Office for National Statistics

Statistical bulletin

Model-based early estimates of regional gross value added in the regions of England and Wales: Quarter 2 (Apr to June) 2021

Experimental model-based estimates of regional gross value added (GVA) output for the nine English regions (North East, North West, Yorkshire and The Humber, East Midlands, West Midlands, East of England, London, South East, and South West) and Wales.

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Release date:
8 October 2021

Next release:
29 November 2021

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- Model-based estimates of regional GVA: an overview

2 . Main points

This is the first publication of experimental model-based estimates of regional gross value added (GVA) by the Office for National Statistics (ONS) and is an important milestone in our plans to transform local and regional statistics.

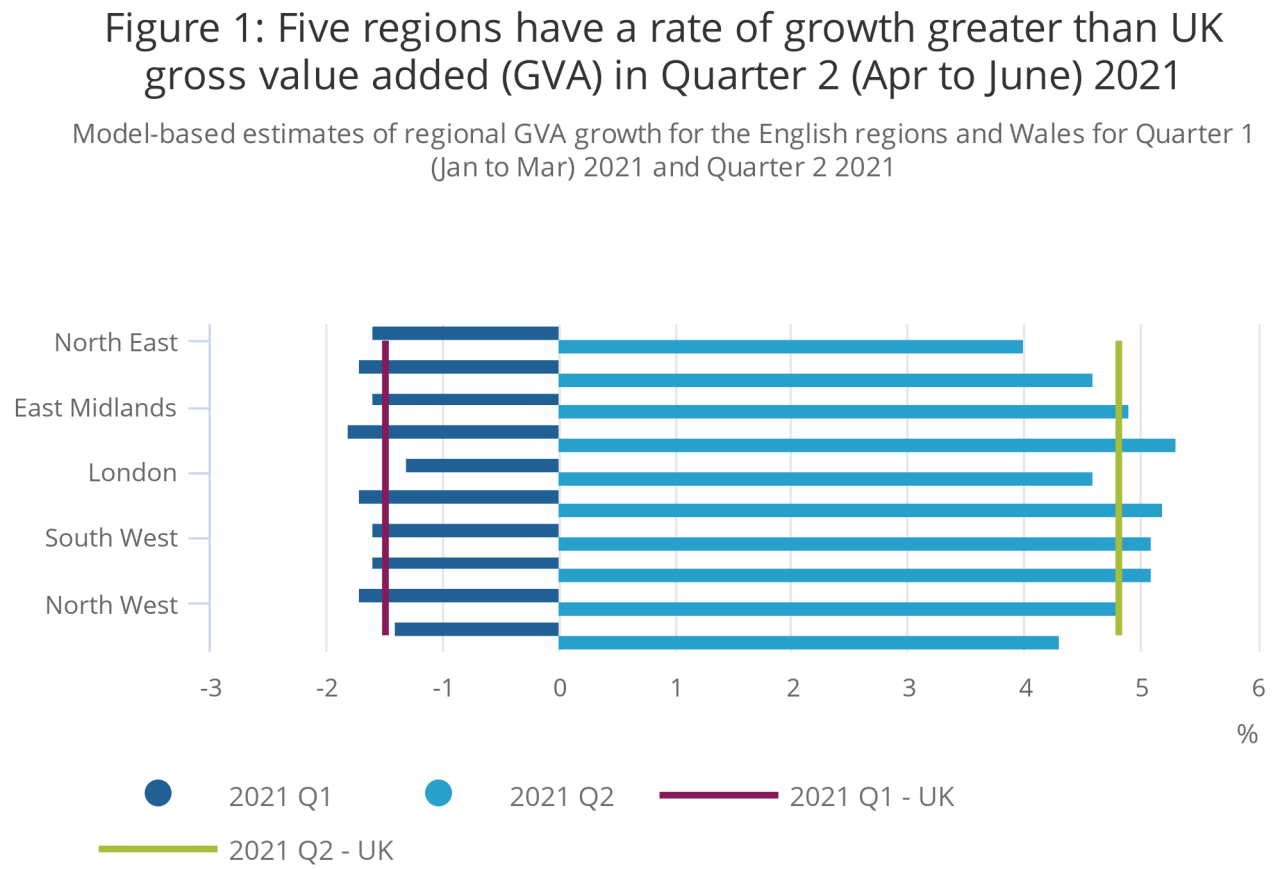
- A supporting article, Model-based estimates of regional GVA is provided to help users' interpretation of these estimates and give a comparison with the ONS' subsequently published GDP, UK regions and countries quarterly estimates, which these estimates are an early indication of.
- These experimental estimates are produced using an econometric model created as part of the Economic Statistics Centre of Excellence (ESCoE) research project, Regional Nowcasting in the UK, an overview of which is provided in the accompanying article.
- All nine English regions and Wales are estimated to have seen a quarter-on-previous-quarter growth in UK GVA of 4% or more in Quarter 2 (Apr to Jun) 2021, following falls in growth in Quarter 1 (Jan to Mar) 2021.
- Data within this release are presented as quarter-on-previous-quarter growth rates.

3 . Model-based estimates of regional gross value added (GVA)

These estimates are modelled from a variety of data sources, including the first estimate of UK gross domestic product (GDP) for Quarter 2 (Apr to June) 2021, and are subject to a degree of uncertainty expressed as confidence intervals (see Section 5).

Figure 1: Five regions have a rate of growth greater than UK gross value added (GVA) in Quarter 2 (Apr to June) 2021

Model-based estimates of regional GVA growth for the English regions and Wales for Quarter 1 (Jan to Mar) 2021 and Quarter 2 2021



Source: Office for National Statistics

The first quarterly estimate of GDP, for Quarter 2 2021, estimated UK gross value added (GVA) in basic prices to have increased by 4.8% quarter-on-quarter.

The model-based estimates of regional GVA indicate that the East Midlands, East of England, South East, South West and West Midlands had growth of greater than the UK-wide figure in Quarter 2 2021 (Figure 1), the highest of which was the East of England at 5.3%

The model estimates that London, North East, Yorkshire and The Humber and Wales have growth below the UK GVA, the lowest of which was the North East at 4.0%.

4 . Methodology of the Model

The model used to produce the estimates utilises a mixed-frequency Vector Autoregressive (MF-VAR). This is described in technical detail in UK Regional Nowcasting using a mixed frequency Vector Autoregressive Model.

The Economic Statistics Centre of Excellence (ESCoE) nowcast model, in essence, takes the latest figure for UK GDP growth and then forms an estimate for each region of England and Wales based on the four factors noted, such that the weighted sum of regional changes is consistent with the change in aggregate UK GDP.

There are four main methodological processes in the model, which are used to create the estimates:

- estimated historical relationships between regional growth and UK growth (this reflects how sensitive regional growth is to UK growth)
- estimated historical relationships between the growth of particular regions (this captures how growth in region x has translated into growth in region y)
- estimated historical relationships within the regions (this captures the persistence of regional growth from one quarter to the next)
- estimated historical relationships between other macroeconomic variables and regional growth (for example, how oil price changes can have a large impact on all of the regions, particularly with regards to the additional UK quarterly macroeconomic variables, so in this example there can be substantial increases in the connection between measures for the oil price and the exchange rate)

Further information is available on the ESCoE website.

5 . Model-based estimates of regional gross value added (GVA) data

Model-based early estimates of regional Gross Value Added (GVA) in the regions of England and Wales
Dataset | Released 8 October 2021
Experimental model-based estimates of quarterly regional gross value added (GVA) output for the nine English regions (North East, North West, Yorkshire and The Humber, East Midlands, West Midlands, East of England, London, South East, and South West) and Wales.

Model-based regional gross value added (GVA) revisions triangle
Dataset | Released 8 October 2021
Model-based regional GVA estimates based on running the model that transitioned from ESCoE to ONS in ‘real time’ from Quarter 2 2019.

6 . Glossary

Mixed-frequency vector autoregressive (MF-VAR)

A MF-VAR approach estimates the set of regressions (for example, one for each variable in the model) as a system. This allows us to take advantage of the interactions between variables to improve the fit of the model. In this case, we expect there to be correlations between the gross domestic product (GDP) growth across regions, so a MF-VAR framework enables this information to be used rather than if we had a separate forecast model for each region. The explanatory variables in each regression are past values of all of the other variables in the model.

Gross value added (GVA)

GVA is the value of an industry's outputs less the value of intermediate inputs used in the production process.

Output approach to GDP

When using the output approach to measuring gross domestic product (GDP), we are actually estimating the contribution of each industry or producer by using GVA at basic prices - put simply, the value of a unit's outputs less the value of inputs used in the production process to produce the outputs. The basic price is the amount that the producer receives for a unit of a good or service that is produced. As such, it includes any subsidies that are received on products but excludes any taxes that are payable on those products.

The link between GVA and GDP is: GVA at basic prices plus taxes on products less subsidies on products equals GDP at market prices (or headline GDP).

7 . Measuring the data

These data are designated as Experimental Statistics. These are statistics that are in the testing phase. These model-based estimates of regional gross value added (GVA) for England and Wales for Quarter 2 (Apr to June) 2021 are published four months in advance of the Office for National Statistics' (ONS') GDP, UK regions and countries for Quarter 2, 2021 scheduled release in February 2022, which is based mainly on HM Revenue and Customs (HMRC) Value Added Tax (VAT) data.

We will continue to develop the model and invite users' views on their uses and needs for these data. We welcome feedback to help inform our development work at regionalgdp@ons.gov.uk.

Model-based estimates of regional GVA

This release contains modelled estimates of regional GVA, and in future releases will be published with a delay of approximately two weeks following the ONS release of the first estimate of GDP. The model provides regional estimates for a given quarter around five months faster than the ONS' GDP: UK regions and countries, which covers the nine English regions and Wales. The model-based estimates will be published a month in advance of the Northern Ireland Statistics and Research Institute's (NISRA's) estimates for the same period, but very close to the Scottish Government's publication of GDP, and the Welsh Government's publication of short-term output indicators, therefore users should refer to their websites for latest estimates.

Quality

More quality and methodology information on strengths, limitations, appropriate uses, and how the data were created is available in the accompanying article, Model-based estimates of regional Gross Value Added.

As an indication of quality for the quarterly modelled estimates, Table 1 provides approximate confidence intervals calculated from the root mean square errors (RMSE) of the model compared with the ONS' GDP, UK regions and countries. These are presented for the period Quarter 2 2019 to Quarter 4 (Oct to Dec) 2020, excluding Quarters 2 and 3 2020 when GVA experienced a shock caused by the coronavirus (COVID-19) pandemic. The confidence intervals will be updated with Quarter 1 (Jan to Mar) 2021 following the next release of the ONS' GDP: UK regions and countries in November 2021.

As an example of how to interpret the confidence intervals in table 1, the model estimated the East of England to have increased by 5.3% in Quarter 2 2021, and the confidence interval indicates 95% confidence that the true growth will lie between 4.5% and 6.1%.

Table 1: 95% Confidence Interval Root Mean Square Error (RMSE), relative to the published estimate

Region	Q2 2019 to Q4 2020 excluding Q2 and Q3 2020
East Midlands	estimate +/- 3.0%
East of England	estimate +/- 0.8%
London	estimate +/- 2.6%
North East	estimate +/- 1.9%
North West	estimate +/- 1.5%
Northern Ireland	estimate +/- 1.7%
Scotland	estimate +/- 1.0%
South East	estimate +/- 1.7%
South West	estimate +/- 1.7%
Wales	estimate +/- 1.3%
West Midlands	estimate +/- 2.0%
Yorkshire and The Humber	estimate +/- 2.2%

Source: Office for National Statistics

8 . Strengths and limitations

Strengths

Timeliness

The model-based estimates of quarterly regional gross domestic product (GDP) are available to approximately the same timetable as the release of the UK first estimate of GDP from published data sources of mixed frequencies. Regional economic activity, by gross domestic product is published annually. More recently, since September 2019, the GDP, UK regions and countries is published quarterly. However, there still remains a delay on publication of sub-national estimates because of the data sources being less timely compared with UK estimates of gross value added (GVA).

Peer reviewed

The model has been peer reviewed as part of the Economic Statistics Centre of Excellence (ESCoE) process and methodologists at the Office for National Statistics (ONS) were involved at various stages of the project and publications.

Performance

The model will continue to be evaluated against our existing predominately Value Added Tax (VAT) based GDP, UK regions and countries estimates.

Limitations

The main limitation that applies to modelling in general, and is not exclusive to this model, is mainly seen during times of economic uncertainty and extreme values. This applies to the periods of the coronavirus (COVID-19) pandemic.

Further detail on strengths and limitations can be found in the paper Model-based estimates of regional GVA: an overview .

9 . Related links

Model-based estimates of gross value added: an overview
Article| Released 8 October 2021
Provides an overview of the econometric model used for producing the estimates, the research and model for which were produced as part of the Economic Centre of Excellence (ESCoE) Research Project, Regional Nowcasting in the UK. A comparison of regional historical modelled estimates of GVA with the existing, predominately VAT-based, Office for National Statistics (ONS) estimates for quarterly UK regions and countries publication is also presented in this article.