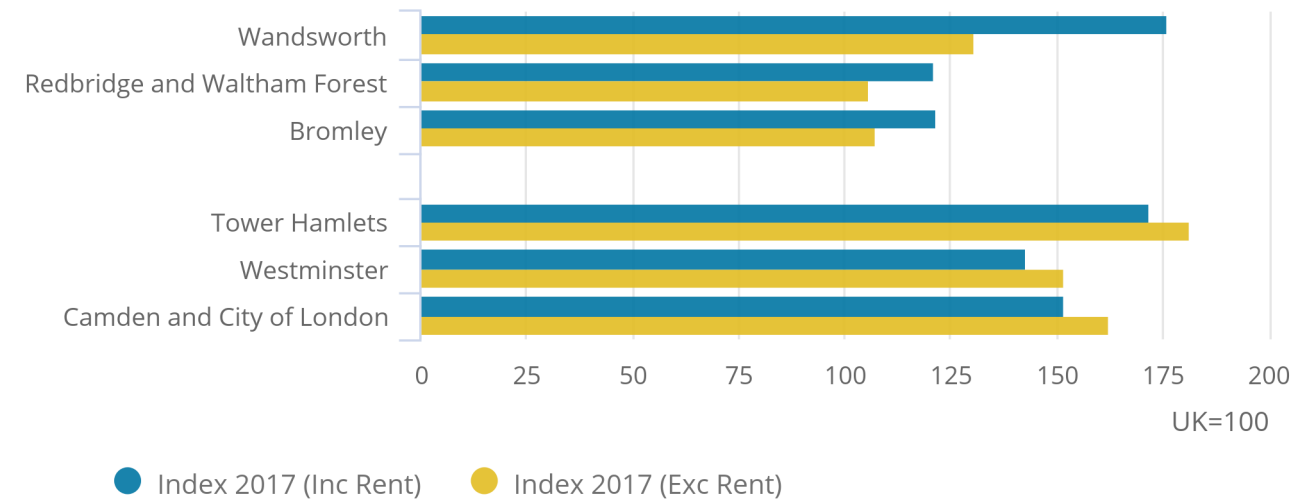
Source: Office for National Statistics

Excluding imputed rental incomes also affects areas outside of London, albeit to a smaller extent. Figure 20 shows that Milton Keynes, Manchester and Nottingham all have a higher relative labour productivity value if imputed rentals are excluded than is the case with total GVA used in the calculations. By contrast, the Isle of Wight, East Kent and West Sussex (South West) all have a reduction in their relative labour productivity values if imputed rentals are removed.

Figure 20: Impact of excluding imputed rental incomes on gross value added per hour worked – UK (excluding London) subregions with largest index change, 2017

UK= 100

Figure 20: Impact of excluding imputed rental incomes on gross value added per hour worked – UK (excluding London) subregions with largest index change, 2017

UK= 100
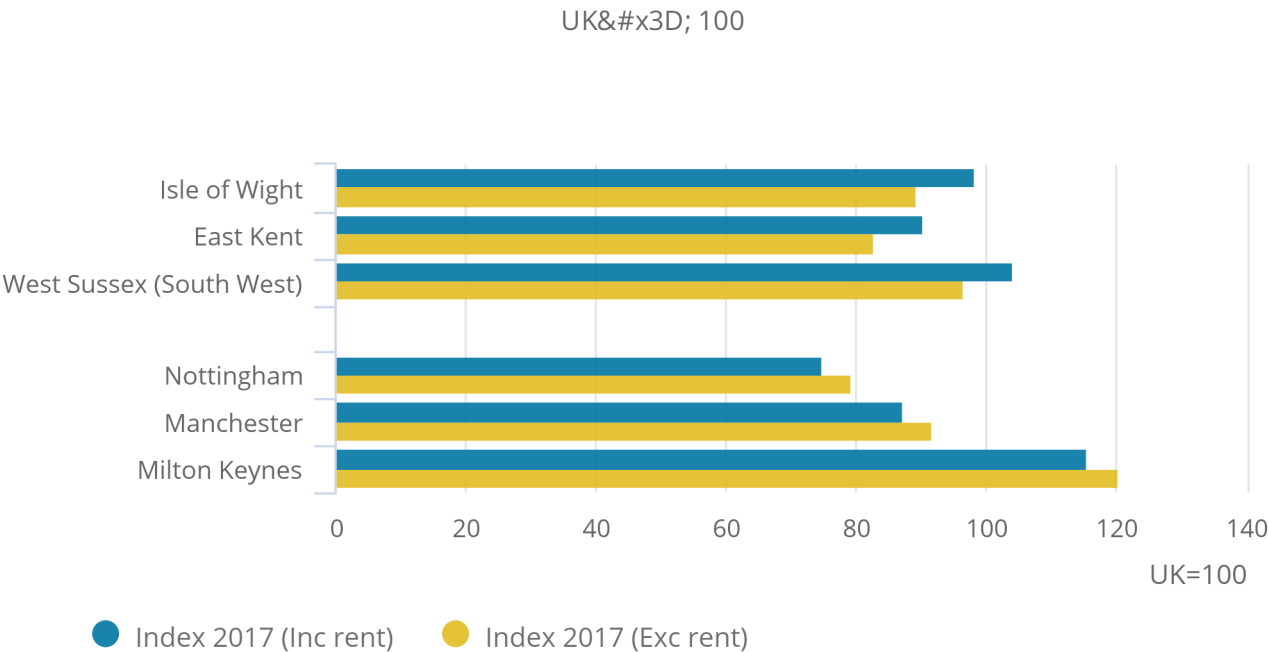
Source: Office for National Statistics

8 . Quality and methodology

Estimates of regional productivity are calculated based on Office for National Statistics (ONS) regional gross value added (GVA) data, which are published each December. Since the December 2017 release, a new improved methodology was adopted, known as regional balanced GVA (GVA(B)). This measure "balances" the income and production approaches to measuring the economy into a single estimate at a regional level. This method was introduced to replace the previous method, which calculated regional GVA based on the income method alone.

An advantage of the new method is that, for the first time, it allows ONS regional labour productivity estimates to be calculated in "real" terms through the production of constant price estimates. These real data allow a greater understanding of time series growth in regional productivity. Real estimates of regional GVA are made available for the first time in the most recent release of regional GVA data at lower geographical breakdowns like NUTS3 subregions and local enterprise partnerships (LEPs). These estimates have been produced by deflating the current price estimates for 112 industries using national industry deflators. The balanced measure of regional GVA has now been granted National Statistics status following a review by the Office for Statistics Regulation.

It should be noted that the National Statistic for regional labour productivity at NUTS1 level remains that based on the long-standing GVA income approach (GVA(I)) method as evolution of the methods was dependent on GVA (B) acquiring National Statistics status. These data are available in the tables accompanying the Labour productivity bulletin.

For data on labour productivity for NUTS2 and NUTS3 subregions, together with LEPs and city regions, we recommend using the new GVA(B) data, which are considered to provide improved GVA estimates. As such, this regional and subregional productivity article has been based on the new GVA(B) data, providing analysis and data across these local geographies together with some experimental analysis of the GVA(B) data for NUTS1 regions.

The subregional productivity data (for NUTS2 and NUTS3 geographies and city regions) in this article are compiled to be consistent with the regional productivity GVA(B) data for NUTS1 regions. The subregional productivity data using the GVA(B) approach are Experimental Statistics.

Data accompanying this article are based on the NUTS geographical classification that came into force on 1 January 2018. More details on the changes introduced by the new NUTS classification are provided in the "Geographies" part of this section.

Components of productivity data

Productivity estimates presented in this article use GVA, productivity jobs and productivity hours data. The methodology requires ensuring that the subregional measures of GVA, jobs and hours are all consistent with the regional totals. The methodology is therefore concerned with how best to apportion the regional totals to the subregional areas. The approach taken is detailed in this section.

GVA: income, production and balanced approach

This output uses the published regional gross value added (GVA) data from our regional GVA publication. The unsmoothed data are published on a workplace basis for NUTS1, NUTS2 and NUTS3 geographies, as defined by the Nomenclature of Territorial Units for Statistics (NUTS) classification. GVA is preferable to gross domestic product (GDP) at the regional level because it excludes taxes and subsidies on products that are difficult to attribute to local units.

In previous years, estimates of regional and subregional GVA growth in nominal terms were available using the GVA income approach (GVA(I)). The GVA(I) is measured at current basic prices only, therefore does not allow for different regional price levels or changes in prices over time (inflation). More recently, an alternative measure of regional and subregional GVA using the production approach (GVA(P)) was developed. GVA(P) is calculated as the total output of goods and services less the value of goods and services used in the production process. The production approach to compile GVA is conceptually equivalent to the income approach, but allows deflation of current prices to produce constant price measures, since the production components relate to goods and services that can be broken down into price and volume indices. Therefore, GVA(P) provides the estimates of regional and subregional GVA growth in both real and nominal terms.

Consequently, to provide users with a single definitive measure of GVA, a balanced GVA approach (GVA(B)) has been developed by taking the strengths from both the GVA(I) and GVA(P) approaches, and using them to produce a new balanced measure of regional GVA. The balanced GVA estimates use a matrix of paired quality metrics for each region, by industry, by year. These quality metrics are compiled by assessing the quality of each component that feeds into either of the two measures and multiplying it by the weight that component represents in the GVA estimate. The balancing process to obtain a single measure of GVA is similar to the balancing process used for measuring the national gross domestic product (GDP) data, compiled using the income, expenditure and production approach. For more information on how the balanced GVA is developed, please refer to the recent release of the regional accounts article, December 2018 .

Constant price GVA(B) is derived by deflating the current price estimates for each of the 112 industries using national industry deflators obtained from the UK GDP (output) system. These deflators are consistent with the [UK National Accounts, The Blue Book: 2018](). The Eurostat Manual on Regional Accounts (2013) recommends that in the absence of regional prices the use of national deflators is acceptable, provided the deflation occurs at minimum level of 38 industries.

Jobs

At the regional level, GVA per filled job is calculated using a "productivity jobs" series as the denominator. This is compiled from four components:

- employee jobs

- self-employed jobs

- government-supported trainees (GST)

- members of Her Majesty's Forces

For consistency purposes, the regional "productivity jobs" series is benchmarked to the national "productivity jobs" series, on a quarterly basis. To produce annual totals for regional productivity jobs, an average of the four quarters in the year is taken.

For subregional geographies, the "total jobs" data series is used to apportion regional productivity jobs to NUTS2 and NUTS3 subregions. This total jobs measure is a workplace-based measure of jobs that we produce mainly for use in calculating job densities at a regional and subregional level. Total jobs data comprise employees (from the Business Register Employment Survey), self-employment jobs (from the Annual Population Survey), government-supported trainees (from the Department for Education and the Department for Work and Pensions) and HM Forces (from Ministry of Defence).

The total jobs series is used to calculate the proportions of regional jobs within each subregion for each year. These results are then used to apportion the regional "productivity jobs" data series to the subregional level.

Hours

At the national and regional level, GVA per hour worked data are calculated using a "productivity hours" series as the denominator. These data are calculated quarterly, based mostly on the Labour Force Survey (LFS), and an annual total is constructed as the average of the four quarters in the calendar year.

At subregional level, only annual productivity data are being produced. Therefore, the Annual Population Survey (APS) is used rather than the LFS as it has a larger sample size1. The process involves calculating total hours for each subregion as the sum of employee hours, self-employment hours, hours worked in government-supported training schemes and hours worked by HM Forces.

Employee hours are calculated by using the APS to estimate, for each subregion, the average hours worked per employee job by industry. These industry average hours are then multiplied by the number of employee jobs for each industry in each subregion. For the period from 2009 onwards, the number of employee jobs by industry is derived from the Business Register and Employment Survey (BRES). Prior to that, employee jobs by industry were derived from the Annual Business Inquiry (ABI)2.

Self-employment hours are calculated from the APS. For government-supported training schemes and HM Forces, the regional totals are allocated to subregions based on each subregion's share of regional employee plus self-employment hours, as calculated in the previous stage. Adding together the sum of employee hours, self-employment hours, hours worked in government-supported training schemes and hours worked by HM Forces provides a total hours estimate for each subregion. Once calculated, these NUTS2 and NUTS3 subregional data are then constrained regionally to the NUTS1 "productivity hours" data to ensure consistency with regional productivity data.

Smoothing

For current price 'nominal' labour productivity, the data are provided both unsmoothed and smoothed. The reason for providing smoothed estimates is that, particularly for NUTS3 geographies, there is volatility in the data that arise from the smaller survey samples inherent within estimates for smaller geographic areas. The smoothed data reduce the volatility by using weighted data from up to five years in producing the estimate for each year. In this article, when discussing current price data, we have used the smoothed data for NUTS3 estimates, but the unsmoothed data for NUTS2 and NUTS1 estimates.

For the "real" estimates, the data used are unsmoothed for all geographies to avoid multiple averaging of data as the GVA(B) data are already chain linked. This "real" data allows for time series labour productivity growth to be examined. While this includes the opportunity to examine single year-on-year changes, we would generally recommend analysing the data over a longer time-period, particularly if examining data for smaller geographic areas such as the NUTS3 areas. Trends over a longer period are less likely to be the result of the volatility around any single year estimate and more likely to be demonstrating a change in the economic performance of the subregion.

Geographies

A number of our regional and subregional outputs are produced based on the Nomenclature of Territorial Units for Statistics (NUTS) geographies. These include regional and subregional GVA. These GVA data are an input in the calculation of subregional productivity. Each NUTS3 subregion covers the same area as either a single local authority or a combination of two or more adjacent local authorities. The data accompanying this article are published on the NUTS geographical classification that came into force on 1 January 2018:

- NUTS1: Wales, Scotland, Northern Ireland and the nine English regions

- NUTS2: 41 subregions – mainly groups of counties and unitary authorities

- NUTS3: 179 local areas – primarily individual counties and unitary authorities

- the term Extra-Regio is applied to an economic activity that cannot be assigned to any specific region within a country

In England, a number of city region areas have been granted increased devolution powers over recent years, while in Scotland and Wales city deals have been agreed between some city regions and the UK government. Therefore, whilst it should be noted that there is no official city regions geography for the UK, the list of areas included (and the boundaries chosen) in this article are as close as possible to those used in the recent devolution and city deal agreements. Where no deal has been made to date, the boundaries reflect those in combined authority proposals, or in discussions occurring locally around greater joint working, or follow a LEP boundary.

It should be noted that the NUTS3 region boundaries are not an exact match for Cardiff, Glasgow, Edinburgh or West of England City Regions. Therefore, to calculate city region data in this article we have additionally included Neath Port Talbot in Cardiff City Region, Clackmannanshire in Edinburgh City Region, part of Argyll and Bute in Glasgow City Region, and North Somerset in West of England so that we can build the data up from the published NUTS3 level. This is unlikely to impact any of the trends shown in this report but does mean the statistics used slightly overstate the size of these three city regions. Some city regions, such as North of Tyne Combined Authority, have not been included in this release because it is not possible to build up estimates from the NUTS 3 data. We are currently working on providing local authority estimates which, will then allow us to add the data for the excluded city region areas.

Every local authority in England belongs to at least one LEP. However, some local authorities belong to more than one LEP. In each case, the LEP boundaries used have been an amalgamation of one or more local authority. In other words, for each local authority associated with an LEP, data covering the whole of that local authority are included within the LEP data.

There are two cases, however, where the working boundaries of an LEP cut through existing local authority boundaries. These are Enterprise M3 and Solent LEPs, where parts of the local authorities of New Forest, Test Valley, Winchester and East Hampshire are in the Enterprise M3 LEP, while parts are in the Solent LEP. As in other recent publications, it has been decided that the whole of these affected local authorities should be allocated to the Enterprise M3 LEP, and to not include them in the estimates for the Solent LEP.

From 1 April 2017, the Northamptonshire LEP was merged with the South East Midlands LEP, reducing the number of LEPs from 39 to 38.

Revisions

As in the previous year's publication, we use the new balanced gross value added (GVA(B)) approach to calculate the productivity estimates for UK regions and subregions. Based on the GVA(B) measure, the labour productivity estimates are provided in both "real" and "nominal" terms. Following an assessment conducted in 2017 and 2018 by the Office for Statistics Regulation, regional GVA balanced estimates have now been accredited with National Statistics status. Moreover, the GVA(B) data are available for the first time in real terms for NUTS3 subregions as well as for LEPs and city regions. Therefore, for the first time, in this publication we are able to provide both real and nominal estimates of productivity for NUTS3 subregions, LEPs and 13 city regions.

There have been changes made to the UK National Accounts measure of GVA, which has an impact on the regional GVA estimates in the form of different national totals for the various components of income. Of these, there is an improved method for allocating owner-occupied imputed rental (OOIR) for privately-rented dwellings and there is a move to a region-based data source that is consistent with the method used in Blue Book 2017.

In October 2015, housing associations were reclassified from the private sector to the public corporations sector with effect from 22 July 2008. This change was implemented in public sector finances in 2016 and in Blue Book 2017 for the UK National Accounts. For further details on all other revisions, please refer to the recent release of the regional accounts article, December 2018.

Subregional productivity jobs and hours data have been revised in comparison with the regional and subregional productivity article published in February 2018. This follows from a number of factors including the annual reweighting of the Labour Force Survey to match with the latest population data. On 5 October 2018, some methodological improvements were made in the way the time series of productivity hours are estimated, which revised the levels of productivity from Quarter 1 (Jan to Mar) 1994 within particular industries. Revisions to jobs data resulting from an annual benchmarking to the Business Register and Employment Survey, as well as revisions to public sector employment estimates, affect hours and jobs in all time periods. Further information can be found in the article Improvements to the latest Labour productivity bulletin: October 2018, published on 14 September 2018.

The underlying method for the calculation of hours data has been modified this year. This is to take into account improvements in the estimates of jobs within the Business Register and Employment Survey and its predecessor. One of the improvements that impacts upon particularly rural areas are modelled estimates for agricultural sector jobs at a local level. Nevertheless, the hours data remain constrained to the published statistic for NUTS1 regions and subsequently smoothed, which limits the impact of any discontinuities in the estimates.

Our present publication has also been affected by changes to Nomenclature of Units for Territorial Statistics (NUTS) boundaries. In January 2018, there were changes to the NUTS boundaries in Scotland and Northern Ireland. In Scotland, a fifth NUTS2 area, Southern Scotland, was created by taking parts from the Eastern Scotland and South Western Scotland NUTS2 areas. In Northern Ireland, changes were made to the NUTS3 areas due to local government re-organisation, with the new NUTS3 areas now matching the 11 local authorities. The GVA estimates as well as our subregional productivity estimates have been produced in accordance with the January 2018 NUTS regions.

Timeliness

The timeliness of the data is determined by the release calendar of the regional GVA data, the total jobs data and the Annual Population Survey from which the hours worked are extracted. Subregional GVA data for 2018 will be available in December 2019 and an update to this article will follow shortly afterwards.

Future work plans

The estimates of balanced gross value added (GVA(B)) are now available at local authority district (LAD) level in both nominal and real terms. Work is therefore currently ongoing to estimate labour productivity using GVA(B) in both nominal and real terms at LAD level. This work for LAD level will also allow us to work out productivity estimates for all city regions and combined authorities.

The change in Northern Ireland NUTS3 geographies have affected our productivity jobs data at this level. In the present article, we only produce data for the 2014 to 2017 period for Northern Ireland's NUTS3 geographies. Work is currently ongoing to provide the entire time series for the new geographies of Northern Ireland and will be published as an update to the present article as soon as data are available.

Notes for: Quality and methodology

1. For 2005, it was not possible to use Annual Population Survey (APS) data, therefore Labour Force Survey (LFS) data were used – with the average taken of the four LFS surveys carried out in 2005.

2. Business Register and Employment Survey (BRES) data are used for 2009 onwards based on the 2007 UK Standard Industrial Classification: SIC 2007. For data up to 2008, the Annual Business Inquiry (ABI) is used and this is based on the 1992 UK Standard Industrial Classification: SIC 1992.