

# Gross domestic product (GDP) QMI

Quality and Methodology Information for gross domestic product (GDP), detailing the strengths and limitations of the data, methods used and data uses and users.

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# 1 . Output information

- National Statistics: yes
- Frequency: monthly, quarterly and annual
- How compiled: sample-based surveys and administrative source; further information on surveys and administrative sources can be found in [Methods used to produce gross domestic product \(GDP\) data](#)
- Geographic coverage: UK
- Last revised: 8 April 2022

## 2 . About this Quality and Methodology Information report

This quality and methodology report contains information on the quality characteristics of the data (including the European Statistical System five dimensions of quality) as well as the methods used to create it.

The information in this report will help you to:

- understand the strengths and limitations of the data
- learn about existing uses and users of the data
- understand the methods used to create the data
- help you to decide suitable uses for the data
- reduce the risk of misusing data

## 3 . Important points

- Gross domestic product (GDP) measures total domestic economic activity.
- GDP estimates use three approaches: output, expenditure and income.
- Data for GDP estimates are sourced from survey and administrative sources, which are used in the compilation of individual components of GDP.
- Data are available and comparable on an annual basis dating back to 1948, on a quarterly basis dating back to 1955 and on a monthly basis dating back to 1997.

## 4 . Quality summary

### Overview

Gross domestic product (GDP) measures total domestic economic activity and can be measured in three different ways: the output approach, the expenditure approach and the income approach.

GDP estimates are produced monthly, quarterly and annually:

- the [GDP monthly estimate](#) consists of output data and is our most timely official estimate of economic growth
- there are two publication stages for the quarterly estimates: the [GDP first quarterly estimate](#), and the [quarterly national accounts](#); in addition to output data the quarterly estimates also include expenditure and income data to give a fuller picture of the UK economy
- annual GDP estimates are also published at two different stages: annual estimates are first available once all quarterly data for a given year is available in the quarterly national accounts; annual estimates are then available in the [UK National Accounts, The Blue Book](#), which is usually published in July or October each year (estimates published in the UK National Accounts, The Blue Book are subject to a process of annual reconciliation)

Further information on GDP and the three approaches can be found in the [National accounts methodology](#) and [UK national accounts - a guide](#).

## Uses and users

The UK national accounts provide the basis for analysing the economic performance of the country and are used throughout business and research communities, education, media and the general public. The accounts are major inputs to [Her Majesty's Treasury \(HMT\)](#) and [Bank of England](#) decisions on fiscal and monetary policy and the forecasts produced by the [Office for Budget Responsibility \(OBR\)](#).

## Recent improvements

As part of The Blue Book September 2021 (BB21), major changes from the national accounts' improvement project were implemented.

### Improved current price data

Expanding the supply and use table (SUT) framework to current price and volume has led to more coherent estimates on industry-level gross value added (GVA); industry-level current price annual estimates from within the SUT framework are now richer than those that historically fed our industry short-term volume estimates.

### Double deflation

[Double deflation](#) is widely recognised as the best approach to producing volume estimates of GVA - that is, output minus intermediate consumption.

Under double deflation, for every industry, the current price estimate of its output is deflated by a price index for output and the current price estimate of its inputs is deflated by an input price index. Previously, a single deflator was applied to both intermediate consumption and output and could often lead to a [bias in industry-level estimates of volume GVA](#). The quality of some deflators was also improved, including telecommunication services and clothing deflators.

### Reconciliation of volume estimates in the SUT framework

Prior to the implementation of double deflation, the SUT framework was only used for balancing current price estimates. Volume measures of GDP were calculated by aligning single deflated production and income measures towards expenditure. Since the extension of these volume measures and implementation of double deflation, this has meant that the expenditure and production estimates are now confronted at a lower industry and product level than previously used.

Further information is available on [specific impacts by industry](#), and [the changes in Blue Book 2021](#).

Notable improvements prior to BB21 include [the new publication model for GDP](#) (2018), and the [Annual Purchases Survey](#) (2015).

## 5 . Quality characteristics of GDP data

The following subsections provide a range of information that describe the quality and characteristics of gross domestic product (GDP) data and identifies issues that should be noted when using the output.

### Relevance

The degree to which statistical outputs meet users' needs.

The UK National Accounts are compiled in accordance with the [European System of Accounts 2010](#) (ESA 2010), under EU law. ESA 2010 is itself consistent with the standards set out in the [United Nations System of National Accounts 2008](#) (SNA 2008). Significantly, [gross national income](#) (GNI), partially derived from the GDP estimates, will continue to determine the UK contributions to the EU budget until estimates for 2020 are produced.

The national accounts cover the UK, with two quarterly estimates of GDP published each quarter alongside a monthly estimate of GDP.

The GDP monthly estimate, which is based on the output approach, is published around 40 days after the end of the reference month.

The GDP first quarterly estimate is published around six weeks after the end of the reference quarter containing output, expenditure and income data.

Around 13 weeks after the end of the reference quarter, the [quarterly national accounts](#) is published, which includes a full national accounts dataset with increased data content.

These estimates are again updated in the [UK National Accounts, The Blue Book](#), where a fully balanced dataset is published.

Regional components of the national estimates are available. These are model-based, or derived from surveys that do not give sufficient sample sizes at smaller areas for reliable estimates to be derived. We publish an annual statistical bulletin presenting [regional gross value added](#)(GVA) estimates for English regions, Scotland, Wales and Northern Ireland, which include component totals and industry group totals. [Experimental Statistics](#) for [GDP by region and country](#) are also produced using Value Added Tax (VAT) returns.

Data for GDP estimates are sourced from survey and administrative sources, which are used in the compilation of individual components of GDP.

### Accuracy and reliability

The degree of closeness between an estimate and the true value.

Some common pitfalls in interpreting data series are:

- expectations of accuracy and reliability in early estimates are often too high
- early estimates are based on incomplete data
- revisions are an inevitable consequence of the trade-off between timeliness and accuracy

Very few statistical revisions arise as a result of "errors" in the popular sense of the word. All estimates, by definition, are subject to statistical "error". In this context the word refers to the uncertainty inherent in any process or calculation that uses sampling, estimation or modelling. Most revisions reflect either the adoption of new statistical techniques or the incorporation of new information, which allows the statistical error of previous estimates to be reduced. Only rarely are there avoidable "errors" such as human or system failures and such mistakes are made quite clear when they do occur.

Unlike many short-term indicators that we publish, there is no simple way of measuring the accuracy of GDP. All estimates, by definition, are subject to [statistical uncertainty](#) and for many well-established statistics we measure and publish the [sampling error and non-sampling error](#) associated with the estimate, using this as an indicator of accuracy.

Since sampling is typically done to determine the characteristics of a whole population, the difference between the sample and population values is considered a sampling error. Non-sampling errors are a result of deviations from the true value that are not a function of the sample chosen, including various systematic errors and any other errors that are not because of sampling.

The estimate of GDP, however, is currently constructed from a wide variety of data sources, some of which are not based on random samples or do not have published sampling and non-sampling errors available. As such it is very difficult to measure both error aspects and their impact on GDP. While development work continues in this area, like all other G7 national statistical institutes, we do not publish a measure of the sampling error or non-sampling error associated with GDP.

One dimension of measuring accuracy is reliability, which is measured using evidence from analyses of revisions to assess the closeness of early estimates to subsequently estimated values. Many users try to minimise the impact of uncertainty by using the historical experience of revisions as a basis for estimating how confident they are in early releases and predicting how far and in what direction the early release might be revised. The estimate is subject to revisions as more data become available, but between the GDP first quarterly estimate and the quarterly national accounts, revisions are typically small (around 0.1 to 0.2 percentage points), with the frequency of upward and downward revisions broadly equal.

Revisions are an inevitable consequence of the trade-off between timeliness and accuracy. It is our role to produce the best possible estimate of GDP using all of the available information at that time. Therefore, the only way to avoid subsequent revisions to GDP as more information becomes available would be to either delay publication until all the relevant information has been received, which could be up to three years after the reference period, or to publish a first estimate and then ignore any subsequent new data and any methodological improvements. So, revisions should be treated as generally a good thing, as long as we document the reasons for them and communicate this to users.

The balance between necessary revisions and revisions for minor issues is achieved through a published [National Accounts Revisions Policy](#). The results of revisions analysis are regularly presented in the [GDP statistical bulletins](#) within the [revision triangles](#) and [real-time databases](#).

More information and analysis on the revisions to GDP can be found in [GDP revisions in Blue Book, 2020](#).

It is important to note that there are other aspects to accuracy, which revisions analysis cannot attempt to measure. A value can be reliable (as in not revised) without being accurate. Broader ways of examining accuracy are presented in [Accuracy assessment of National Accounts statistics \(2002\) \(PDF, 53.6KB\)](#). The article describes how basic "raw" data are transformed by a series of adjustments to give the statistical estimates that are used to compile the national accounts.

Accuracy of the short-term estimates of GDP growth can be affected by response rates to important surveys. If a lower response rate than normal is received then there is a decrease in the information base of the estimate in the short-term, and this may possibly lead to an increased chance of revisions in subsequent estimates of GDP.

[The Independent Review of UK Economic Statistics \(2016\)](#) (PDF, 5.13MB) provides a thorough discussion of accuracy and quality in economic statistics, as well as recommendations for future development.

We are continually working on the methodological changes to improve the accuracy of the national accounts.

The first improvement was the harmonisation of the deflators used across the accounts. The second was the replacement of Retail Prices Index (RPI) series with Consumer Prices Index (CPI) series in forming the deflators. For more information see [Deflation improvements in the UK National Accounts \(2011\) \(PDF, 176KB\)](#). Blue Book 2014 saw an introduction of the European System of Accounts 2010 (ESA 2010) and a series of articles were published explaining the [changes to national accounts](#). Blue Book 2021 implemented [double deflation](#) for the first time.

Accompanying each quarterly and annual production cycle, external quality assessors with particular areas of expertise are invited to challenge and report on the statistical and economic coherence of the headline national accounts and component dataset. Current assessors include HM Treasury, Bank of England, National Institute of Economic and Social Research, HM Revenue and Customs and Tax Administration Research Centre. The external quality assessors work to challenge the synergy of the dataset from a full range of views - those of producers, data compilers and users of the statistics - before final sign-off.

## Coherence and comparability

Coherence is the degree to which data that are derived from different sources or methods, but refer to the same topic, are similar. Comparability is the degree to which data can be compared over time and domain for example, geographic level.

Since international standards such as [System of National Accounts 2008](#) and [European System of Accounts 2010](#) are used in the production of the national accounts, the figures should be directly comparable with the accounts of other countries. However, the revisions policies of these countries should be examined before comparing data for back periods. Furthermore, during the coronavirus (COVID-19) pandemic, [methodological differences in the measurement of non-market output](#) have led to challenges in the [comparability of GDP between countries](#).

Data in the GDP statistical bulletins are consistent with our following outputs:

- [Index of Services](#)
- [Business investment](#)
- [Consumer trends](#)
- [Trade in goods \(part of the UK trade release\)](#)

The only inconsistencies occur when more timely monthly releases introduce revisions in advance of their incorporation into the later quarterly publications. For example, data are not always consistent with trade in goods as the [UK trade release](#) contains more up-to-date quarterly data.

Please note, in the new approach in Blue Book 2021, balanced estimates of gross value added (GVA) now account for both the outputs produced and inputs consumed by the industry. There are also some coverage differences given the use of the Annual Business Survey in their compilation. As a result, GVA estimates published in the GDP releases will be different from the construction output release. Previous experimental analysis showed that the construction sector has a relatively high level of intermediate consumption and was more likely to be impacted by double deflation.

Inconsistencies with the public sector accounts releases are also possible because of the different revisions policies being applied to these releases.

When annual data first become available (in the February first quarterly estimate release) they contain revisions to previous quarter data. This introduces inconsistencies between the latest [GDP first quarterly estimate](#) data and [sector and financial accounts](#) data published in the earlier [quarterly national accounts](#) release.

Another important aspect is the coherence between the three different approaches to the measurement of GDP, which are theoretically equal. However, since they are measured independently, statistical and measurement errors will mean that this is not the case. Further explanation is provided within the "Balancing process" section of this report. These issues also formed a major part of the article [Monitoring the quality of the National Accounts \(2008\) \(PDF, 338KB\)](#).

Every effort is made to ensure that the data series is comparable over time, and a comparable time series is available back to 1948 for annual estimates, 1955 for quarterly estimates and 1997 for monthly estimates. Where possible, changes to methodology are applied to the whole series to ensure this comparability is maintained. However, the [National Accounts revision statements](#) may mean that this is not possible.

## Accessibility and clarity

Accessibility is the ease with which users are able to access the data, also reflecting the format in which the data are available and the availability of supporting information. Clarity refers to the quality and sufficiency of the release details, illustrations and accompanying advice.

Our recommended format for [accessible content](#) is a combination of HTML web pages for narrative, charts and graphs, with data being provided in usable formats such as CSV and Excel. Our website also offers users the option to download the narrative in PDF format. In some instances, other software may be used, or may be available on request. Available formats for content published on our website but not produced by us, or referenced on our website but stored elsewhere, may vary. For further information please refer to the contact details on this report.

For information regarding conditions of access to data, please refer to:

- [terms and conditions](#)
- [copyright and reuse of published data](#)
- [pre-release access](#)

In addition to this Quality and Methodology Information report, basic quality information relevant to each release is available in each GDP statistical bulletin. Advance notice of any forthcoming major changes in methodology for the GDP estimates can be found under [National Accounts methodology and articles](#).

In 2020, legislation came into effect requiring [all publications to meet accessibility standards](#). We are currently working to ensure all our spreadsheets can be read using assistive technology in order to comply with these standards. For more information on how the format of our publications is changing, visit [Releasing statistics in spreadsheets](#).

## Timeliness and punctuality

Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the gap between planned and actual publication dates.

GDP estimates are produced on a monthly, quarterly and annual basis:

- monthly GDP estimates, based on the output approach, are published around 40 days after the end of the reference month
- the first quarterly GDP estimates are published around six weeks after the end of the reference period
- updated quarterly GDP estimates as part of the quarterly national accounts are published around 12 weeks after the end of the reference period
- the [UK National Accounts. The Blue Book](#) consistent dataset is published either in June or September, six or nine months after the reference period

The [special data dissemination standards](#) page on the [International Monetary Fund's](#) (IMF) website provides more information on periodicity and timeliness of estimates. To date, the GDP statistical bulletins have always met the pre-announced publication dates.

For more details on related releases, the [release calendar](#) provides 12 months' notice of release dates. In the unlikely event of a change to the pre-announced release schedule, public attention will be drawn to the change and the reasons for the change will be explained fully at the same time, as set out in the [Code of Practice for Statistics](#).

## Concepts and definitions (including list of changes to definitions)

Concepts and definitions describe the legislation governing the output and a description of the classifications used in the output.

GDP estimates are produced in line with international standards, most notably [European System of Accounts 2010](#), which is enforced for all EU member states through [EU council regulation \(EC\) Number 549/2013](#). ESA 2010 is in turn consistent with the United Nations System of National Accounts 2008 ([System of National Accounts 2008](#)). The SNA 2008 is the recent update of [System of National Accounts 1993](#) and led in turn to the revision of [European System of Accounts 1995](#) forming [European System of Accounts 2010](#), which has subsequently been implemented in the UK National Accounts, as well as those of all other EU member states.

GDP estimates are compiled using [UK Standard Industrial Classification 2007 \(SIC 2007\)](#), used for the first time at Blue Book 2011, replacing the previously used [Standard Industrial Classification 2003](#). The introduction of SIC 2007 for GDP estimates was in keeping with EU regulations and adapted the classifications to changes in the structure of the economy. Important changes in SIC 2007 include a number of new sections giving more service sector detail while the detail in manufacturing is significantly reduced, reflecting the move towards more services-based economies over the past 20 years. For further information on the introduction of SIC 2007 see [Implementation of Standard Industrial Classification 2007: December 2009 update, Economic and Labour Market Review, December 2009, Volume 3, Number 12](#).

## 6 . Methods used to produce GDP data

### How we collect the data, main data sources and accuracy

We produce a comprehensive set of national accounts of which the main components are:

- monthly, quarterly and annual gross domestic product (GDP) estimates
- quarterly and annual sector and financial accounts
- financial and non-financial balance sheets

The production and publication of each GDP release is managed by a highly skilled team with a strong emphasis on statistical, analytical and economic debate throughout the production process to publish the headline GDP estimate and components.

[Trade statistics](#), [balance of payments](#), [public sector accounts](#) and other short-term indicators of economic activity are all integrated within the system of national accounts.

It is important to emphasise that the national accounts are estimates of an underlying reality, based on statistical surveys, forecasts and models; they are not compiled through "accounting" in the common sense of the word.

GDP estimates use three approaches, which are theoretically equal:

- output (or production) - the output approach to measuring gross domestic product (GDP) involves estimating production activity within the UK economy
- expenditure - the expenditure approach is the sum of all final expenditures within the economy, that is, all expenditure on goods and services that are not used up or transformed in the production process
- income - the income approach adds up all income generated by production in the form of gross operating surplus (profits), compensation of employees (CoE) (income from employment), mixed income (self-employment income) and taxes on products and production less subsidies for the whole economy

## Output approach

The output approach is based upon the following data sources which feed into the [Index of Production](#) (IoP), [Index of Services](#) (IoS), [Output in the construction industry](#) and [Retail Sales Index](#) (RSI). As a result, the output approach to GDP is compiled from:

- data from our surveys including the [Monthly Business Survey](#) (this information is gathered directly from businesses) and [Construction Output Survey](#)
- short-run forecasts and models where data have not yet been collected or are not yet available
- our other outputs
- administrative data (for example, Value Added Tax (VAT))

The estimates are then deflated by a variety of sources including lower-level components of the [Consumer Price Index](#), [Producer Price Index](#) and [Services Producer Price Index](#).

VAT turnover data have been used to estimate parts of the output approach of gross domestic product from the [Quarterly national accounts release](#) published on 22 December 2017 onwards. This is part of our ongoing effort to transform the way we use large, externally-collected administrative data to supplement data collected via Office for National Statistics (ONS) surveys. VAT turnover for small- and medium-sized businesses, for selected industries covered by the monthly business surveys, is used to estimate growth rates. The overall level of output is still derived from the Annual Business Survey (ABS) and other annual benchmark sources. Further information regarding the use of VAT turnover data is available in [VAT turnover implementation into national accounts: December 2017 update](#).

## Expenditure approach

The expenditure approach is based upon the following data sources which feed in to [consumer trends](#), [business investment](#), [UK trade](#) and [public sector finances](#). As a result, the expenditure approach to GDP is compiled from:

- data from our surveys including the [Living Costs and Food Survey](#) (LCF), [Quarterly Acquisitions and Disposals of Capital Assets](#) (QCAS), [Quarterly Stocks Survey](#), [International Trade in Services Survey](#) (ITIS), [International Trade in Goods Survey](#) and [Construction Output Survey](#)
- short-run forecasts and models where data has not yet been collected or is not yet available
- our other outputs
- administrative data

The estimates are then deflated by a variety of sources including lower-level components of the [Consumer Price Index](#), [Producer Price Index](#) and [Services Producer Price Index](#).

## Income approach

The income approach is based upon the following:

- data from our surveys including the [Quarterly Operating Profits Survey](#), [Average Weekly Earnings](#) (AWE), [General Insurance Survey](#), [Investment Trusts Survey](#) and [Financial Services Survey](#)
- short-run forecasts and models where data have not yet been collected or are not yet available
- our other outputs
- administrative data

## How we process the data

There are different methods for annual and quarterly estimation with subsequent integration. There are two main principles driving GDP estimation in the UK.

### Principle 1

The level of GDP is best estimated using a [supply use framework](#); this breaks the economy down to display transactions of all goods and services between industries and final consumers in the UK, enabling GDP to be based on a fully consistent set of components.

### Principle 2

Short-term growth is best estimated using the output approach to GDP and the other two approaches are brought in line with the output approach through careful analysis of the coherence of the three approaches.

The three measures become coherent in the long-term through the use of a [supply and use framework](#). This enables differences between the estimates of supply and use of specific products to be investigated, and the accounts adjusted to ensure a balance.

We publish information on the methods for [balancing the output, income and expenditure approaches to measuring GDP](#).

In the short run, there are not enough data available to produce a full supply and use balancing table (SUT). The first step in increasing the coherence of the raw data received is adjustment for quality by national accounts experts following comprehensive analysis and investigation of possible incoherencies.

Estimates of quarterly growth from the expenditure and income sides are brought into line with the estimate measured from the output side in the latest two quarters. The output approach is taken to be the best estimate of growth in the short-term. Before this, headline quarterly GDP is an average of the three approaches.

It takes around two years for us to produce annually balanced estimates of GDP in a SUT framework because of the time it takes to collect and process our data completely. Estimates over the course of the pandemic period, covering 2020 and 2021, have not yet been fully balanced within our annual SUT framework.

Table 1 shows that based on the March 2022 [quarterly national accounts](#):

- data up to the last supply use balanced year (2019) are fully reconciled using the annual SUT framework - there is one single estimate for all periods that have been fully balanced, which cover up to the end of 2019
- data from Quarter 1 (Jan to Mar) 2020 to Quarter 2 (Apr to June) 2021 are balanced from all three approaches to produce an average - that is, the headline GDP figure reflects the average growth rates of the output, income and expenditure measures
- data from Quarter 3 (July to Sept) to Quarter 4 (Oct to Dec) 2021 are led by the output measure with expenditure and income balanced to produce headline GDP - the headline GDP figure reflects the output growth rate, which income and expenditure are balanced to

Table 1: Comparison of three measures and average GDP, quarter-on-quarter and cumulative growth in comparison with Quarter 4 (Oct to Dec) 2019

	<b>Average GDP</b>	<b>Expenditure</b>	<b>Income</b>	<b>Output</b>
<b>Quarter on quarter growth rates</b>				
<b>2019 Q4</b>	0	0	0	0
<b>2020 Q1</b>	-2.5	-2.7	-2.2	-2.7
<b>2020 Q2</b>	-19.4	-18.7	-20.4	-19.3
<b>2020 Q3</b>	17.6	16.9	18	17.9
<b>2020 Q4</b>	1.5	1.2	1.8	1.5
<b>2021 Q1</b>	-1.2	-1.3	-1	-1.3
<b>2021 Q2</b>	5.6	5.5	5.7	5.5
<b>2021 Q3</b>	0.9	0.9	0.9	0.9
<b>2021 Q4</b>	1.3	1.3	1.3	1.3
<b>Cumulative position</b>				
<b>2019 Q4 to 2021 Q4</b>	-0.1	-0.4	0.1	0.1

Source: Office for National Statistics

#### Notes

1. Estimates of monthly GDP are comparable with the output-based estimates.
2. The headline GDP figure for Quarter 1 (Jan to Mar) 2020 to Quarter 2 (Apr to June) 2021 is the average of the expenditure, income and output GDP unrounded growth rates.

For these most recent quarterly periods that have not yet been subject to a full balancing process in a SUT framework, we confront our data and balance the three measures of quarterly GDP. This is achieved by the following methods.

## Alignment adjustments

The alignment adjustment is applied to the component of the accounts that is conceptually the most difficult to measure and which has the suspected lowest accuracy on a quarterly basis. It is applied to the series "changes in inventories" (on the expenditure side) and "gross operating surplus of private non-financial corporations" (on the income side).

The alignment adjustment acts to offset transactions that have a timing of recording effect. For example, if the production of a good occurs in one quarter but the household consumption of that good is recorded in the following quarter, then the alignment adjustments will help to balance both quarters across all three measures of GDP. The alignment adjustments have a target of positive or negative £3 billion per quarter, although this may be exceeded when it is proving to be particularly challenging to achieve a balance. However, as the purpose is one of adjusting for timing effects within a year, the alignment adjustment will sum to zero on a calendar year basis. As such, it has no effect on the annual difference in GDP.

The size of these alignment adjustments is one measure of coherence of the accounts, and is published in the [GDP first quarterly estimate](#) and the [quarterly national accounts](#). These alignment adjustments sum to zero annually as output is not thought to be the best estimate of annual growth, because, unlike expenditure and income, output does not feed into the supply and use framework that is used to balance GDP.

## Statistical discrepancy

Further to the alignment adjustments, a statistical discrepancy remains between the three approaches until supply and use balancing is run and this is also published. This is the difference between the sum of the expenditure components and average GDP and is published likewise for income components. These are detailed in Table M of the GDP first quarterly estimate and the quarterly national accounts.

The residual error is the amount by which the expenditure-based approach to measuring GDP exceeds the income-based estimate. It is also the sum of the statistical discrepancy (expenditure) with sign reversed and the statistical discrepancy (income) with natural sign (Table L of the quarterly national accounts statistical bulletin).

## Coherence adjustments

These reflect where there are quality concerns around specific components. These coherence adjustments are undertaken through consultation with our data experts, which are applied to where there is known [data uncertainty](#) . [Coherence adjustments are published in measuring the data](#) as part of the regular GDP releases.

Although a limited audience have access to GDP data ahead of publication, those involved in the process are selected to ensure each GDP balance achieves a rigorous statistical and economic challenge. A "balancing meeting" is held during each production round, where GDP and its components are assessed against a range of external indicators and a focus on GDP headline components. The data are challenged to ensure consistency and plausibility of the GDP balance. We recognise the importance of transparency and have an additional section in our GDP statistical bulletins where the balancing adjustments applied - size and the components targeted - are published.

## Deflation

Nominal GDP (GDP in current prices) gives the value of GDP at a specific point in time. Growth in nominal GDP reflects the effects of inflation, as well as real GDP growth; it reflects changes in value terms. Real GDP (GDP chained volume measures) excludes any inflationary issues and reflects the changes in volume terms. Using chained volume measures makes use of more up-to-date weights and is therefore more relevant. We have published an article that shows [the chain-linking methods in UK national accounts](#).

## Seasonal adjustment

The headline estimates of quarterly GDP are seasonally adjusted (non-seasonally adjusted versions are available in the [UK economic accounts](#)). Seasonal adjustment is the process of removing the variations associated with the time of year, or the arrangement of the calendar, from a data time series.

GDP estimates, as for many data time series, are difficult to analyse using raw data because seasonal effects dominate short-term movements. Identifying and removing the seasonal component leaves the trend and irregular components.

## How we quality assure and validate the data

These data are subject to many layers of vigorous quality assurance, from clarity and confirmation of individual unit data direct from the business contact to scrutiny of data at the macro level. Other sources of data include other government departments and administrative data, including Value Added Tax (VAT) data from Her Majesty's Revenue and Customs (HMRC), which are subject to quality checks and challenges from us. By comparing and contrasting these different sources, the national accounts produce a single picture of the economy which is consistent, coherent and fully integrated.

## How we disseminate the data

There are four main stages in the GDP production process.

### 1. GDP monthly estimate

This monthly estimate of GDP is based on information on output (production) only and is published around 40 days after the end of the reference month. This is our most timely estimate of GDP and data content at this production stage is approximately 80%.

### 2. GDP first quarterly estimate

This is the first quarterly estimate of GDP and is published around six weeks after the end of the reference quarter.

In this release, we have around 80% data content for the output measure, 60% data content for the expenditure measure and 40% data content for the income measure.

The output approach is thought to be the best indicator of growth in the short-term. However, at this point, any conflicting information from the expenditure or income sides would be used to inform the average estimate of GDP.

### 3. Quarterly national accounts

The next estimate, the quarterly national accounts, is published around 13 weeks after the end of the reference quarter.

In this release we produce a full set of quarterly economic accounts, updating and expanding the information made available in the earlier estimate as well as updating estimates for earlier quarters in the current year and normally the previous year. Fuller survey data for components of each of the expenditure, output and income approaches are available.

At this point the output approach to GDP is based upon 100% data content. There is also around 75% data content available to produce estimates of GDP from the expenditure approach and around 85% data content from the income approach. The output approach is still taken to be the best estimate of short-term growth, although again, the other approaches are used to inform the average measure of GDP, as well as to construct the sector and financial accounts.

## 4. UK National Accounts, The Blue Book

Annual estimates are published in the [UK National Accounts, The Blue Book](#), usually in July or October each year. The Blue Book is an annual estimate, however, it is not the first annual estimate that we make. It is the point of annual reconciliation of data sources.

The quarterly data are updated again during the production of the first estimate of annual GDP, as data from new and more comprehensive annual data sources become available. The second time an annual estimate is published in the Blue Book, supply and use balancing is applied to the estimate for the first time. The supply and use balancing is re-run in subsequent Blue Books using further benchmark data.

The Blue Book publication will be consistent with the relevant UK quarterly national accounts of either June or September depending on the Blue Book timing.

Methodological improvements may also be made during the publication of the Blue Book; [Impact on GDP current price and chained volume measure annual and quarterly estimates: 1997 to 2016](#) describes the changes introduced at Blue Book 2018, [Double deflation methods and deflator improvements to UK National Accounts: Blue Book 2021](#) describes the changes introduced at Blue Book 2021.

## How we review and maintain the data processes

User engagement surveys for the then second estimate of GDP and the quarterly national accounts were conducted from May to July 2015. In accordance with the [Code of Practice for Statistics](#) requirements, the objectives of the user engagement surveys were to investigate:

- who the users of the statistical product were
- what the statistics were used for (including the decisions they informed)
- users' perceptions of the quality of the statistics, statistical presentation and statistical commentary
- users' perceptions of the statistical service in relation to this particular statistical product

There are currently no user engagement surveys planned for any GDP publications, however, we are continually assessing whether further surveys are required.

## 7 . Other information

### Output quality trade-offs

Trade-offs are the extent to which different dimensions of quality are balanced against each other.

There is a trade-off between accuracy and timeliness. Provisional outputs are timely, but less firmly based.

Estimates may be revised during intermediate stages. These are explained under the section "How the output is created".

## Useful links

### [What is GDP?](#)

Article | Released 21 November 2016

Find out more how gross domestic product is used to measure the size and health of a country's economy.

### [UK national accounts - a short guide](#)

Article | Released 6 March 2020

An introduction to the concepts and underlying principles of national accounting and the various publications available.

### [Introducing a new publication model for GDP](#)

Article | Released 27 April 2018

Upcoming changes to the GDP publication model. The new model is outlined, as well as the benefits and trade offs and the impact on data content.