Compendium

Regional estimates of gross domestic product

An analysis of economic statistics development and trends. The compendium Economic Review is published quarterly, usually in January, April, July and October.

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1 . Introduction

There has been an increase in user demand for better understanding the performance of the countries and regions in the UK. This need for timelier and more frequent subnational estimates of economic activity reflects not only a shift towards the devolution of powers, but also for helping policymakers and researchers understand how performance at the regional level can help explain recent economic and social trends. Recent analysis (PDF, 2.09 MB) highlights how this has been reflected in understanding how economies operate at a local level, calling "for new data, at a higher frequency and higher resolution and new ways of stitching it together".

The Allsopp Review (2004) provided recommendations to improve subnational economic statistics, including a focus on better quality and more timely measure of real regional gross value added (GVA) and expanding the range of micro-economic and sub-regional information that was available. The Independent Review of UK Economic Statistics (PDF, 5.13MB) identified some of the key challenges in the measurement of the UK economy, including "inadequate regional statistics". One of its key themes was to improve the coverage and timeliness of subnational estimates, exploring the potential for administrative data to fill some of these gaps. Historically, we have produced subnational estimates of gross domestic product (GDP) on an annual basis, produced with a lag of around a year. Research undertaken by the Economic Statistics Centre of Excellence (PDF, 876KB) has focused on improving the timeliness and frequency of these estimates in the UK, so that a much more comprehensive regional picture of the UK economy can be produced that helps users understand the local experience of households and businesses[1].

This article explains how we have produced quarterly estimates of GDP for the nine English NUTS1[2] regions and Wales. These experimental estimates, coupled with the existing estimates for Scotland and Northern Ireland, provide a complete subnational picture for the UK economy for the first time. It then offers new insights into how the UK regions have performed lately, highlighting how and why these regional estimates are inherently more volatile than UK GDP, but can help provide more insight in explaining headline movements in the UK economy. It reconciles these new indicators with the latest regional productivity estimates in helping explain the economic performance of the regions in the UK. We then outline some of the proposed development to these experimental estimates, as we look to improve how we estimate subnational activity with a view to these becoming National Statistics.

GDP growth for NUTS1 regions in the UK, Quarter 4 (Oct to Dec) 2018

Data download

Notes for: Introduction

1. "Nowcasts" of gross value added (GVA) for the UK regions have been produced, which are available around 45 days after the reference quarter. These are based on a mixed frequency Vector Autoregressive model in which restrictions are imposed such that these estimates are consistent with the official annual regional figures and the quarterly UK totals. Furthermore, historical estimates of nominal and real GVA growth have also been developed back to 1970 for each NUTS1 region of the UK.

2. NUTS, within the UK, refers to Nomenclature of Territorial Units for Statistics (NUTS) areas.

2 . Producing experimental estimates of regional gross domestic product

In September 2019, we introduced [country and regional volume estimates of gross domestic product](#) (GDP), with additional granular industry-level information for the nine English regions and Wales for the first time. This complements the estimates for [Scotland](#) and [Northern Ireland](#) produced elsewhere, thereby providing a complete subnational picture for the UK[1]. The production approach to GDP is often referred to as the output approach, as not all the information is available to fully measure all production activity in the economy. As such, production is approximated by recording output, which in turn is estimated by turnover. Gross value added (GVA) is considered a proxy of our short-term estimates of GDP and, as we consider the relationship between output and intermediate consumption to be similar over short time horizons, this allows VAT turnover to help us produce estimates of regional GDP.

Further information on [introducing GDP for the countries of the UK and the regions of England](#) is available for a more in-depth explanation of how this administrative information has also allowed us to develop regional estimates of GDP. In short, we apportion the VAT turnover for each business based on their employment share within any region[2]. While this tends to be a reliable proxy for regional activity, it also highlights the possibility of different activities taking place at different sites – and as such there might be variation in industrial classification between regions and UK measurement. In such instances where this may not be the most reliable indicator of where that activity is taking place[3] , we will look to exploit information from other direct regional indicators. These new industry estimates of regional GDP are based on the activity of the site, in line with how we produce our annual estimates of the regional accounts[4].

Notes for: Producing experimental estimates of regional gross domestic product

1. These regional estimates of GDP are produced by the Scottish Government and the Northern Ireland Statistics and Research Agency respectively. The Scottish estimates provide comparable industry-level estimates of output, while the Northern Irish estimates provides estimates for construction, production and services, as well as a private-public split.

2. The construction estimates here are sourced from the current price, non-seasonally adjusted subnational estimates published alongside the monthly Construction output publication. These data are modelled from new orders data via project-level information collected from [Barbour ABI](#). These data map the projects' geographic locations, the specific duration of projects, and factor in the project start date and lag time from the order being placed to the project commencing.

3. In producing estimates of output for public sector industries, a mix of VAT turnover for market output and government expenditure for non-market output is used.

4. Estimates of economic activity published by Scotland and Northern Ireland are based on an industry classification that is a hybrid between the site-level activity and the overall business activity. However, the overall business and the site are the same for most businesses. While the actual difference between the estimates based on the two different classifications is not known, it is believed to be small.
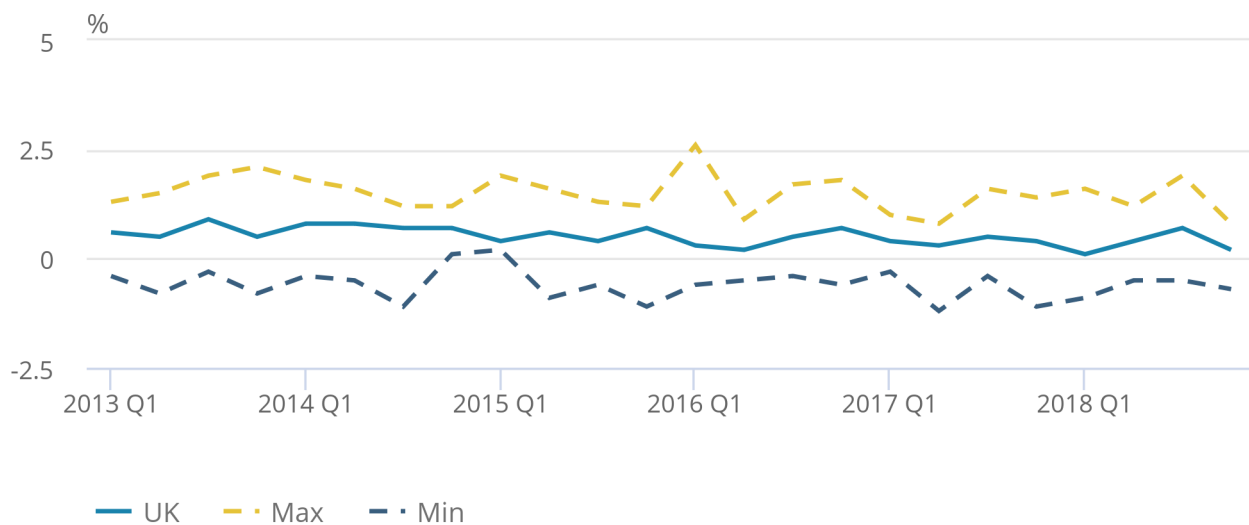
3 . The economic performance of the UK regions

Regional gross domestic product (GDP) estimates show the extent to which economic performance has varied across the UK. Figure 1 shows UK GDP growth from 2013 onwards, comparing it to the range of economic performances at the subnational level[1]. The UK economy has been relatively steady in recent years as GDP has increased by 0.5% each quarter on average. The latest official estimates show that the UK economy contracted by 0.2% in Quarter 2 (Apr to June) 2019, in part reflecting changes in the timing of activity related to the UK's original planned exit date from the European Union in late March. Regional GDP estimates are only available up to the end of 2018, so 2019 figures are not included in this comparison.

However, the picture is much more mixed at the subnational level, highlighting the extra volatility in the regional estimates. For instance, at least 1 of these 12 NUTS1 regions has experienced a fall in output for most of the quarters covered here, as it is much more frequent for a region to experience contracting output than it is for the headline UK economy. It is also the case that individual regions are more capable of experiencing faster growth than the UK economy. For example, the UK has not seen quarterly GDP growth in excess of 1% over this six-year period, but at least one region has experienced that for most of this period.

Figure 1: The range of quarterly GDP growth estimates for UK NUTS1 regions (Quarter 1 2013 to Quarter 4 2018)

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Source: Office for National Statistics, the Scottish Government, and the Northern Ireland Statistics and Research Agency - Economic review

Notes:

1. Real GDP figures are chained volume estimates that are adjusted for the effects of inflation over time.

2. UK GDP estimates are taken from the June 2019 quarterly national accounts, which are consistent with the regional GDP estimates here. These UK estimates include extra-regio figures; this is UK economic activity that cannot be attributed to a region, such as offshore oil and gas extraction and activities of UK embassies and forces overseas.

3. In more recent periods, gross value added (GVA) and GDP are not fully aligned except in the very latest two quarters where balanced GDP and GVA will be equal. The regional estimates of GDP are aligned to the official estimates of output GVA.

4. The minimum and maximum figures here capture the range of quarterly GDP growth estimates of all the 12 NUTS1 regions, as it refers to the maximum and minimum figures across all regions at a particular point in time. That is, these will not necessarily relate to the same region over time.

The much higher volatility in the regional estimates may reflect the industry composition at the sub-national level, in which certain industries are more likely to experience large fluctuations and/or that specific industries are relatively more exposed to shocks. For example, if a power station experiences a temporary shutdown, it is likely to have a large impact on its region because it is a major part of the electricity industry in that place. However, the impact is likely to be much smaller on the UK economy, not only because of the existence of many other power stations elsewhere in the UK, but because those plants will likely pick up much of the slack from the temporary closure.

Regional GDP estimates also allow us to provide a richer understanding of notable movements at the whole economy level. For instance, the UK economy was hit by a number of "special events" in 2012, which led to a particularly volatile path through the year. Following a contraction in the second quarter, there was a large rebound in activity in the third quarter, before contracting once more in the final quarter of the year. One of the factors that played a role in this path is the London 2012 Olympic and Paralympics Games [2], bringing increased ticket sales to the UK in Quarter 3 (July to Sept) 2012 [3]. These effects are highlighted in the regional estimates here – although the UK economy increased by 1.2% in the third quarter, all but one of the English regions experienced a contraction in GDP. The one exception was London, which increased by 1.7% over that quarter, reflecting the increase in administrative and support service activities.

In studying the recession profiles within the UK, the Economic Statistics Centre of Excellence (PDF, 241KB) find that "regional cycles are more volatile and often de-couple from the path of the UK as a whole", highlighting the variation around the frequency and timing of recessions. While these new estimates of regional GDP do not cover a recession episode for the UK economy, it is still possible to look at the extent to which there has been such regional variation in recent years.
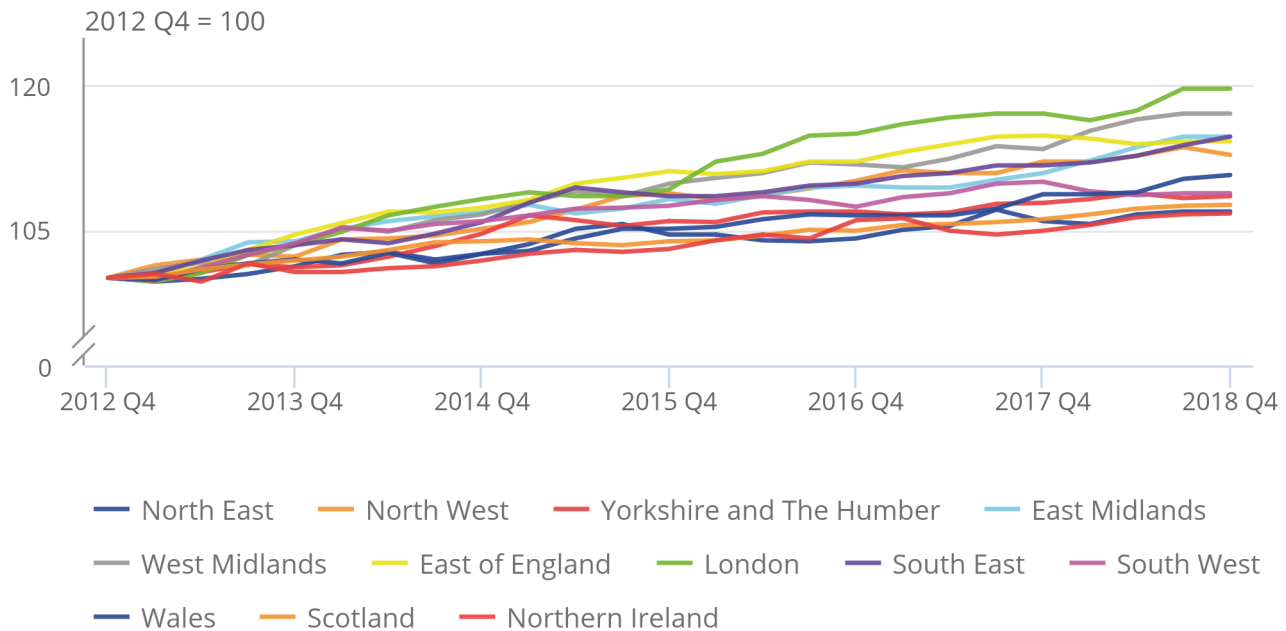
Figure 2 shows the cumulative GDP growth of the 12 NUTS1 regions, providing a fuller picture of how wide ranging the regional performances have been. For instance, the London economy has increased by 19.7%, while Northern Ireland has only increased by 6.7% over the same period. Furthermore, these headline figures do not necessarily pick up how the shape of the profiles have shifted over time – for example, there are instances where regions have experienced technical recessions over this six-year period, although the regional estimates are much more inherently volatile. Instead, it is more striking though that it is not only that the underlying trends vary by region, but these regional trends have not been the same over time. This reflects that there are also dynamic effects here, which may be more useful in picking up cyclical and structural factors at the subnational level.

Figure 2: Cumulative GDP growth by UK NUTS 1 regions,

Quarter 4 (Oct to Dec) 2012 to Quarter 4 2018
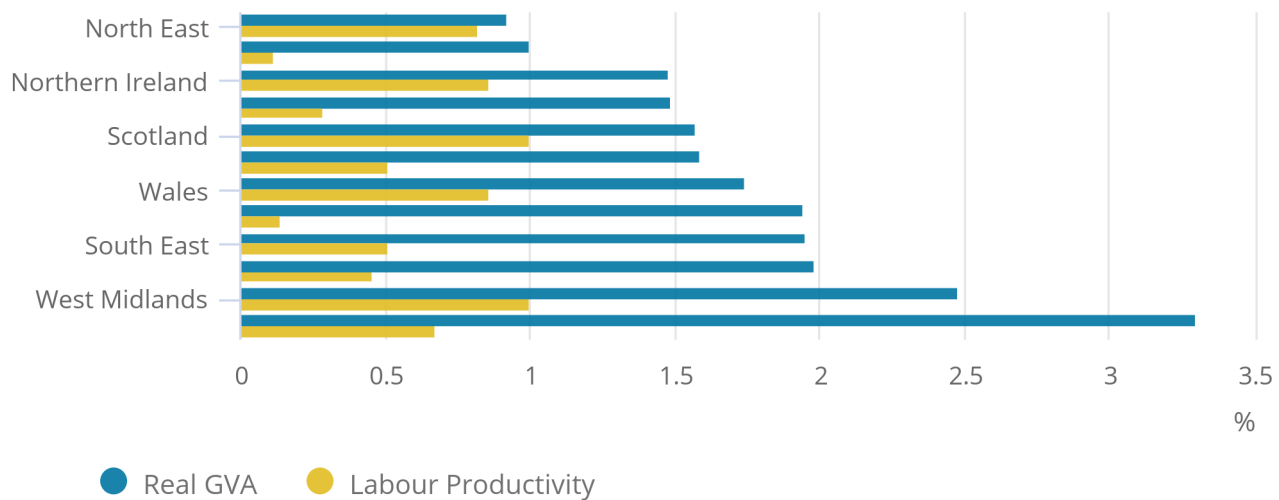

Source: Office for National Statistics, the Scottish Government, and the Northern Ireland Statistics and Research Agency - Economic review

However, these figures do not provide much insight into regional inequality in the UK, as these do not take into consideration the productivity of each region. Regional differences in output growth will reflect changes in the rate at which factor inputs have been accumulated and/or regions being better at becoming more productive in how much output is produced per hour. Figure 3 shows the relationship between the average annual change in real gross value added (GVA) and labour productivity for each of the NUTS1 regions over the post-crisis period from 2010 to 2017, based on the latest regional productivity estimates. It shows that while London did see the largest annual increase in output over this period on average, this largely reflects it also experiencing the largest average increase in hours worked in the region. Annual productivity increased by an average of 0.7% per year over this period, which was only sixth fastest of the 12 NUTS1 regions. Similarly, while Northern Ireland did see the smallest average increase in output over this period, this was explained to some extent by it experiencing a relatively small increase in labour input. Productivity growth in Northern Ireland over this period was only behind the West Midlands and Scotland.

Figure 3: Average annual real GVA growth and labour productivity growth for UK NUTS1 regions, 2010 to 2017

● Real GVA   ● Labour Productivity

Source: Office for National Statistics - Economic review

Previous analysis offers some further insights as to why there may be these differences in regional productivity. It found that it was not likely to reflect the composition of the industrial structure of that region, as "even within single industries we can observe large differences in average productivity levels between different parts of the country, particularly in services industries". Instead, it finds that there is some evidence that points to the importance of "internal factors" that impact upon firm-level productivity, such as whether that business is foreign-owned or if it exports, and "external factors" that relate to the location. External research on the productivity puzzle (PDF, 987KB) looks at explaining the distribution of firm-level productivity over time, including analysis of firm characteristics of those in the upper and lower tails of that distribution. While recognising that there are marked differences in average productivity across UK regions, it finds that "regional differences are not the main factor explaining the UK's long tail of firms nor why this tail is longer in the UK than elsewhere", as every region has frontier firms in the upper tail and laggard firms in the lower tail.

Notes for: The economic performance of the UK regions

1. Given that the effects of the Queen's Diamond Jubilee and the Olympic and Paralympic Games led to a sizeable reprofiling of economic activity through 2012, these figures have been excluded from the analysis shown in this article.

2. As part of the balancing process in producing headline estimates of UK GDP, adjustments would have been applied in real time to take into consideration the London 2012 Olympic and Paralympics Games to reflect our best judgements of its effects. These would not have been reflected in the regional GDP estimates here.

3. Another factor was the bounce-back that took place in Quarter 3 (July to Sept) 2012, as the celebrations for the Queen's Diamond Jubilee led to an additional bank holiday in the previous quarter.

4 . Conclusions

It has long been recognised that economists and policymakers that are interested in the subnational performance of the UK have typically faced a lack of timely and high-frequency regional estimates. This has impacted upon their ability to understand subnational dynamics and how this might help explain macroeconomic trends. One of the key themes of the Independent Review of UK Economic Statistics was to improve the coverage and timeliness of subnational estimates, specifically exploring the potential for administrative data to fill some of the gaps. As part of the transformation of the UK National Accounts, we have introduced country and regional volume estimates of gross domestic product (GDP), with additional granular industry-level information for nine English regions and Wales. These experimental estimates, coupled with the previously published estimates for Scotland and Northern Ireland, provide a complete subnational picture for the UK economy for the first time.

This analysis shows that while the UK economy has been relatively steady in recent years, the picture is much more mixed at the regional level. It is much more common for individual countries and regions to experience more volatile movements in its economic output, which in part may reflect that industrial composition of that region as certain industries are more likely to experience large fluctuations and/or that specific industries are relatively more exposed to shocks. The production of more timely and frequent estimates of country and regional GDP can help provide more insight in explaining the movements in the headline estimates, particularly if these are likely to reflect one-off movements that reflect region-specific effects. The latest headline estimates show that the UK economy contracted by 0.2% in Quarter 2 (Apr to June) 2019, following an increase of 0.6% in the first quarter of the year. However, this in part reflects changes in the timing of activity related to the UK's original planned exit date from the European Union in late March[1]. The development of these new regional estimates of GDP will help offer further insight as to where these timing effects were most prevalent in the UK, providing users with more information as to where such shifts in activity was taking place[2]. The next set of subnational estimates will be published on 30 October 2019, including figures for Quarter 1 (Jan to Mar) 2019 for the first time.

As these estimates are experimental, we will continue to work on their development. These include the following.

Our regional GDP estimates aim to produce the best estimates at a subnational level. However, the sum of the UK regions may not equal the national total, reflecting that there are some differences in data sources and methods. We have constrained our regional GDP estimates in such a way that minimises the changes to the region by industry quarterly growth rates. While the overall impact of this constraining on the regional estimates is small, we are continuing to examine the impact of this range of options before deciding which one is best suited to these data in advance of applying to be assessed as National Statistics.

Following the announcement by the UK Statistics Authority in March 2019, Construction output price indices, Great Britain construction output statistics and Construction new orders were re-designated as National Statistics. It was noted, however, that the subnational and subsector breakdowns were excluded from consideration because of concerns around the path of the sub-national estimates of construction output. We have worked closely with the Construction Statistics Steering Group and Consultative Committee on Construction Industry Statistics (CCCIS) on improving these estimates. While While these users have acknowledged the improvements in the modelling of these estimates, there is ongoing development work to improve these lower-level estimates as we ultimately look to regain National Statistic status in due course. Any developments in this area will in turn lead to improved accuracy in the Regional GDP estimates.

Flexible geographies in the regional accounts build data up from lower-level "building blocks", allowing the user to define the higher-level area required. We can already build up from local authority, but we hope to eventually build up from workplace zones. The development of flexible geographies in the regional accounts should allow us, in time, to blend these methodologies together to provide quarterly GDP estimates for any user-specified area. This work will be developed over the next five years.

We plan to publish a consultation later this year, which will pick up some of these topics and explore wider consideration so that we are able to respond to user needs in the most effective manner.

Notes for: Conclusions

1. Stockbuilding can take place in response to unexpected fluctuations in demand or when businesses simply choose to hold a different level of inventories of final or intermediate goods. This may have been particularly prevalent this year, given the heightened uncertainty around whether there would be disruption to cross-border supply chains. It was also reported that several car manufacturers had brought forward their annual shutdowns to April as part of contingency planning.

2. The latest nowcasts produced by the Economics Statistics Centre of Excellence show that Northern Ireland, the South East, the South West, Wales and Scotland experienced a contraction in output in Quarter 2 (Apr to June) 2019. That said, the confidence intervals around these quarterly estimates are larger than for the headline nowcasts, so these quarterly estimates are subject to higher levels of uncertainty. The latest experimental estimates by the Northern Ireland Statistics and Research Agency (NISRA) show that the volume of economic output increased by 0.3% in Quarter 2 2019.

5 . Authors

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