Office for National Statistics

Article

Quarterly UK public service productivity (Experimental Statistics): October to December 2017

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 4 (Oct to Dec) 2017, productivity for total public services increased by 0.4% relative to the previous quarter, following a 0.6% increase in the previous quarter; this was caused by output growth of 0.4%, while inputs were stable.

- Comparing with the same quarter in the previous year, Quarter 4 2017 saw an increase in productivity for total public services of 0.2%.

- In 2017, year-on-year productivity for total public services has decreased by 0.2%, as year-on-year inputs growth of 0.3% exceeded output growth of 0.1%, leading to a decrease in the ratio of output to inputs.

- These estimates are experimental, using a degree of estimation to deliver timelier estimates compared with our national public service productivity figures, which are published with a two-year lag; the methodology used in these 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 of public services is estimated by comparing growth in total output with growth in the total inputs used. Productivity will increase when more output is being produced for each unit of input. Estimates of output, inputs and productivity are given both as growth rates between consecutive periods and as indices showing the cumulative trend of productivity over time.

Estimated growth rates of output and inputs for individual public services are aggregated by their relative share of total expenditure on public services (expenditure weight) to produce estimates of total public service output, inputs and productivity.

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 quantity 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 provides 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, for example the number of outpatients in hospitals or the number of children taught at school. These are then 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 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 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 and understanding of UK public service – chief amongst these being measures of output that reflect quality changes. After 2015, estimates in this article are presented on both a quarterly and annual basis [1], however, the quality of services provided is assumed not to have changed and remains constant throughout the period. Further information is available in the total public service productivity quality and methodology information (QMI) report.

Trends in quarterly total public service output, inputs and productivity estimates are determined mostly 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 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.

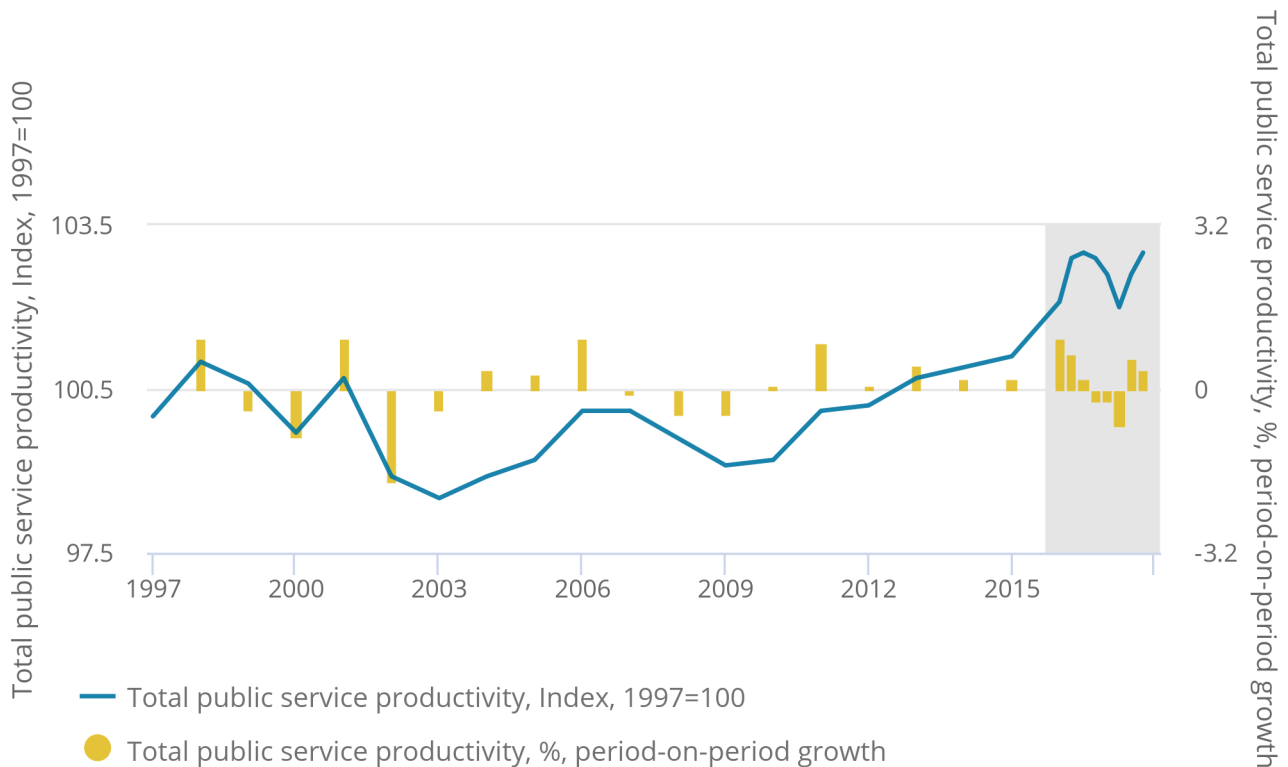# 3 . Quarterly public service productivity rises as output grows while inputs remain the same

In Quarter 4 (Oct to Dec) 2017, total public service productivity increased by 0.4% relative to the previous quarter, following an increase of 0.6% in Quarter 3 (July to Sept) of 2017. As a result of the latest quarterly growth, productivity has returned to its previous peak, seen in Quarter 3 2016.

Looking at 2017 as a whole, despite growth in the latest two quarters, productivity is estimated to have fallen by 0.2%, driven by contractions at the start of the year. This marks the first contraction in annual total public service productivity since 2009.

Placing this in the context of a longer time series, Figure 1 combines the latest experimental quarterly estimates – covering Quarter 1 (Jan to Mar) 2016 to Quarter 4 2017 – with estimates for between 1997 and 2015, taken from the Public service productivity estimates: total public service, UK: 2015 release. It suggests that, while maintaining an upward trend, growth in public service productivity has experienced some volatility. Between 2010 and 2017, total public service productivity has increased by 3.4% – an average growth of 0.5% per year.

Figure 1: Total UK public service productivity, 1997 to Quarter 4 (Oct to Dec) 2017

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Total public service productivity, Index, 1997=100

Total public service productivity, %, period-on-period growth

— Total public service productivity, Index, 1997=100

● Total public service productivity, %, period-on-period growth

Source: Office for National Statistics

Notes:

1. Estimates from 1997 to 2015 are based on the existing annual series.

2. Estimates from Quarter 1 2016 to Quarter 4 2017 are based on the experimental quarterly total public service productivity series.

3. Estimates for Quarter 1 2016 reflect the growth rate between annualised quarterly productivity for 2015 and Quarter 1 2016.

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 were estimates are based on experimental methodology.

Figure 2 breaks down the productivity estimate into the underlying changes in inputs and output of total public services.

It shows that the latest increase in quarterly productivity of 0.4% was driven by a 0.4% increase in output, with inputs remaining flat over the same period. This meant that there was an increase in the ratio of output to inputs, leading to an increase in productivity.

It was the largest quarterly increase in output since Quarter 1 2016 and the first incident where productivity growth, in the experimental period, has been driven solely by growth in output. This differs from the previous general trend, where inputs acted as the main driver behind changes in productivity. Healthcare services were the main positive contributors to output growth over the quarter, reflecting both growth in healthcare's output and its large expenditure weight — relative to total public services. This means that increases or reductions in this service area are reflected strongly in the respective total series.

Looking at 2017 as a whole and decomposing productivity growth into underlying changes in inputs and output, the contraction in public service productivity was driven by growth of 0.3% in inputs, whilst output grew by 0.1% relative to the previous year.

Figure 2 also illustrates the longer-term trend, showing the change in both components since 1997, with growth up to 2015 taken from the Public service productivity estimates: total public service, UK: 2015 and growth rates after this taken from the quarterly experimental series. Output has grown steadily over this series while inputs have been weaker and volatile in recent periods, leading to productivity growth in the series. Taking each series from 2010 to 2017, inputs have grown by 1.6% (an average of 0.2% per year) while output has risen by 5.0% (an average of 0.7% per year).

Figure 2: Growth in total UK public service inputs, output and productivity, 1997 to Quarter 4 (Oct to Dec) 2017

Figure 2: Growth in total UK public service inputs, output and productivity, 1997 to Quarter 4 (Oct to Dec) 2017
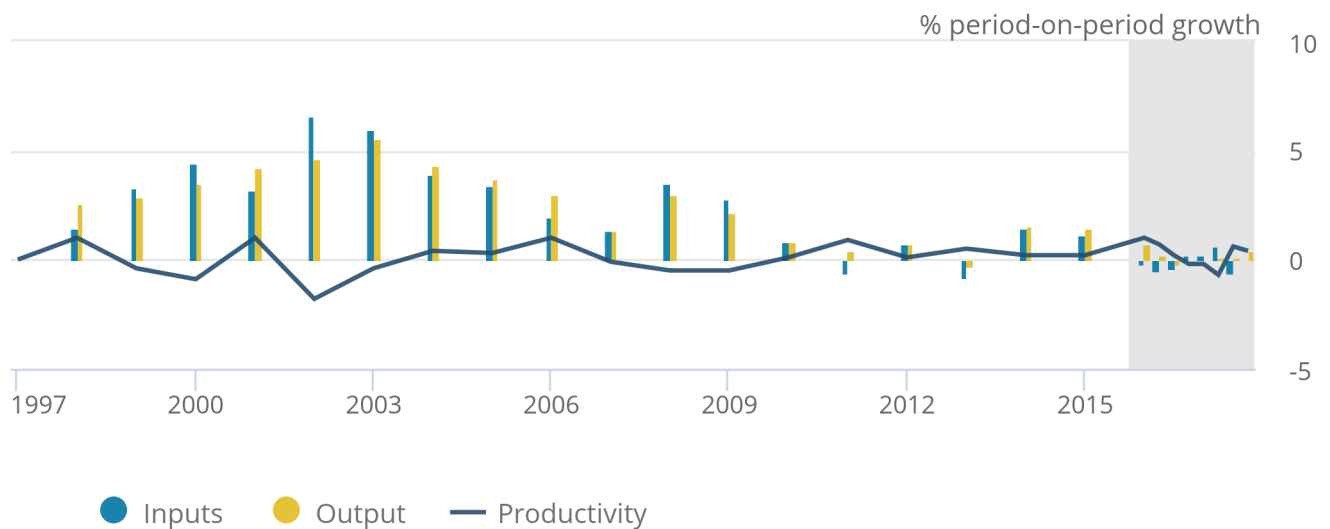
Source: Office for National Statistics

Notes:

1. Estimates from 1997 to 2015 are based on the existing annual series.

2. Estimates from Quarter 1 2016 to Quarter 4 2017 are based on the experimental quarterly total public service productivity series.

3. Estimates for Quarter 1 2016 reflect the growth rate for inputs and output between annualised quarterly estimates for 2015 and Quarter 1 2016

4. Estimates of inputs and output for the experimental period are directly seasonally adjusted.

5. Asterisks (*) and greyed out area reference periods were 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?

All estimates, by definition, are subject to statistical "error", but in this context the word 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.

Compared with the [latest release, published on 5 January 2018](#), a number of revisions have been incorporated to the quarterly experimental series, including:

- minor revisions within the quarterly national accounts back to Quarter 1 (Jan to Mar) 2016

- revisions to direct measures of volume of labour input

- minor revisions in some price deflators

The overall effect of these revisions has been marginal on the broad picture of public service productivity. However, the precise path productivity has taken over the experimental period has changed.

While productivity was previously estimated to have been flat over the latter part of 2016, current estimates suggest a more volatile experience, as both inputs and output were revised. Combined with downward revisions to productivity growth in mid-2017 (due primarily to revisions to output), total public service productivity in Quarter 3 (July to Sept) 2017 is now estimated to be 1.5% higher than in 2015 (previously 1.7% higher). Figure 3 summarises these revisions, presenting previous and current estimates of the period-on-period productivity growth between Quarter 1 2016 and Quarter 3 2017.

Figure 3: Previous and current estimates of period-on-period public service productivity growth rate, Quarter 1 (Jan to Mar) 2016 to Quarter 3 (July to Sept) 2017

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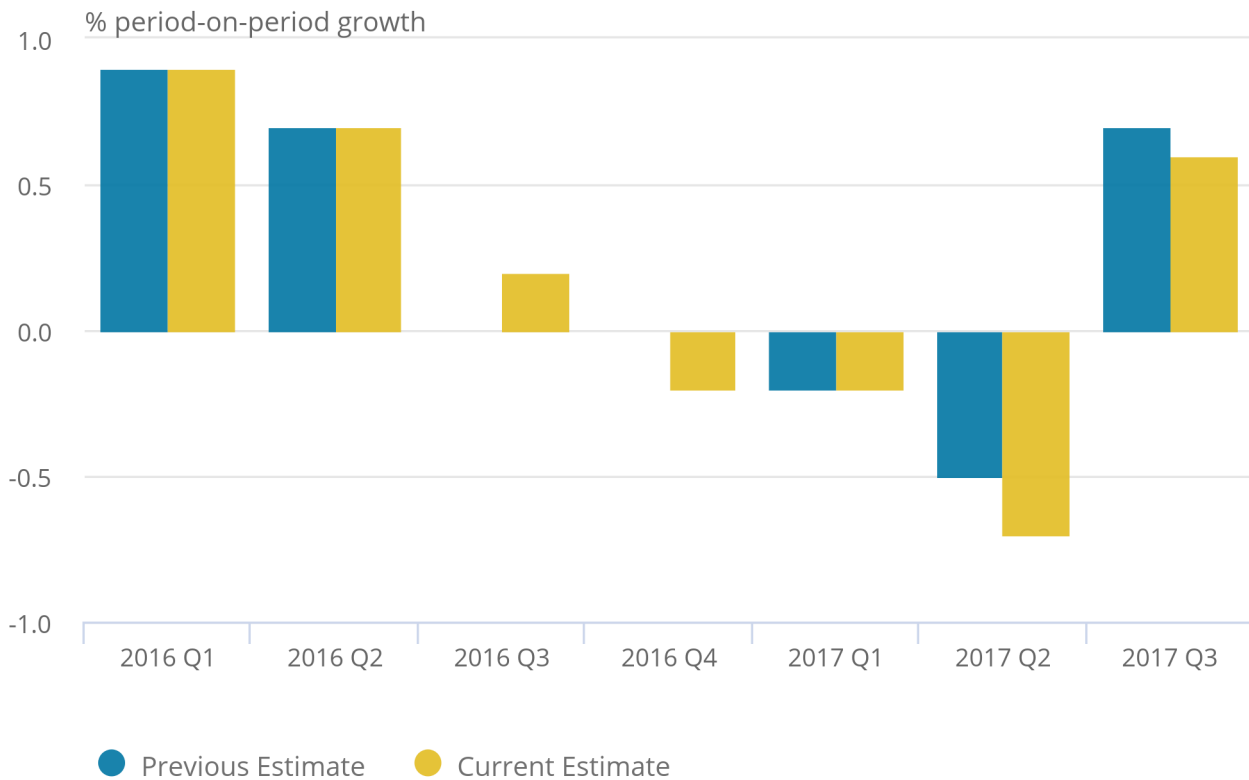
Source: Office for National Statistics

Notes:

1. Estimates for Quarter 1 2016 reflect the growth rate for productivity between annualised quarterly estimates for 2015 and Quarter 1 2016.

2. All estimates are based on experimental quarterly total public service productivity.

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

5 . Future developments

This article presents updated experimental total public service productivity, inputs and output series, aiming to provide a timelier indicator of the likely trend in the existing annual series. 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 annual estimates produced later. As a result, they are not replacements for the annual estimates and are merely intended to provide a timelier estimate for the more recent period. 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 . Author(s)

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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 it compares 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

- UK productivity introduction: October to December 2017 draws together the headlines of the productivity releases into a single release, providing additional analysis of our productivity statistics (published 6 April 2018).

- Labour productivity: October to December 2017 contains the latest estimates of labour productivity for the whole economy and a range of industries, together with estimates of unit labour costs (published 6 April 2018).

- Quarterly UK public service productivity (experimental statistics): October to December 2017 contains the latest experimental estimates for quarterly UK total public service productivity, inputs and output (published 6 April 2018).

- International comparisons of UK productivity (ICP), final estimates: to 2016 presents an international comparison of labour productivity across the G7 nations, in terms of growth in GDP per hour and GDP per worker (published 6 April 2017).

- Introducing industry-by-region labour metrics and productivity presents new, experimental industry-by-region productivity metrics; this includes measures of hours worked, jobs, and accompanying productivity measures for the SIC letter industries in the NUTS1 regions (published 6 April 2018).

- Quarterly multi-factor productivity: Progress to date and next steps details the methodology used to compile quarterly multi-factor productivity and sets out plans to reduce the time taken in producing these estimates and increasing the industry granularity (published 6 April 2018).

- [Quarterly Multi-factor productivity (MFP), (experimental estimates): to Q2 2017](#) decomposes output growth into the contributions that can be accounted for by labour and capital inputs; the contribution of labour is further decomposed into quantity (hours worked) and quality dimensions (published 6 April 2018).

- [Management practices and productivity in British production and services industries - initial results from the Management and Expectations Survey: 2016](#) Results from the second wave of a pilot survey, the Management and Expectations Survey, which gathered information on British management practices and firms' expectations for future growth (published 6 April 2018).

- [Public service productivity estimates: total public service, UK: 2015](#) presents updated measures of output, inputs and productivity for public services in the UK between 1997 and 2014, in addition to new estimates for 2015 (published 5 January 2018).

- [Public service productivity estimates: healthcare, 2015](#) presents updated estimates of output, inputs and productivity for public service healthcare in the UK between 1995 and 2014, in addition to new estimates for 2015 (published 5 January 2018).

- [International comparisons of labour productivity by industry: 2014](#) uses new production-side PPPs to present estimates of labour productivity for 29 European countries across 10 industries on a GVA per hour worked basis (published 6 October 2017).

- [Quality adjusted labour input: UK estimates to 2016](#) presents updated estimates of quality adjusted labour input (QALI) for the whole economy and for the market sector (published 6 October 2017).

- [Foreign direct investment and labour productivity: a micro-data perspective: 2012 to 2015](#) examines the composition of firms with foreign direct investment (FDI) in Great Britain between 2012 and 2015, and their productivity outcomes compared with firms with no FDI relationships (published 6 October 2017).

- [Introducing division level labour productivity estimates](#) provides an overview of new and experimental estimates of labour productivity at the two-digit SIC industry level for the UK and provides some initial analysis demonstrating trends in the data (published 5 July 2017).

- [Understanding firms in the bottom 10% of the labour productivity distribution in Great Britain: "the laggards", 2003 to 2015](#) examines the characteristics of businesses in the bottom 10% of the labour productivity distribution in terms of their size, age, industry and location, between 2003 and 2015 (published 5 July 2017).

- [Multi-factor productivity estimates: Experimental estimates to 2015](#) decomposes output growth into the contributions that can be accounted for by labour and capital inputs; the contribution of labour is further decomposed into quantity (hours worked) and quality dimensions (published 5 April 2017).

- [Developing new measures of infrastructure investment: July 2017](#) is the first in a series of papers on infrastructure statistics, focusing on definitional and data challenges in measuring infrastructure investment (published 5 July 2017).

- [Volume index of UK capital services (experimental): estimates to Quarter 2 (Apr to Jun) 2017](#) provides estimates of the contribution of capital inputs to production in the market sector, split by asset and industry (published 7 February 2018).