Article

Quarterly UK public service productivity (Experimental Statistics): July to September 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.

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1 . Main points

- In Quarter 3 (July to Sept) 2018, public service productivity decreased by 0.3% on the previous quarter; both inputs and output decreased, by 0.1% and 0.5% respectively; the comparably larger decrease in output meant that productivity fell.

- Comparing with the same quarter in the previous year, productivity for total public services decreased by 2.9% in Quarter 3 2018.

- For 2017, public service productivity increased by 0.6%, revised down from the previous experimental estimates of 0.9%; year-on-year inputs decreased by 0.8%, while output fell 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.

For total UK public service, estimates of total public service 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. 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 quantity 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 2016 are reported on an annual basis and use data from Public service productivity: total, UK, 2016. 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 2016. After 2016, estimates in this article are presented on both a quarterly and annual basis [1], however, we assume the quality of services provided has not changed and remains constant throughout the period. Further information is available in the Quality and Methodology 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 output falls

Public service productivity decreased by 0.3% in Quarter 3 (July to Sept) 2018 compared with the previous quarter. This follows a decrease of 1.7% in Quarter 2 (Apr to June) 2018 and a decrease of 0.7% in Quarter 1 (Jan to Mar) 2018, continuing the downward trend in productivity growth for the fourth consecutive quarter.

The main driver of the decrease in productivity was from a 0.5% decrease in output. This contrasts with the previous three quarters where increases in inputs were the primary driver of negative productivity growth. This is the first quarter where output has decreased since Quarter 1 2017, where it fell by 0.4%. At the same time, inputs in Quarter 3 2018 fell by 0.1%. As this was smaller than the reduction in output, productivity declined.

Table 1 shows quarter-on-quarter growth of experimental quarterly productivity and the underlying changes in inputs and output of total public services from 2017 onwards.

Table 1: Experimental quarterly growth of inputs, output and productivity, UK, Quarter 1 (Jan to Mar) 2017 to Quarter 3 (July to Sept) 2018

Period-on-period % growth rates

	Inputs	Output	Productivity	Inputs	Output	Productivity
	Quarter-on-quarter			**Quarter-on-quarter a year ago**		
Quarter 1 (Jan to Mar) 2017	-0.4	-0.4	0.1	-1.6	-0.4	1.2
Quarter 2 (Apr to June) 2017	0.0	0.1	0.1	-0.9	-0.4	0.5
Quarter 3 (July to Sept) 2017	-0.1	0.3	0.4	-0.4	-0.1	0.3
Quarter 4 (Oct to Dec) 2017	0.4	0.1	-0.3	-0.2	0.1	0.2
Quarter 1 (Jan to Mar) 2018	0.6	0.0	-0.7	0.9	0.4	-0.5
Quarter 2 (Apr to June) 2018	1.7	0.0	-1.7	2.6	0.3	-2.2
Quarter 3 (July to Sept) 2018	-0.1	-0.5	-0.3	2.6	-0.4	-2.9

Source: Office for National Statistics

Notes

1. Output growth minus inputs growth does not necessarily equal productivity growth. Back to table

2. Figures have been rounded to one decimal place. Back to table

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

When comparing Quarter 3 2018 with Quarter 3 2017, total public service productivity decreased by 2.9%. This is because inputs grew by 2.6% relative to the same quarter in 2017, while output fell by 0.4%.

Productivity growth, on an annual basis, was revised down to 0.6% for 2017 from previous estimates, published in Quarterly UK public service productivity (Experimental Statistics): April to June 2018. Productivity growth in 2017 is estimated to be driven by inputs decreasing by 0.8%, while output fell by 0.2%. Placing this in the context of a longer time series, Figure 1 combines the latest annualised experimental series for 2017 – with estimates between 1997 and 2016 taken from our Public service productivity: total, UK, 2016 release. It shows that, between 2010 and 2017, total public service productivity increased by 5.3%.

Figure 1: Total UK public service productivity, 1997 to Quarter 3 (July to Sept) 2018
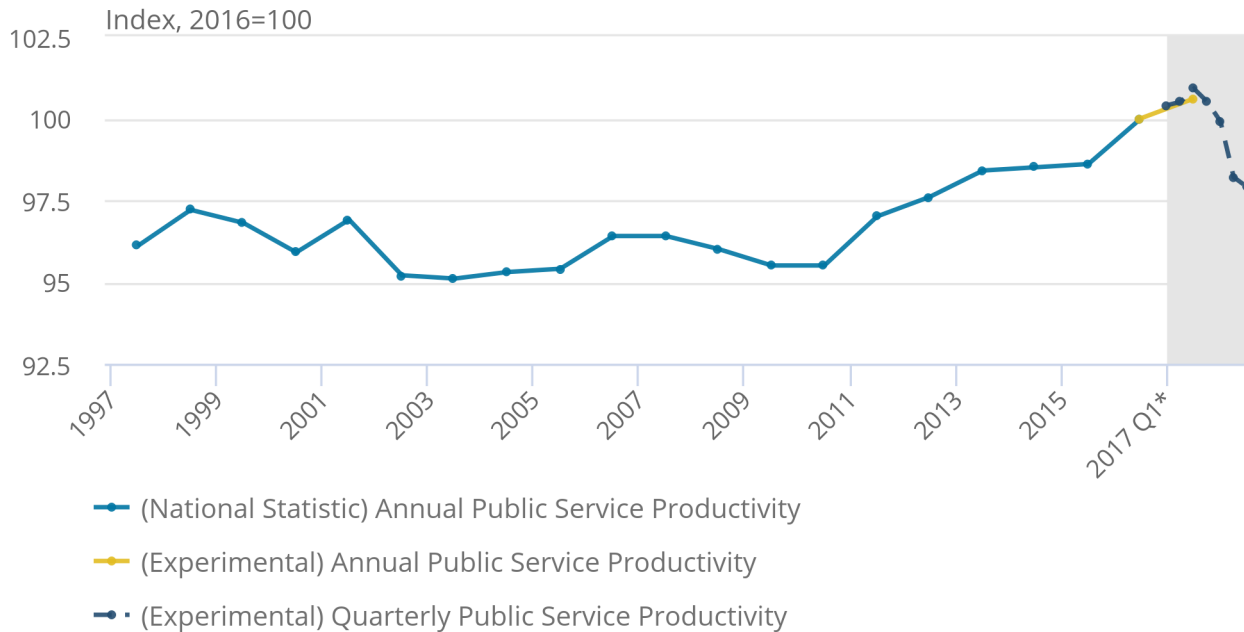
Index, 2016=100

- ━━━ (National Statistic) Annual Public Service Productivity
- ━━━ (Experimental) Annual Public Service Productivity
- ━・━ (Experimental) Quarterly Public Service Productivity

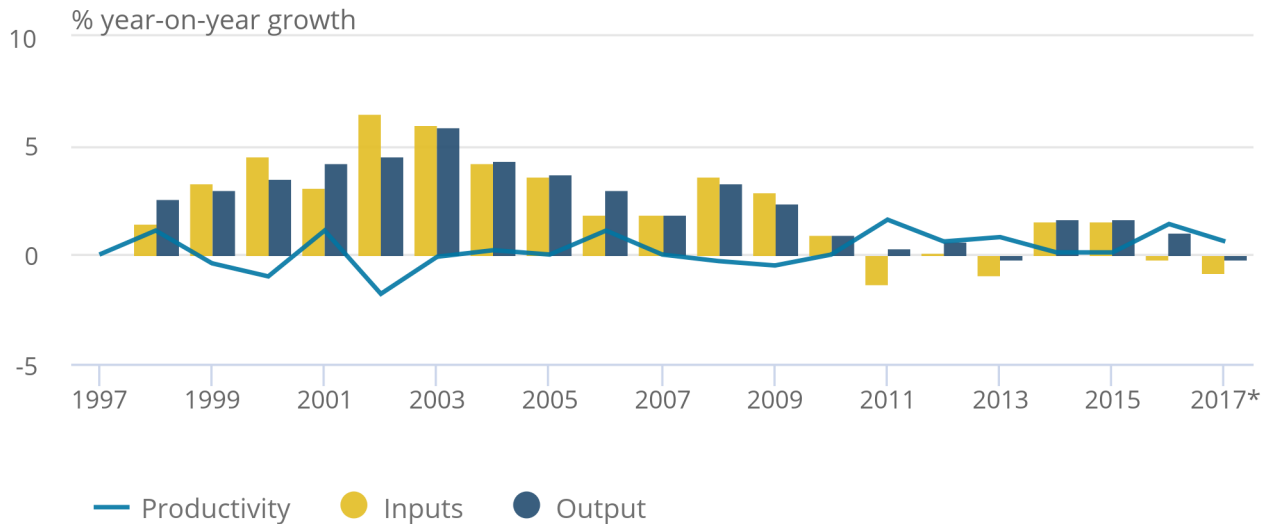**Source: Office for National Statistics**

Notes:

1. Estimates from 1997 to 2016 are based on the existing annual series.

2. 2017 annual estimates are based on the annualised experimental series. These series are displayed in the third quarter of the year.

3. Estimates from Quarter 1 2017 to Quarter 3 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. 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 2016 are taken from the [Public service productivity: total, UK, 2016](#) release, while growth rates after this are taken from the experimental series. Inputs growth has been relatively weaker and more volatile in recent periods; from 2010 to 2017, inputs have grown by 0.1% (an average of 0.0% per year). For output in this time period, it has risen by 5.3% (an average of 0.8% per year). Productivity has been on a positive growth path accordingly, increasing by 5.3% from 2010 to 2017 and at an average rate of 0.8% per year.

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

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% year-on-year growth

— Productivity ● Inputs ● Output

Source: Office for National Statistics

Notes:

1. Estimates from 1997 to 2016 are based on the existing annual series.

2. Estimates for 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.

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 5 October 2018, a number of revisions have been incorporated to the quarterly experimental series, including:

- revisions due to the incorporation of the [Public service productivity: total, UK, 2016](#) data replacing the existing experimental statistic data for the year 2016

- minor revisions within the quarterly national accounts back to Quarter 1 (Jan to Mar) 2017 affecting estimates of both expenditure and output

- minor revisions in direct measures of labour inputs back to Quarter 1 2017

- minor revisions in some price deflators

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

Figure 3: Previous and current estimates of growth rate for total UK public service productivity, Quarter 1 (Jan to Mar) 2017 to Quarter 2 (Apr to June) 2018

Figure 3: Previous and current estimates of growth rate for total UK public service productivity, Quarter 1 (Jan to Mar) 2017 to Quarter 2 (Apr to June) 2018
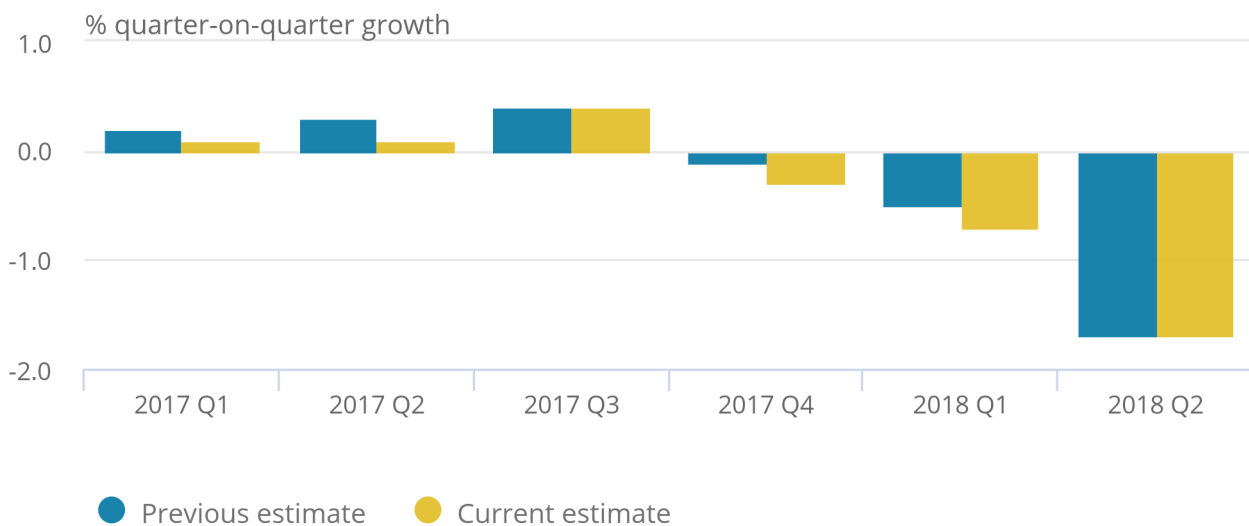
Source: Office for National Statistics

Notes:

1. All estimates are based on the experimental quarterly total public service productivity series.

2. Estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted outputs.

The estimates for Quarter 3 (July to Sept) 2017 and Quarter 2 (Apr to June) 2018 have remained unchanged. For the other quarters in the period shown in Figure 3, there have been only relatively small revisions.

For Quarter 2 2017, Quarter 4 (Oct to Dec) 2017 and Quarter 1 2018, productivity has been revised downwards by an extra 0.2 percentage points compared with the previous quarter. For Quarter 1 2017, productivity has been revised downwards by an extra 0.1 percentage points compared with the previous quarter.

In addition to revisions in the experimental data, productivity estimates between 1997 and 2016 have been revised since the previous publication due to changes in the official public services productivity series. As well as updated measures of output, inputs and productivity for public services in the UK between 1997 and 2015, this release includes new estimates for 2016.

Compared with previous estimates, growth for public service productivity in 2016 was revised upwards from 1.1% to 1.4%. This was as a result of growth in both inputs and output being revised upwards – inputs from negative 0.3% to negative 0.2% and output from 0.8% to 1.1%. This is in part due to the application of quality adjustments, which are not available for the experimental statistic.

Further information on the impact and causes of revisions, as well as the impact of quality adjustment, can be found in Public service productivity: total, UK, 2016.

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 improve 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 via email to productivity@ons.gov.uk.

6 . Authors

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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: July to September 2018 draws together the main findings from official statistics and analysis of UK productivity to present a summary of recent developments (published 9 January 2019)

- Labour productivity, UK: July to September 2018 contains the latest estimates of labour productivity for the whole economy, the UK regions at NUTS1 level and a range of industries, together with estimates of unit labour costs (published 9 January 2019).

- Multi-factor productivity estimates: Experimental estimates to quarter 3 (July to September) 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 9 January 2019).

- A simple guide to multi-factor productivity explains the concept and measurement of multi-factor productivity through simple stylised examples (published 5 October 2018).

- Quarterly UK public service productivity (Experimental Statistics): July to September 2018 contains the latest experimental estimates for quarterly UK total public service productivity, inputs and output (published 9 January 2019).

- Public service productivity: total, UK, 2016 presents updated measures of output, inputs and productivity for public services in the UK between 1997 and 2015, in addition to new estimates for 2016 (published 9 January 2019).

- Public service productivity: healthcare, UK, 2016 presents updated estimates of output, inputs and productivity for public service healthcare in the UK between 1995 and 2015, and new estimates for 2016 (published 9 January 2019).

- Public service productivity: healthcare, FYE 2017 presents estimates of output, inputs and productivity for public service healthcare in England on a financial year basis up to FYE 2017 (published 9 January 2019).

- Improving estimates of Labour Productivity and International Comparisons discusses recent OECD findings showing that the methodologies, data sources and adjustments used to estimate the number of persons, jobs and hours worked varied significantly across countries, and explores these differences and the impact on our ICP (published 9 January 2019).

- Productivity development plan: 2018 to 2020 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 which aids businesses to calculate their productivity and compare their performance to other businesses in Great Britain (published 6 July 2018).

Related content

In October 2018 the ONS informed users we will no longer be publishing estimates on International comparisons of UK productivity, due to an ongoing review of the methodology. In December 2018 the OECD published a working paper "International productivity gaps: Are labour input measures comparable?" which showed the methodologies, data sources and adjustments used to estimate labour inputs varied significantly across countries. The ONS published an article exploring these differences and the impact they had on our international comparisons of UK productivity (ICP) statistics.

We publish experimental estimates of multi-factor productivity (MFP), which decompose output growth into the contributions that can be accounted for by labour and capital inputs. In these estimates, the contribution of labour is further decomposed into quantity (hours worked) and quality dimensions.

The Economic Review covers recent developments in the UK economy, featuring our latest economic statistics as well as in-depth analysis of current issues.

Experimental indices of labour costs per hour differ from the concept of labour costs used in the unit labour cost estimates in the labour productivity release. The main difference is that experimental indices of labour costs per hour relate to employees only, whereas unit labour costs also include the labour remuneration of the self-employed.

Lastly, we publish a range of Public service productivity measures and related articles. These measures define productivity differently from that used in our labour productivity and MFP estimates. Further information can be found in the Economic and Labour Market Review, No. 5, May 2010 and in an information note published on 4 June 2015.

More information on the range of our productivity estimates can be found in the ONS Productivity Handbook.