

Article

# Recent challenges of balancing the three approaches of GDP

The coronavirus (COVID-19) pandemic has led to challenges in the balancing of early estimates of GDP. We explain how this has been undertaken in real time in 2020 and 2021, and show how the balancing process has become more certain over time as updated information has become available.

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# 1 . Main points

- One of the recent challenges in compiling the UK National Accounts has been the anticipated heightened levels of data uncertainty, particularly in reconciling the three measures of output, income and expenditure.
- There was an unprecedented income alignment adjustment in the first estimate for Quarter 3 (July to Sept) 2020, while the alignment adjustments for income and expenditure were initially out of tolerance in Quarter 3 2021.
- As updated information has become available, it has become easier to reconcile the three estimates of gross domestic product (GDP), and so our alignment adjustments have naturally reduced.

## 2 . The challenge of uncertainty

Gross domestic product (GDP) can be measured by three different approaches - output, income, and expenditure - which we compile to produce our headline estimate of GDP, given the available data we have at that point in time. However, these need to be balanced to produce a single estimate of GDP, reflecting our best knowledge of the underlying information at that time. Our [article, Introducing a new publication model for GDP](#) explains this model in more detail.

One of the recent [practical challenges](#) in compiling the UK National Accounts has been the anticipated heightened levels of data uncertainty, particularly in reconciling the three measures of output, income and expenditure. By confronting the different estimates for each approach, uncertainty is reflected in how coherent the estimates are and how much "intervention" is required to balance the three measures so that there is one single estimate of GDP.

The coronavirus (COVID-19) pandemic has led to challenges in the balancing of early estimates of GDP. We explain how this has been undertaken in real time over the last 2 years - 2020 and 2021. We show how the balancing process has become more certain over time, as updated information has become available. We provide insights on the likely explanations for the challenges we have encountered and how these will be further resolved over the next 18 months as new and updated data become available.

## 3 . Balancing the three approaches of gross domestic product (GDP)

In the UK, we use the [Supply and Use Tables \(SUTs\) framework](#) as a basis for producing annual estimates of gross domestic product (GDP). We use comprehensive information to fully reconcile how the economy performs at a detailed 112 industry and 112 product level basis. The SUT process is completed on an annual basis around 18 to 24 months after the reference period. For example, estimates for 2020 will be fully balanced in September 2022. Once the SUT process is completed, these time periods are referred to as "balanced".

For those periods that have not yet been fully balanced, we use a transparent framework that enables us to manage this balancing process, where we apply adjustments to GDP components. These reflect their relative strengths and weaknesses and the information we have available at that time. This framework captures alignment adjustments and statistical discrepancies, for example, for those time periods that have not yet been balanced. This allows us to produce a reconciled estimate [note 1] of the three measures of GDP.

### Alignment adjustments

This has the purpose to adjust the quarterly paths of income and expenditure measures, so that it reflects the path of the output measure for the latest two quarters. We consider our output measure to be the lead estimate of the change in GDP in the latest quarters, reflecting the larger data content for this measure --- you can find out more in [our GDP\(o\) data sources catalogue dataset](#). In earlier quarters, these alignment adjustments [note 2] help to bring the quarterly change in expenditure and income into a target range compared with our average measure of GDP.



## Statistical discrepancies

There can be small discrepancies in the annual levels of the three measures of GDP. It ensures that each approach to measuring GDP equals the average on an annual basis. As part of our compilation process, these differences are then apportioned across the four quarters to minimise the impact on quarterly GDP growth.

We are fully transparent in this reconciliation process in that we publish these adjustments [note 3]; we show the alignment adjustments and statistical discrepancies; and we explain when we are not in tolerance. Our alignment adjustments have a tolerance target of approximately £3 billion per quarter - around 0.5% of the level of quarterly GDP. This ensures we place more emphasis on the balancing process taking place through the data confrontation of output, income and expenditure components, and which is subject to our best collective judgement, reflecting the information we have available at that time.

However, this tolerance target might be exceeded when it is proving to be particularly challenging to achieve a balance. Our standard practice is to prefer that the alignment adjustment be out of tolerance rather than over-adjust individual GDP components to achieve a balance. This is most likely to occur in the latest quarter where the constraints are larger, where we must align to the output estimate for that change in GDP, and where the data content is at its lowest.

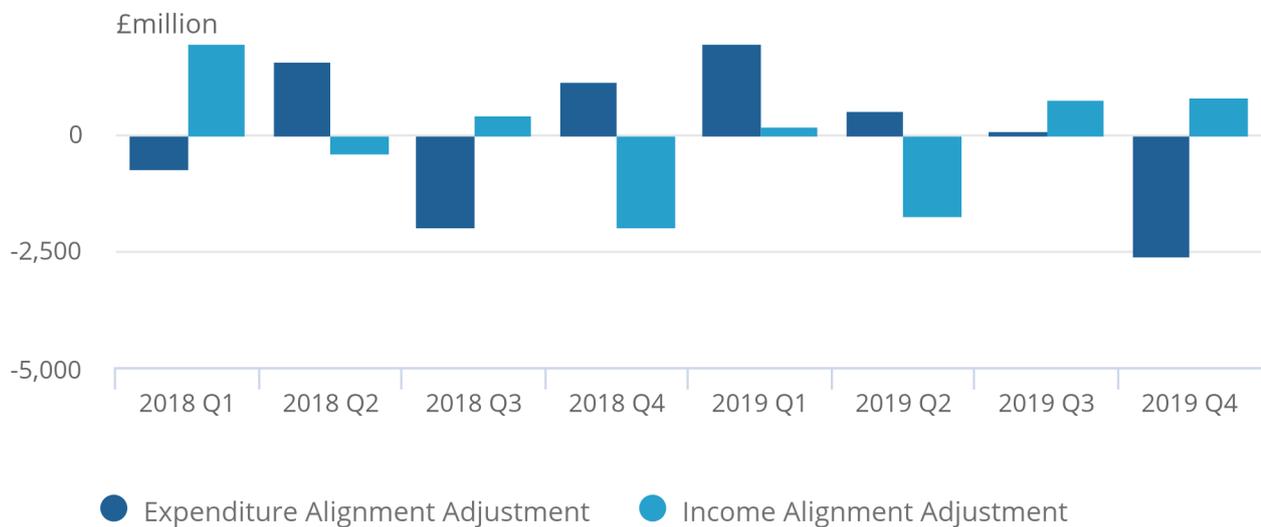
Figure 1 shows a "typical" picture for the alignment adjustment position prior to the coronavirus (COVID-19) pandemic. For illustrative purposes, this is taken from [March 2020](#), in which the open period refers to Quarter 1 (Jan to Mar) 2018 to Quarter 4 (Oct to Dec) 2019. This shows that the annual position for the income and expenditure alignment adjustments sum to zero, so there is minimal impact on the annual change in GDP. In 2018, the income and expenditure alignment adjustments are positive in two quarters and negative in two quarters. These also have the opposite sign in every quarter. In 2019, there is a different picture to the quarterly profile of alignment adjustments. There are three positive quarters for the income and expenditure alignment adjustments, which is entirely offset by one large negative quarter. There are also quarters in which these alignment adjustments are of the same sign. This position is also a common position to see in an annual set of alignment adjustments.

## Figure 1: A “typical” pre-coronavirus pandemic balance in the quarterly national accounts

Alignment adjustments, Quarter 1 (Jan to Mar) 2018 to Quarter 4 (Oct to Dec) 2019

### Figure 1: A “typical” pre-coronavirus pandemic balance in the quarterly national accounts

Alignment adjustments, Quarter 1 (Jan to Mar) 2018 to Quarter 4 (Oct to Dec) 2019



Source: Office for National Statistics

#### Notes:

1. We align to our output measure in the latest two quarters, so we have only included our expenditure and income alignment adjustments for ease.

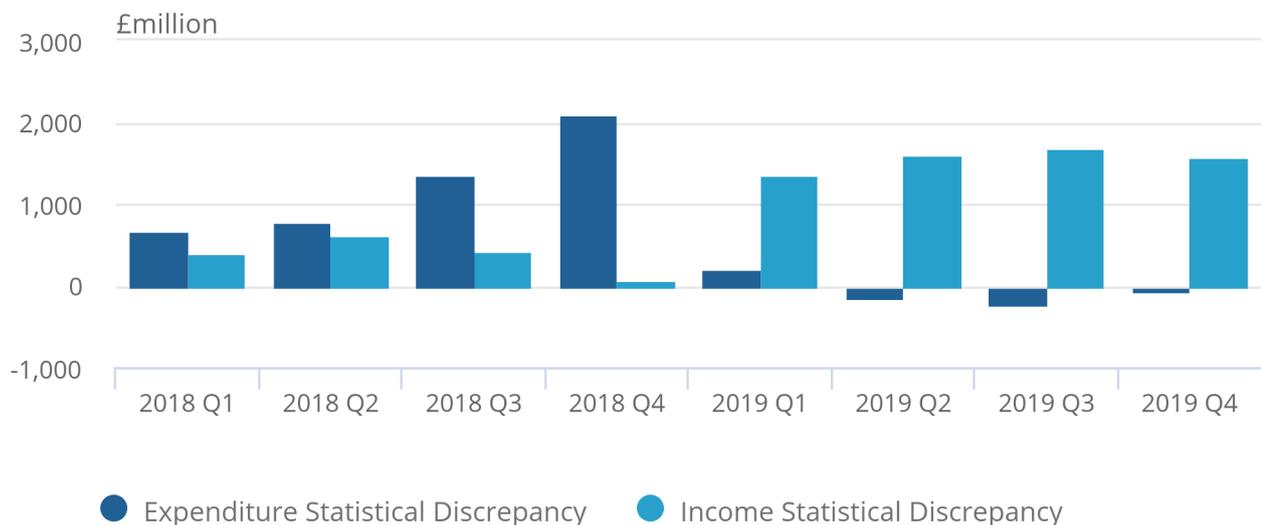
Figure 2 shows the statistical discrepancies taken from [March 2020](#). For 2018, income and expenditure are annually below the level of average GDP - that is, the output estimate of the level of GDP is above the level of average GDP. In this example, income receives relatively small positive statistical discrepancies applied to each quarter to bring it up to the average GDP level. The expenditure statistical discrepancies are larger - that is, it is further below the level of average GDP, which is why it needed larger adjustments. These profiles are relatively consistent between the quarters of 2018 to avoid influencing the quarterly path more than is necessary. There is a switch in 2019 as the level of income is further below the average level of GDP and needs a total of around £6 billion of a statistical discrepancy adjustment, which is applied relatively evenly across the four quarters. In contrast, the level of expenditure required very small statistical discrepancy adjustments.

## Figure 2: A “typical” pre-coronavirus pandemic balance in the quarterly national accounts

Statistical discrepancies, Quarter 1 (Jan to Mar) 2018 to Quarter 4 (Oct to Dec) 2019

### Figure 2: A “typical” pre-coronavirus pandemic balance in the quarterly national accounts

Statistical discrepancies, Quarter 1 (Jan to Mar) 2018 to Quarter 4 (Oct to Dec) 2019



Source: Office for National Statistics

#### Notes:

1. We align to our output measure in the latest two quarters, so we have only included our expenditure and income alignment adjustments for ease.

#### Notes for: Balancing the three approaches of gross domestic product (GDP)

1. There are also "coherence adjustments", which are applied to an individual component where there are concerns about the quality of the indicator. This reflects our best judgement of the level and change in that specific component. There are also balancing adjustments that are applied to individual components to help achieve a balance, which are explicitly published for transparency so that the effects of balancing are known - see "Reaching the gross domestic product balance".
2. These alignment adjustments are applied to the private non-financial corporations gross operating surplus and change in inventories. This is where accurate measurement is most challenging for income and expenditure respectively.
3. These adjustments to expenditure are available in Tables C1 and C2 of the first quarterly estimate and quarterly national accounts, while those for income are in Table D.

## 4 . Balancing the national accounts through the coronavirus (COVID-19) pandemic period

Figure 3 shows the first estimates of the alignment adjustment over the last 15 years. As additional data become available, the alignment adjustment that is needed is reviewed and updated, which can lead to revisions over time.

The magnitude of the first estimates highlights the extent of recent balancing challenges. These include the unprecedented income alignment adjustment in the third quarter of 2020 and where these alignment adjustments for income and expenditure are out of tolerance in Quarter 3 (July to Sept) 2021 [note 1]. By these recent historical standards, there has never been a higher level of uncertainty in this period as reflected in how the first balanced estimates of GDP have had to be reconciled.

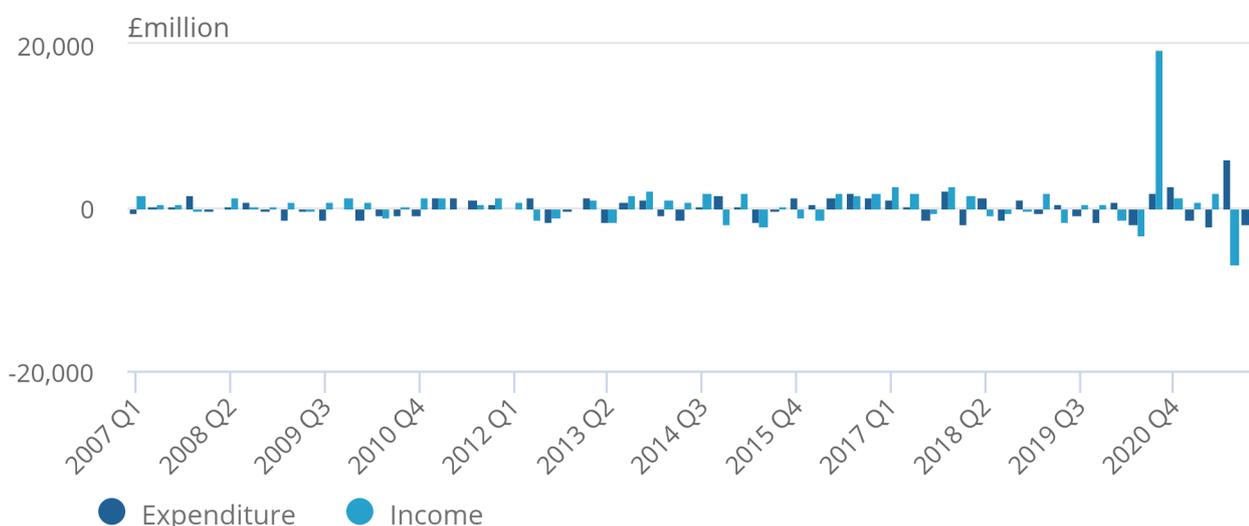
However, the latest estimates of these alignment adjustments highlight how these can be initially large but improve over time as we receive updated estimates. For example, the income alignment adjustment for Quarter 3 2020 was first recorded as £19.4 billion. However, when the estimates for the fourth quarter of that year were produced, this allowed an accurate statistical discrepancy to be profiled for income, and led to the alignment adjustments reducing and becoming annually neutral. The alignment adjustment is now in tolerance at £1.1 billion in [March 2022](#).

### Figure 3: There have been instances where the first estimates of the alignment adjustments have been out of tolerance over the coronavirus pandemic

First estimates of the alignment adjustment, Quarter 1 (Jan to Mar) 2007 to Quarter 4 (Oct to Dec) 2021

Figure 3: There have been instances where the first estimates of the alignment adjustments have been out of tolerance over the coronavirus pandemic

First estimates of the alignment adjustment, Quarter 1 (Jan to Mar) 2007 to Quarter 4 (Oct to Dec) 2021



Source: Office for National Statistics

Notes for: Balancing the national accounts through the coronavirus (COVID-19) pandemic period

1. More information is available on the [conceptual recording](#) of the Coronavirus Job Retention Scheme (CJRS) and the Self-Employment Income Support Scheme (SEISS) in the national accounts and some of the [practical considerations](#).

## 5 . The challenge of measuring income during the coronavirus (COVID-19) pandemic

In the November 2020 first quarterly estimate and the December 2020 quarterly national accounts, there were only three quarters of 2020 available at that time. Because of data uncertainty in this period, we decided to leave the alignment adjustment out of tolerance rather than try to forecast an annual figure for 2020. This would then have generated larger statistical discrepancies. This is shown by the profile of the alignment adjustments over time (Figure 4). These were initially large in Quarter 3 (July to Sept) 2020, although this allowed the statistical discrepancies to be smaller for this quarter (Figure 5).

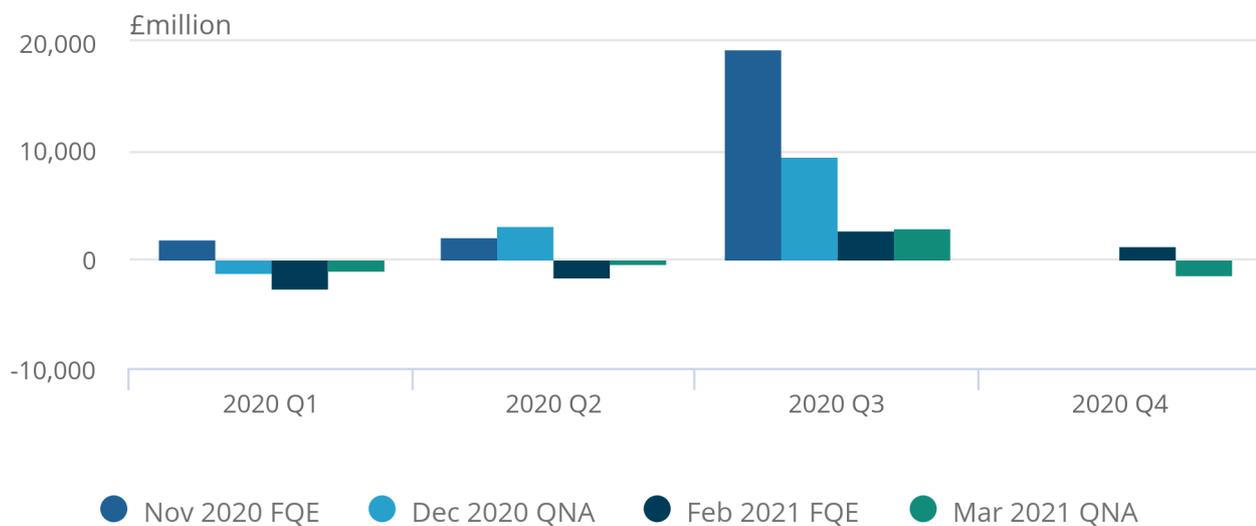
In the March 2021 quarterly national accounts, when the four quarters of 2020 were published in full, the income statistical discrepancy for 2020 was recorded as £18.3 billion. This was larger than at any point in the past. With the level of income now adjusted higher for 2020, the large alignment adjustment in Quarter 3 2020 was no longer needed (Figure 4).

**Figure 4: The income alignment adjustment was initially out of tolerance in the first estimate for Quarter 3 (July to Sept) 2020**

### Income alignment adjustments by quarter

Figure 4: The income alignment adjustment was initially out of tolerance in the first estimate for Quarter 3 (July to Sept) 2020

Income alignment adjustments by quarter



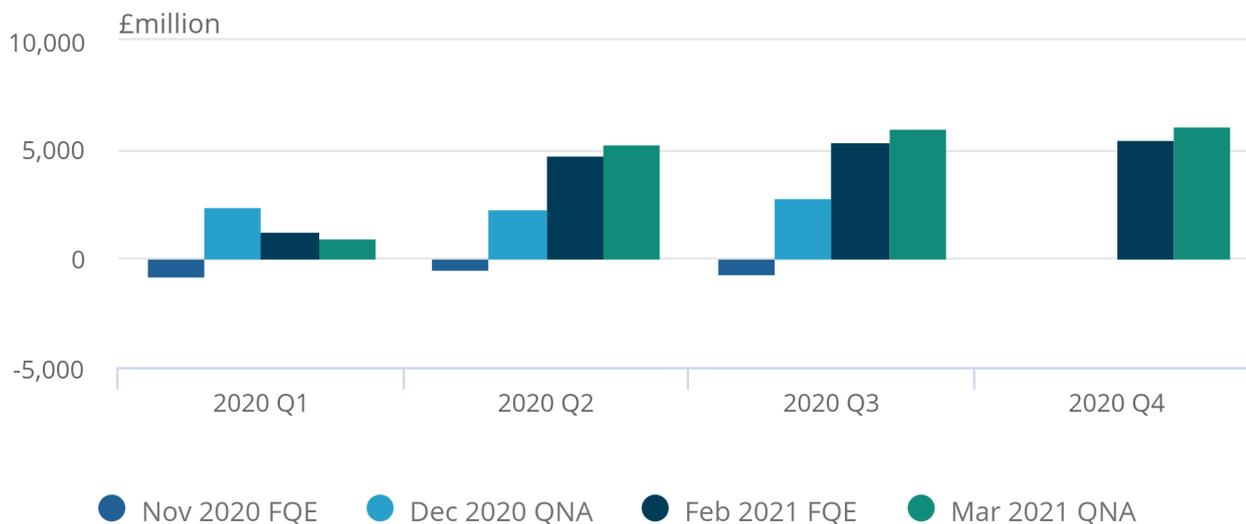
Source: Office for National Statistics

**Figure 5: As information for the full calendar year for 2020 became available, we were able to adjust the level on income through statistical discrepancies**

**Income statistical discrepancy by quarter**

Figure 5: As information for the full calendar year for 2020 became available, we were able to adjust the level on income through statistical discrepancies

Income statistical discrepancy by quarter



**Source: Office for National Statistics**

The relatively low level of income seen in [March 2021](#) reflected the uncertainty in the estimates of the income approach. In particular, there were challenges on the measurement of government interventions like the Coronavirus Job Retention Scheme (CJRS) and the Self-Employment Income Support Scheme (SEISS). There were also challenges around the interaction of these schemes with other components of Income. Figure 5 shows how the income statistical discrepancy was profiled to be small in Quarter 1 (Jan to Mar) 2020, which then increased into Quarter 2 (Apr to June) 2020, reflecting the height of the impacts of the coronavirus pandemic, where uncertainty was at its highest.

The statistical discrepancy could have remained at this record level until it was fully balanced in the annual Supply and Use Tables (SUTs) Framework in Blue Book 2022, which will be published in September 2022. However, further data updates in the income and expenditure approaches as well as revisions to the gross domestic product (GDP) implied deflator have reduced the size of the statistical discrepancy, and at an earlier timeframe.

We have also extended the standard revisions window in the latest quarterly national accounts so that it covers 2020 and 2021, as part of working through this challenge of uncertainty. We have exceptionally allowed the whole of 2020 to be open to revision so we can take on new information. The latest estimates based on the income approach are now closer to average GDP in 2020.

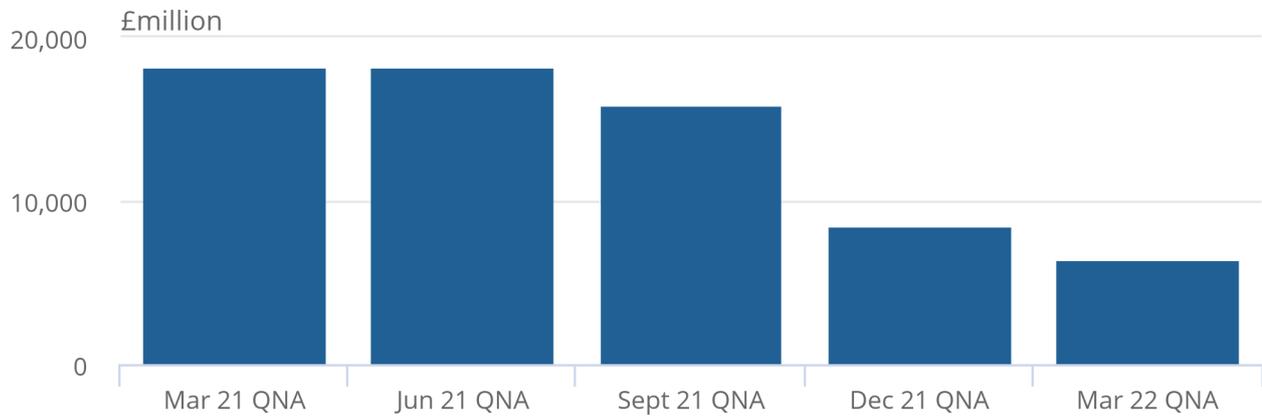
As of [March 2022](#), the income statistical discrepancy now stands at £6.4 billion for 2020 (Figure 6). This will be reduced to zero as part of the SUT balancing approach that we will achieve as part of Blue Book 2022, which will be published in September 2022. This will enable us to use more complete information across the three approaches that are used to balance GDP, as well as some extra detailed information we have requested on CJRS and SEISS by industry from HM Revenue and Customs.

**Figure 6: The income statistical discrepancy for 2020 has reduced over time**

Real-time estimates of the income statistical discrepancy

Figure 6: The income statistical discrepancy for 2020 has reduced over time

Real-time estimates of the income statistical discrepancy



Source: Office for National Statistics

## 6 . Recent challenges of balancing the three approaches of GDP data

### [GDP - data tables](#)

Dataset | Released 31 March 2022

Annual and quarterly data for UK gross domestic product (GDP) estimates, in chained volume measures and current market prices.

### [GDP in chained volume measures - real-time database \(ABMI\)](#)

Dataset | Released 31 March 2022

Quarterly levels for UK gross domestic product (GDP) at current market prices.

### [GDP at current prices - real-time database \(YBHA\)](#)

Dataset | Released 31 March 2022

Quarterly levels for UK gross domestic product (GDP) at current market prices.

### [GDP expenditure components - real-time database](#)

Dataset | Released 31 March 2022

Quarterly levels for UK gross domestic product (GDP) expenditure components, in chained volume measures at market prices.

### [GDP income components - real-time database](#)

Dataset | Released 31 March 2022

Quarterly levels for UK gross domestic product (GDP) income components at current market prices.

## 7 . Glossary

### Gross domestic product (GDP)

A measure of the economic activity produced by a country or region. GDP growth is the main indicator of economic performance. There are three approaches used to measure GDP:

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

### Alignment adjustments

This has the purpose to adjust the quarterly paths of income and expenditure measures, so that it reflects the path of the output measure for the latest two quarters. In earlier quarters, these alignment adjustments help to bring the quarterly change in expenditure and income into a target range, compared with our average measure of GDP.

### Statistical discrepancies

There can be small discrepancies in the annual levels of the three measures of GDP. It ensures that each approach to measuring GDP equals the average on an annual basis.

## 8 . Future developments

Heightened levels of uncertainty since 2020 have led to increased challenge in producing balanced estimates of the three measures of gross domestic product (GDP). This has been reflected in the real-time estimates of GDP to which we need to apply alignment adjustments to balance the quarterly changes in GDP, and also statistical discrepancies to ensure we achieve a balance in the levels of our three GDP estimates.

As updated information has become available, it has become easier to reconcile the three estimates of GDP, and so our alignment adjustments have naturally reduced. This has been reflected in revisions to our estimates of the output, income and/or expenditure approaches over time. However, it might not be until Blue Book 2022 (September 2022) where we have a clearer position, given that this is when we will have more complete annual survey and administrative information covering 2020. This is where our datasets have been fully balanced through our comprehensive SUT framework and it allows us to investigate the underlying reasons for these initial imbalances at this lower level.

We remain committed to being transparent in our communications around any balancing challenges, as we have been over the last two years.

## 9 . Related links

[Coronavirus \(COVID-19\) latest data and analysis](#)

Web page | Updated as and when data are available

Latest data and analysis on coronavirus (COVID-19) in the UK and its effect on the economy and society.

[GDP quarterly national accounts, UK: October to December 2021](#)

Bulletin | Released 31 March 2022

Revised quarterly estimate of gross domestic product (GDP) for the UK. Uses additional data to provide a more precise indication of economic growth than the first estimate.