Office for National Statistics

Article

Impact of improvements to construction statistics: June 2018

A description of the impact of improvements that have been incorporated into construction output, as part of Blue Book 2018. This focuses on the improvements implemented to address the bias in early estimates of construction output in addition to usual changes in nominal data and seasonal adjustment.

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1 . Main points

- As part of the wider improvement programme for construction statistics, ONS has introduced significant improvements to the method for imputing data for businesses that have not yet returned their ONS survey responses and further methodological adjustments to address the bias in early estimates of construction output.
- These improvements mean that future early estimates of construction output are likely to be more accurate with the significant upward bias, previously seen in early construction output estimates, removed.
- As well as usual changes in nominal data and seasonal adjustment, these methodological improvements are being published for the first time in Quarterly national accounts: January to March 2018, leading to revisions.
- We will continue to analyse the revisions performance of construction output as we utilise these new methods and VAT turnover data across more periods.

2 . Introduction

This article will describe the impact of improvements that have been incorporated into construction output statistics, as part of UK National Accounts, The Blue Book 2018 and show the impact of the changes. The latest data incorporate changes to:

- nominal data as a result of: the receipt of late survey returns, revisions coming from improved methodology to address the bias in early estimates and the inclusion of the latest Value Added Tax (VAT) turnover data (which incorporates the Quarter 4 (Oct to Dec) 2017 period for the first time)
- seasonal adjustment
- inclusion of latest mark-up data used within the price indices (which now include 2016 data)

More information on how each of these changes can impact on revisions can be found in Annex A.

Construction output statistics are published monthly and follow the standard revisions policy for national accounts . As a result, within the Quarterly national accounts published on 29 June 2018, and Blue Book 2018 due to be published on 31 July 2018, construction output is open to revisions back to January 2010, when the monthly construction survey was introduced (although please note that the full revised monthly series will only be available for the first time alongside the Construction output: May 2018 release, due to be published on 10 July 2018).

It is also worth noting that the improved methodology to address bias in early estimates is likely to considerably enhance the revisions performance of construction output statistics in the future and the revisions being published within the Quarterly national accounts on 29 June 2018, compared with initial estimates, would have been much smaller if the new methodology had been in place at the time the data were first published. This is further explained in Section 6.

3 . Headline revisions

Table 1 shows the new annual growth rates for total construction work and the revision from the previously published series.

Table 1: Revision to growth rates, most recent year on previous year, construction output, all work, chained volume measure, seasonally adjusted

Great Britain, 2010 to 2017

Period	Previously published	Blue Book 2018	Revision
2010	8.5	8.5	0.0
2011	2.2	2.2	0.0
2012	-6.9	-6.9	0.0
2013	1.5	1.5	0.0
2014	9.0	8.8	-0.2
2015	4.4	4.4	0.0
2016	3.9	4.1	0.2
2017	5.7	7.1	1.4

Source: Office for National Statistics

Table 2 shows the revisions to the quarter-on-quarter growth rates for total construction work compared with the previously published series. Revisions to the monthly construction output series will be available in the revisions triangles published alongside Construction output: May 2018 due to be published on 10 July 2018.

Table 2: Revision to growth rates, most recent quarter on previous quarter, construction output, all work, chained volume measure, seasonally adjusted

Great Britain, Quarter 1 (Jan to Mar) 2010 to Quarter 1 (Jan to Mar) 2018

Period	Previously published	Blue Book 2018	Revision
Q1 2010	4.0	4.8	0.8
Q2 2010	5.7	4.9	-0.8
Q3 2010	2.3	1.8	-0.5
Q4 2010	-2.8	-2.7	0.1
Q1 2011	1.7	1.7	0.0
Q2 2011	0.8	1.1	0.3
Q3 2011	-0.8	-0.7	0.1
Q4 2011	-0.1	0.0	0.1
Q1 2012	-3.2	-3.4	-0.2
Q2 2012	-4.0	-3.9	0.1
Q3 2012	-1.6	-1.6	0.0
Q4 2012	0.7	0.8	0.1
Q1 2013	0.0	-0.3	-0.3
Q2 2013	1.3	1.6	0.3
Q3 2013	2.9	2.9	0.0
Q4 2013	1.4	1.4	0.0
Q1 2014	2.9	2.5	-0.4
Q2 2014	1.9	2.2	0.3
Q3 2014	3.0	2.9	-0.1
Q4 2014	0.4	0.3	-0.1
Q1 2015	1.6	1.1	-0.5
Q2 2015	0.7	1.2	0.5
Q3 2015	-0.4	-0.6	-0.2
Q4 2015	1.2	1.5	0.3
Q1 2016	0.4	0.3	-0.1
Q2 2016	1.6	1.7	0.1
Q3 2016	1.2	1.1	-0.1
Q4 2016	3.2	2.9	-0.3
Q1 2017	2.4	3.2	0.8
Q2 2017	-0.4	0.4	0.8
Q3 2017	0.4	0.4	0.0
Q4 2017	-0.1	0.3	0.4
Q1 2018	-2.7	-0.8	1.9

Source: Office for National Statistics

4 . Impact of Blue Book 2018 changes

The revisions that can be seen in Tables 1 and 2 are a result of a combination of the improvements that have been incorporated for Blue Book 2018. An indication of the main cause of revision across all periods is summarised in Table 3 with a further description provided in the remainder of this section (although it is worth noting that it is not possible to quantify the impact resulting from each type of revision).

Table 3: Indicative causes of revisions by period, construction output, all work, chained volume measure, seasonally adjusted

Great Britain, Quarter 1 (Jan to Mar) 2010 to Quarter 1 (Jan to Mar) 2018

Period	Main cause of revision
Pre-2017	Seasonal adjustment
2017 Q1	Improved imputation methodology
2017 Q2	Seasonal adjustment
2017 Q3	No revision
2017 Q4	Combination of changes to nominal data
2018 Q1	Improved imputation methodology

Source: Office for National Statistics

While there were a couple of factors that fed into the series in earlier years, the main cause of revisions prior to 2017 is the change in seasonal adjustment. This is also highlighted by the fact that annual revisions prior to 2017 are minimal.

The revisions from Quarter 1 (Jan to Mar) 2017 onwards are a result of a combination of the improvements that have been incorporated and described in the previous sections. In particular, the improved imputation methodology has contributed to revisions across all periods, but the most notable contributions can be seen in Quarter 1 2017 and Quarter 1 2018.

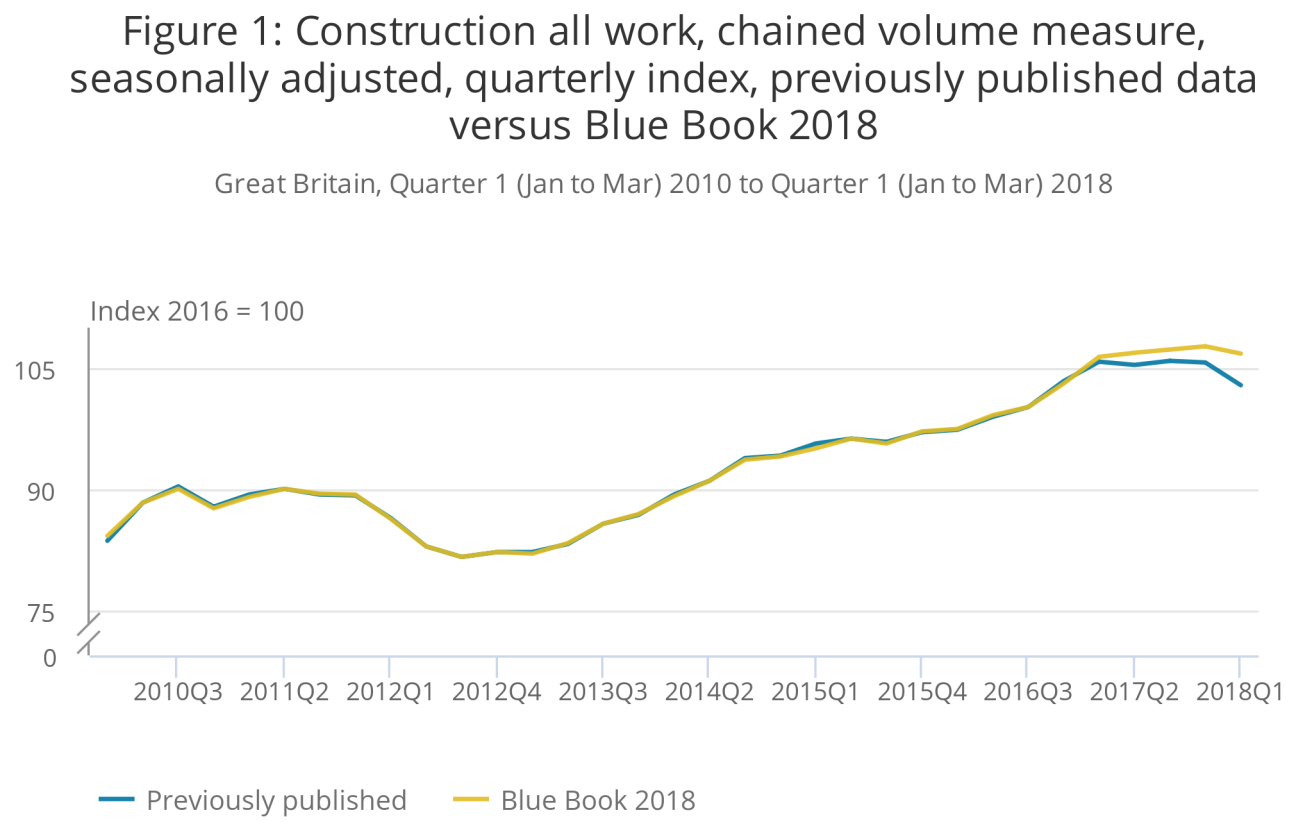
The impact of the new imputation method tends to be greater in the first quarter of the year because of annual updates to the Inter-Departmental Business Register (IDBR), which provides the sampling frame for the survey, where there are more newly-selected businesses in January compared with other months and therefore, a larger number of imputations that will now have a higher value. Quarter 1 2018 is affected to a greater extent than Quarter 1 2017 due to the higher number of imputations in more recent periods due to lower response rates, as well as the inclusion of the bias adjustment. More information on how the improved imputation methodology affects revisions is available in Annex A.

Changes to seasonal adjustment was the main contributor to the positive revision in Quarter 2 (Apr to June) 2017, while the negative revision coming from seasonal adjustment in Quarter 3 (July to Sept) 2017 was offset by changes in nominal data (including the new methodology), resulting in the quarterly growth being unrevised. Changes in nominal data coming from the receipt of late survey data and the inclusion of Value Added Tax (VAT) turnover data for the first time in this quarter, as well as the methodology change resulted in the positive revision to Quarter 4 (Oct to Dec) 2017. The combination of mainly positive revisions across the quarters of 2017 has resulted in an annual revision of 1.4 percentage points.

The change in level between the last publication and Blue Book 2018 data is highlighted in Figure 1.

Figure 1: Construction all work, chained volume measure, seasonally adjusted, quarterly index, previously published data versus Blue Book 2018

Great Britain, Quarter 1 (Jan to Mar) 2010 to Quarter 1 (Jan to Mar) 2018



Source: Office for National Statistics

5 . Impact on GDP

Construction output accounts for 6.0% of the output measure of gross domestic product (GDP(O)). As previously indicated, prior to 2017 the revisions are minimal and as such, if all other components remained equal, there is no implied impact (to one decimal place) on GDP(O) on either a quarterly or annual basis for this period. The combined impact of quarterly construction revisions across 2017 result in an upward revision to annual 2017 GDP (O) growth of 0.1 percentage points, while the quarterly revisions themselves result in no changes to quarterly GDP(O) growth over this period. The most significant quarterly revision to construction output of 1.9 percentage points in Quarter 1 (Jan to Mar) 2018 contributes an upward revision of 0.1 percentage points to quarterly GDP (O) growth.

6 . Longer-term impact of improved methodology

While there are notable revisions as a result of the implementation of the new imputation methodology and bias adjustment, this should not be the case for future periods, where the new approach will be used for initial construction estimates – improving the accuracy of initial estimates. (It should be noted that we may see some revisions when the period prior to 2017 is next open for revision, as part of Blue Book 2019, as the impact of the new imputation method can only be seen from 2017 onwards). When retrospectively applying the new methodology, it is apparent that the revisions would have been considerably lower if the new method had been in place at the time of first publication.

Table 4 indicates how the quarterly growth rates have changed from the first construction output publication to the latest version consistent with Blue Book 2018, but also includes an indication of what the first estimate of quarterly growth would have been if the new imputation methodology was in place at the time of first release.

Table 4: Comparison of most recent quarter on previous quarter growth rate, construction output, all work, chained volume measure, seasonally adjusted of current imputation methodology against new imputation methodology at different publication points

Great Britain, Quarter 1 (Jan to Mar) 2016 to Quarter 1 (Jan to Mar) 2018

	First construction output publication	First construction output publication with new method	Previous publication prior to Blue Book 2018	Blue Book 2018
2016Q1	-1.1	1.1	0.4	0.3
2016Q2	-0.7	1.2	1.6	1.7
2016Q3	-1.1	0.7	1.2	1.1
2016Q4	0.2	2.6	3.2	2.9
2017Q1	0.2	2.7	2.4	3.2
2017Q2	-1.3	0.3	-0.4	0.4
2017Q3	-0.9	0.2	0.4	0.4
2017Q4	-0.7	0.4	-0.1	0.3
2018Q1	-2.7	-0.9	-2.7	-0.8

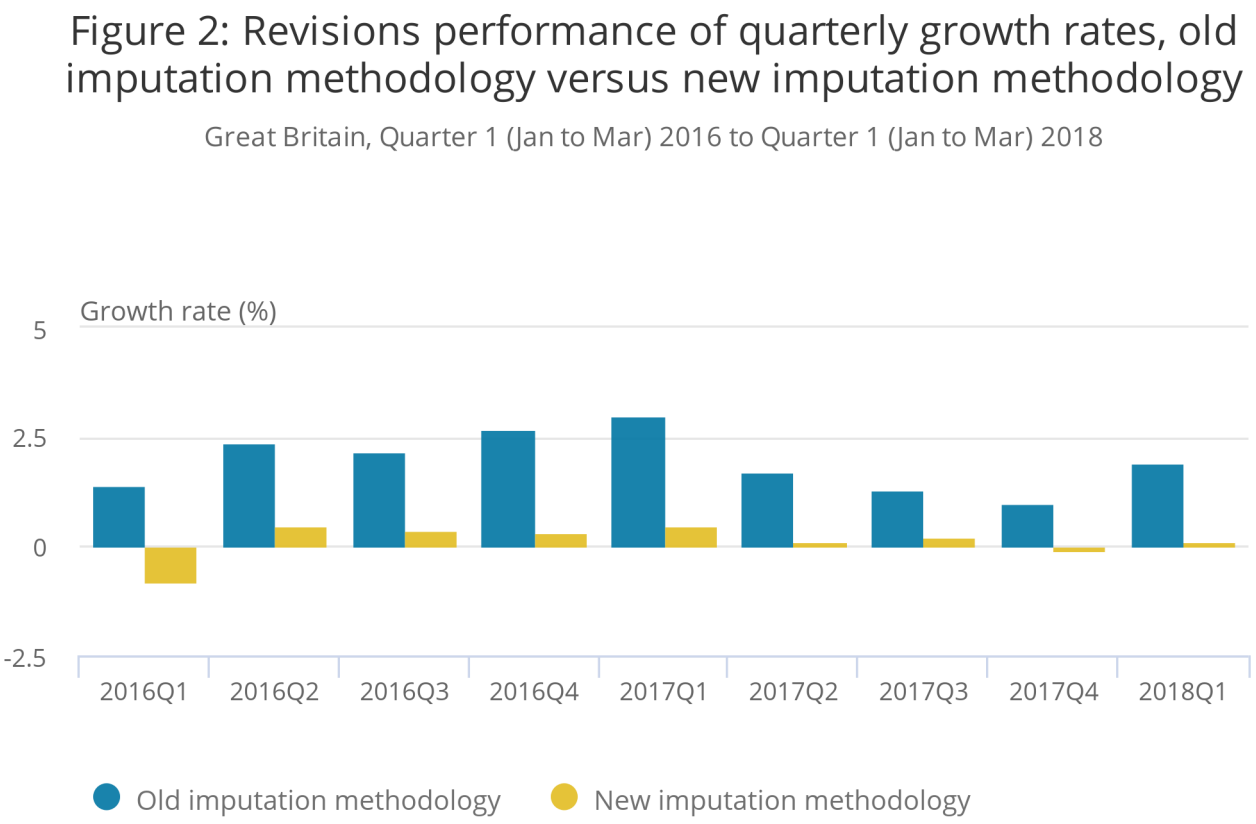
Source: Office for National Statistics

Table 4 highlights the bias in the existing early estimates of construction output. For example, the first time we published quarterly construction growth for Quarter 1 (Jan to Mar) 2017, this was estimated to be 0.2%. However, if the new methodology had been in place at the time, the estimate would have been 2.7%. This is compared with the Blue Book 2018 estimate for Quarter 1 2017 of 3.2%, meaning we would be looking at a total revision of 0.5 percentage points under the new method, compared with 3.0 percentage points under the old method.

Figure 2 compares the revisions performance under the old and new methodologies.

Figure 2: Revisions performance of quarterly growth rates, old imputation methodology versus new imputation methodology

Great Britain, Quarter 1 (Jan to Mar) 2016 to Quarter 1 (Jan to Mar) 2018



Source: Office for National Statistics

When comparing the revision between the first publication and the Blue Book 2018 estimate under the old methodology, the average quarterly revision is 2.0 percentage points. Therefore, although, we have published a notable positive revision to Quarter 1 2018 (positive 1.9% percentage points), this is fairly consistent with the longer-term positive revisions that we have seen across the rest of the series and is an indication that the new methodology is addressing the bias in earlier estimates.

Under the new methodology, the average quarterly revision would be 0.1 percentage points, highlighting the vast improvement to the early estimates where the new methodology aims to address the bias. The lower revisions that can be seen under the new methodology indicate an improvement in quality in the earlier estimates of Construction output. We will, however, continue to analyse the revisions performance of construction output as we utilise these new methods and incorporate VAT turnover data across more periods.

7 . Annex A - Blue Book 2018 changes

Changes to nominal data

Survey data:

A common cause for data revisions is the return of late data to the construction Monthly Business Survey, which in particular will affect the more recent periods. Construction output follows the National Accounts Revisions Policy and as such, not all periods are open for revision at each publication.

VAT turnover data:

Since its first introduction into national accounts in December 2017, Value Added Tax (VAT) turnover has been used to estimate the output of some small- and medium-sized businesses in the construction industry from 2016. The Quarterly national accounts: January to March 2018 is also open to revision from VAT turnover data and, in particular, this will be incorporated for the first time in the Quarter 4 (Oct to Dec) 2017 estimate for construction output.

Improved methodology to address bias:

On 4 June 2018, we published an article highlighting plans for Improvements to addressing the bias in early estimates of construction output, which will be incorporated for the first time in the Quarterly national accounts: January to March 2018 on 29 June 2018. As stated in the article, an improved imputation methodology will be implemented alongside a quality adjustment system, which together will considerably enhance the revisions performance of construction output statistics in the future, but as a result will lead to some revisions to the previously published series.

The new constructed imputation methodology addresses the bias to early estimates of construction output, having concluded that the former methodology was under-estimating the true value of a business's work. The primary purpose of its implementation is to reduce the bias in future early estimates and thus see a reduction in the revisions that occur, when late responses replace imputed values. However, it will also affect those values in previous periods which have remained as imputations and not otherwise been revised.

The implementation requires the replacement of existing constructed imputations with new values and updating all future imputed values that are calculated from the initial constructed imputation. The new methodology on average results in larger values being imputed for businesses yet to return their forms and therefore, the periods with the larger number of imputations will see the biggest impact.

Naturally, the most recent months tend to have higher imputation rates, with the article highlighting that we usually receive the majority of late returns within the first four months after the reference period. In addition, when we apply the methodology to a longer run of the series, it is usually the case that January is most affected. This is because, as a result of annual updates to the Inter-Departmental Business Register (IDBR - the sampling frame for the survey), there are more newly-selected businesses in January compared with other months and therefore, there are a higher number of constructed imputations that will now have a higher value.

In addition, the new methodology also incorporates an adjustment that aims to address the bias in early estimates of construction output in the most recent months (more information on both the improved methodology and the bias adjustment can be found in the article).

It is worth noting that, while the new methodology is applied to the full dataset, due to the timing of data deliveries required as part of the Blue Book 2018 systems process, the impact of this change can only be seen from 2017 onwards.

Seasonal adjustment

The construction output series is seasonally adjusted using a software tool called X-13ARIMA-SEATS. Eurostat guidelines on seasonal adjustment (PDF, 544KB) indicate that short time series (three to seven years) can be unstable, and the construction output monthly series is now just over eight years in length. Therefore, there is potential for comparatively larger revisions to the seasonally adjusted data as the series matures because of additional data points being added to the series and previous data points being altered. The change in seasonal adjustment factors is the main cause of revisions in earlier years.

The seasonal adjustment model for construction output is also reviewed annually to assess the full time series and this review itself can also lead to revisions in the seasonally adjusted series. As with the change in methodology, due to the timing of the review against the timing of deliveries required as part of the Blue Book 2018 process, the impact of the review can only be seen from 2017 onwards.

Inclusion of latest mark-up data

For Blue Book 2018, the latest data have been incorporated into the output price series, most notably the update of mark-up values, which now include 2016 values (more information on the mark-up can be found in the Construction development: Impact of improvements to construction statistics: September 2017 article published on 29 September 2017). However, the impact of this change is minimal.