Office for National Statistics

Article

Public service productivity: quarterly, UK, April to June 2019 (Experimental Statistics)

Estimates of UK total public service productivity, inputs and output, providing a short-term timely indicator of the future annual productivity estimates.

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1 . Main points

- Productivity of total public services decreased by 0.3% in Quarter 2 (Apr to June) 2019 compared with the same quarter in the previous year.

- While there were increases in both inputs and output growth for Quarter 2 2019 compared with the same quarter in the previous year, inputs grew at a faster rate (4.1%) than output (3.8%), causing productivity to fall.

- Inputs growth exceeded output growth despite the increase in output being the largest since Quarter 4 (Oct to Dec) 2008.

- Productivity decreased by 0.5% in Quarter 2 2019 compared with the previous quarter; this was driven by the increase in inputs (1.6%) exceeding a smaller increase in output growth (1.1%).

- This release incorporates new methods and data sources, consistent with changes made in Blue Book 2019, leading to revisions to estimates in earlier releases.

- The estimates of productivity growth for 2017 and 2018 have been revised up to 1.4% and 0.4% respectively, continuing the modest growth seen in recent years.

- These Experimental quarterly estimates are timelier than our annual National Statistics estimates, the next of which will be published on 8 January 2020, covering 1997 to 2017.

2 . Quarterly public service productivity decreases as inputs rise

Changes in productivity are normally a result of long-term structural trends. Therefore, we advise looking at changes in productivity between periods that are further apart. This can help to smooth any short-term fluctuations in growth rates.

Comparing quarters with the same quarters a year ago provides a rolling annual estimate of productivity and is therefore a good indication of the future path of the National Statistics annual estimates. Compared with the same quarter in the previous year (Figure 1), productivity for total public services decreased by 0.3% in Quarter 2 (Apr to June) 2019 because inputs increased by 4.1%, which is more than the increase observed in output (3.8%).
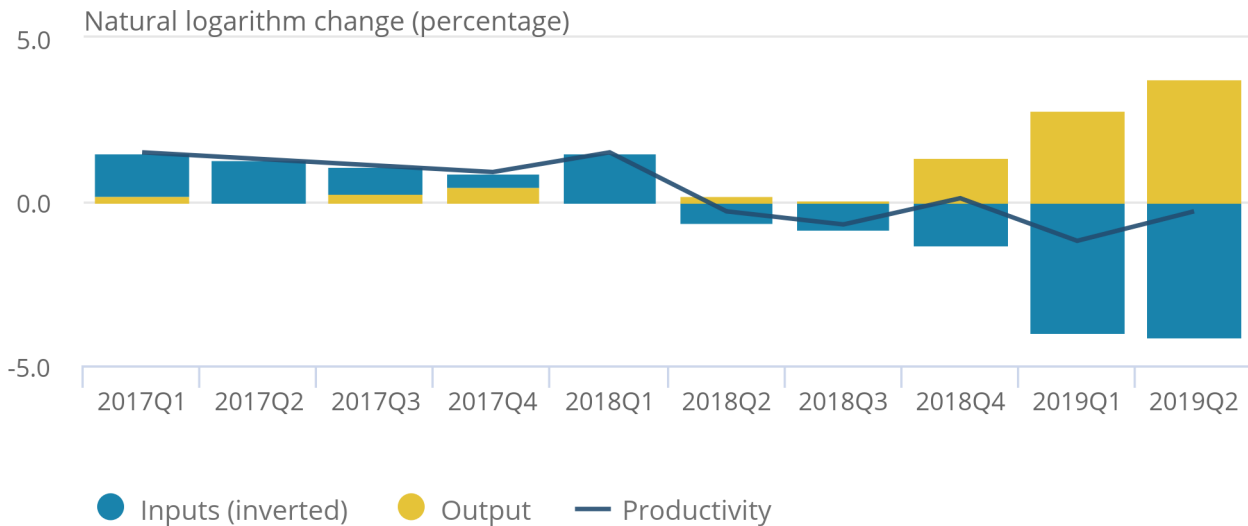
As inputs growth has a negative effect on productivity growth, both Figure 1 and Figure 2 show the inverted growth rates of inputs. The sum of the stacked bars (output, and inverted inputs) is therefore equal to productivity growth.

Figure 1: Productivity falls in Quarter 2 2019 when compared with the same quarter of the previous year

Public service productivity, inputs and output, quarter-on-same-quarter-a-year-ago growth rates, UK, Quarter 1 (Jan to Mar) 2017 to Quarter 2 (Apr to June) 2019

Figure 1: Productivity falls in Quarter 2 2019 when compared with the same quarter of the previous year

Public service productivity, inputs and output, quarter-on-same-quarter-a-year-ago growth rates, UK, Quarter 1 (Jan to Mar) 2017 to Quarter 2 (Apr to June) 2019

Natural logarithm change (percentage)

Output falling,
Inputs rising

Inputs (inverted) ● Output ● Productivity

Source: Office for National Statistics – Public service productivity

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 such that output growth and (inverted) input growth can be added to exactly equal changes in productivity. Further information on log changes can be found in Section 3 of A simple guide to multi-factor productivity .

The increase in output was the largest on this basis since Quarter 4 (Oct to Dec) 2008, but this is partially attributable to the large increase in inputs in the indirectly measured service areas. The output of some service areas is measured solely by the growth rate of inputs, following the 'output equals inputs' convention. These service areas, including military defence and parts of central and local government activity, make up over 30% of public service output. While productivity cannot change in these service areas, increases in inputs will be mirrored by increases in outputs. This has been a driver of recent large increases in both inputs and output, which cancel each other out.

For the directly measured service areas over the past 12 months, output has been increasing but inputs have been rising faster. The latest quarter broadly continues that trend. Output in healthcare, education and social protection were all higher in Quarter 2 2019 than in the same quarter in 2018, but total inputs has grown by more than total output. Healthcare, in particular, continues to see large increases in labour and intermediate consumption inputs. Such spending may lead to higher output in future, or better patient outcomes, but in these short-term productivity series such improvements are not visible.
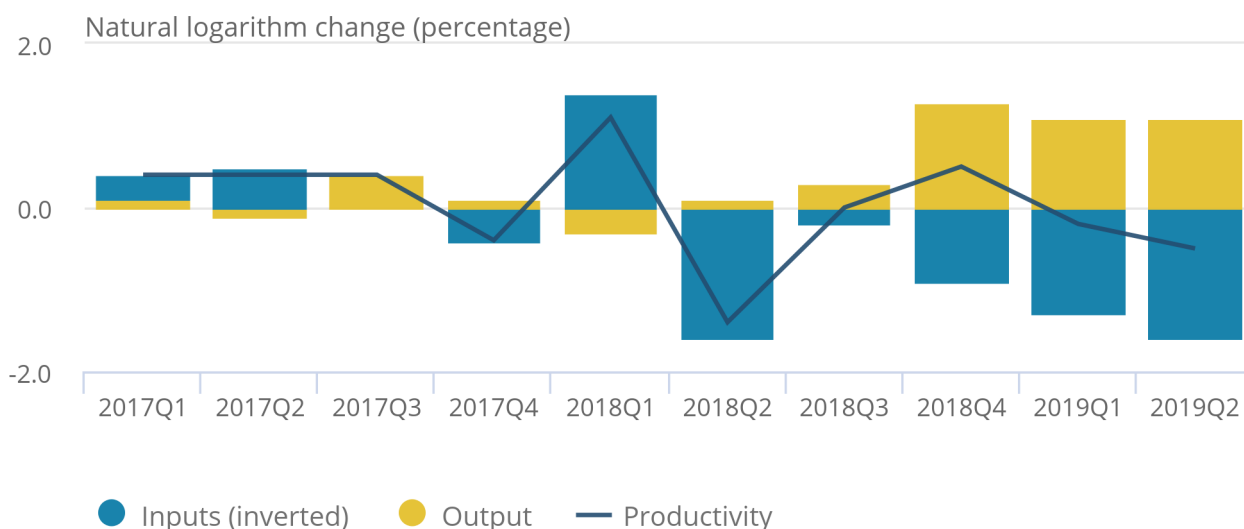
Figure 2 shows that public service productivity growth has been volatile over the last few years on a quarter-on-quarter basis. It decreased by 0.5% in Quarter 2 2019 compared with the previous quarter, following a decrease in Quarter 1 (Jan to Mar) 2019 of 0.2%. This has been revised up from the previous release, which reported a decrease of 1.1%. See Section 3 and Section 4 for further details on revisions.

Figure 2: Productivity falls in Quarter 2 2019 when compared with Quarter 1 2019

Public service productivity, inputs and output, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2017 to Quarter 2 (Apr to June) 2019

Figure 2: Productivity falls in Quarter 2 2019 when compared with Quarter 1 2019

Public service productivity, inputs and output, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2017 to Quarter 2 (Apr to June) 2019

Source: Office for National Statistics – Public service productivity

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 such that output growth and (inverted) input growth can be added to exactly equal changes in productivity. Further information on log changes can be found in Section 3 of A simple guide to multi-factor productivity.

The decrease in productivity in Quarter 2 2019 compared with the previous quarter was driven by a faster rate of increase of inputs (1.6%) than output (1.1%).
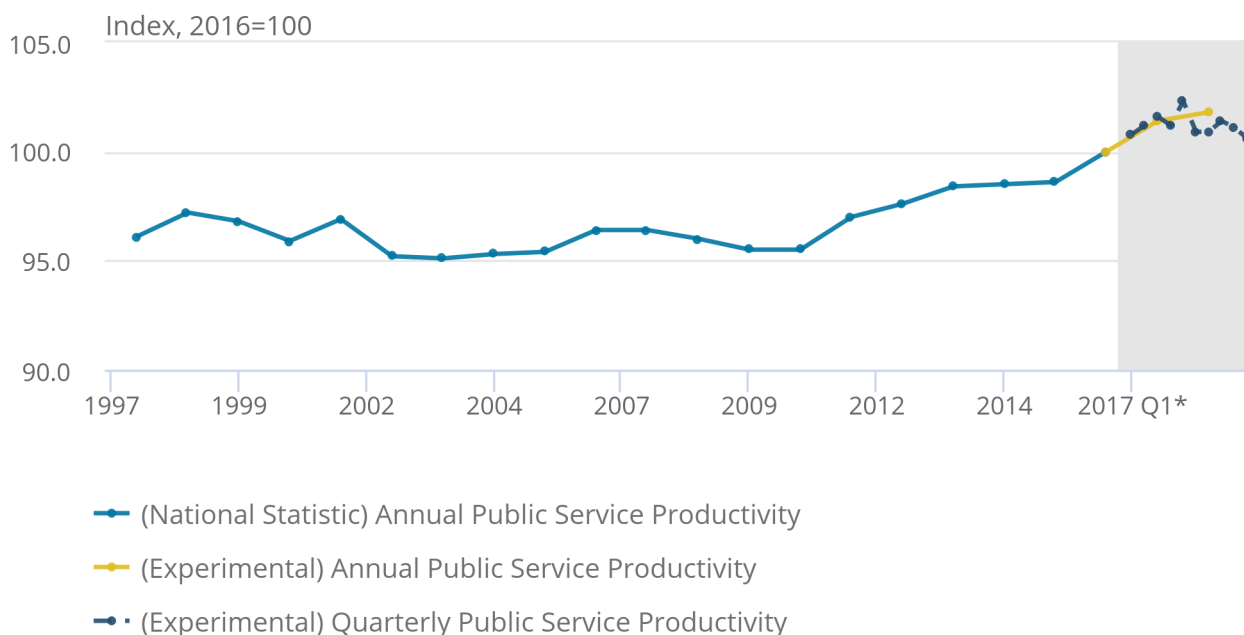
Placing these movements in the context of a longer time series, Figure 3 combines the experimental quarterly data in this release and the annualised versions of these for 2017 and 2018 with estimates between 1997 and 2016 taken from our latest 2016 annual release.

Figure 3: Productivity is volatile from Quarter 1 2017 to Quarter 1 2019 but increases overall

Total public service productivity, UK, 1997 to 2018

Figure 3: Productivity is volatile from Quarter 1 2017 to Quarter 1 2019 but increases overall

Total public service productivity, UK, 1997 to 2018

— (National Statistic) Annual Public Service Productivity

— (Experimental) Annual Public Service Productivity

— · (Experimental) Quarterly Public Service Productivity

Source: Office for National Statistics – Public service productivity

Notes:

1. Estimates from 1997 to 2016 are based on the latest annual public service productivity release.

2. Estimates from Quarter 1 2017 to Quarter 2 2019 (in grey) are the Experimental quarterly estimates in this article and are annualised (in orange) for 2017 and 2018.

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 2018 saw an increase in public service productivity of 0.4%, but this should be treated as an Experimental estimate until the more robust annual estimate for 2018 is available in our National Statistics publication. In particular, the data in this quarterly release are not adjusted for changes in quality during the Experimental period. Public service productivity is estimated to have increased by a total of 6.3% between 2010 and 2018 (an average of 0.8% per year).

The annualised 2017 and 2018 Experimental productivity figures have both been revised up considerably from the previous release, by 0.8 and 0.7 percentage points respectively. See Section 3 and Section 4 for further details on revisions.

3 . Improved methods and data sources in this release

This release uses improvements to methods and data sources to measure public service inputs and output, resulting in revisions to past estimates. This section outlines the methodological changes used in this release, and Section 4 explains their impact.

Public service productivity estimates operate an open revisions policy. This means that new data or methods can be used at any time and will be applied to 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 over-estimate the growth rate relative to the later estimates.

Public service productivity estimates use an aggregate inputs measure that includes labour, goods and services (intermediate consumption); payments to private sector providers (social transfers in kind); and the use of capital assets (consumption of fixed capital). The Office for National Statistics (ONS) has made considerable improvements to the measurement of capital stocks and consumption of fixed capital, which have been incorporated into the National Accounts in Blue Book 2019.

Full details of these improvements can be found in Changes to the capital stock estimation methods for Blue Book 2019. The most notable changes are that the asset lives for various types of capital (including buildings and machinery) have been reviewed and updated – in most cases, asset lives are now estimated to be shorter, leading to faster rates of deprecation and higher estimates of consumption of fixed capital – and the quality of the input data has been updated and considerably improved, making estimates for different parts of government more accurate and consistent over time.

In addition to improvements to capital consumption, Blue Book 2019 also introduced an improvement to the valuation of government purchases of goods and services by better accounting for Value Added Tax (VAT). Government does not pay VAT on purchases of goods and services used to produce government output. The effective cost has to be estimated and added, to ensure that all intermediate consumption is valued consistently in the national accounts; this approach follows international guidance. The ONS previously implemented this adjustment inconsistently over time and has improved the approach in Blue Book 2019.

Full details of revisions to gross domestic product (GDP) can be found in Section 7 of the GDP quarterly national accounts, UK: April to June 2019 publication.

As in most quarters, we have made further improvements to our methodology, resulting in some minor revisions. These quarterly public service productivity statistics are classified as Experimental Statistics, indicating the ongoing improvement to the methods used to calculate them. Section 6 outlines some future developments we intend to explore.

4 . Analysis and impact of improvements

This section details revisions to the quarterly Experimental series since the previous release, published on 5 July 2019. Revisions have been made throughout our data series, but trends have remained broadly the same.
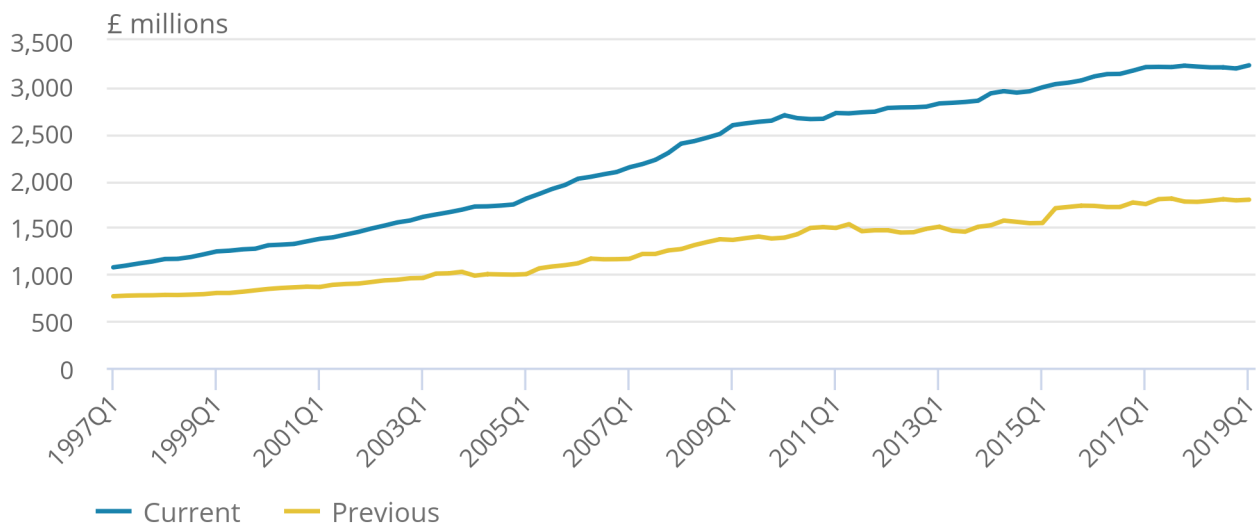
Revisions to capital consumption are substantial (Figure 4). As well as increasing the level, the growth rate of this input has also increased. The impacts vary by service area, but Figure 4 shows capital consumption for public services as a whole since 1997.

Figure 4: Consumption of fixed capital saw substantial upwards revisions

Total general government current price consumption of fixed capital, Quarter 1 (Jan to Mar) 1997 to Quarter 1 2019

Figure 4: Consumption of fixed capital saw substantial upwards revisions

Total general government current price consumption of fixed capital, Quarter 1 (Jan to Mar) 1997 to Quarter 1 2019

Source: Office for National Statistics – Public service productivity

Notes:

1. Data are from this Experimental quarterly release.

2. "Previous" refers to data within the publication released on 5 July 2019.

While increasing the rate of growth of this input, the higher level also means that a greater weight is allocated to capital in the aggregate inputs measure. The other inputs – labour, goods and services (intermediate consumption), and payment to independent sector providers (social transfers in kind) – are correspondingly allocated a smaller share.
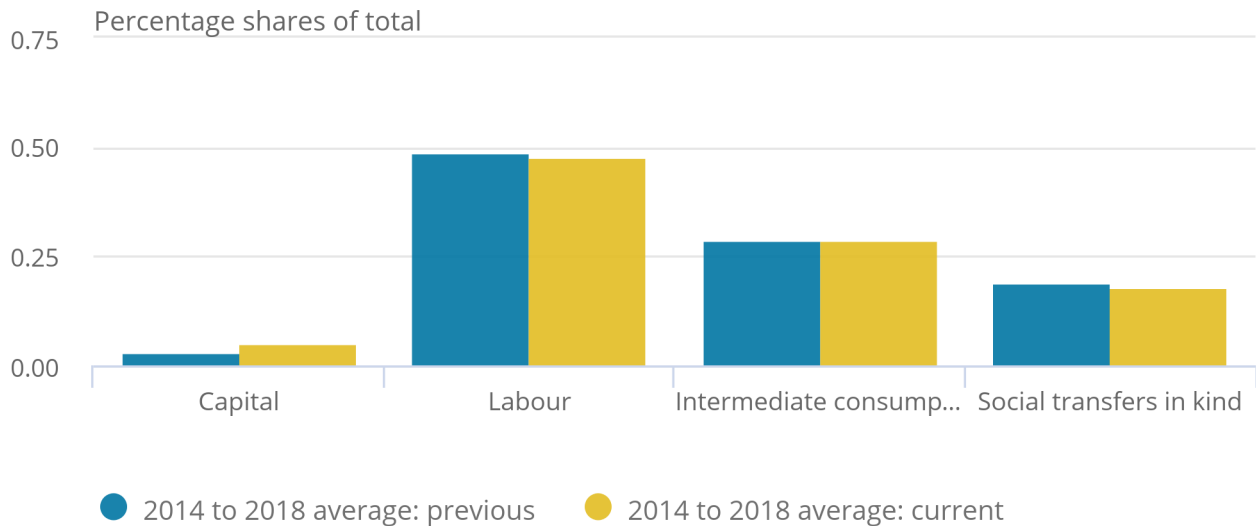
As Figure 5 shows, capital remains a small contributor to overall public service inputs. However, since capital consumption tends to grow less quickly than other types of input (especially intermediate consumption and social transfers in kind), allocating capital a larger weight tends to reduce the overall growth rate of the aggregate inputs measure. This change has reduced the growth rate of inputs in 2017 and 2018, contributing to the upward revision to productivity in these years.

Figure 5: Expenditure shares shift as capital consumption increases

Current price expenditure shares by component across aggregated service areas, average over five years, UK, 2014 to 2018

Percentage shares of total

● 2014 to 2018 average: previous   ● 2014 to 2018 average: current

Source: Office for National Statistics – Public service productivity

Notes:

1. Data are from this Experimental quarterly release.

2. "Previous" refers to data within the publication released on 5 July 2019.

The introduction of improved valuation of intermediate consumption, as a result of Value Added Tax (VAT), has further reduced the growth rate of inputs in 2017. Previous estimates of intermediate consumption incorporated this valuation approach from Quarter 2 (Apr to June) 2017 onwards. The latest data incorporates this approach for the full time period, increasing the level of intermediate consumption in 2016. This reduces the growth rate of inputs between these years and so also contributes to the upward revision of productivity growth in 2017.
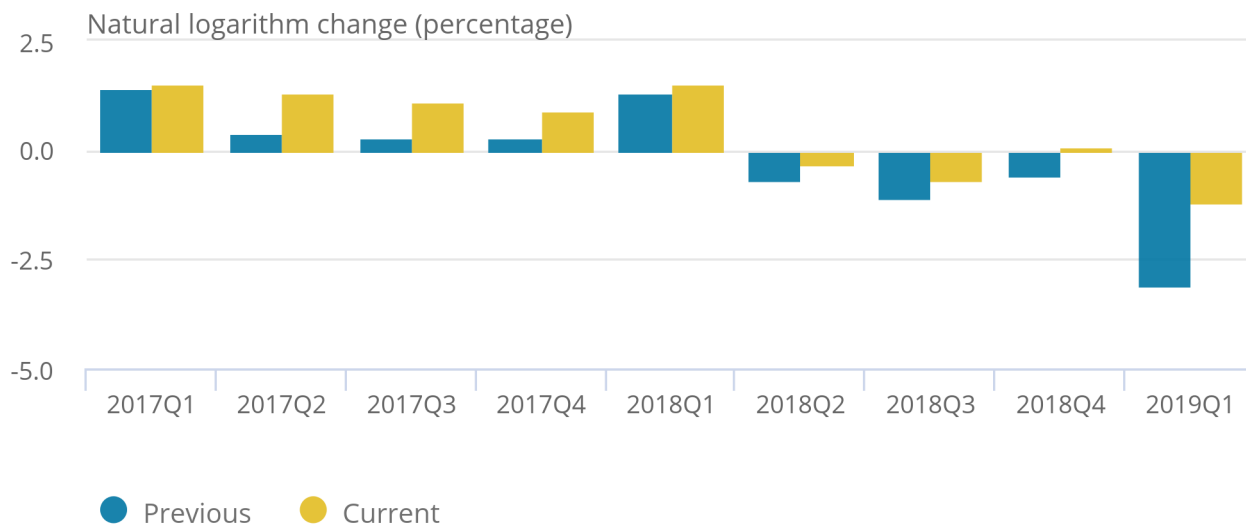
Figure 6 shows the cumulative impact of these revisions on public service productivity since Quarter 1 (Jan to Mar) 2017, measured on a quarter-on-same-quarter-a-year-ago basis. As explained earlier in this section, the upward revisions to productivity are primarily as a result of slower inputs growth. Output is also estimated to have grown faster than previously thought in 2018 and 2019, as a result of new data becoming available for the latest periods.

Figure 6: Productivity saw upwards revisions back to Quarter 1 2017

Public service productivity revisions, quarter-on-same-quarter-a-year-ago growth rates, UK, Quarter 1 (Jan to Mar) 2017 to Quarter 1 2019

Source: Office for National Statistics – Public service productivity

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 5 July 2019.

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 .
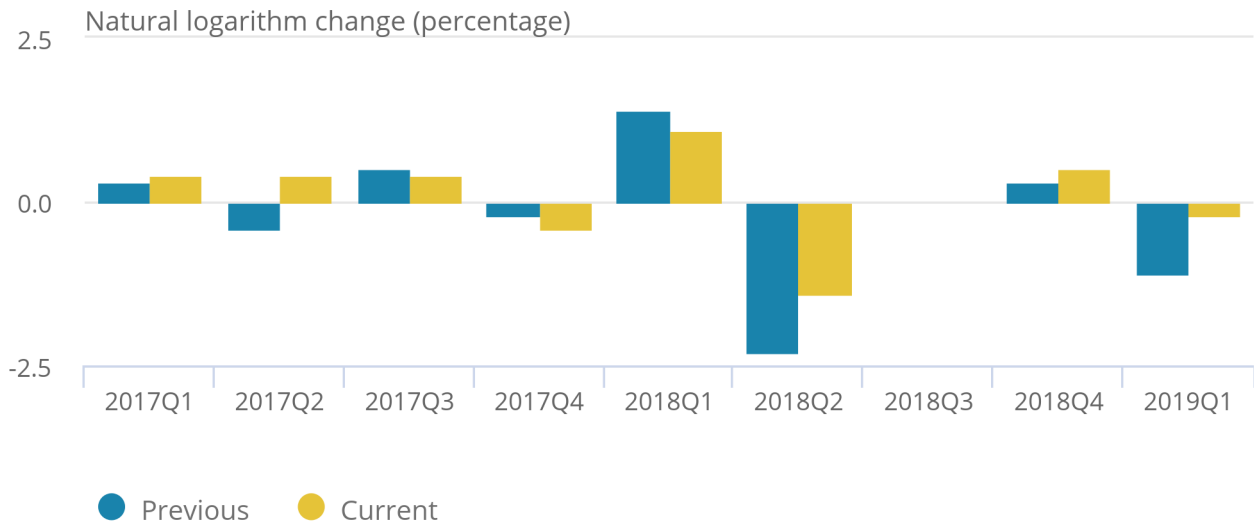
When comparing with the previous quarter, growth rates have been revised in most quarters since Quarter 1 2019, although the trend varies across the series. Figure 7 illustrates the volatility of the quarter-on-quarter revisions to productivity.

Public service productivity revisions, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2017 to Quarter 1 2019

Figure 7: Productivity revisions vary when comparing with the previous quarter

Public service productivity revisions, quarter-on-quarter growth rates, UK, Quarter 1 (Jan to Mar) 2017 to Quarter 1 2019

Source: Office for National Statistics – Public service productivity

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 5 July 2019.

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: April to June 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 publications. The use of log changes allows decompositions of productivity to be exactly additive between inputs and output. In general, when 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 output, inputs and productivity up to 2016 are reported on an annual basis and use data from Public service productivity: total, UK, 2016. Further information about the annual, National Statistics release can be found in the Quality and Methodology Information (QMI) report.

Differences between the National Statistics and Experimental releases and information on data sources for quarterly total public service productivity can be found in New nowcasting methods for more timely quarterly estimates of UK total public service productivity.

As these statistics are Experimental, we are continuously improving our methods. To improve these statistics over the coming year, we intend to:

- 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 adjustment

- continue to publish analysis of the underlying movements driving quarterly productivity movements, 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 be sent via email to productivity@ons.gov.uk.

7 . Authors

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8 . Related links

Labour productivity, UK: April to June 2019
Article | Released 8 October 2019
The latest estimates of labour productivity for the whole economy.

Multi-factor productivity estimates: Experimental estimates April to June 2019
Article | Released 8 October 2019
Growth accounting estimates for the UK market sector and 10 industry groups.

Quarterly UK public service productivity (Experimental Statistics): April to June 2019
Article | Released 8 October 2019
Contains the latest experimental estimates for quarterly UK total public service productivity, inputs and output.

Industry by region estimates of labour productivity: 2017
Article | Released 6 February 2019
Annual productivity estimates for 16 industries in Standard Industrial Classification 2007 section groups for each of the NUTS1 regions from 1997 to 2017. It compares annual productivity growth by region, as output per hour, relative to the UK and explains how manufacturing and services have grown across the regions.

Regional and sub-regional productivity in the UK
Article | Released 6 February 2019
Estimates for measures of labour productivity using a balanced gross value added (GVA) approach for NUTS1, NUTS2 and NUTS3 sub-regions of the UK, selected city regions and English local enterprise partnerships (LEPs) up to 2017. Estimates are in both real and nominal terms.

Improving estimates of labour productivity and international comparisons
Article | Released 9 January 2019
Discusses recent Organisation for Economic Co-operation and Development 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.

Analysis of compositional changes in hours worked in the UK
Article | Released 7 August 2019
Analysis of the changes in the UK labour composition during and after the economic downturn, and international comparison over the last five years.

Public service productivity: total, UK, 2016
Article | Released 9 January 2019
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.

Public service productivity: healthcare, UK, 2016
Article | Released 9 January 2019
Presents updated estimates of output, inputs and productivity for public service healthcare in the UK between 1995 and 2015, and new estimates for 2016.

How productive is your business?
Article | Released 6 July 2018
An interactive tool that helps businesses to calculate their productivity and compare their performance with other businesses in Great Britain.