

## **Scotland's Gross Domestic Product: Earlier Publications And Updated Revisions Policy**

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### **Summary**

The Scottish Government is introducing a new publishing model for Quarterly GDP to provide a timelier measure of Scotland's economic performance.

Starting in September, Scotland's GDP growth will change from being updated once each quarter to a cycle of two updates, similar to the new publishing model being introduced by ONS for UK GDP statistics<sup>1</sup>.

- There will be an earlier 'first estimate' of GDP released approximately 80 days after the end of each quarter, instead of the 95-110 days currently.
- This will be followed by an updated 'second estimate' of GDP in Quarterly National Accounts Scotland (QNAS) at approximately 120-130 days after the end of the quarter.
- These publications will be 5 ½ weeks after the corresponding UK new First Estimate of GDP, and 4 ½ to 5 ½ weeks after the UK Quarterly National Accounts respectively.

This change is being made in response requests from across the user community, and will enhance the public value of the statistics by supporting society's needs for information.

This paper explains the developments in more detail, the changes to methodology required, and the expected impact on the reliability of the statistics. The move to two updates of GDP each quarter will also require a new approach to the handling of any revisions in the statistics, which is also explained in this paper.

The changes can be summarised as follows:

- The new first estimate of GDP will continue to use exactly the same data for around 88% of the economy as currently used in Scotland's GDP statistics.
- New provisional data sources used for the remaining 12% of Scotland GDP will be derived from UK GDP sources, ensuring that the first estimate for Scotland is directly comparable to the first estimate for the UK.
- The new second estimate in QNAS will include *all* the data currently used in Scotland's GDP, plus some additional results not usually included until the following quarter. The second estimate will be directly comparable to the UK Quarterly National Accounts.

We welcome your views on these changes. Please contact us at [economic.statistics@gov.scot](mailto:economic.statistics@gov.scot) with any comments or questions.

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<sup>1</sup><https://www.ons.gov.uk/economy/grossdomesticproductgdp/articles/introducinganewpublicationmodelforgdp/2018-04-27>

## Background

### GDP data sources

Gross domestic product (GDP) is one of the best known and most comprehensive indicators of economic activity, and change in GDP is used as the main measure of economic growth for Scotland. The Scottish Government has produced quarterly GDP growth statistics since 2002, with the estimates published as national statistics. The results relate to what is commonly referred to as the onshore economy, meaning that they do not include the output of offshore oil and gas extraction.

The publication of Scotland's Gross Domestic Product uses the output approach for GDP, where the activity of each industry is measured and then combined together to form an estimate for the whole economy. The methods used by the Scottish Government have been designed to closely replicate the equivalent methods used by ONS for estimating quarterly GDP growth for the UK as whole, and most of the data sources used are the Scottish extracts of the UK data.

A wide range of data sources are used which provide direct or indirect (proxy) measures of output. For most industries, turnover is used as a proxy for output and then deflated by a price index to produce a measure of change in the volume of output, or growth in 'real terms'. Alternatively, some data sources directly measure the volume of output by industry, such as the number of passenger journeys made by train. Sources vary in their periodicity (usually annual, quarterly or monthly) and whether they are expressed in current prices (requiring deflation), volume terms or both. We estimate output at a level of around 100 separate industries.

The main types of sources used are summarised below. This shows that 78% of GDP is measured using quarterly or monthly data, with the remaining 22% - mostly public sector services like Health and Education - using annual data which is interpolated and forecast to give quarterly results.

**Table 1 – Summary of main data source periodicity and weight for Scotland's GDP**

Data Source	2014 Weight (%) by periodicity of data	
	Annual	Quarterly/Monthly
ONS Monthly Business Survey	-	49
ONS Construction Output Statistics	-	6
Other Private Sector Sources	2	3
Other Public Sector Sources	12	8
Imputed Rent of Owner-Occupiers	8	
UK GDP release	-	12
<b>Total</b>	<b>22</b>	<b>78</b>

Further information on GDP methodology is available at the [About These Statistics](#)<sup>2</sup> web pages.

<sup>2</sup> <http://www.gov.scot/Topics/Statistics/Browse/Economy/GDP/Methods>

## Timing of the current publication

For many years, Scotland's GDP was published around 105-110 days after the end of each quarter, and around three weeks after the corresponding UK Quarterly National Accounts. More recently, improved access to data and more timely processing has seen GDP being regularly published at around 95 days after the end of the quarter, in the week following the UK statistics. Until now, Scotland's GDP statistics have been consistent with the preceding UK Quarterly National Accounts, which has meant that the 95 day timing represents the earliest it has been possible to publish without making a significant change to the methodology approach used.

The Scottish Government currently uses a complete set of data each quarter, without the need to use monthly forecasts or provisional data sets other than for annual data where this is unavoidable. This approach is equivalent to the UK third estimate of GDP in the quarterly national accounts. By contrast, the earlier estimates of UK GDP from ONS do use forecasting or provisional data to enable more timely publications, but this approach naturally leads to revisions when more final data is available.

This trade-off between timeliness and accuracy, both of which are valued by users, is central to all decisions on when to publish GDP statistics. It is this balance which has been reconsidered for Scotland at this time: in particular, whether it is feasible to use alternative, provisional data sources for some components of GDP to improve the timeliness without causing a significant reduction in the accuracy and reliability of the statistics.

Table 2 demonstrates that data covering approximately 88% of the Scottish economy is available by around 73 days after the end of the quarter. There is then a notable gap in time before the receipt of the final data sources which are required for consistency with the UK Quarterly National Accounts. These least-timely data sources, which cover mining support, financial services, real estate and the 'other services' sector, have been the focus for improving the timeliness of the statistics.

**Table 2 – Summary of key data source timings for Scotland's GDP: current approach**

Industry(ies)	Data Sources	Timeliness after quarter end ▼	2014 Weight
Agriculture, Public Sector, Imputed Rent	Various annual data sources	No quarterly update	22%
Manufacturing and Services industries	ONS: monthly business survey microdata (requires processing)	30 then 60 days (monthly extracts)	49%
Other non-survey data sources	BEIS, DEFRA, Energy Companies, etc.	30-70 days	9%
Construction	ONS: Output in GB Construction Industry, Table 6 by region	72 days	6%
Public Sector Employment	ONS: Labour Market Statistics	73 days	3%
Mining Support, Financial Services, Other Services	ONS: derived from detailed UK GDP, Quarterly National Accounts	90 days	12%
Wind Electricity Generation	BEIS: Quarterly Energy Trends Table ET6.1	90 days	<1%

## Statistics Planning

The [Scottish Economic Statistics Plan 2017-18](#) noted that users have expressed an interest in earlier estimates of Scotland's GDP growth. One of the special projects for statistics development last year was to review the data sources, methods and processes used to produce quarterly GDP statistics and to determine whether it is feasible to produce the statistics on a more timely basis.

Scottish Government statisticians have been focussing on this project since late 2016, and have been trialling new approaches to producing GDP behind the scenes. Progress has been reported at the last two annual meetings of the Scottish Economic Statistics Consultation Group<sup>3</sup> (SESCG) to keep key users updated and to discuss the methodology implications of the move. The SESCg group has been generally supportive of this work.

Also during the latest year, The Scottish Parliament Economy, Jobs and Fair Work Committee undertook an inquiry into economic data for Scotland<sup>4</sup>. The Committee's report, [How To Make Data Count: Improving The Quality And Coverage Of Our Economic Statistics](#), includes a number of recommendations for the Scottish Government, ONS and other bodies. One of the key recommendations of the Committee, based on evidence collected during the course of the inquiry, was for the Scottish Government to "continue to improve the timeliness of key indicators e.g. accelerate publication of GDP".

## Changes to ONS GDP publications for the UK

The Office for National Statistics (ONS) will be introducing a new publishing model for UK GDP in July 2018. This model will give two (rather than three) estimates of quarterly GDP, and brings forward the Index of Services publication by two weeks, enabling the publication of monthly GDP estimates for the UK. Details of these changes have been published by ONS in [Introducing A New Publishing Model for GDP](#).

The current UK GDP publication model has three releases per quarter:

- The Preliminary estimate of GDP is released approximately 25-28 days after the end of the quarter, and is based only on the output approach to GDP. This estimate has a data content of around 45%, with the final month of the quarter largely forecasted.
- The Second estimate of GDP is published after approximately 55 days, and includes results for the third month of the quarter as well as other more complete output data and the first estimates of GDP for the income and expenditure approaches.
- The third estimate of GDP is released as part of the Quarterly National Accounts approximately 90 days after the end of the quarter.

The new model will see the publication of two quarterly GDP releases rather than three.

- The new First Estimate will be published approximately 40 days after the end of the quarter, and will include much higher data content than in the current Preliminary Estimate. It will also contain data from the income and expenditure approaches, available to users two weeks earlier than in the current model. However, the data content for these measures will be lower than the current second estimate.
- An updated estimate of GDP will continue to be released as part of the Quarterly National Accounts approximately 90 days after the end of the quarter.

These changes to UK GDP publications and their timing have been accounted for while investigating the impact of earlier data sources on Scotland's GDP, and our planned developments will closely resemble some aspects of the new UK approach, as explained below.

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<sup>3</sup> <http://www.gov.scot/Topics/Statistics/Browse/Economy/ScotStat/Meetings>

<sup>4</sup> <http://www.parliament.scot/parliamentarybusiness/CurrentCommittees/105164.aspx>

## A New Publication Schedule For Scotland's GDP

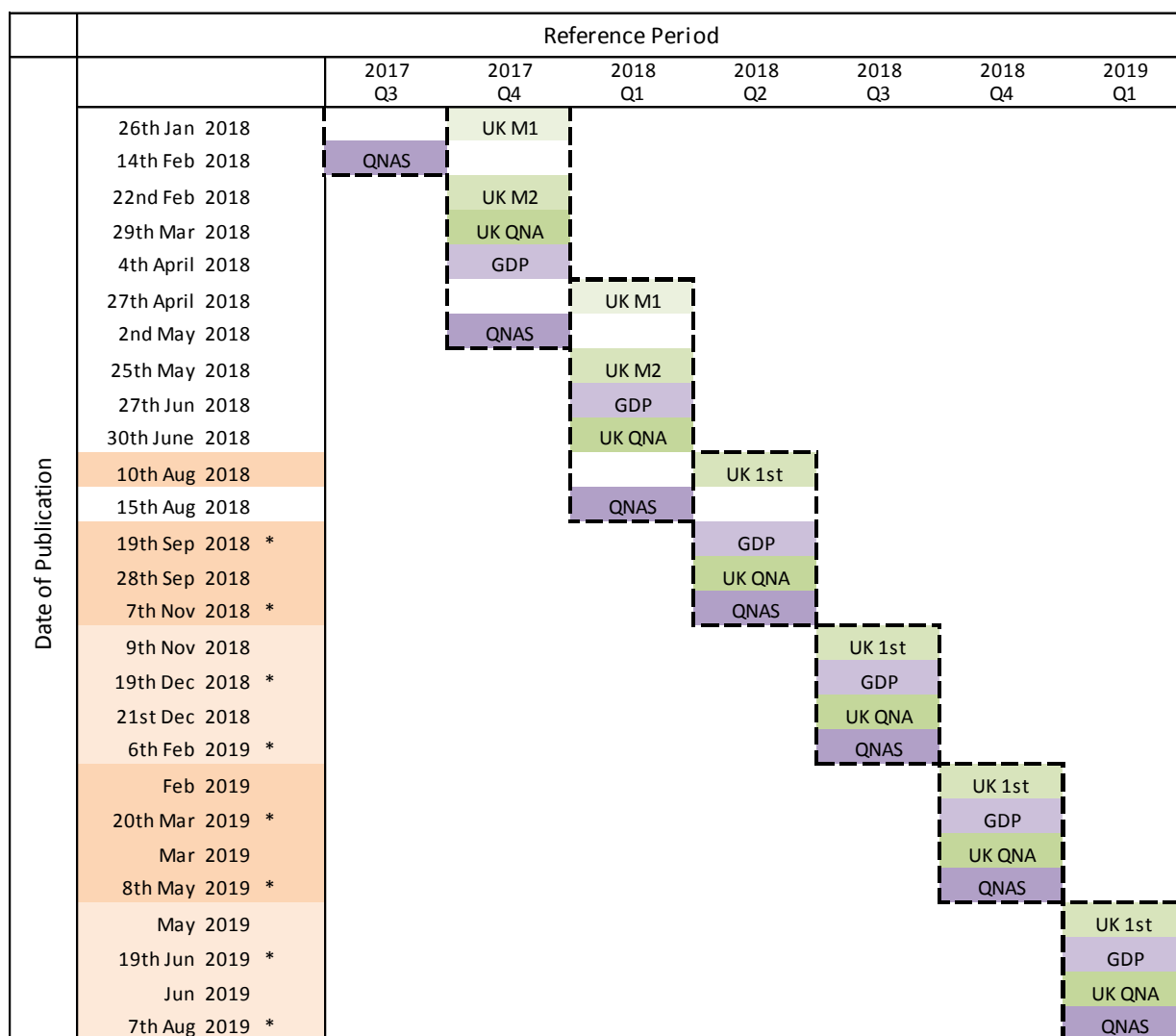
As a result of the work undertaken over the last 18 months, the Scottish Government has determined that it is feasible to improve the timeliness of Scotland's GDP growth statistics. Starting in September, GDP will change from being updated once each quarter to a cycle of two updates, similar to the new publishing model being introduced by ONS for the UK.

- There will be an earlier 'first estimate' of GDP approximately 80 days after the end of each quarter. This will replace the current publication released at 95-110 days currently. The first estimate for Scotland will be released 5 ½ weeks after the corresponding first estimate for the UK.
- This will be followed by an updated 'second estimate' of GDP in Quarterly National Accounts Scotland (QNAS), approximately 120-130 days after the end of the quarter. QNAS will be published between 4 ½ and 5 ½ weeks after the UK Quarterly National Accounts.

QNAS will continue to be published on its current timescales for now, but its timeliness will be kept under review. This publication also includes other aspects of the national accounts including nominal GDP and its components of the Income and Expenditure approaches, as well as Output.

Due to the new publishing model for UK GDP statistics, this means that from 2018 Quarter 2 onwards, there will no longer be any overlap between quarter releases for Scotland and the UK. This synchronised publication schedule is illustrated in Figure 1 below, including provisional publication dates for the next year.

**Figure 1 – New publishing schedules for Scotland and UK GDP statistics**



\* provisional dates to be confirmed 1 month prior to publication

## **Methodology and data sources for the new first estimates of GDP**

As noted above, the attempts to improve the timeliness of Scotland's GDP have focussed on the least timely data sources, which are available relatively late in the publication and processing cycle. These sources account for around 12% of Scotland's GDP by weight. In other words, the new first estimate uses exactly the same data as the current approach for around 88% of GDP.

Table 1 showed that the data sources currently limiting the timeliness of Scotland's GDP are predominantly those derived from the detailed sub-components of UK Quarterly National Accounts, such as mining support and financial services, plus a relatively small component of renewable electricity generation. In order to accelerate the production of GDP, good quality alternative sources of data for these components have been selected:

- For the components derived from the detailed industry results in the UK Quarterly National Accounts, the equivalent detailed components are also available in earlier UK GDP releases.
- For wind energy generation in Scotland, data is only published by BEIS in each quarterly Energy Trends release. However, provisional estimates of UK total wind generation are updated monthly. A large proportion of UK wind generation occurs in Scotland, making this source a good provisional indicator of the regional results. Furthermore, the UK results can be checked for broad consistency against generation data available to the Scottish Government from major power producers.

These data sources mean that provisional estimates for Scotland are fully consistent with, and therefore comparable to, the provisional estimates for the UK as a whole. This consistency is particularly important for the user community.

As well as seeking alternative data sources, a significant effort has also been placed on accelerating the procedures used by the Scottish Government to process the other data used for GDP, such as the Monthly Business Survey (MBS). The outcome of this project has been that quality assured estimates are now available by 70-75 days after the end of each quarter, at the same time that other key data sources such as Public Sector Employment and Construction Output become available.

Due to these timescales, the selected publication at 80 days is now the earliest point at which estimates can reasonably be published without significantly risking the quality of the results.

## **Methodology updates for the second estimate in QNAS**

As discussed above, 88% of the data currently used for Scotland's GDP will still be used in the new first estimate. The new second estimate published in QNAS will still include *all* the data currently available, consistent with the UK Quarterly National Accounts. In addition, the results in QNAS will be able to take on board further any further updates to the MBS received in the t+90 days extract, which will mean any late or revised survey responses will be accounted for much sooner than at present, although this effect is thought to be small.

The updated second estimate – which could be revised from the first – will ensure that Scotland's GDP statistics remain consistent with and comparable to the equivalent latest release from ONS for the UK. The update is also required to ensure that the components of GDP by industry are balanced with the components of the Income and Expenditure approaches also published in QNAS.

The alternative data sources used for the first and second estimates are summarised in Table 3 below.

**Table 3 – Alternative data sources for the ‘first’ and ‘second’ estimates’ of GDP**

Industry	Weight	First Estimate		Second Estimate (QNAS)	
		Data Source	Timeliness	Data Source	Timeliness
Mining Support, Financial Services, Other Services	12%	ONS: new First Estimate of GDP	40 days	ONS: Quarterly National Accounts	90 days
Wind Electricity Generation	<1%	BEIS: Monthly Energy Trends Table ET5.3	60 days	BEIS: Quarterly Energy Trends Table ET6.1	90 days

### Summary of Changes

The changes described in the previous sections can be summarised as:

- The new first estimate of GDP will continue to use exactly the same data for around 88% of the economy as currently used in Scotland’s GDP statistics.
- The provisional data sources used for the remaining 12% of Scotland GDP will be based on UK GDP data sources, ensuring that the first estimate for Scotland is directly comparable to the first estimate for the UK.
- The new second estimate of QNAS will include *all* the data currently used in Scotland’s GDP, plus some additional MBS results not usually included until the following quarter. The second estimate will be directly comparable to the second estimate in the UK Quarterly National Accounts.
- The data sources which will be updated (and potentially revised) between the first and second estimates of GDP will be updated consistently with any revisions to the same industries at UK level, ensuring that comparability is maintained.

## Assessing the Impact Of These Changes

The *accuracy* of GDP (i.e. how close is an estimate to the true value) is almost impossible to assess because it is estimated using a large number of data sources which each have their own margin of error, and there is no single 'true' data source. Instead, other dimensions of statistical quality are usually monitored to assess the statistics. In particular, timeliness and reliability are highly valued. The reliability of GDP statistics is determined by how much initial estimates are revised over time. If revisions are too large then the value of the statistics is reduced. The timeliness of GDP statistics is particularly important for guiding and evaluating economic policy and the behaviour of people and businesses. There is therefore a careful balance which must be achieved between ensuring that the data is timely (i.e. published as early as possible) and reliable.

### Analysis of reliability in the new first estimates

The Scottish Government has been conducting trial runs of the new first estimates for internal analysis for six quarters since late 2016. The results of this trial have been used to produce indicators for the likely reliability of the statistics.

It is standard practice for GDP statistics to use the scale of revisions to previous results as an indicator of likely revisions to future statistics, as long as methods and data remain consistent over time. This approach was covered in detail in an earlier paper<sup>5</sup>, and continues to be used on a quarterly basis by the Scottish Government, ONS, and other producers.

Six quarters of trial data are summarised in Table 4 below. The pre-publication estimates are the growth rates which would have been published as the new 'first estimates'. The published estimates are the results that were actually published, equivalent to the new 'second estimates'.

**Table 4 – Revisions between trial first and second estimates of Scotland's GDP**

Quarter	Date of Publication	Pre-publication Estimate	Published Estimate	Revision
2016 Q3	18 January 2017	0.12%	0.21%	0.08%
2016 Q4	5 April 2017	-0.29%	-0.24%	0.05%
2017 Q1	5 July 2017	0.75%	0.75%	0.00%
2017 Q2	4 October 2017	0.10%	0.14%	0.04%
2017 Q3	17 January 2018	0.18%	0.15%	-0.03%
2017 Q4	4 April 2018	0.38%	0.31%	-0.07%

These results show that, during the trial phase, the revisions between the pre-publication 'first' estimates and the published 'second' estimates have been relatively small and not biased in one direction or another. For example, the largest revisions so far have been for 2016 Q3, up from 0.1% to 0.2%, and for 2017 Q4, down from 0.4% to 0.3% when rounded to 1 decimal place.

The average revision during the testing phase (the mean percentage point revision, including the direction) has been 0.01%, which is not significantly different to zero. This indicates that revisions are as likely to be up as down.

The average absolute revision (the mean percentage point revision, regardless of direction) has been 0.05%. This indicates that the first estimate of GDP growth is typically revised by plus or minus 0.05% in the second estimate: in practice this has meant no revision half the time, and a revision of +/- 0.1% half the time when rounded to 1 decimal place.

<sup>5</sup> <http://www.gov.scot/Topics/Statistics/Browse/Economy/GDP/research/Revisions2010>

## How do these results compare to other statistics?

Revisions to GDP statistics are to be expected, and the revisions reported in Table 4 are in line with those observed between quarterly releases of Scotland's GDP statistics at the current time, and with GDP statistics for other advanced economies.

Analysis published alongside Scotland's GDP shows that growth rates in the current statistics are typically revised, on average, by around plus or minus 0.1 percentage points in the next publication following their initial release, and by around plus or minus 0.2 percentage points over the course of the next year.

Similar statistics for the UK and OECD members demonstrate that this scale of revisions is normal by international standards. The ONS [Quality and Methodology Information for UK GDP](#) shows it has been normal for the provisional (flash) estimate of UK GDP growth to be revised upwards or downwards by 0.1 percentage points by the time of the Quarterly National Accounts, and this revisions increases to +/- 0.2 percentage points over longer timescales, similar to the Scottish results quoted above.

Internationally, the OECD publishes similar analysis of [Revisions of quarterly GDP in selected OECD countries](#)<sup>6</sup>. This analysis shows that, on average amongst the 18 countries considered, GDP growth rates are revised by +/- 0.18 percentage points between 'first estimates' and the result published five months later, and by +/- 0.3 percentage points by one year later. There is considerable variation in these revisions between the countries selected.

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<sup>6</sup> <http://www.oecd.org/sdd/na/revisions-of-quarterly-gdp-in-selected-oecd-countries.htm>

## Updated Revisions Policy

Revisions to economic statistics such as GDP are an inevitable consequence of the trade-off between timeliness and reliability. Early estimates are usually based on incomplete data or proxy indicators, and are updated as better information becomes available over time. Many components of GDP and the national accounts are measured using annual surveys, or via tax returns, which are not collected until considerably after the reference period. In fact, GDP statistics are never truly finalised, with occasional methodology and classification reviews meaning that the conceptual definitions used in the national accounts can be updated and revised years, or even decades, into the future.

The new approach to GDP statistics for Scotland requires a new approach to the timing and implementation of revisions. Until now, Scotland's GDP growth has been re-published in QNAS without any additional data content, and therefore has been unrevised. The Scottish Government revisions policy for GDP has therefore focussed on implementing changes between one quarter and the next every three months, with no opportunity for more frequent revisions in between<sup>7</sup>.

Due to extensive use of UK-derived source data and the importance of consistency and comparability with UK GDP statistics, the new revisions policy for Scotland's GDP closely resembles the equivalent approach used by ONS for the UK.

- The first key policy is that there will be no revisions to previous quarters when the first estimate of GDP is published. Results for all previous periods will remain unchanged from the previous second estimate. This approach is consistent with ONS GDP statistics, ensuring consistency and comparability.
- The second key policy is that periods of time covered by annual data sources will only be re-assessed and subject to revisions on an annual basis. Therefore in most publications each year, only recent quarters will be open to revision. This approach is currently used for Scotland's GDP, and is also consistent with the ONS policy for UK GDP statistics

One of the key principles for compiling National Accounts is that the best and most comprehensive data are from the main annual data sources. The most significant of these are the Scottish part of the ONS Annual Business Survey (ABS), the UK Supply and Use Tables, and UK Regional Gross Value Added statistics. These sources provide the core inputs to estimating the level of gross domestic product (GDP) through the supply and use framework, and for providing annual benchmark levels for GDP.

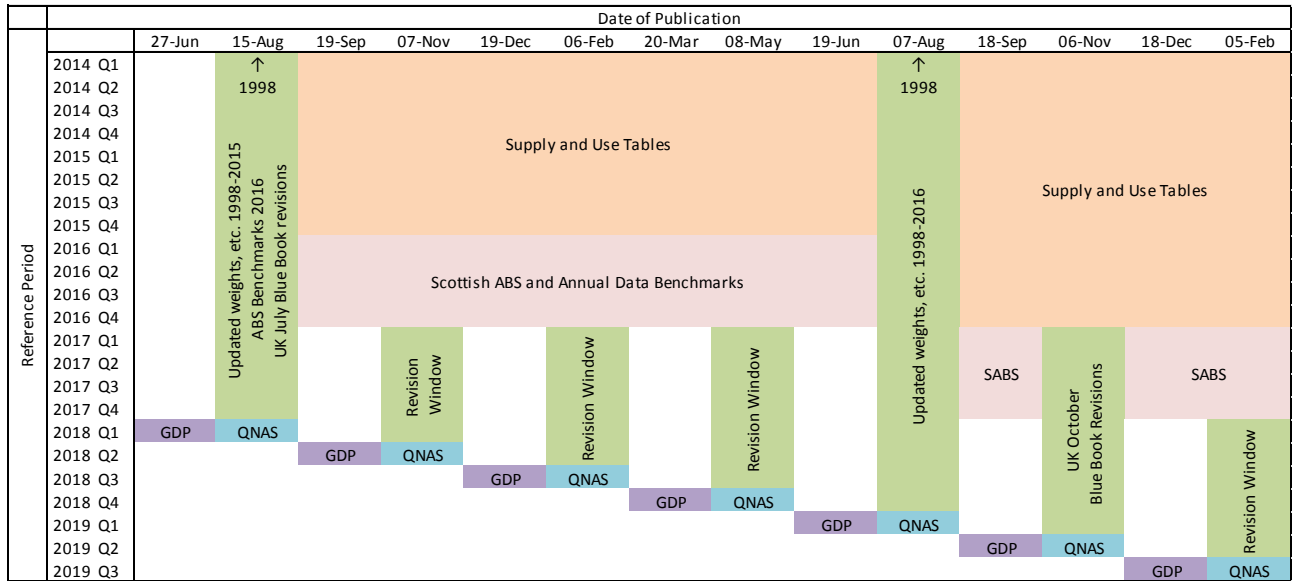
In the coming year, the annual Supply and Use Tables due to be published on 18 July 2018 will provide GDP weights and benchmarks for the years 1998-2015. In addition, with the earlier publication of Scottish Annual Business Statistics in June with provisional ABS results for 2016, it will be possible to incorporate an additional year of annual output data at the same time the Supply and Use Table results are applied. This means that between the Quarterly National Accounts for 2018 Q1 (August 2018) and the First Estimate for 2019 Q1 (June 2019), GDP growth will only be open for revision in the period 2017 Q1 to present.

This timeline for which periods will be open to revision within each publication in the coming year and into the next year is shown in Figure 2 below. The Scottish Government will continue to monitor the size and direction of revisions during this time, and will review the effectiveness of this approach to revisions.

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<sup>7</sup> The only exceptions to this rule have been for Quarter 1 2017 and 2018, when updated weights published in Supply and Use Tables after the initial GDP release have been applied in QNAS. This approach to annual updates is very similar to the ONS annual 'Blue Book' updates to UK GDP.

**Figure 2 – New revisions policy for Scotland’s GDP statistics**



\* provisional publication dates

Fixed Period - whole economy	GDP	First Estimate of GDP growth includes no revisions to previous quarters
Fixed Period - provisional	QNAS	QNAS includes Second Estimate of GDP with revisions to previous quarters
Period open for revisions due to late or revised survey responses and weights, seasonal adjustment factors, other updated source da		