Office for National Statistics

Article

Public service productivity: quarterly, UK, October to December 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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Next release:
To be announced

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1 . Main points

- In Quarter 4 (Oct to Dec) 2019, compared with the same quarter a year ago, productivity for total public services fell by 1.1%; this is because inputs grew at a faster rate (4.7%) than output (3.6%).
- Compared with the same quarter a year ago, Quarter 4 2019 saw inputs grow at the fastest rate since Quarter 4 2008, continuing the recent trend of strong inputs growth.
- Productivity decreased by 0.2% compared with the previous quarter; this was also caused by an increase in inputs (1.7%) that exceeded the increase in output growth (1.5%).
- The first annualised experimental estimate of quarterly productivity for 2019 suggests a fall of 0.2% compared with 2018; when put alongside our National Statistics annual estimates of public service productivity, this suggests the first annual decline since 2010.
- Because of methodological improvements, our latest estimates of productivity have a slightly slower rate of growth in recent quarters compared with previous estimates.

2 . Trends in quarterly public service productivity

Productivity for total public services was down in Quarter 4 (Oct to Dec) 2019 compared with the same quarter a year ago (Figure 1). Over this period, inputs increased by 4.7% while output increased by 3.6%, causing productivity to fall by 1.1%.

Quarter 4 2019 continued the trend of strong inputs growth seen in 2019, as discussed in previous releases. The main services causing the growth seen in this quarter's inputs were healthcare and central government, with military defence and local government also contributing.

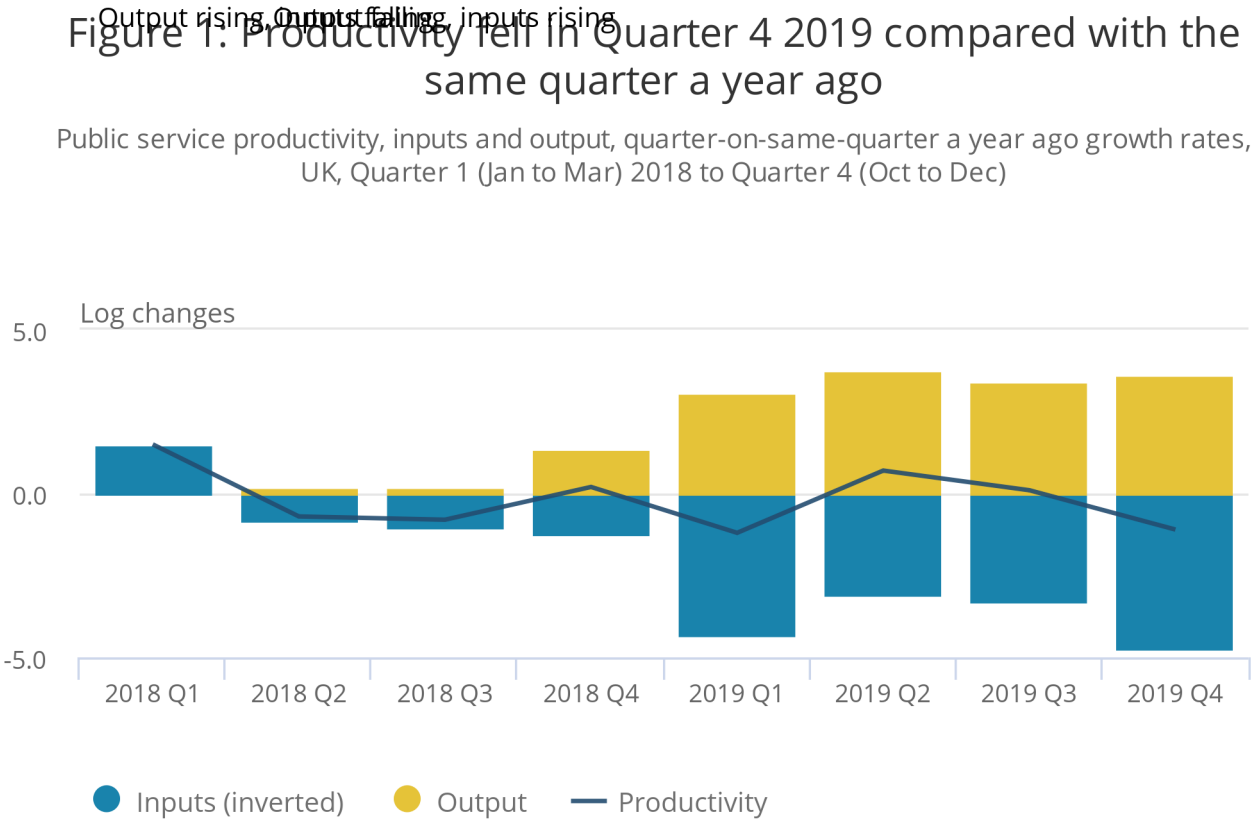
The increase in inputs of 4.7% in Quarter 4 2019 was the highest recorded since Quarter 4 2008. Please note that these estimates are subject to revisions due to improvements to source data and methodology. More information on the sources of revisions can be found in the previous article.

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. Comparing quarters with the same quarters a year previously provides a rolling annual estimate of productivity and is therefore a good indication of the future path of the National Statistics annual estimates, which 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 (inverted inputs and output) is equal to productivity growth.

Figure 1: Productivity fell in Quarter 4 2019 compared with the same quarter a year ago

Public service productivity, inputs and output, quarter-on-same-quarter a year ago growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 4 (Oct to Dec)



Source: Public service productivity: quarterly, UK, October to December 2019

Notes:

1. Data are from this experimental quarterly release.

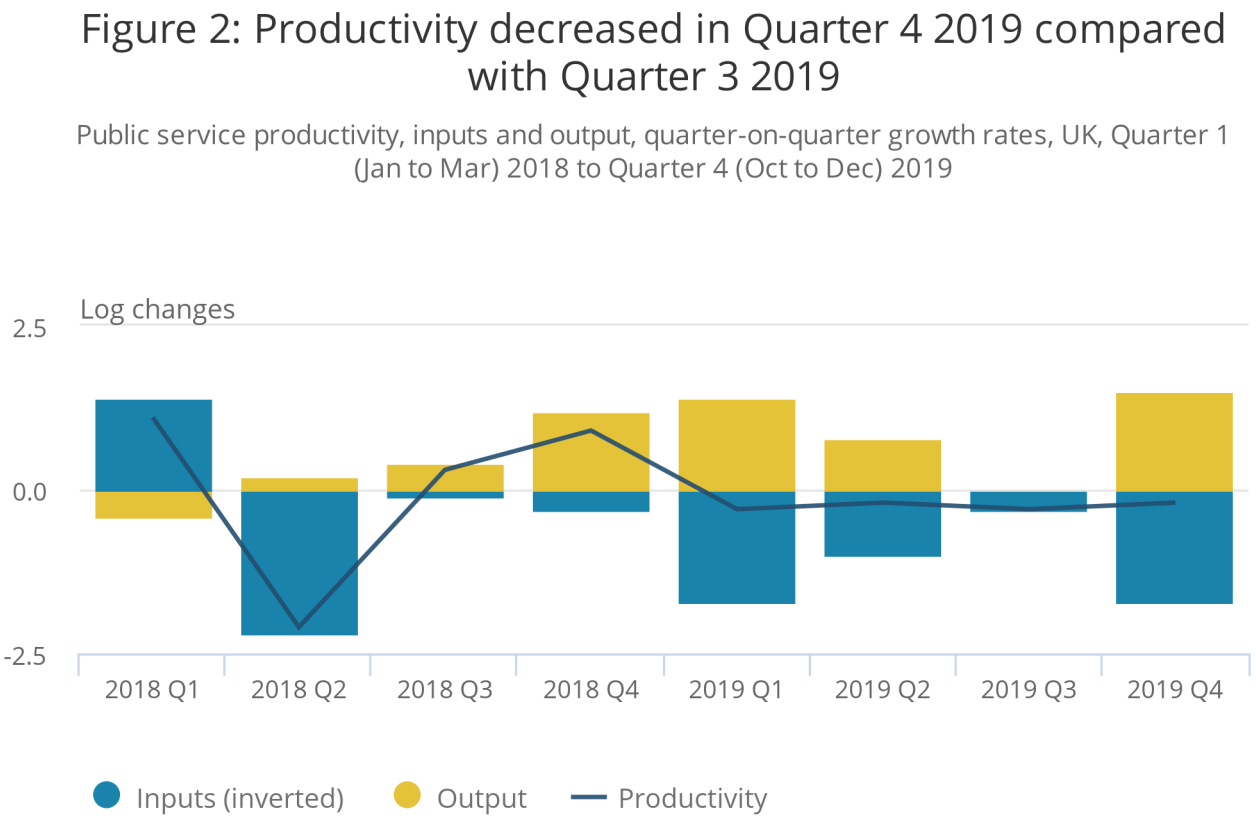
2. Experimental quarterly estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.

3. Growth rates have been expressed in (natural) logarithm changes. 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 was volatile on a quarter-on-quarter basis until 2019, when it seemed to be more stable. Productivity decreased by 0.2% in Quarter 4 2019 compared with the previous quarter. This was caused by an increase of inputs of 1.7%, which outstripped output growth of 1.5%.

Figure 2: Productivity decreased in Quarter 4 2019 compared with Quarter 3 2019

Public service productivity, inputs and output, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2018 to Quarter 4 (Oct to Dec) 2019



Source: Public service productivity: quarterly, UK, October to December 2019

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

Quarter 4 2019's increase in output was the largest observed since Quarter 1 (Jan to Mar) 2012, continuing the recent trend of constant or positive growth in output since Quarter 2 2018. Quarter 3 (July to Sept) 2018 saw a revision upwards to 0.0% from an unusual fall of negative 0.7%. Further information on the causes of this and any other revisions can be found in Section 4 of this article.

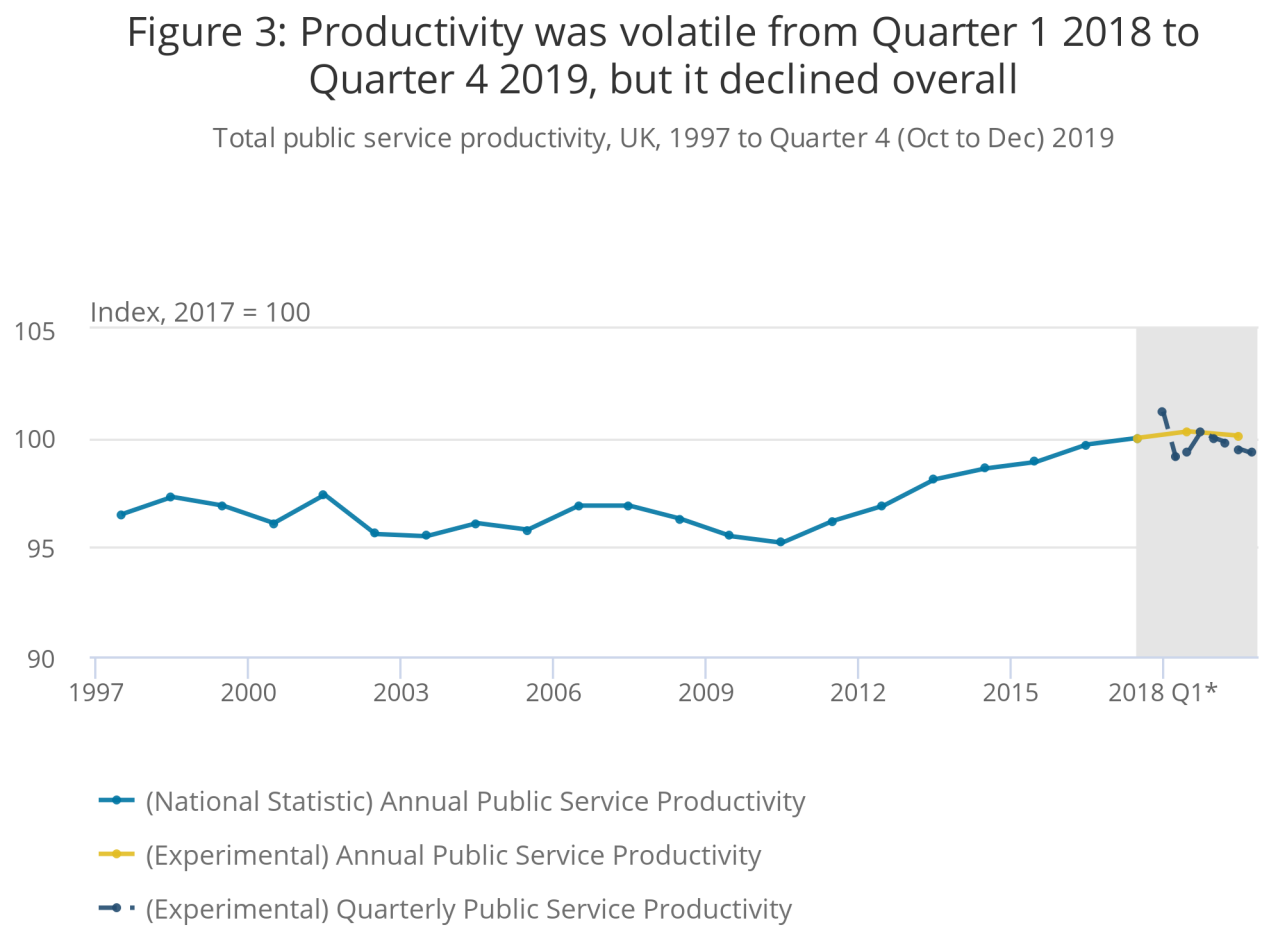
A sharp increase in central government services was the main cause of output growth. However, the output of central government services, local government services and military defence are measured indirectly, using the volume of inputs used to produce them. As such, the increase in output in these service areas reflects equivalent increases in inputs, and they therefore have no effect on productivity.

For the last four quarters, inputs growth has outstripped output growth, meaning productivity fell in every quarter in 2019.

Placing these movements in the context of a longer time series, Figure 3 combines the experimental quarterly data in this release and the annualised versions of these for 2018 and 2019, 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 they adjust output for changes in the quality of services delivered.

Figure 3: Productivity was volatile from Quarter 1 2018 to Quarter 4 2019, but it declined overall

Total public service productivity, UK, 1997 to Quarter 4 (Oct to Dec) 2019



Source: Public service productivity: quarterly, UK, October to December 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 4 2019 (in grey) are the experimental quarterly estimates in this article and are annualised (in orange) for 2018 and 2019.
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 2019 saw the first fall in annual public service productivity since 2010. Inputs were estimated to have grown by 3.8%, greater than the estimated growth in output of 3.6%, causing productivity to fall by 0.2%.

This estimate should be treated with caution until the more robust annual estimate for 2019 is available. In particular, data in this release are not adjusted for changes in quality during the experimental period: quality is held constant at the level of the last published annual period. Nonetheless, public service productivity is estimated to have increased by a total of 5.0% between 2010 and 2019 (an average of 0.5% per year). More information on the differences between annual estimates and annualised quarterly estimates can be found in Section 6 of this article.

3 . Methodological improvements in this release

Significant methodological changes were introduced in Quarter 4 (Oct to Dec) 2019. These changes affected healthcare inputs.

NHS bank staff

Following on from developments to the annual publication, we have introduced NHS bank staff into the quarterly inputs in this release. Bank staff are similar to agency staff and work variable hours to help meet fluctuating healthcare needs and patient demand. Please note that unlike agency staff, bank staff are employed directly by the NHS and so count as a healthcare labour input.

NHS England and NHS Improvement began measuring total expenditure on NHS bank staff in England, starting from the financial year ending 2016. The volume of bank staff can therefore be indirectly measured by deflating bank staff expenditure with the NHS providers' pay cost deflator.

As this group was previously excluded and the scale of bank staff employed in the NHS has increased in recent years, including them has contributed to upward revisions in inputs and hence downward revisions in productivity.

Healthcare deflators

We have improved our healthcare deflators. In previous quarterly releases, the Health Service Cost Index (HSCI) was used to deflate healthcare intermediate consumption. As it was discontinued in 2017, we forecasted the HSCI from Quarter 1 (Jan to Mar) 2017 onwards, until implementing a new deflator, the NHSCII (NHS Cost Inflation Index), in this release. The NHSCII has been implemented from Quarter 1 2015 onwards.

Intermediate consumption is defined as the value of inputs consumed in the process of production. For healthcare, this includes non-pay costs such as drugs, clinical supplies and general supplies.

The NHSCII is a composite deflator made up of a weighted basket of inputs, with each element deflated by an appropriate price index. By including only non-pay costs in the weighted basket of inputs, we are able to derive a quarterly index suitable to deflate healthcare intermediate consumption.

The NHSCII replaced the HSCI deflator from Quarter 1 2015 onwards. The NHSCII has grown more slowly than the HSCI over this period, meaning growth in the volume of healthcare intermediate consumption has been revised up. This has contributed to downward revisions in productivity.

4 . Revisions since the last publication

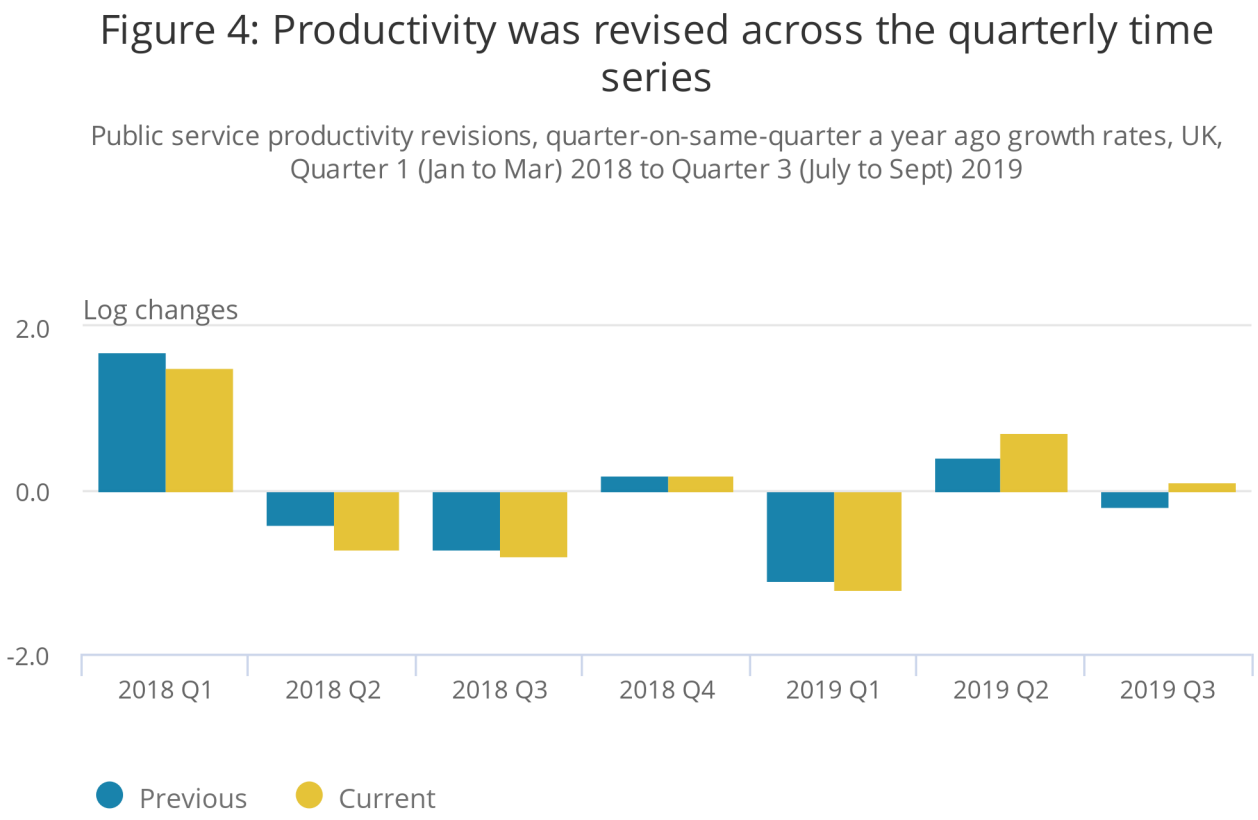
This section details revisions to the quarterly experimental series since the previous release, released 8 January 2020. We have made revisions throughout our data series.

While trends have remained broadly the same, productivity has seen a slight revision downwards overall in recent quarters.

We revised quarter-on-same-quarter a year ago productivity growth up for Quarter 3 (July to Sept) 2019, from negative 0.2% to positive 0.1%. Figure 4 shows the impact of these revisions on public service productivity since Quarter 1 2018. Revisions can occur due to methodology and data source improvements, in line with the ONS revisions policy.

Figure 4: 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 3 (July to Sept) 2019



Source: Public service productivity: quarterly, UK, October to December 2019

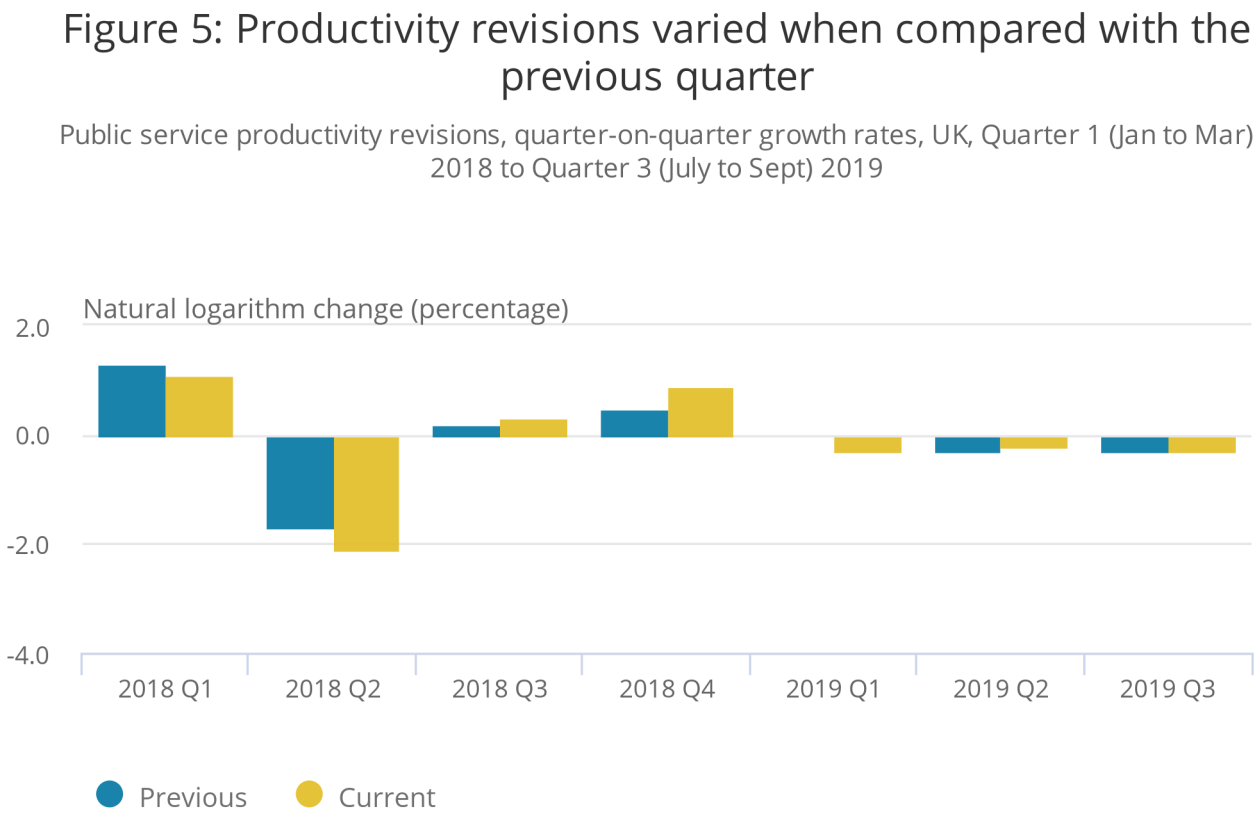
Notes:

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 January 2020.
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. However, the trend varies across the series. Figure 5 illustrates the quarter-on-quarter revisions to productivity.

Figure 5: Productivity revisions varied when compared with the previous quarter

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



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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.
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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, therefore, 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, UK: October to December 2019 . The quarterly national accounts 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 articles. The use of log changes allows decompositions of productivity to be exactly additive between inputs and output. In general, where 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 productivity, inputs and output 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 Public service productivty: total, UK QMI.

Differences between the National Statistics and experimental quarterly statistics

Different sources and methods are used to produce the experimental quarterly statistics and the National Statistics.

This release uses expenditure data from quarterly UK National Accounts, split into seven categories:

- health
- education
- social protection
- justice and fire
- military defence
- central government services
- local government services

The National Statistic uses data from annual UK National Accounts on a government services Classification of the Functions of Government (COFOG) basis. There are therefore differences in the source expenditure data and in how public services are categorised and aggregated.

Data sources and methods differ from the annual publication, depending on data availability and appropriateness on a quarterly or annual basis. For example, some inputs measures that are available on an annual basis as direct measures are not available on a quarterly basis. These missing quarterly direct input measures may only be obtainable using indirect measures (deflated expenditure).

The National Statistic also uses different deflators to those used in this release to estimate those volumes of inputs. As such, estimates are not directly comparable between the quarterly and the annual publications.

Most importantly, this release does not provide adjustments for the quality in public service output whereas the National Statistic does for some public output.

As such, estimates are not directly comparable between the quarterly and the annual publications. Table 1 illustrates how annual average growth rates differ between quality adjusted and non-quality adjusted estimates, and how these compare to the annualised estimated growth rates for 2018 and 2019.

Table 1: A comparison of quality-adjusted and non-quality-adjusted annual productivity growth
Public service productivity, annual growth rate estimates, UK

	1997-2017	2010-2017	2018	2019
Quality Adjusted	0.2%	0.7%	-	-
Non Quality Adjusted	(0.2%)	0.5%	0.3%	(0.2%)

Source: Public service productivity: quarterly, UK, October to December 2019

Notes

1. Estimates pre-2018 are compound annual average growth rates, derived from National Statistics figures. The 2018 and 2019 estimates are derived from annualised quarterly esimates from Experimental Statistics figures.

2. The growth rate estimate for 2018 refers to growth from the previous year, from 2017 to 2018. Likewise, the growth rate estimate for 2019 refers to growth from the previous year.

3. Estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.

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.

Please note that quality-adjusted productivity has been historically stronger than non-quality-adjusted productivity.

Further information on the methodology of the annual National Statistics release on public service productivity can be found in Public service productivity: total, UK QMI.

Information on data sources and methods for quarterly total public service productivity can be found in New nowcasting methods for more timely quarterly estimates of UK total public service productivity.

Improvements

As the quarterly 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 causing movements in quarterly productivity, 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 emailed to productivity@ons.gov.uk.

7 . Authors

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