Office for National Statistics

Article

GDP revisions in Blue Book: 2024

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1 . Main points

- We maintain a transparent approach in showing revisions to UK gross domestic product (GDP) estimates by publishing real-time estimates of GDP, alongside our data vintages, and by providing a timely assessment of these revisions.
- The mean absolute revision (MAR) to quarterly GDP from Quarter 1 (Jan to Mar) 2020 to Quarter 2 (Apr to June) 2024 in Blue Book 2024 was slightly smaller than in recent Blue Books.
- There is some evidence that revisions are marginally statistically significant when looking at the final quarterly estimate of GDP across the entire time span from Quarter 2 1961 to Quarter 4 (Oct to Dec) 2021 compared with first estimates.
- The period from Quarter 1 2010 to Quarter 4 2019, before the coronavirus (COVID-19) pandemic, does not show statistically significant revisions, but initial revisions have been larger through the pandemic period.
- Reflecting the higher levels of data uncertainty as the UK economy emerged from the coronavirus pandemic, revisions to annual GDP estimates were proportionally larger in 2022 than we saw historically before the pandemic period.
- We have now started publishing revisions triangles for both GDP per head of population and the Household Saving ratio, and this article spotlights some of the changes in these areas.
- This article also provides an update to the work we are undertaking in response to the Office for Statistics Regulation (OSR) report on Revisions of estimates of UK Gross Domestic Product (GDP).

2 . Overview of GDP revisions

There is a trade-off between the timeliness and accuracy of estimates of gross domestic product (GDP). As additional information becomes available, we have a more complete picture of economic activity in that period. This compilation cycle can take up to three years and naturally leads to revisions in our estimates of GDP. Our article on Why GDP figures are revised gives more details. We also introduce major methodological improvements during the annual Blue Book process to ensure that changes are implemented in a consistent and co-ordinated way.

We can analyse revisions to our GDP estimates using three internationally recognised approaches, as outlined in the Organisation for Economic Co-operation and Development's (OECD's) Revisions in quarterly GDP of OECD and key partner countries update (PDF 5.2MB). These are:

- the mean revision (MR), which shows whether there is a systematic tendency for initial estimates to be revised upwards or downwards
- the mean absolute revision (MAR), which measures the absolute size of revisions so that upward revisions are not offset by downward revisions of the same magnitude
- the relative mean absolute revision (RMAR), which incorporates the size of the initial estimate in relation to the revision, as a large revision on a very large initial growth rate can have less of an impact than a large revision to a very small initial growth rate

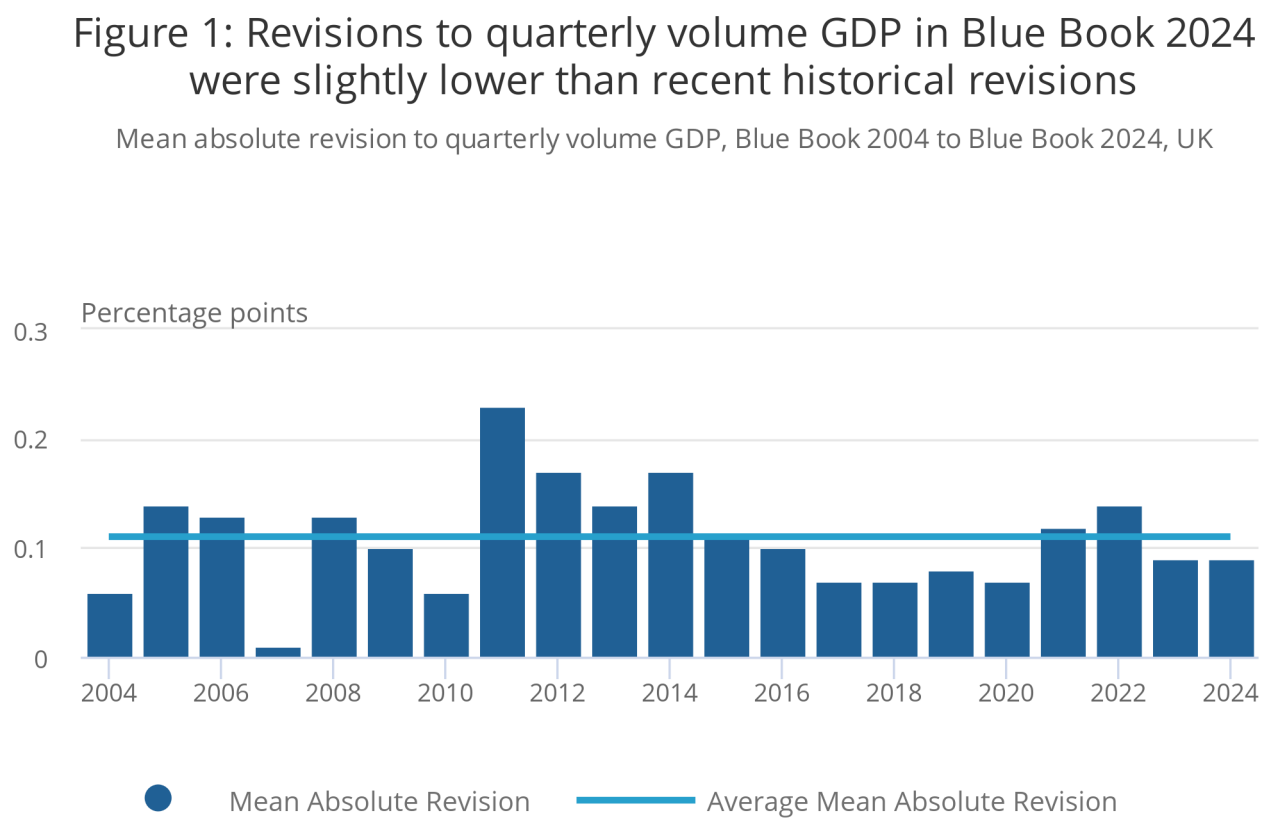
This article analyses the revisions to our quarterly GDP estimates that were published inour Blue Book 2024 publication in October 2024.

3 . Revisions in Blue Book 2024

Figure 1 shows the revisions to estimates of the quarterly change in real gross domestic product as part of implementing our Annual National Accounts. This figure would typically be an appropriate proxy of the impact of the revisions in a Blue Book, provided there was a similar revision to the change in GDP for all periods. Blue Books 2022 and 2023 saw higher revisions during the coronavirus (COVID-19) pandemic period of 2020 and 2021 reflecting the expected higher levels of data uncertainty. Blue Book 2024 sees very little revision to 2020 and 2021 with larger revisions in the 2022 pandemic recovery period, which has been fully balanced for the first time. For example, the mean revision (MR) over the period from Quarter 1 (Jan to Mar) 2020 to Quarter 4 (Oct to Dec) 2024 (the period open to revision in Blue Book 2024) on this basis was 0.05 percentage points in Blue Book 2024, while the MAR was 0.09 percentage points. The MR being so close to zero in this period reflects a mixture of offsetting upwards and downward revisions with ten quarters being downwardly revised and eight being upwardly revised.

Figure 1: Revisions to quarterly volume GDP in Blue Book 2024 were slightly lower than recent historical revisions

Mean absolute revision to quarterly volume GDP, Blue Book 2004 to Blue Book 2024, UK



Source: GDP revisions in Blue Book: 2024 from the Office for National Statistics

Notes:

1. The revisions in each Blue Book relate to the period from Quarter 1 (Jan to Mar) 1997 to the latest quarter available in that publication. For example, the Blue Book 2024 revisions reflect those between the August 2024 and September 2024 vintages of quarterly estimates of volume GDP - this includes up to Quarter 2 (Apr to June) 2024.

2. The x-axis refers to that Blue Book publication, reflecting the mean absolute revision (MAR) to quarterly volume estimates of GDP from Quarter 1 1997 onwards. Blue Book 2024 is an exception as there was not a fully open revisions period as part of this update of the UK National Accounts. The MAR only covers the period from Quarter 1 2020 to Quarter 1 2024.

We can use our GDP estimates to provide timely snapshots of quarterly GDP, which enable us to compare how a first estimate of quarterly GDP compares with one that is published months later. Our focus is on those estimates published 3, 24 and 36 months after the first estimate of quarterly GDP, reflecting the three-year production cycle of UK GDP.

Table 1 shows there is a zero-mean revision (MR) at t plus 3 months over the period Quarter 2 (Apr to June) 1961 to Quarter 4 2021, implying that there is no tendency for the first estimate to be revised up or down. However, the size of revisions has not been constant over time, where revisions have tended to be larger in earlier periods and around turning points in the economy, where uncertainty is likely to be more pronounced. Table 1 shows that the MR is a little higher when comparing the first published quarterly estimate with the estimate published three years later. This analysis continues to show that while initial revisions (t plus 3 months) are not statistically significant, those revisions that tend to reflect the SUTs balancing process (t plus 36 months) are marginally statistically significant over the full span.

Table 1: Revision analysis differs over time when selected time spans are considered, some spans show statistically significant revisions at the final quarterly estimate of GDP
Revision information and t-test for statistical significance for quarterly GDP growth, UK, Quarter 2 (Apr to June) 1961 to Quarter 4 (Oct to Dec) 2021

	T+3 months				T+36 months			
Timespan	**Mean Revision (pp)**	**Mean Absolute Revision (pp)**	**T Score 2**	**Statistically Significant?**	**Mean Revision (pp)**	**Mean Absolute Revision (pp)**	**T Score 2**	**Statistically Significant?**
1961 Q2 to 2021 Q4 1	0.0	0.2	1.9	No	0.1	0.5	2.5	Yes
1961 Q2 to 1969 Q4 1					0.1	0.8	0.4	No
1970 Q1 to 1979 Q4 1					0.3	1.0	1.3	No
1980 Q1 to 1989 Q4	0.1	0.3	1.6	No	0.2	0.7	1.4	No
1990 Q1 to 1999 Q4	0.0	0.1	0.4	No	0.1	0.2	2.6	Yes
2000 Q1 to 2009 Q4	0.0	0.1	0.2	No	0.0	0.3	0.0	No
2010 Q1 to 2019 Q4	0.0	0.1	1.6	No	0.1	0.2	1.8	No
2020 Q1 to 2021 Q4	0.2	0.4	1.9	No	0.5	0.9	1.6	No

Source: GDP revisions in Blue Book: 2024 from the Office for National Statistics

Notes

1. Because of the compilation process at the time t plus three months has no revisions pre-1980.

2. Two tailed standard significance test at 95% confidence interval.

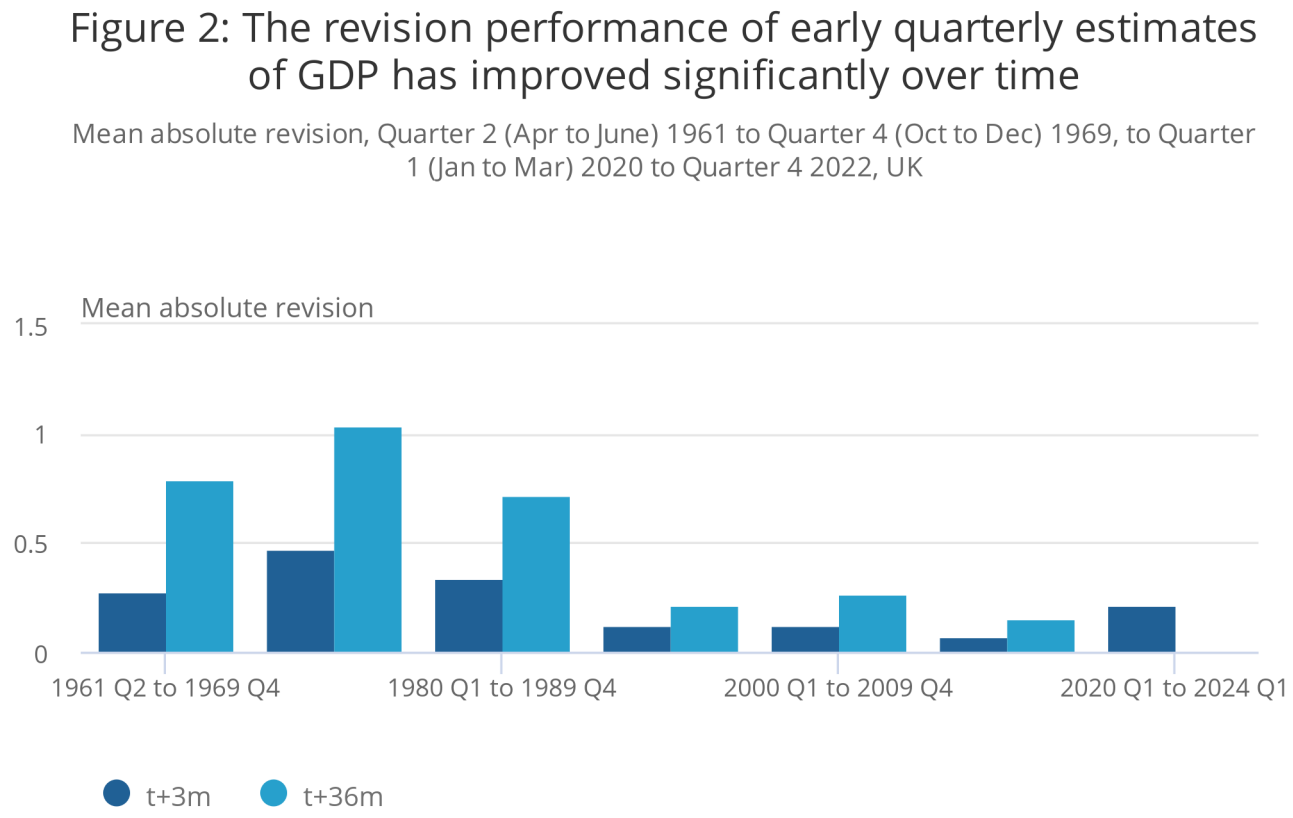
3. We do not have a t plus 36 months estimate yet for Quarter 3 (July to Sept) 2021 and Quarter 4 2021. However, our revisions policy is such that these current estimates will not be revised before we get to the t plus 36 months stage, so this has been inferred for these purposes. These have gone through two supply and use tables balancing processes, which is the basis of the "final" estimate being chosen.

4. The significance test for the period from Quarter 1 (Jan to Mar) 2020 to Quarter 4 2021 may not contain sufficient data points to be reliable at this stage.

The quality of early quarterly estimates has improved substantially over time (Figure 2). There have been improvements to the measurement of GDP with improved data coverage from both surveys and administrative data sources, as well as a lower degree of volatility in the UK economy, although the pandemic has proven to be an exception. Figure 2 shows that the MAR is larger at the three-year horizon for each of the last six decades. As additional information becomes available, the revision increases between t plus 3 months and t plus 36 months, although there are other revision points on the way to t plus 36 months. These include the first annual dataset in the quarterly national accounts round in March each year, and the first supply and use balance at t plus 24 months. However, the MAR is less in recent periods, including a reduction between these MAR revisions as later data are incorporated. One likely explanation is that these revisions reflect theimpact of balancingour full range of information in a supply and use (SUTs) framework for the first time and methodological improvements, which cannot be anticipated at the time of the first estimate.

Figure 2: The revision performance of early quarterly estimates of GDP has improved significantly over time

Mean absolute revision, Quarter 2 (Apr to June) 1961 to Quarter 4 (Oct to Dec) 1969, to Quarter 1 (Jan to Mar) 2020 to Quarter 4 2022, UK



Source: GDP revisions in Blue Book: 2024 from the Office for National Statistics

Notes:

1. The period from Quarter 1 2020 onwards does not yet have sufficient periods for a reliable t plus 36 months picture to be presented.

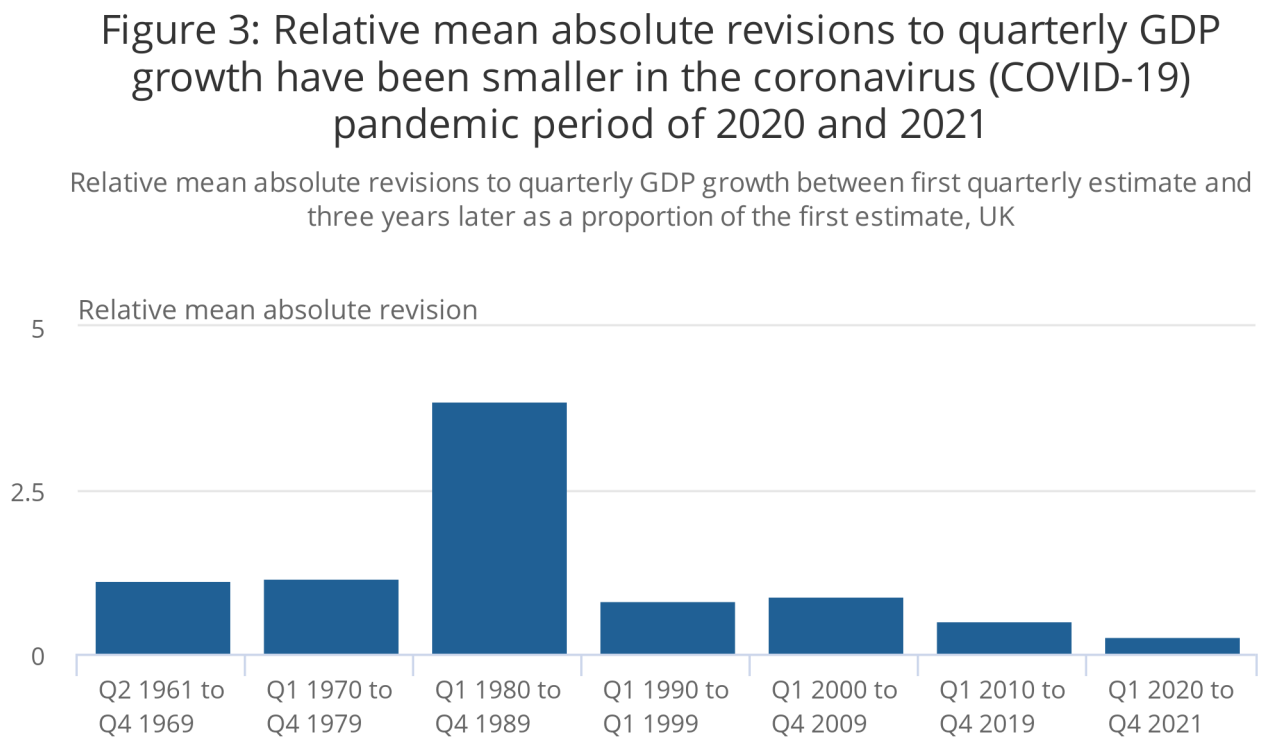
For the first time, we have included a separate revisions analysis for the period Quarter 1 (Jan to Mar) 2020 to Quarter 1 2024 on a t plus 3 month basis. There are not yet sufficient data points to include a t plus 36 month position for the latest periods. Figure 2 shows that the MAR is larger for this period, which includes the effects of the pandemic period. However, it is useful to consider the size of the change in quarterly GDP in looking at the revisions, given the exceptional impacts of the pandemic on the economy through 2020 and 2021.

In 2023 the Office for Statistics Regulation (OSR) published a report on the Revisions of estimates of UK Gross Domestic Product (GDP), which recommended looking at relative revisions as well as absolute revisions as "this contextualises the revision in the context of the growth rates, measuring the MAR in relation to the size of the growth rates".

Figure 3 shows how the relative mean absolute revision (RMAR) has varied through the same time periods, where we compare the revision between the first estimate and the "'final'" estimate three years later as a proportion of the first estimate. Figure 3 provides more context around the relative revision performance through the pandemic period of 2020 and 2021. These absolute revisions for these periods were larger (Figure 2), but Figure 3 implies that this in part reflected the size of the movements in GDP. The RMAR for 2020 and 2021 was not out of line with earlier time periods, once we consider how much the economy expanded or contracted. In fact they are less than a third of the size of the RMAR seen in the period Quarter 1 2000 to Quarter 4 2009, which included the 2008 to 2009 financial crisis.

Figure 3: Relative mean absolute revisions to quarterly GDP growth have been smaller in the coronavirus (COVID-19) pandemic period of 2020 and 2021

Relative mean absolute revisions to quarterly GDP growth between first quarterly estimate and three years later as a proportion of the first estimate, UK



Source: GDP revisions in Blue Book: 2024 from the Office for National Statistics

Notes:

1. We do not have a t plus 36 months estimate yet for Quarter 3 (July to Sept) 2021 and Quarter 4 (Oct to Dec) 2021. However, our revisions policy is such that these current estimates will not be revised before we get to the t plus 36 months stage, so this has been inferred for these purposes. These have gone through two supply and use tables balancing processes, which is the basis of the "final" estimate being chosen.

2. The relative mean absolute revision (RMAR) is recommended by the Office for Statistics Regulation as providing more context around the cyclical performance of revisions, specifically considering the size of the quarterly change in GDP as part of the revision between the first and "final" estimate.

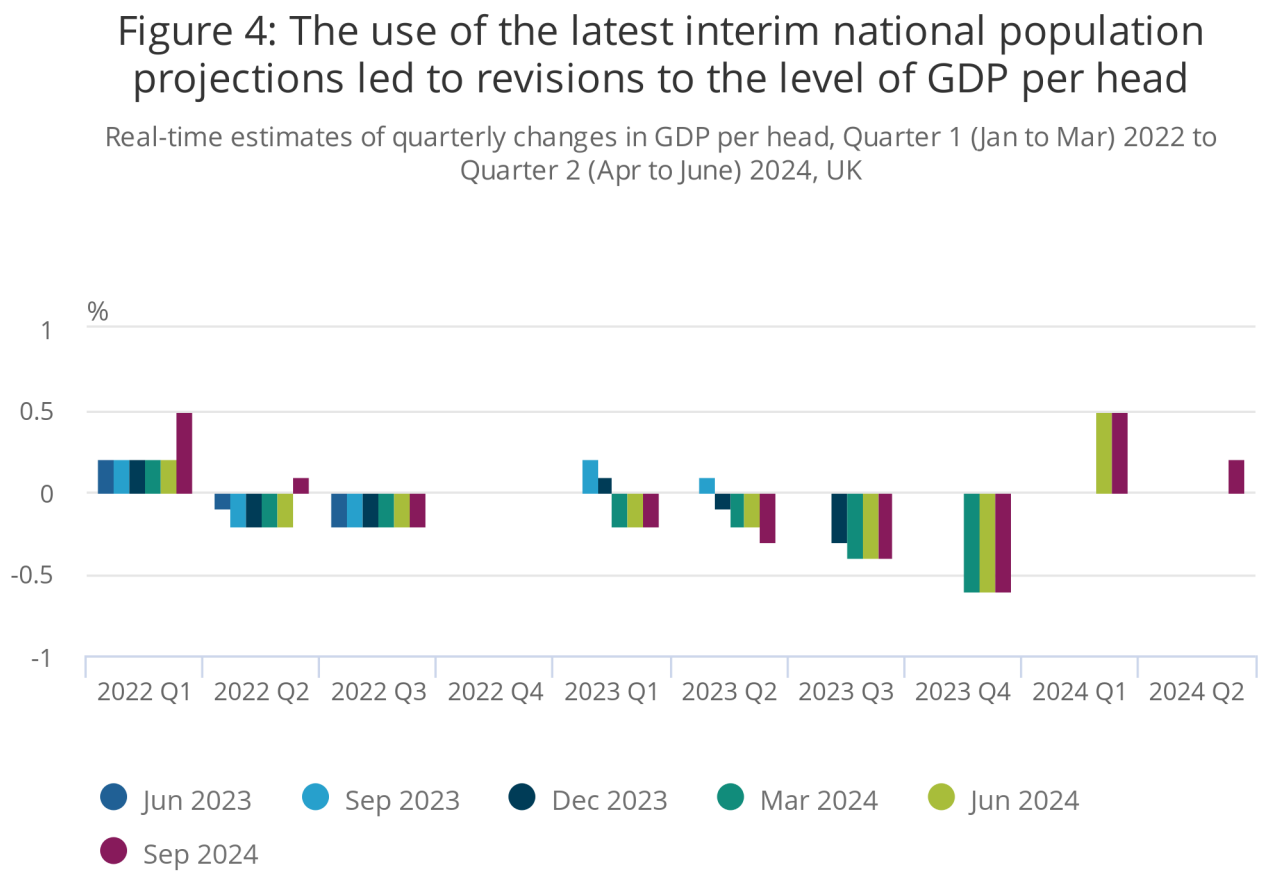
GDP per head is one indicator of economic welfare. There has been a slowing in the growth of this indicator in recent periods. Recent analysis, presented in our Trends in UK real GDP per head: 2022 to 2024 article, shows that the latest GDP estimates are around 3% above pre-pandemic levels, as of Quarter 2 2024. GDP per head is still slightly below its level from Quarter 4 2019. Estimates of GDP per head are subject to further uncertainty, reflecting that population estimates are also revised.

We typically release new mid-year population estimates annually, around one year after the reference period. This will replace previous population projections for that reference period in producing estimates of GDP per head, which will potentially lead to revisions for that year's estimates. For example, the latest estimates of GDP per head, up to and including 2022, are based on our mid-year population estimates, whereas estimates from 2023 to 2024 are based on our interim population projections that were published in early 2024. For GDP per head calculations, we will take on the newly published mid-year population estimates for 2023 as part of our next GDP revisions. National population projections are published biennially. These population projections are used where mid-year population estimates are not yet available. The projections will include any updated judgements around future fertility, migration, and mortality, which could lead to further revisions.

Our interim national population projections, published in early 2024, incorporated new information that showed higher net migration flows into the UK. This led to upward revisions to our estimates of the UK population, which would reduce the level of GDP per head, provided there were no other revisions. Figure 4 shows the revised 2023 profile of GDP per head as part of the March 2024 vintage.

Figure 4: The use of the latest interim national population projections led to revisions to the level of GDP per head

Real-time estimates of quarterly changes in GDP per head, Quarter 1 (Jan to Mar) 2022 to Quarter 2 (Apr to June) 2024, UK



Source: GDP revisions in Blue Book: 2024 from the Office for National Statistics

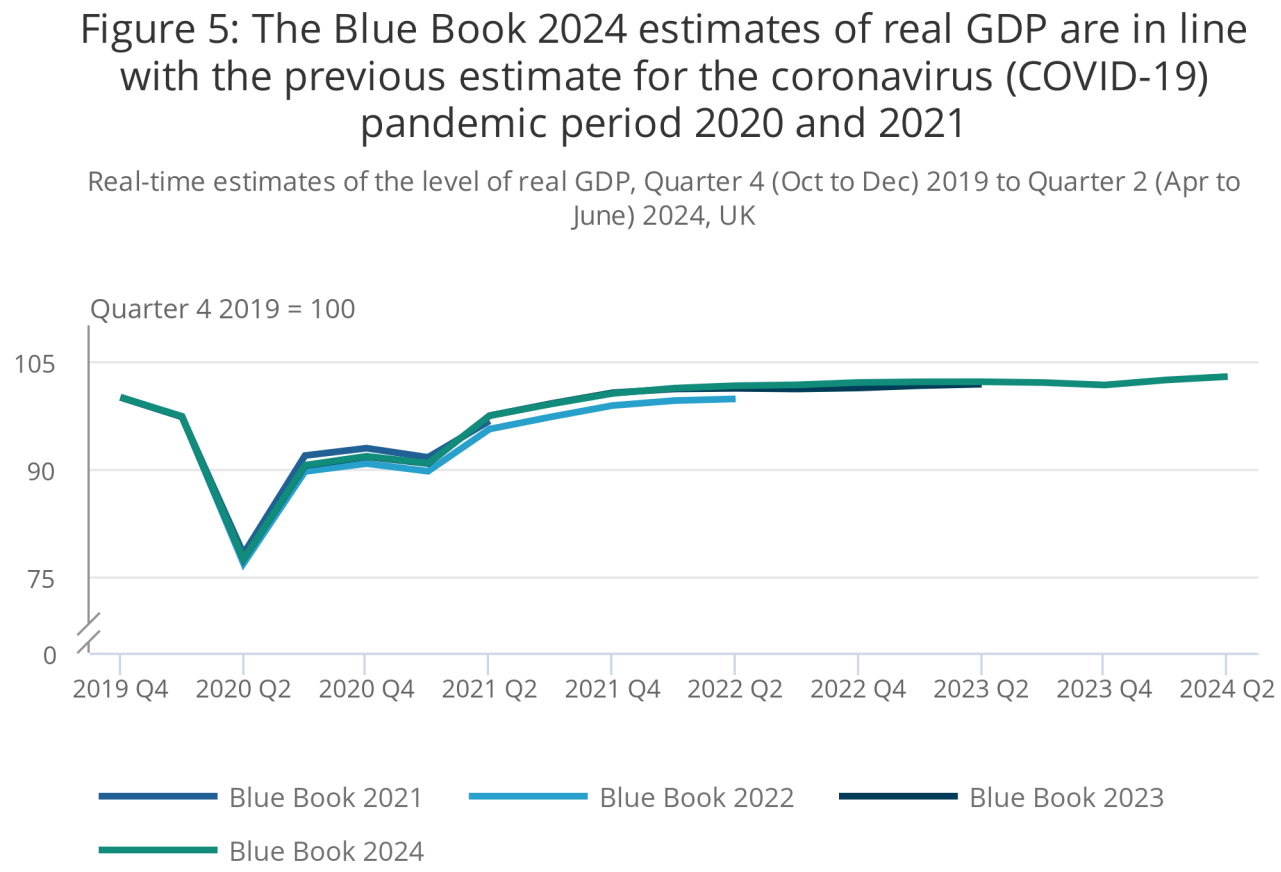
4 . Pre-pandemic versus pandemic revisions performance

Given the considerable impact of the coronavirus (COVID-19) pandemic on the economy, we highlighted uncertainty in our early estimates of gross domestic product (GDP) during 2020 and 2021, and the subsequent reopening of the economy in 2022. We have not been able to include the full effects of the pandemic in our revision analysis, as we do not yet have "final" (t plus 36 month) quarterly estimates of volume GDP for 2022. These will be available as part of the Blue Book 2025 publication.

Figure 5 shows the level of volume GDP in recent Blue Books, which shows how our understanding of the effects of the pandemic on the economy has evolved. This shows how there were some relatively large revisions to our estimates for 2020 and 2021, particularly in Blue Book 2022 and Blue Book 2023. In Blue Book 2024, the latest data have not changed the previous profile of real GDP through 2020 and 2021. However, there is now a stronger recovery in 2022, as the pandemic period ended in the UK. We now estimate real GDP to have increased by 4.8% in 2022, revised from the previous estimate of 4.3%.

Figure 5: The Blue Book 2024 estimates of real GDP are in line with the previous estimate for the coronavirus (COVID-19) pandemic period 2020 and 2021

Real-time estimates of the level of real GDP, Quarter 4 (Oct to Dec) 2019 to Quarter 2 (Apr to June) 2024, UK



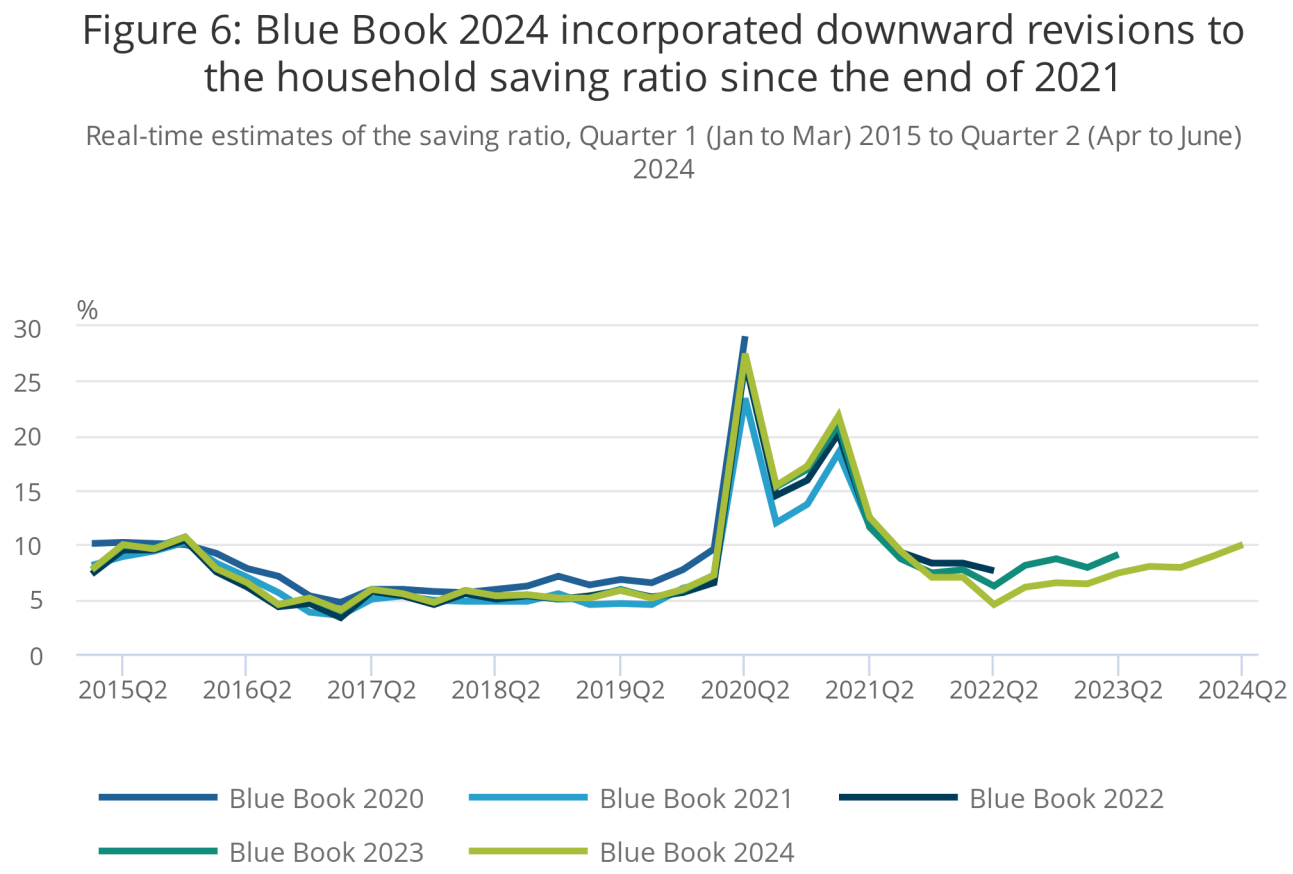
Source: GDP revisions in Blue Book: 2024 from the Office for National Statistics

One feature of the pandemic has been the impact on the household saving ratio, which is the proportion of the total resources of households that are saved rather than being used for consumption expenditure. Public health restrictions that were brought into effect contributed to a large increase in the saving ratio. These restrictions to consumption opportunities, and additional government support to disposable incomes, affected the accumulation of household saving.

Real-time estimates of the revisions seen in the saving ratio revisions triangle, released for the first time on 31 October 2024, enable us to compare how this picture of income, savings, and consumption has changed over time. Figure 6 shows that "forced" savings has been a phenomenon through the pandemic in each vintage, while real-time estimates also show that household savings has been elevated in more recent periods. In Blue Book 2024, we estimated that households were saving less in more recent periods, reflecting stronger consumption expenditure at this time.

Figure 6: Blue Book 2024 incorporated downward revisions to the household saving ratio since the end of 2021

Real-time estimates of the saving ratio, Quarter 1 (Jan to Mar) 2015 to Quarter 2 (Apr to June) 2024



Source: GDP revisions in Blue Book: 2024 from the Office for National Statistics

5 . Office for Statistics Regulation (OSR) review of GDP revisions – update to the ONS response

In November 2023 the Office for Statistics Regulation (OSR) published a report on Revisions of estimates of UK Gross Domestic Product (GDP). The report outlined eight requirements for improvement in the way we produce and communicate estimates of gross domestic product (GDP). Since the publication of the report, we have been taking steps to address the requirements it set out.

Requirements 1 to 4 focused on how the Office for National Statistics (ONS) should communicate uncertainty in the estimates, and in helping users to understand revisions. From December 2023 onwards, we have introduced new charts and surrounding commentary in our GDP releases. The publication date for this GDP revisions article has also been brought forward to coincide with the annual Blue Book publication. These developments were communicated in our update to OSR in January 2024.

Requirements 5 to 8 focused on minimising uncertainty in GDP by enhancing the data content for the three measures of GDP in the short-term estimates. This enables us to capture signals from various parts of the economy, which might otherwise be missed if we focus mainly on the output approach. While there will always be a trade-off between timeliness and accuracy in short-term estimates of GDP, we have developed an ambitious plan of work focused on improving the quality, data content and robustness of these estimates. The aim of this will be to improve the coherence between the three approaches to measuring GDP. Through this section, we outline the initial areas of focus for this work aligned to the three approaches to measuring GDP.

Output

Using data science techniques, we aim to make better use of a real-time administrative VAT dataset for monthly GDP estimates. We expect this to improve our revision performance of our first estimates of GDP. There are three opportunities we will explore.

The first is to use VAT real-time information, currently published as part of our Economic activity and social change in the UK, real-time indicators release, to supplement the VAT turnover data used in the compilation of gross domestic product output (GDP(O)). The aim will be to produce a timelier and more robust iteration of VAT turnover data to use within estimates of GDP(O). This will allow us to bring this data source into the compilation of these estimates sooner, helping to minimise revisions.

The second opportunity we will explore is to build on the findings from a 2021 research paper on using VAT expenditure data to estimate intermediate consumption (PDF, 1,637KB). Short-term estimates of UK GDP rely on the assumption that there are corresponding trends in turnover, output and intermediate consumption. Analysis of estimates that are subject to the supply and use balancing process has shown that, during less volatile economic periods the output to intermediate consumption relationship remains relatively stable. However, when there are economic shocks or turning points, such as the COVID-19 pandemic, this assumption is not always accurate. Changes in the output to intermediate consumption relationship become a substantial contributor to overall revisions. When intermediate consumption increases (relative to output), contributions to GDP growth tend to be revised down. On the other hand, when intermediate consumption decreases (relative to output), contributions to GDP growth tend to be revised up.

With access to the VAT real-time information, we aim to create a quality assurance dashboard showing short-term estimates of intermediate consumption derived from VAT expenditure to support the compilation and balancing of short-term GDP(O) estimates.

Further information on output to intermediate consumption ratios can be found in Section 11: Data sources and quality of our GDP quarterly national accounts, UK: April to June 2024 bulletin.

The third area we will explore is around closer working with other government departments to focus on data sharing. The later inclusion of intermediate consumption estimates in the government sector for health and education estimates was a main cause of revision in Blue Book 2021. For this reason, we will investigate earlier access to intermediate consumption patterns across government and the level of government activity to minimise uncertainty in early estimates of GDP.

In addition to using administrative sources, we have identified several specific areas where we can make targeted improvements to either current price series or deflators feeding into estimates of monthly GDP(O). For example, Service Producer Price Indices (SPPIs) are used as deflators for many of the industries within the services sector. SPPIs are measured quarterly, however measures of short-term GDP are produced monthly. We are analysing and reviewing methods for forecasting a monthly path until the next quarterly data point becomes available, with the aim of improving the monthly volume estimate of GDP. We will continue a rolling programme of targeted improvements to estimates of GDP(O).

Expenditure

The initial area of focus is around exploring the potential for using administrative data sources to either measure or supplement the measurement of quarterly household final consumption expenditure (HHFCE) (the largest component of the expenditure measure). The work we are doing will aim to reduce the size of balancing adjustments to the expenditure approach to measuring GDP.

The ONS has acquired access to administrative data showing UK consumer credit and debit cards spending, as well as supermarket scanner data, which is being used for the transformation of the Consumer Price Index (CPI). We will explore whether a tactical approach can be taken with these data to support the compilation of HHFCE estimates, using them in combination with existing data sources to assess and quality assure the growth in each period.

Longer-term work will focus on whether a more strategic approach to using these types of administrative sources can be found. This will mean focusing on methodological challenges such as mapping the data to classification of individual consumption according to purpose (COICOP), analysing and adjusting for market share, and assessing the reliability and robustness of these administrative data sources. This longer-term programme will seek to identify whether these administrative data sources can be used to inform the level of household expenditure, rather than only the growth rates in the latest periods.

Income

Large scale transformation to the ONS Labour Force Survey, along with the realisation of benefits from access to the HM Revenue and Customs (HMRC) Pay As You Earn (PAYE) Real Time Information (RTI) data will lead to improvements to earnings and employment estimates used within the Compensation of Employees element of the income approach to measuring quarterly GDP.

Alongside the review of GDP revisions, OSR have also conducted reviews of Private Non-Financial Corporations (PNFC) Gross Operating Surplus (GOS) and Business Investment in 2024. Requirements outlined in these reviews will realise benefits for the short-term estimates of these indicators, both of which feed into GDP. Furthermore, there are a number of planned improvements taking place across the compilation of national accounts, which will have a positive impact on short-term estimates of GDP.

Timeline

This is an ambitious programme of work targeting many components of the output, expenditure and income approaches to measuring GDP and will take a number of years to complete. As an indicative timeline, as we undertake these improvements, we will explore:

- the opportunity for using Value Added Tax (VAT) real-time information to supplement the VAT turnover data used in the compilation of GDP(O) in November 2024 to June 2025 (output measure)
- the opportunity for using VAT expenditure data to estimate intermediate consumption through 2025 (output measure)
- data sharing across government to improve early estimates of government output and intermediate consumption through 2025 (output measure)
- targeted industry improvements through rolling reviews in 2024 and 2025 (output measure)
- various alternative data sources to support and inform the compilation of HHFCE estimates from October 2024 onwards and through 2025 (expenditure measure)
- incorporating improvements from the Labour Force Survey (LFS) transformation and HMRC PAYE RTI data in CoE through 2025 and 2026 (income measure)

In driving this work forward, we have a great reliance on other government departments sharing their data with us and we will work closely with them to secure the timely and sustainable deliveries that are vital to make this a success.

While we are committed to all the improvements discussed, many will take time to research, test and analyse. We will communicate improvements through our regular statistical bulletins and articles, while continuing to share commentary around the data content, uncertainty, and revisions of our short-term GDP estimates. The improvements set out in this section will lay the foundations for feasibility work into whether it is possible to create fully supply-use balanced measures of GDP on a quarterly basis.

Presentation of GDP uncertainty

As part of the response to the OSR review we continue to consider ways to present the uncertainty around GDP early estimates.

Within the quarterly national accounts publications, we now include more text and charts on the weaknesses in the three approaches to measuring GDP in initial estimates. For example, figure 3 within the October to December (Q4) 2023 quarterly national accounts release. We have also implemented changes to help users understand the impact of revisions on the economic narrative of our statistics and especially on the lower-level components of GDP, which are often revised more than the aggregate GDP estimates. This includes signposting where data are considered provisional and describing the upcoming data changes for components of GDP. A blog with some further options for ways to present uncertainty around GDP early estimates will be published in early 2025.

6 . Future developments

Revisions are a natural part of statistical compilation and there is a balance between timeliness and accuracy, making the best use of the data available at the time.

We continue to publish full revisions performance information for gross domestic product (GDP) and its components in a timely and transparent way. In September 2024 we published our quarterly national accounts with a revisions triangle for GDP per head for the first time. On 31 October 2024, we published the first revisions triangles for the household saving ratio, real household disposable income (RHDI) and RHDI per head.

We have also made changes to the GDP outputs to highlight uncertainty in the latest estimates where it exists, including showing the annual position of the three approaches to measuring GDP alongside the average (headline) estimate. We will highlight this work further in a blog in early 2025.

Work in response to the Office for Statistics Regulation (OSR) review, as previously highlighted, will continue to develop the suite of GDP outputs to improve the early estimates of GDP using additional data where possible.

7 . Glossary

Gross domestic product (GDP)

A measure of the economic activity produced by a country. There are three approaches used to measure GDP:

- the output approach
- the expenditure approach
- the income approach

A more detailedglossary of terms used within the national accounts is available.

8 . Data sources and quality

More information about strengths and limitations of national accounts data used in the Blue Book can be found inour GDP Quality and Methodology Information.

9 . Related links

UK National Accounts, The Blue Book: 2024
Compendium | Released on 31 October 2024
National accounts statistics including national and sector accounts, industrial analyses, and environmental accounts.

10 . Cite this article

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