Article

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

Table of contents

1 . Main points

- 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]().

- In Quarter 3 (July to Sept) 2017, productivity for total public services increased by 0.7% relative to the previous quarter; this followed on from a 0.5% decrease in Quarter 2 (Apr to June) 2017.

- Comparing with the same quarter in the previous year, Quarter 3 2017 productivity fell by 0.1%.

- In 2016, revised up from previous estimates, year-on-year productivity growth for total public services has increased by 1.6%, as year-on-year output grew by 0.8% while inputs fell by 0.7%, leading to an increase in the ratio of output to inputs.

- In 2015, year-on-year productivity was revised up, with official estimates showing growth of 0.2%.

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 that show the cumulative trend 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 expenditure on labour, goods and services, and of consumption of fixed capital. For some labour inputs, direct quantity measures can be observed and used, such as full-time equivalent. For other areas of labour and all areas of goods and services, and consumption of fixed capital, the quantity of inputs is not directly available. In these cases, the quantity of inputs is 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, 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 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.

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 official 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 inputs fall and output grows
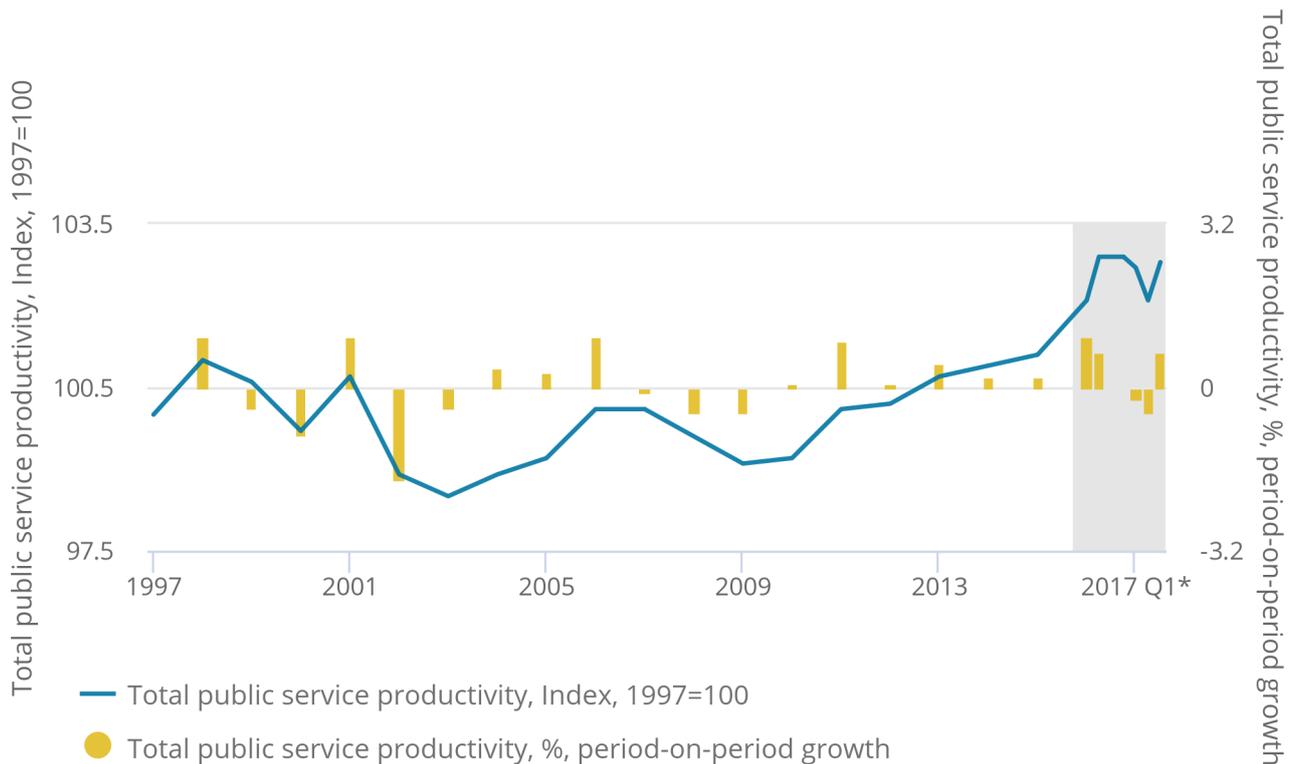
In Quarter 3 (July to Sept) 2017, total public service productivity increased by 0.7% relative to the previous quarter, following a decrease of 0.5% in Quarter 2 (Apr to June) 2017. This was a change in the recent trend of quarterly productivity, where quarterly productivity was relatively flat in 2016 and declining in the earlier quarters of 2017. As a result of the latest quarterly growth, productivity is now slightly below that of Quarter 3 2016, by 0.1%.

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 3 2017 – with estimates for between 1997 and 2015, taken from our Public service productivity estimates: total public service, UK: 2015 release. Figure 1 shows that, while maintaining an upwards trend, growth in public service productivity has experienced some volatility.

Between 2010 and 2016, total public service productivity is estimated to have increased by 3.6% – an average growth of 0.6% per year. This represents the longest sustained period of growth in public service productivity since the start of the series in 1997.

Figure 1: Total UK public service productivity, 1997 to Quarter 3 (July to Sept) 2017

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 (Jan to Mar) 2016 to Quarter 3 (July to Sept) 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 show periods where 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 0.7% was mainly driven by inputs decreasing by 0.5% with output rising by 0.2%. This meant that there was an increase in the ratio of output to inputs, leading to an increase in productivity.

Figure 2 also shows the longer-term trend, including the change in both components since 1997, with growth up to 2015 taken from the [Public service productivity estimates: total public service, UK: 2015](#) article 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 2016, inputs have grown by 1.3% (an average of 0.2% per year) while output has risen by 4.9% (an average of 0.8% per year).

In the experimental period, the general trend in the underlying components is similar; with inputs acting as the main driver behind changes in productivity. In recent quarters, this has largely been due to falls in inputs of healthcare services, reflecting both contractions in healthcare's inputs and its large expenditure weight, relative to total public services. This means that increases or reductions in spending are reflected strongly in total inputs.

The fact that productivity rose after four consecutive quarters of flat or negative growth represents a change in the trend. However, Quarter 3 2017 has seen a similar fall in inputs to that of Quarter 2 2016 while maintaining modest output growth, resulting in productivity growing 0.7% in the most recent Quarter. The quarters between saw inputs rising again, primarily driven by increased expenditure on goods and services.

Figure 2: Growth in total UK public service inputs, output and productivity, 1997 to Quarter 3 (July to Sept) 2017

Figure 2: Growth in total UK public service inputs, output and productivity, 1997 to Quarter 3 (July to Sept) 2017
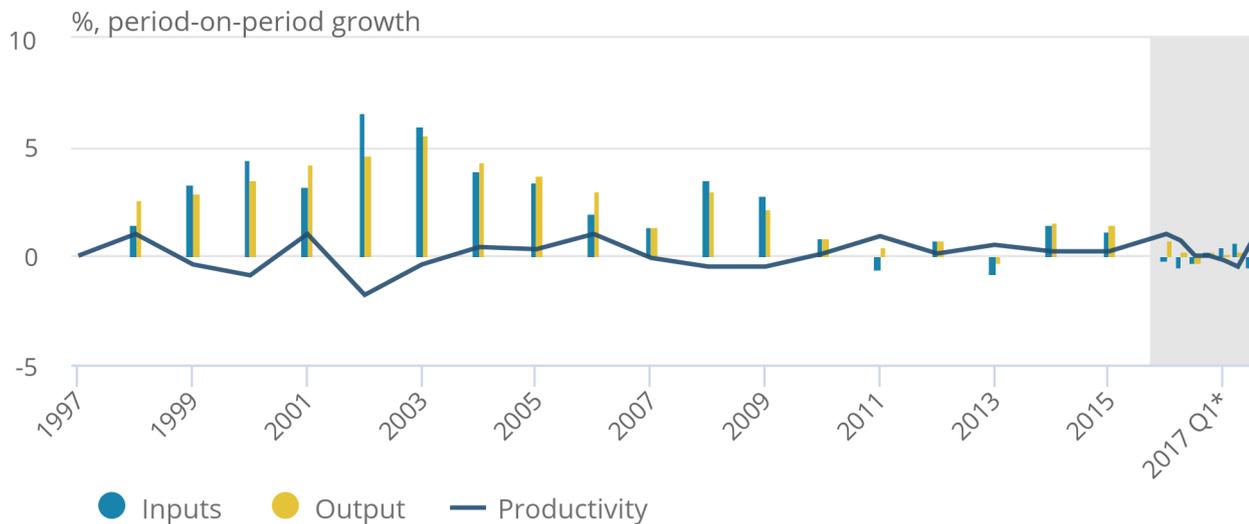
Source: Office for National Statistics

Notes:

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

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

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. Estimates of productivity for the experimental period are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.

6. Asterisks (*) and greyed out area show 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?

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 6 October 2017, a number of revisions have been incorporated to the quarterly experimental series, including:

- updated measures of output, inputs and productivity for public services in the UK between 1997 and 2014, in addition to new (non-experimental) estimates for 2015

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

- minor revisions in direct measures of labour input

- minor revisions in some price deflators

- improvements to price deflators resulting in minor revisions to specific service areas

These changes mean that productivity and its subsequent components – inputs and output – have experienced revisions from previous estimates over the experimental period.

The largest of revisions to productivity occurred for Quarter 1 (Jan to Mar) 2016, growth being revised up from 0.4% to 1.0%. This revision however, as well as illustrating the impact of revisions to data, reflects the impact of growth now being between the annualised quarterly data for 2015 (from the experimental estimates) and Quarter 1 (Jan to Mar) 2016, rather than Quarter 4 (Oct to Dec) 2015. Beyond this, further revisions made to the growth rates of other quarters are a result of minor revisions in the data.

Figure 3 summarises these revisions, presenting previous and current estimates of the period-on-period productivity growth between Quarter 1 (Jan to Mar) 2016 and Quarter 2 (Apr to June) 2017.

Figure 3: Previous and current estimates of period-on-period public service productivity growth rate, UK, Quarter 1 (Jan to Mar) 2016 to Quarter 2 (Apr to June) 2017

Figure 3: Previous and current estimates of period-on-period public service productivity growth rate, UK, Quarter 1 (Jan to Mar) 2016 to Quarter 2 (Apr to June) 2017
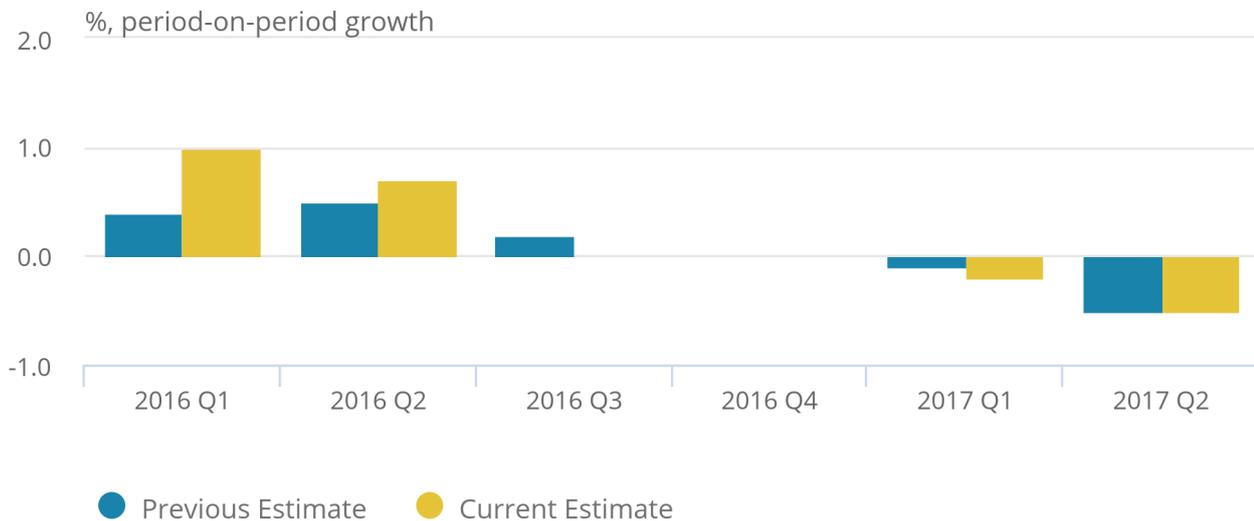
Source: Office for National Statistics

Notes:

1. Estimates for Quarter 1 (Jan to Mar) 2016 reflect the growth rate for productivity between annualised quarterly estimates for 2015 and Quarter 1 2016.

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

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

In addition to revisions in the experimental data, productivity estimates between 1997 and 2015 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 2014, this release includes new estimates for 2015.

Compared with previous estimates, growth for public service productivity in 2015 was revised up from 0.0% to 0.2%. This was as a result of growth in both inputs and output being revised up – inputs from 0.6% to 1.2% and output from 0.6% to 1.5%. In 2015, the overall quality of public services is estimated to have remained unchanged and to have had zero contribution to growth in quality adjusted total public service output. Further information on the impact and causes of revisions, as well as the impact of quality adjustment, can be found in Public service productivity estimates: total public service, UK, 2015 .

The estimate for annual productivity growth for 2016 has also experienced revision from previous estimates, revised up from 0.9% to 1.6%. This was driven by a combination of a large downward revision in inputs growth (from 0.2% growth to a decrease of 0.7%), while output growth fell to 0.8% from 1.1%.

5 . Future developments

This article presents updated experimental quarterly 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.gsi.gov.uk.

6 . Authors

Mark Grundy and Piotr Pawelek, 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 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: July to September 2017 draws together the headlines of the productivity releases into a single release, providing additional analysis of our productivity statistics (published 5 January 2018).

- Labour productivity: July to September 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 5 January 2018).

- Quarterly UK public service productivity (experimental statistics): July to September 2017 contains the latest experimental estimates for quarterly UK total public service productivity, inputs and output (published 5 January 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, and new estimates for 2015 (published 5 January 2018).

- [Quality adjustment of public service public order and safety output: current method](#) Presents new methodology used to quality adjust elements of public order and safety (POS) output, as part of estimates of UK total public service productivity.(published 5 January 2018).

- [International comparisons of UK productivity (ICP), first estimates: 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 October 2017).

- [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).

- [Quality adjustment of public service criminal justice system output: experimental method: 1997 to 2014](#) presents new methodologies to capture changes in quality of outputs of the criminal justice system, expanding ONS's coverage of quality adjustment for public service output (published 6 October 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 5 July 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 2015](#) provides estimates of the contribution of capital inputs to production in the market sector, split by asset and industry (published 6 January 2017).