

Article

# Public service productivity: quarterly, UK, July to September 2019

Experimental estimates for UK total public service productivity, inputs and output to provide a short-term, timely indicator of the future path of the annual productivity estimates.

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# 1 . Main points

- Productivity for total public services fell by 0.2% in Quarter 3 (July to Sept) 2019 compared with the same quarter in the previous year, continuing the trend of weak productivity growth over the last two years.
- In Quarter 3 2019, productivity fell by 0.3% compared with the previous quarter; this was driven by a fall in output of 0.7% which outpaced a fall in inputs of 0.3%.
- Quarter 3 2019 saw the first quarter-on-quarter fall in output since Quarter 1 (Jan to Mar) 2018, and the largest quarter-on-quarter fall in output since Quarter 1 2013.
- The estimate of productivity growth for 2018 has been revised down from 0.4% to 0.2%, which suggests that the modest growth in public service productivity seen in our National Statistics annual estimates in recent years may be slowing.
- These [experimental](#) estimates are timelier than our National Statistics, the latest version of which have been published [alongside this release](#), estimating productivity growth for 2017 that incorporates quality changes and revisions.

## 2 . Trends in quarterly public service productivity

Compared with the same quarter in the previous year (Figure 1), productivity for total public services decreased by 0.2% in Quarter 3 (July to Sept) 2019. Over this period, inputs increased by 3.0% while outputs increased by 2.8%, causing productivity to fall.

Over the past 12 months, inputs growth has been strong by recent standards, as discussed in [previous releases](#). This is particularly true in other central government services (such as public administration, environmental protection, and cultural services), military defence and healthcare. Inputs for local government services have also returned to modest growth on a quarter-on-same-quarter a year ago basis for the first time since 2009. Output growth has also picked up, but to a lesser extent than inputs, which has led productivity growth to be weak.

In general, because changes in productivity represent long-term structural trends, we advise looking at changes over a longer time period, which can help to smooth any short-term fluctuations in growth rates. Comparing quarters with the same quarter a year ago provides a rolling annual estimate of productivity and is therefore a good indication of the future path of the National Statistics annual estimates. These include additional data sources that are less timely than those used for quarterly estimates.

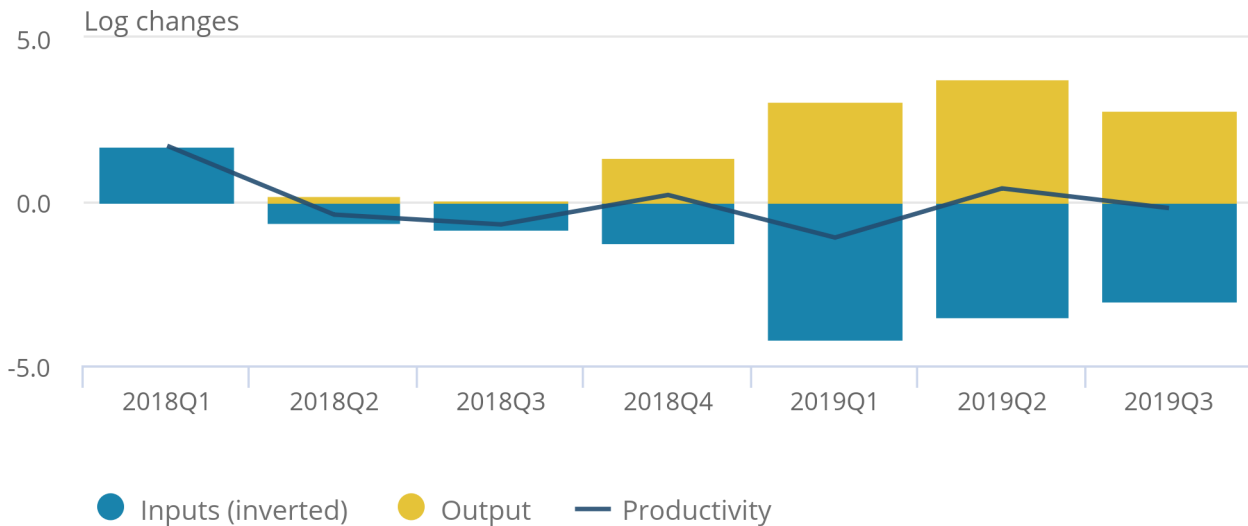
As inputs growth has a negative effect on productivity growth, both Figure 1 and Figure 2 invert the growth rates of inputs. As such, the sum of the stacked bars (output, and inverted inputs) is equal to productivity growth.

**Figure 1: Productivity fell in Quarter 3 2019 compared with the same quarter of the previous year**

Public service productivity, inputs and output, quarter-on-same-quarter-a-year-ago growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 3 (July to Sept) 2019

Figure 1: Productivity fell in Quarter 3 2019 compared with the same quarter of the previous year

Public service productivity, inputs and output, quarter-on-same-quarter-a-year-ago growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 3 (July to Sept) 2019



Source: Quarterly UK public service productivity: July to September 2019

Notes:

1. Data are from this experimental quarterly release.
2. Experimental quarterly estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
3. Growth rates have been expressed in (natural) logarithm changes such that output growth and (inverted) input growth can be added to exactly equal changes in productivity. Further information on log changes can be found in Section 3 of [A simple guide to multi-factor productivity](#).

Figure 2 shows that public service productivity growth is volatile on a quarter-on-quarter basis. It decreased by 0.3% in Quarter 3 2019 compared with the previous quarter, following a decrease in Quarter 2 (Apr to June) 2019 of 0.3%.

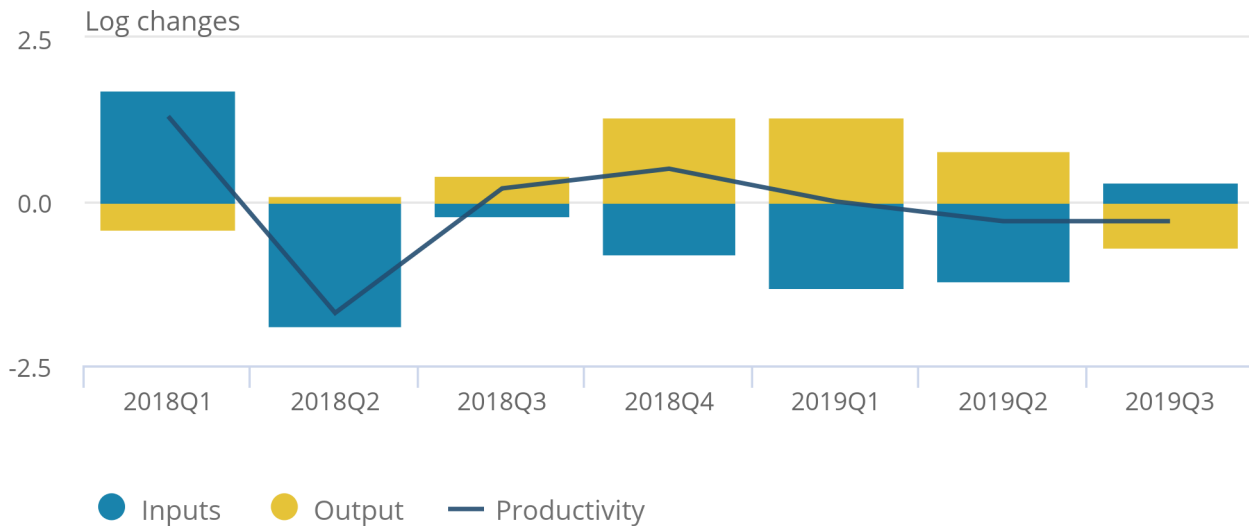
The decrease in productivity in Quarter 3 2019 compared with the previous quarter was driven by a sharp fall in output (0.7%) which outpaced a modest decrease in inputs (0.3%). This was the largest fall in output on this basis since Quarter 1 2013, and the first negative growth rate of output since Quarter 1 2018. It is also the first quarter-on-quarter fall in inputs since Quarter 1 2018. This change to the pattern of inputs and output growth relative to recent quarters could be subject to change in future releases once more data become available (see Section 3 for a discussion).

## Figure 2: Productivity fell in Quarter 3 2019 compared with Quarter 2 2019

Public service productivity, inputs and output, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 3 (July to Sept) 2019

### Figure 2: Productivity fell in Quarter 3 2019 compared with Quarter 2 2019

Public service productivity, inputs and output, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 3 (July to Sept) 2019



Source: Quarterly UK public service productivity: July to September 2019

#### Notes:

1. Data are from this experimental quarterly release.
2. Experimental quarterly estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
3. Growth rates have been expressed in (natural) logarithm changes such that output growth and (inverted) input growth can be added to exactly equal changes in productivity. Further information on log changes can be found in Section 3 of [A simple guide to multi-factor productivity](#).

The quarterly fall in output was driven mainly by a sharp decrease in other central government services, and smaller falls in other local government services and military defence. The output of other government services (central and local government) and military defence are measured indirectly, using the volume of inputs used to produce them. As such, the falls in output in these service areas reflect equivalent falls in inputs, and thus have no effect on productivity. The falls in inputs in Quarter 3 2019 follow strong inputs growth in previous quarters, as discussed in [previous releases](#).

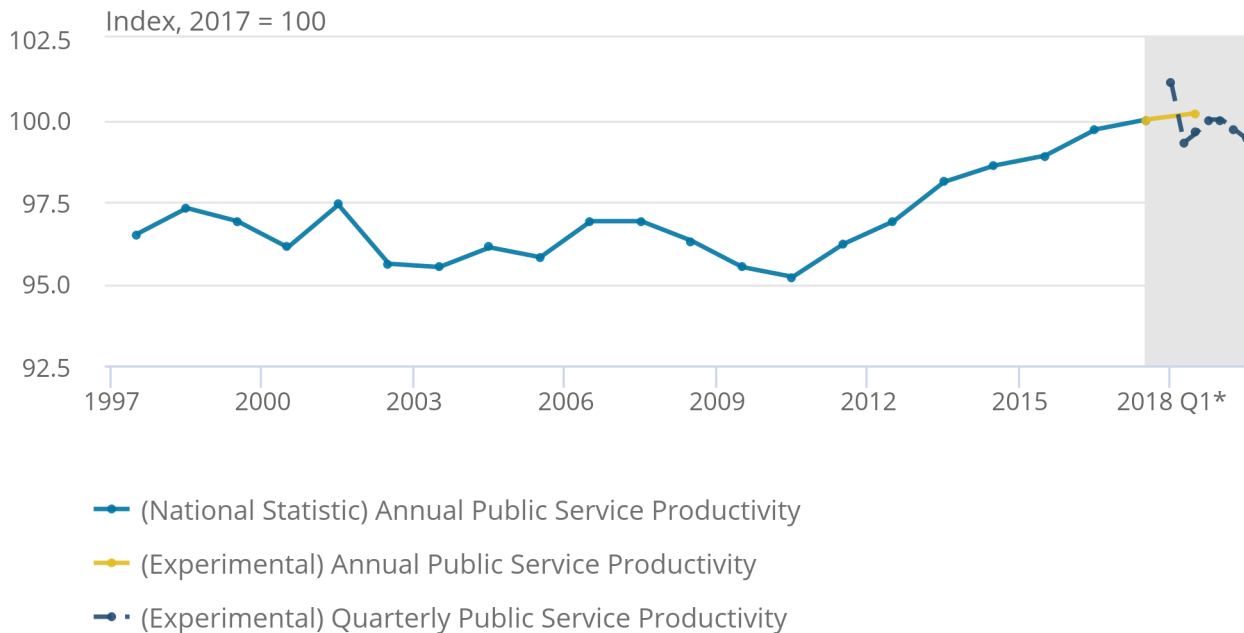
Placing these movements in the context of a longer time series, Figure 3 combines the experimental quarterly data in this release and the annualised version of this for 2018, with estimates between 1997 and 2017 taken from our latest annual release. The annual public service productivity estimates are more comprehensive than the experimental quarterly estimates in this release, and adjust output for changes in the quality of services delivered. [Annual estimates for 2017](#) are published for the first time alongside this release.

### Figure 3: Productivity is volatile from Quarter 1 2018 to Quarter 3 2019 but declines overall

Total public service productivity, UK, 1997 to Quarter 3 (July to Sept) 2019

## Figure 3: Productivity is volatile from Quarter 1 2018 to Quarter 3 2019 but declines overall

Total public service productivity, UK, 1997 to Quarter 3 (July to Sept) 2019



Source: Public service productivity: total, UK, 2017 and Quarterly UK public service productivity: July to September 2019

#### Notes:

1. Estimates from 1997 to 2017 are based on the latest annual public service productivity release.
2. Estimates from Quarter 1 2018 to Quarter 3 2019 (in grey) are the experimental quarterly estimates in this article and are annualised (in yellow) for 2018.
3. Estimates of productivity for the experimental period are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.

The latest annualised quarterly data suggest that 2018 saw growth of 0.2% in public service productivity, but this should be treated as an experimental estimate until the more robust annual estimate for 2018 is available in our National Statistics publication. In particular, the data in this quarterly release are not adjusted for changes in quality during the experimental period.

The experimental estimate of lower growth in 2018 suggests that the growth in public service productivity since 2010 may be starting to tail off. The 0.3% growth in 2017, published in the National Statistics article alongside this release, continues the trend since 2010, but is the joint slowest over that period.

### 3 . Analysis on data uncertainty and sources of revisions

Every statistic will contain some element of [uncertainty](#), particularly Experimental Statistics such as the estimates of quarterly public service productivity in this article. Uncertainty refers to the relation of the data to the “true” value, and it is important to understand this so that the data are used appropriately.

Public service productivity operates an open revisions policy, which means we take on improved data sources and methods as soon as they become available. In each article, we revise productivity estimates based on updated data (and occasionally new methods). There are three main types of causes for these revisions:

- uncertainty around the data (revisions to source data)
- uncertainty from methodology changes (within public service productivity systems or to source data, for example in the national accounts)
- uncertainty in certain quarters (estimates for Quarter 2 (Apr to June) tend to be revised to a greater extent because of the new financial year starting in this quarter, so most spending estimates are forecasts. See [Public sector finances QMI Report](#)).

Figure 4 illustrates the revisions to estimates of quarterly public service productivity by contrasting three publications of the same estimates, each a year apart. As well as the series in this publication, Figure 4 includes equivalent series published in January 2019 and January 2018 (each extending only as far as was possible at the time).

Between each of these publications, a number of changes impacted the estimates:

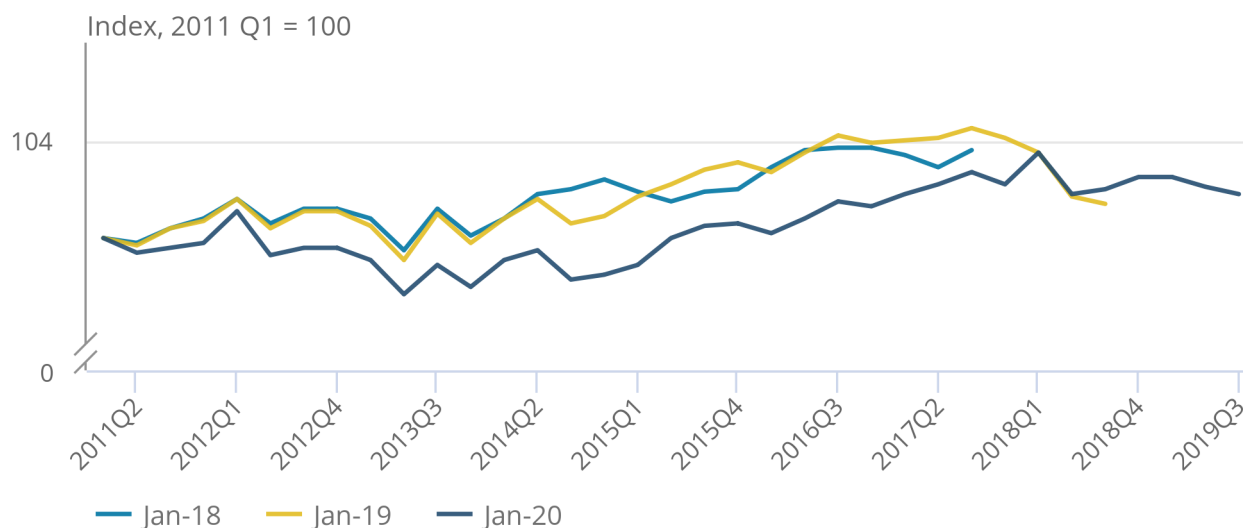
- changes to source data as a result of increased response rates and the replacement of forecasts with outturn data
- changes to source data as a result of national accounts methods revisions introduced through successive Blue Books
- changes to methods in the public service productivity system as new approaches were developed and preferred data sources introduced

## Figure 4: Comparing three iterations of quarterly public service productivity publications

Estimates of quarterly public service productivity since Quarter 1 (Jan to Mar) 2011, as published in January 2018, January 2019, and January 2020

### Figure 4: Comparing three iterations of quarterly public service productivity publications

Estimates of quarterly public service productivity since Quarter 1 (Jan to Mar) 2011, as published in January 2018, January 2019, and January 2020



Source: Quarterly UK public service productivity: July to September 2019 and previous publications

#### Notes:

1. All estimates are based on experimental quarterly total public service productivity.
2. Estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
3. Estimates of productivity growth between 2011 and 2017 will not equate to any iteration of the National Statistics annual estimates due to differences in data sources and methods. The National Statistics annual estimates are preferred where available (up to 2017 as of this release), but earlier experimental estimates are shown here for illustrative purposes.

In Figure 4, the January 2020 line (using data from this article) grows more slowly than earlier estimates for much of the time series as the result of methodological improvements to the measurement of capital inputs, among other factors. These were introduced in Blue Book 2019 and were detailed in the [previous quarterly article](#), when these changes were first implemented.

The short-term fluctuations in the January 2020 and January 2019 lines are similar until around 2017, despite the change in trend. More recent estimates are noticeably different, reflecting a period of higher uncertainty as revised source data impact on estimates as well as methods changes. Estimates of periods further from the present tend to be revised less, as the source data become finalised through rounds of revisions.

Differences between the January 2019 and January 2018 line are minor before Quarter 2 2014, and significant thereafter. This is primarily because of changes implemented in Blue Book 2018, which included improvements to the measurement of public sector pensions and other methodological and data improvements (see [National Accounts articles: Impact of Blue Book 2018 changes](#)). It should also be noted that some updates to data coverage or methodological improvements are not possible to carry throughout the series, and as such only more recent estimates may be revised after their use.

## 4 . Revisions since the last publication

This section details revisions to the quarterly experimental series since [the previous release](#), published on 8 October 2019. Revisions have been made throughout our data series, but trends have remained broadly the same.

Quarter-on-same-quarter a year ago productivity growth was revised up for Quarter 2 (Apr to June) 2019, from negative 0.3% to 0.4%. It was revised slightly upwards for Quarter 1 (Jan to Mar) 2019, from negative 1.2% to negative 1.1% (remaining negative). Figure 5 shows the impact of these revisions on public service productivity since Quarter 1 2018. Most quarters have been revised following data source improvements, with a mixture of upwards and downwards movements.

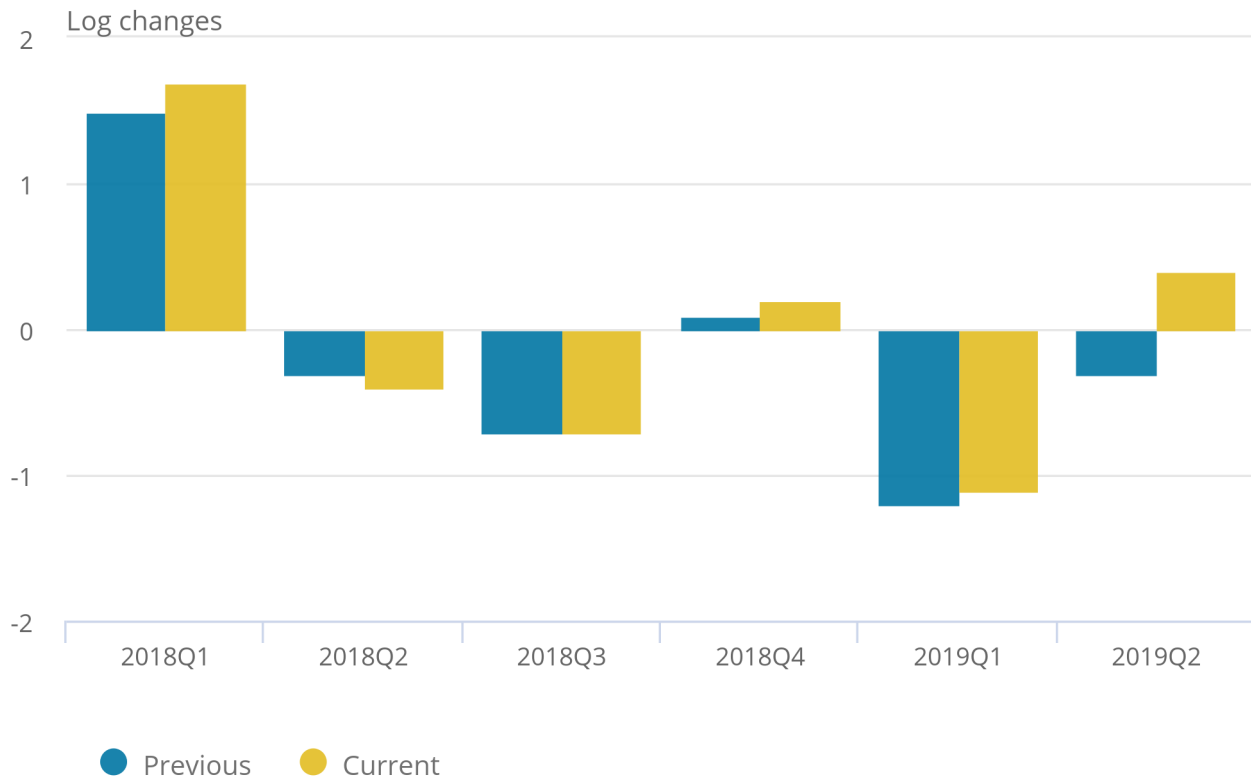


## Figure 5: Productivity was revised across the quarterly time series

Public service productivity revisions, quarter-on-same-quarter-a-year-ago growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 2 (Apr to June) 2019

### Figure 5: Productivity was revised across the quarterly time series

Public service productivity revisions, quarter-on-same-quarter-a-year-ago growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 2 (Apr to June) 2019



Source: Quarterly UK public service productivity: July to September 2019

#### Notes:

1. All estimates are based on experimental quarterly total public service productivity.
2. Estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
3. "Previous" refers to estimates included in the publication on 8 October 2019.
4. Growth rates have been expressed in (natural) logarithm changes. Further information on log changes can be found in Section 3 of [A simple guide to multi-factor productivity](#).

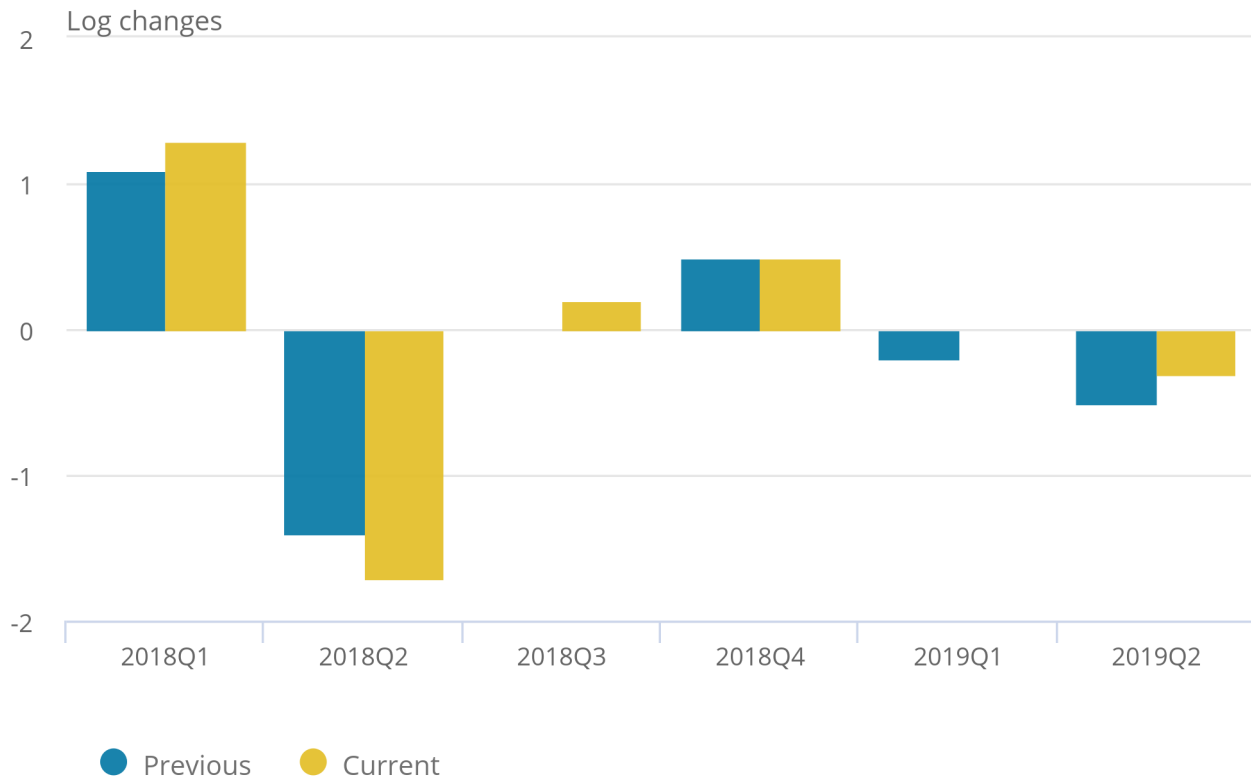
When comparing with the previous quarter, growth rates have been revised in most quarters since Quarter 1 2018 – although the trend varies across the series. Figure 6 illustrates the volatility of the quarter-on-quarter revisions to productivity.

## Figure 6: Productivity revisions vary when comparing with the previous quarter

Public service productivity revisions, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 2 (Apr to June) 2019

### Figure 6: Productivity revisions vary when comparing with the previous quarter

Public service productivity revisions, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 2 (Apr to June) 2019



Source: Quarterly UK public service productivity: July to September 2019

#### Notes:

1. All estimates are based on experimental quarterly total public service productivity.
2. Estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
3. "Previous" refers to estimates included in the publication on 8 October 2019.
4. Growth rates have been expressed in (natural) logarithm changes. Further information on log changes can be found in Section 3 of [A simple guide to multi-factor productivity](#).

## 5 . Background to public service productivity measurement

Productivity is calculated by dividing output by the respective inputs used to produce it. Productivity will increase when more output is being produced for each unit of inputs used. Estimates of inputs, output and productivity are given both as growth rates between consecutive periods and as indices, showing the cumulative trend over time.

For total UK public services, estimates of output and inputs are made up of aggregated series for individual public services, weighted together by their relative share of total expenditure on public services (expenditure weight). Inputs are composed of labour, goods and services, and consumption of fixed capital. Expenditure data, used to estimate most inputs growth, are taken from the [GDP quarterly national accounts \(QNA\), UK: July to September 2019](#). The QNA also provide estimates of government output, based on direct measures where they are available, and indirect measures where they are not.

Users should be aware that all growth rates in this release are expressed as changes in (natural) logarithms, including previous estimates. These can differ slightly from the discrete percentage changes typically used in our other statistical releases and previous public service productivity publications. The use of log changes allows decompositions of productivity to be exactly additive between inputs and output. In general, when the growth rates are smaller, the deviation of log changes from discrete percentage change is small.

Further information on log changes can be found in Section 3 of [A simple guide to multi-factor productivity](#).

## 6 . Quality, methodology and future improvements

This release presents experimental estimates for total public service productivity, inputs and output, providing a short-term, timely indicator of the future path for the National Statistics estimates of total public service productivity, which are produced with a two-year lag. Estimates of output, inputs and productivity up to 2017 are reported on an annual basis and use data from [Public service productivity: total, UK, 2017](#). Further information about the annual National Statistics release can be found in the [QMI report](#).

Differences between the National Statistics and experimental releases, and information on data sources for quarterly total public service productivity can be found in [New nowcasting methods for more timely quarterly estimates of UK total public service productivity](#).

As these statistics are experimental, we are continuously improving our methods. We intend to explore the following areas to improve these statistics over the coming year:

- Explore the feasibility of providing indicators of changes in quality of public service output to make the quarterly estimates better predictors of the future trend of the National Statistics annual estimates, which include quality adjustments.
- Continue to publish analysis of the underlying movements driving quarterly productivity movements, including analysis for service areas, and explore the feasibility of publishing more detail by service area.
- Develop experimental direct output measures for service areas that are currently indirectly measured; in particular, central government (civil service) activities.
- Continue to review our data sources and methods, and make improvements where possible.

Feedback on the use of these estimates and suggestions for improvements will be essential for the future development of timely estimates for public service productivity. All questions and feedback can be sent via email to [productivity@ons.gov.uk](mailto:productivity@ons.gov.uk).

## 7 . Authors

Josh Martin, Sonny Ali and Leah Harris, Office for National Statistics

## 8 . Related links

[Public service productivity: total, UK, 2017](#)

Article | Released 8 January 2020

Updated measures of output, inputs and productivity for public services in the UK between 1997 and 2016, in addition to new estimates for 2017

[Productivity economic commentary: July to September 2019](#)

Article | Released 8 January 2020

Draws together the main findings from official statistics and analysis of UK productivity to present a summary of recent developments.

[Labour productivity, UK: July to September 2019](#)

Article | Released 8 January 2020

The latest estimates of labour productivity for the whole economy.

[Unit labour costs, UK: July to September 2019](#)

Article | Released 8 January 2020

Unit labour costs and sectional unit labour costs estimates for the whole economy and a range of industries.

[A simple guide to multi-factor productivity](#)

Article | Released 5 October 2018

Explains the concept and measurement of multi-factor productivity through simple stylised examples.