

Article

Quarterly UK public service productivity (Experimental Statistics): April to June 2018

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.

Contact:
Fred Foxtton
productivity@ons.gov.uk
+44 (0)1633 455750

Release date:
5 October 2018

Next release:
9 January 2019

Table of contents

1. [Main points](#)
2. [Things you need to know about this release](#)
3. [Quarterly public service productivity decreases as inputs grow while output remains unchanged](#)
4. [What's changed in this release?](#)
5. [Future developments](#)
6. [Authors](#)
7. [Quality and methodology](#)
8. [Links to related statistics](#)

1 . Main points

- In Quarter 2 (Apr to June) 2018, public service productivity decreased by 2.0% on the previous quarter; this was predominantly driven by inputs growing by 2.1% while output remained broadly unchanged.
- Comparing with the same quarter in the previous year, productivity for total public services decreased by 0.8% in Quarter 2 2018.
- Revised up from previous estimates, public service productivity fell by 0.3% in 2017, as year-on-year output fell by 0.1% while inputs increased by 0.2%.
- These estimates are [experimental](#), using a degree of estimation to deliver timelier estimates compared with our [national statistic public service productivity](#) figures, which are published with a two-year lag; the methodology used in these experimental estimates is explained in [New nowcasting methods for more timely quarterly estimates of UK total public service productivity](#).

2 . Things you need to know about this release

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.

Estimates of total public service output and inputs are made up of aggregated series for individual public services, weighted 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. For some labour inputs, direct quantity measures, such as full-time equivalent, can be observed and are used to measure growth in the quantity of inputs. For other areas of labour, all areas of goods and services and consumption of fixed capital, the quantities of inputs are not directly available. In these cases, the quantities of inputs are estimated by taking associated expenditure data and adjusting for inflation using a suitable price index (deflator). Expenditure data, used to estimate most inputs growth, are taken from the quarterly national accounts (QNA).

The QNA also provide estimates of government output, based on direct measures where they are available and indirect measures where they are not. Direct measures of output use the number of activities performed and services delivered, which are weighted together using their relative cost of delivery. Indirect measures of service output assume that the volume of output is equal to the volume of inputs used to create them. This is referred to as the “output-equals-inputs” convention and means that productivity growth will always be zero where indirect measures are used.

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 statistic estimates of total public service productivity](#), which are produced with a two-year lag.

Estimates of output, inputs and productivity up to 2015 are reported on an annual basis and use data from [Public service productivity estimates: total public service, UK: 2015](#). This allows the entire time series to reflect the most comprehensive data, leading to a fuller understanding of UK public services. Crucially, the measures of output reflect quality changes for years up to 2015. After 2015, estimates in this article are presented on both a quarterly and annual basis¹, however, we assume the quality of services provided has not changed and remains constant throughout the period. Further information is available in the [Quality, Methodology and Information report](#).

Trends in quarterly total public service output, inputs and productivity estimates are mostly determined by those service areas where quarterly data are readily available, for example, healthcare. A large proportion of activity data used to estimate the volume of output are annual data. This has subsequently been converted to a quarterly series – split among the four quarters – reducing the impact these components have on volatility.

Differences between the national statistic and experimental public service productivity estimates are a result of differences in the estimates of output and inputs. Further information on these differences can be found in [New nowcasting methods for more timely quarterly estimates of UK total public service productivity](#).

Notes for: Things you need to know about this release

1. Using annualised quarterly data.

3 . Quarterly public service productivity decreases as inputs grow while output remains unchanged

Public service productivity decreased by 2.0% in Quarter 2 (Apr to June) 2018 relative to the previous quarter. This follows an increase of 0.9% in Quarter 1 (Jan to Mar) 2018 and flat growth (0.0%) in Quarter 4 (Oct to Dec) 2017; both quarters having been revised from previous estimates. The relatively strong decline in Quarter 2 2018 has taken public service productivity to a lower level than it was at in 2015.

Table 1 shows quarter-on-quarter growth of experimental quarterly productivity and the underlying changes in inputs and output of total public services from 2016 onwards. From Table 1, we can see that the recent contraction in quarterly productivity of 2.0% was driven by a 2.1% quarter-on-quarter increase in inputs, while output remained broadly unchanged.

Table 1: Experimental quarterly growth of inputs, output and productivity

UK, Quarter 1 (Jan to Mar) 2016 to Quarter 2 (Apr to June) 2018

Quarters	Period-on-period % growth rates					
	Inputs	Output	Productivity	Inputs	Outputs	Productivity
	Quarter-on-quarter			Quarter-on-quarter a year ago		
2016 Q1	0.4	0.4	-0.1	0.2	1.4	1.2
2016 Q2	-0.3	0.1	0.5	-0.1	1.1	1.2
2016 Q3	-0.6	-0.1	0.5	-1.1	0.2	1.2
2016 Q4	0.1	0.0	-0.1	-0.4	0.4	0.8
2017 Q1	0.5	-0.3	-0.8	-0.3	-0.3	0.1
2017 Q2	0.0	0.1	0.0	0.0	-0.3	-0.4
2017 Q3	-0.3	0.1	0.4	0.4	-0.1	-0.5
2017 Q4	0.3	0.2	0.0	0.5	0.1	-0.4
2018 Q1	-0.9	0.0	0.9	-1.0	0.3	1.3
2018 Q2	2.1	0.0	-2.0	1.1	0.3	-0.8

Source: Office for National Statistics

Notes:

1. Figures have been rounded to one decimal place.
2. Output growth minus inputs growth does not necessarily equal productivity growth.

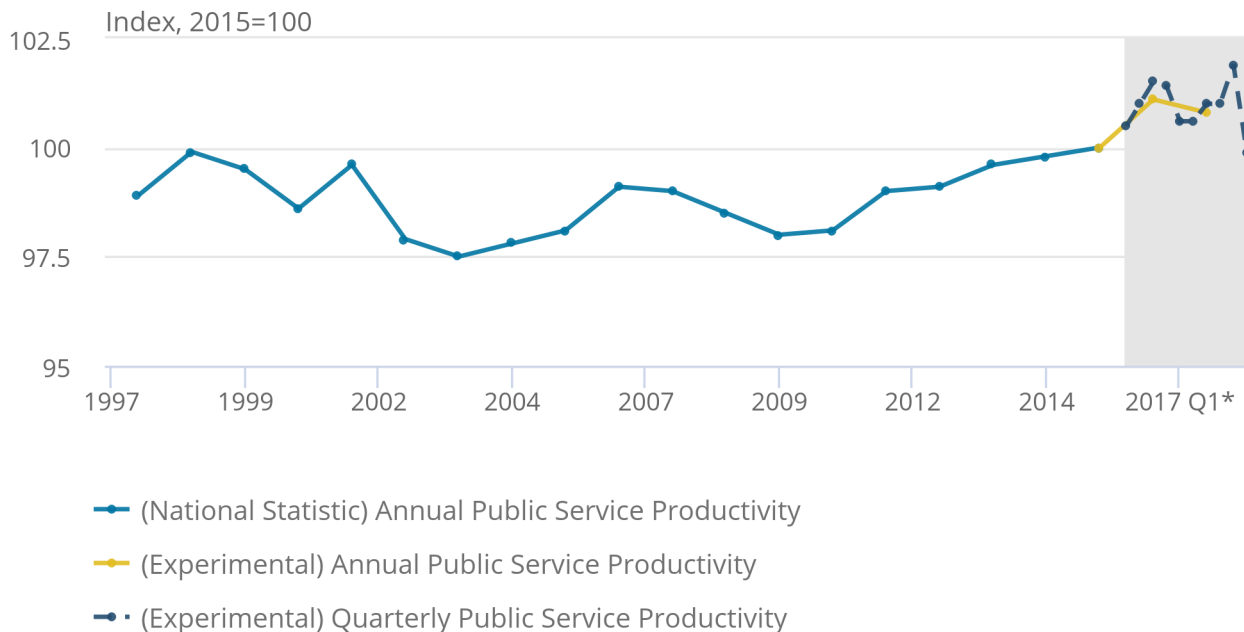
In addition, Table 1 shows the latest growth between each quarter and the corresponding quarter of the previous year – referred to as quarter on same quarter a year ago. Owing to quarter-on-quarter movements, growth in public service productivity, inputs and output can be large and liable to unpredictable change, despite seasonal factors being taken into account. Looking at changes in productivity between periods that are further apart can reduce the volatility of growth rates.

When comparing Quarter 2 2018 with Quarter 2 2017, total public service productivity decreased by 0.8%. This was driven by inputs increasing at a faster rate than output, at 1.1% and 0.3% respectively, relative to the same quarter in 2017.

Productivity change, on an annual basis, was revised up to negative 0.3% for 2017 from previous estimates, published in [Quarterly UK public service productivity \(Experimental Statistics\): January to March 2018](#). In 2017, output decreased by 0.1% and inputs increased by 0.2%, marking the first contraction in annual total public service productivity since 2009. In 2016, output grew by 0.8% and inputs fell by 0.3%, resulting in unrevised productivity growth of 1.1%. Placing this in the context of a longer time series, Figure 1 combines the latest annualised experimental series for 2016 and 2017 – with estimates between 1997 and 2015 taken from our [Public service productivity estimates: total public service, UK: 2015](#) release. It shows that, between 2010 and 2017, total public service productivity increased by 2.8% – an average growth rate of 0.4% per year.

Figure 1: Total UK public service productivity, 1997 to Quarter 2 (Apr to June) 2018

Figure 1: Total UK public service productivity, 1997 to Quarter 2 (Apr to June) 2018



Source: Office for National Statistics

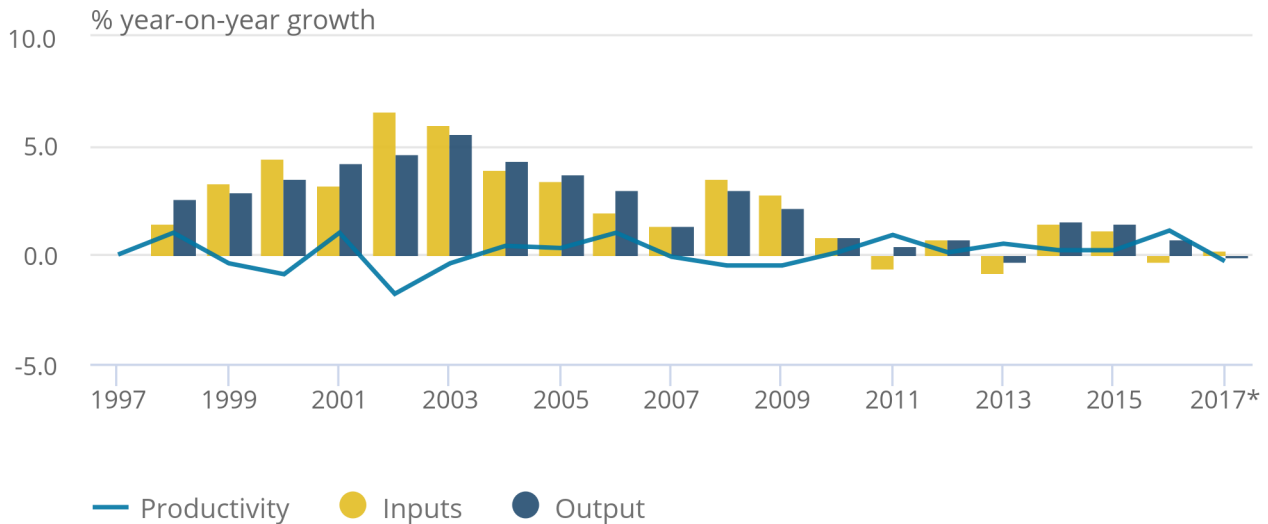
Notes:

1. Estimates from 1997 to 2015 are based on the existing annual series.
2. Annual estimates from 2016 to 2017 are based on the annualised experimental series. These series are displayed in the third quarter of the year for comparison purposes.
3. Estimates from Quarter 1 2016 to Quarter 2 2018 are based on the experimental quarterly total public service productivity series.
4. Estimates of productivity for the experimental period are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
5. Asterisks (*) and greyed out area reference periods where estimates are based on experimental methodology.

Figure 2 illustrates a similar picture for both inputs and output. Again, the longer-term trend in both components since 1997 and up to 2015 are taken from the [Public service productivity estimates: total public service, UK: 2015](#), while growth rates after this are taken from the experimental series. Both output and inputs growths have been relatively weaker and more volatile in recent periods, leading to variability in productivity growth. Taking each series from 2010 to 2017, inputs have grown by 1.8% (an average of 0.3% per year) while output has risen by 4.6% (an average of 0.7% per year).

Figure 2: Growth in total UK public service inputs, output and productivity, 1997 to 2017

Figure 2: Growth in total UK public service inputs, output and productivity, 1997 to 2017



Source: Office for National Statistics

Notes:

1. Estimates from 1997 to 2015 are based on the existing annual series.
2. Estimates from 2016 to 2017 are based on the experimental total public service productivity series.
3. Estimates of productivity for the experimental period are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
4. Asterisks (*) reference periods where estimates are based on experimental methodology.

Further information on data sources for quarterly total public service productivity can be found in the [Quality and Methodology Information report](#) and in [New nowcasting methods for more timely quarterly estimates of UK total public service productivity](#). These articles highlight methods and caveats for producing the quarterly growth estimates and they should be referenced when reporting on specific quarterly movements. This is especially the case for the latest quarters, which are more liable to be subject to revisions.

4 . What's changed in this release?

Compared with the previous release, [published on 6 July 2018](#), a number of revisions have been incorporated to the quarterly experimental series, including:

- revisions due to the incorporation of regular end-of-financial year returns for estimates from Quarter 1 (Jan to Mar) 2017 onwards, containing more comprehensive data, into the national accounts
- minor revisions in some price deflators
- minor revisions in some direct measures of labour

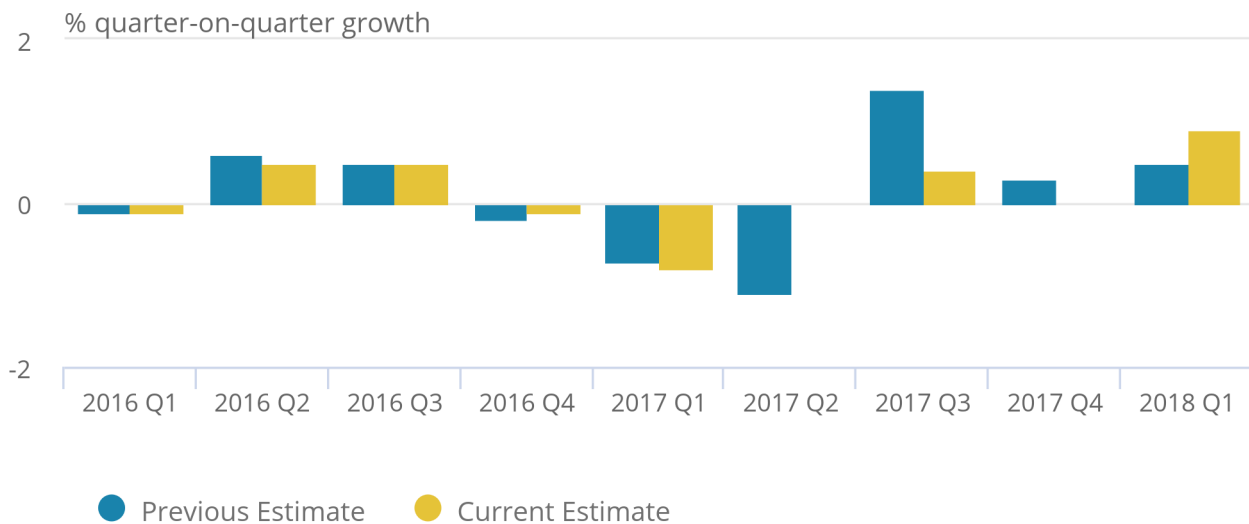
These changes mean that growth in productivity and its components – inputs and output – have been revised since previous estimates over the experimental period – the overall impact is illustrated in Figure 3a.

Figure 3a: Previous and current estimates of growth rate for total UK public service productivity

Quarter 1 (Jan to Mar) 2016 to Quarter 1 (Jan to Mar) 2018

Figure 3a: Previous and current estimates of growth rate for total UK public service productivity

Quarter 1 (Jan to Mar) 2016 to Quarter 1 (Jan to Mar) 2018



Source: Office for National Statistics

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 outputs.

Presenting both current and previous estimates of quarterly public service productivity growth, productivity for 2016, as a whole, has remained unchanged from the previous estimates, although there are revisions to individual quarters of the year.

However, current estimates for 2017 suggest that total public service productivity declined at a slower rate than previously thought. Inputs are now estimated to have grown at 0.2% per year, rather than 0.5%, while the growth rate of output has not been revised from a 0.1% decrease. As a result, productivity is now estimated to have fallen by 0.3% per year in 2017, compared with earlier estimates of a 0.6% decrease.

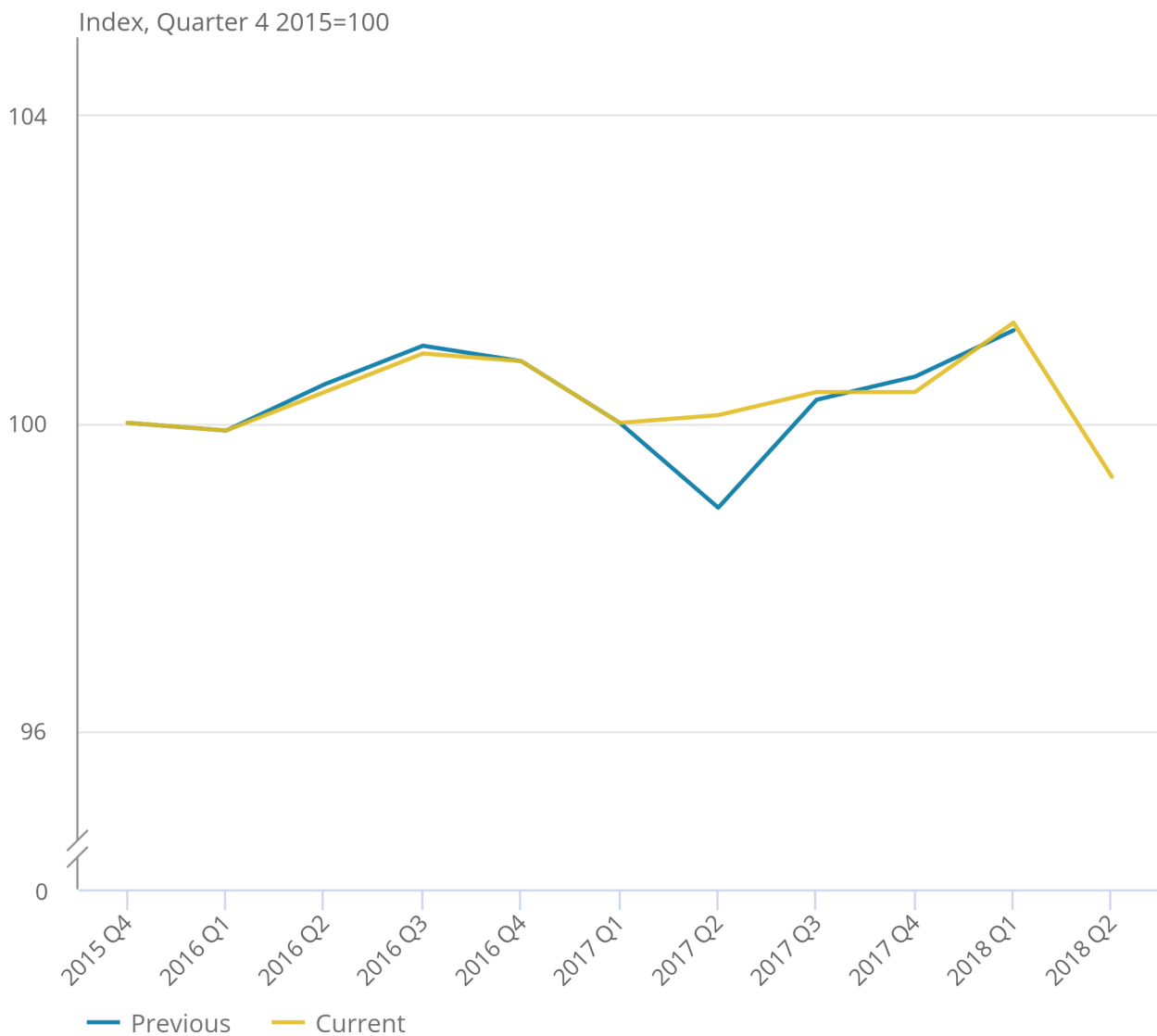
There are large revisions in Quarter 2 (Apr to June) and Quarter 3 (July to Sept) of 2017. The quarterly growth rate of public service productivity has been revised up from negative 1.1% to 0.0% for Quarter 2 2017. The growth rate for Quarter 3 2017 has been revised down from 1.4% to 0.4%. These revisions broadly offset each other, reducing the revision to the 2017 annual productivity growth estimate. To more easily see the effect of quarter-on-quarter revisions on annual growth estimates, it can be better to look at changes across vintages of quarterly indices – as shown in Figure 3b.

Figure 3b: Previous and current indices of total UK public service productivity

Quarter 4 (Oct to Dec) 2015 to Quarter 2 (Apr to June) 2018

Figure 3b: Previous and current indices of total UK public service productivity

Quarter 4 (Oct to Dec) 2015 to Quarter 2 (Apr to June) 2018



Source: Office for National Statistics

Notes:

1. Estimates from Quarter 4 2015 to Quarter 2 2018 are based on the experimental quarterly total public service productivity series.
2. Estimates of productivity for the experimental period are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.

Here we can see that, despite revisions to growth rates in Quarter 2 and Quarter 3 of 2017 broadly offsetting each other, the contraction in the productivity indices for 2017 is on average less pronounced in the current estimates of productivity.

Productivity growth for Quarter 1 2018 has been revised upwards, as the estimate of inputs growth has been revised down more than the estimate of output growth. Inputs growth for Quarter 1 2018 is currently estimated at negative 0.9% compared with negative 0.4% previously; while output growth is currently estimated at 0.0% compared with 0.2% previously.

All estimates, by definition, are subject to statistical “error”. In this context, error 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.

Public service productivity estimates operate an open revisions policy. This means that new data or methods can be incorporated at any time and will be implemented for the entire time series. Revisions to estimates of productivity growth in recent periods are common, as new data improves the estimates. Analysis carried out in [Historical revisions analysis of quarterly UK public service productivity \(Experimental Statistics\) and nowcast evaluation](#) suggests that previous preliminary estimates of quarterly UK public service productivity, inputs and output did not systematically under or overestimate the growth rate relative to the later estimates.

5 . Future developments

This article presents updated experimental estimates of total public service productivity, inputs and output, aiming to provide a timelier indicator of the likely trend in the national statistic annual estimates. These estimates are based on different sources from those used to estimate annual total public service productivity. The sources used here contain less detail and necessarily involve a greater degree of estimation than the annual estimates, which are produced later using more comprehensive data. As a result, they are not replacements for the annual estimates but are intended to provide a timelier estimate for the more recent periods. We aim to assess the impact of these differences and to address issues such as quality adjustment, direct measures, the treatment of annual data and service-level breakdown in future work.

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 feedback is welcome and can be sent to productivity@ons.gov.uk.

6 . Authors

Piotr Pawelek and Connor Marsland, Office for National Statistics.

7 . Quality and methodology

The [Quarterly public service productivity estimates: total public services Quality and Methodology Information](#) report contains important information on:

- the strengths and limitations of the data and how they compare with related data
- users and uses of the data
- how the output was created
- the quality of the output including the accuracy of the data

8 . Links to related statistics

- [Productivity economic commentary: April to June 2018](#) draws together the main findings from official statistics and analysis of UK productivity to present a summary of recent developments (published 5 October 2018).
- [Labour productivity, UK: April to June 2018](#) contains the latest estimates of labour productivity for the whole economy and a range of industries, together with estimates of unit labour costs (published 5 October 2018).
- [Multi-factor productivity estimates: Experimental estimates to quarter 2 \(April to June\) 2018](#) presents quarterly estimates of multi-factor productivity (MFP), capital services and quality-adjusted labour input (QALI), including a range of industry breakdowns and analysis (published 5 October 2018).
- [A simple guide to multi-factor productivity](#) explains the concept and measurement of MFP through some simple stylised examples (published 5 October 2018).
- [Quarterly UK public service productivity \(Experimental Statistics\): April to June 2018](#) contains the latest experimental estimates for quarterly UK total public service productivity, inputs and output (published 5 October 2018).
- [Information and Communication Technology intensity and productivity](#) contains new firm-level analysis to explore the relationship between the use of technologies and productivity (published 5 October 2018).
- [Productivity development plan: 2018 to 2020](#) is a development plan that builds on recent improvements to our productivity statistics and looks at introducing new outputs, further improving our productivity statistics and consolidating our improvements to date (published 6 July 2018).
- [How productive is your business](#) is an interactive tool that helps businesses to calculate their productivity and compare their performance with other businesses in Great Britain (published 6 July 2018).