

Statistical bulletin

# Public service productivity, quarterly, UK: July to September 2023

UK total public service productivity, inputs and output to provide a short-term, timely indicator of annual productivity estimates. These are official statistics in development.

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# 1 . Main points

- Public service productivity levels have remained relatively stable since Quarter 2 (Apr to June) 2021.
- Public service productivity fell by an estimated 0.1% in Quarter 3 (July to Sept) 2023 compared with the same quarter the previous year.
- Public service productivity fell by an estimated 0.8% in Quarter 3 2023 compared with Quarter 2 2023, a second consecutive fall on the quarter.
- Annual estimates suggest that public service productivity rose by 2.9% in 2022 following an increase of 9.1% in 2021, representing a "bounce-back" from the coronavirus (COVID-19) pandemic, however, this did not return UK public service productivity to its pre-coronavirus peak; this pattern of growth is also reflected in the estimates from our new nowcasting methods.

These are official statistics in development, and we advise caution when using the data. The method is currently under development, which means that these estimates will be subject to revision as methods are redefined and more up-to-date data become available. Read more in [Section 10: Measuring the data](#)

## 2 . About these estimates

This release presents [official statistics in development](#) for total public service productivity, inputs and output. This provides a short-term, timely indicator of the annual [National Statistics](#) estimates of total public service productivity, which apply quality adjustments to output data but are produced with a two-year lag to give time for data on quality factors to be gathered. See our [total public service productivity publication](#) for more information.

The estimates are not a measure of the productivity of an individual worker within the public sector but rather reflect the volume of services delivered to end-users relative to the volume of total inputs required to deliver these services. The measure is dominated by healthcare and education services because of their relative size.

Caution should be used when comparing the latest estimates with pre-coronavirus (COVID-19) pandemic years, as the structure of inputs and output changed in response to the pandemic.

This release contains data that are consistent with our [Quarterly national accounts bulletin](#). Therefore, in line with the quarterly national accounts, the revisions included in this bulletin reflect updated data on public administration and defence (PAD), and healthcare.

This bulletin is the second publication on quarterly public service productivity estimates since the beginning of the National Statistician's [Public services productivity review](#). The review is being undertaken following a commission from the Chancellor of the Exchequer asking the National Statistician to review and improve how public service productivity is measured. The first phase is to review measurement improvements for England but we will also be working with the devolved administrations to share best practice and identify what data sources would be required to make improvements to the estimates for Scotland, Wales and Northern Ireland. This is with a view to how UK-wide measurement improvements will be incorporated into the national accounts in future. More information about [the review's governance and contacts](#) is available.

We are now working to improve both our data sources and our methods, to ensure we capture changes in productivity across the public sector in a better and more consistent way.

Details on data and methods are described in [Section 10: Measuring the data](#).

In reading the following statistics, please consider that, unless stated otherwise, all growth rates reported in this bulletin are indexed to the base year of 1997.

### 3 . Quarter-on-previous-year productivity estimates

Because changes in productivity represent long-term structural trends, we advise looking at changes over a longer period. This helps to smooth any short-term fluctuations.

Comparing quarters with the same quarters a year previously provides a rolling annual estimate of productivity and is, therefore, a better indication of the [National Statistics annual productivity estimates](#). These estimates include additional data sources that are less timely than those used for quarterly estimates.

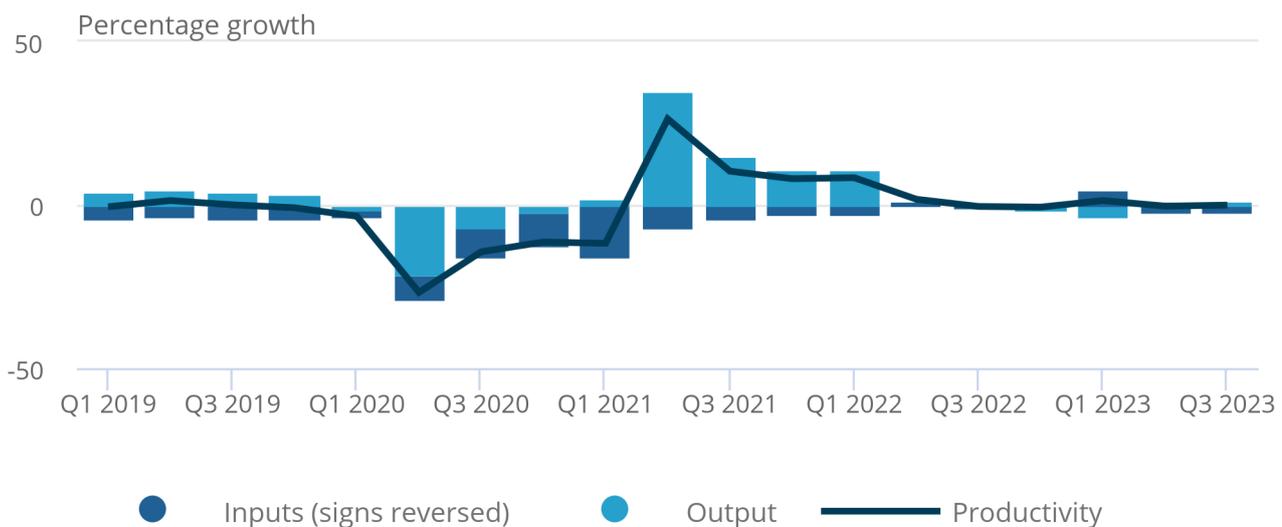
Productivity for total public services was estimated to be 0.1% lower in Quarter 3 (July to Sept) 2023 compared with the same quarter the previous year. Over this period, inputs increased by 1.8% while output increased by 1.7%.

#### Figure 1: Public service productivity fell by 0.1% in Quarter 3 2023 compared with the same quarter a year ago

Quarter-on-same-quarter a year ago growth rates in public service productivity, inputs, and output, UK, Quarter 1 (Jan to Mar) 2019 to Quarter 3 (July to Sept) 2023

#### Figure 1: Public service productivity fell by 0.1% in Quarter 3 2023 compared with the same quarter a year ago

Quarter-on-same-quarter a year ago growth rates in public service productivity, inputs, and output, UK, Quarter 1 (Jan to Mar) 2019 to Quarter 3 (July to Sept) 2023



Source: Public service productivity from the Office for National Statistics

#### Notes:

1. Official statistics in development quarterly estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
2. This chart inverts the growth rates of inputs.

Please note that our public service productivity estimates are subject to revisions because of improvements to source data and methodology.

## 4 . Quarter-on-quarter productivity estimates

Productivity for total public services was estimated to be 0.8% lower in Quarter 3 (July to Sept) 2023 compared with the previous quarter. This is because of inputs increasing by a proportionately larger amount than output (1.7%, compared with 0.9%).

Both inputs and output increased on the quarter for:

- healthcare
- education
- social protection
- justice and fire
- military defence
- central government "other"

The only service area that saw a fall in both inputs and output was local government "other".

Healthcare inputs, specifically the intermediate consumption (IC) component, was the main driver of total inputs growth. This is a result of both the magnitude of growth of IC inputs and the relative share of healthcare in total public services expenditure.

Military defence, central and local government service areas all adopt an "output-equals-inputs" convention; for more information, see our [Sources and methods for public service productivity estimates methodology](#). The "output-equals-inputs" convention states that output volume is assumed to be equal to the volume of inputs used to create them when output cannot be directly measured. Where outputs and inputs are assumed to be equal, productivity is then constant by assumption.

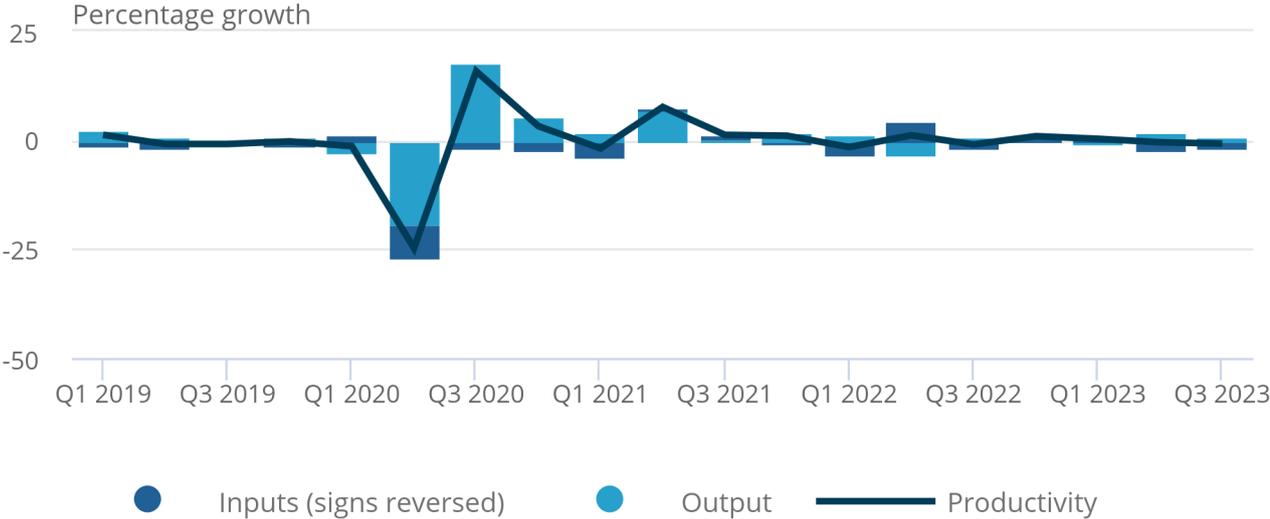
Quarterly estimates should also be interpreted with caution because of the volatile nature of quarterly inputs estimation.

**Figure 2: Public service productivity fell by 0.8% in Quarter 3 2023, caused by inputs growing faster than output**

Quarterly growth rates in public service productivity, inputs, and output, UK, Quarter 1 (Jan to Mar) 2019 to Quarter 3 (July to Sept) 2023

Figure 2: Public service productivity fell by 0.8% in Quarter 3 2023, caused by inputs growing faster than output

Quarterly growth rates in public service productivity, inputs, and output, UK, Quarter 1 (Jan to Mar) 2019 to Quarter 3 (July to Sept) 2023



Source: Public service productivity from the Office for National Statistics

Notes:

1. Official statistics in development quarterly estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.
2. This chart inverts the growth rates of inputs.

## 5 . Post-coronavirus estimates

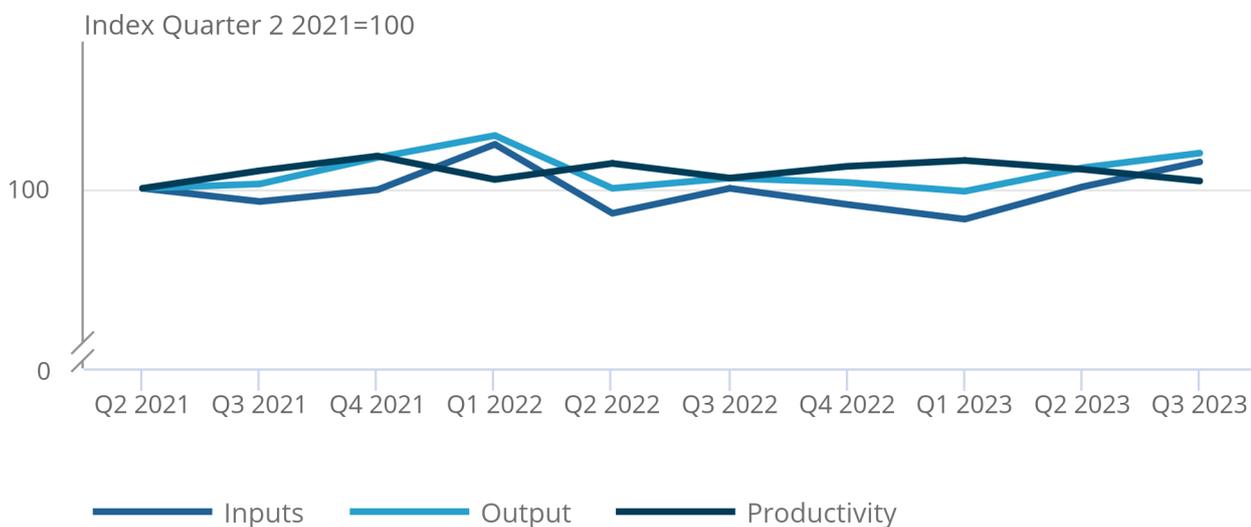
As seen in our previous [public service productivity bulletin](#) public service productivity levels have remained relatively stable since Quarter 2 (Apr to June) 2021. Over this period, inputs grew by 1.8%, while output grew by 2.3%, leading to productivity growth of 0.5%. Since the coronavirus (COVID-19) pandemic, productivity has fluctuated in a fairly tight band, although these data exclude quality adjustment.

**Figure 3: Public service productivity has remained relatively stable since Quarter 2 2021**

Index of public service productivity, inputs, and output, UK, Quarter 2 (Apr to June) 2021 to Quarter 3 (July to Sept) 2023

### Figure 3: Public service productivity has remained relatively stable since Quarter 2 2021

Index of public service productivity, inputs, and output, UK, Quarter 2 (Apr to June) 2021 to Quarter 3 (July to Sept) 2023



Source: Public service productivity from the Office for National Statistics

**Notes:**

1. Official statistics in development quarterly estimates of productivity are indirectly seasonally adjusted, calculated using seasonally adjusted inputs and seasonally adjusted output.

## 6 . Annual estimates

Figure 4 places productivity, inputs and output in an annual context over a longer period, combining our annual estimates from our [total public service productivity National Statistics publication](#) between 1997 and 2020, with data from our official statistics in development from 2021 onwards.

Estimates from our official statistics in development suggest that annual total public service productivity grew by 2.9% in 2022, revised down from [our previous productivity estimate](#) of 3.2%. This followed growth of 9.1% in 2021, which remained unrevised on our previous estimate.

The coronavirus (COVID-19) pandemic had a significant impact on public services. In 2020, inputs rose reflecting the extra resources provided to public services to deal with the pandemic. Conversely, output fell in 2020, as many services were delivered in a different way than in 2019, with additional costs and mandatory restrictions present for certain services.

It is worth noting that the pandemic caused widespread cost pressures and disruption to public service outputs, including:

- new safety measures
- urgent healthcare treatments taking priority
- remote consultations
- remote learning within education
- support for care homes
- restrictions to courts and tribunals

In 2021 and 2022, output grew faster than inputs, as fewer restrictions were present and new services such as test, trace and vaccinations were introduced.

Therefore, comparing pre- and post-coronavirus productivity is difficult, and estimates of this nature should be treated with caution.

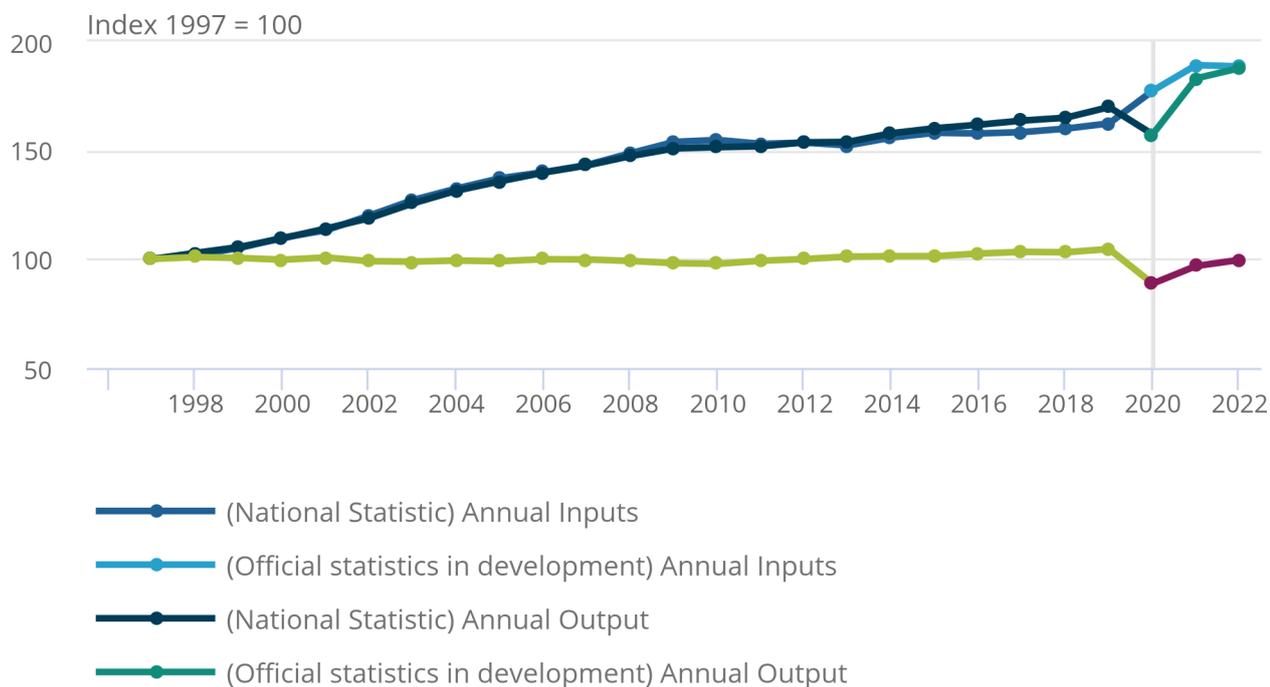
**Figure 4: Public service productivity is estimated to have risen by 2.9% in 2022**

Total public service productivity, UK, 1997 to 2022

Figure 4: Public service productivity is estimated to have risen by 2.9% in 2022

Total public service productivity, UK, 1997 to 2022

National Statistic



Source: Public service productivity from the Office for National Statistics

Notes:

1. Estimates for 2021 and 2022 are official statistics in development.
2. Estimates from 1997 to 2020 are National Statistics.

Output estimates in the official statistics in development use data on changes in the quantity of various services delivered, but do not include data on changes in the relative quality of these services. Data including quality adjustment for 2021 will be published with a two-year lag, as many of these quality factors require data collected with a lag.

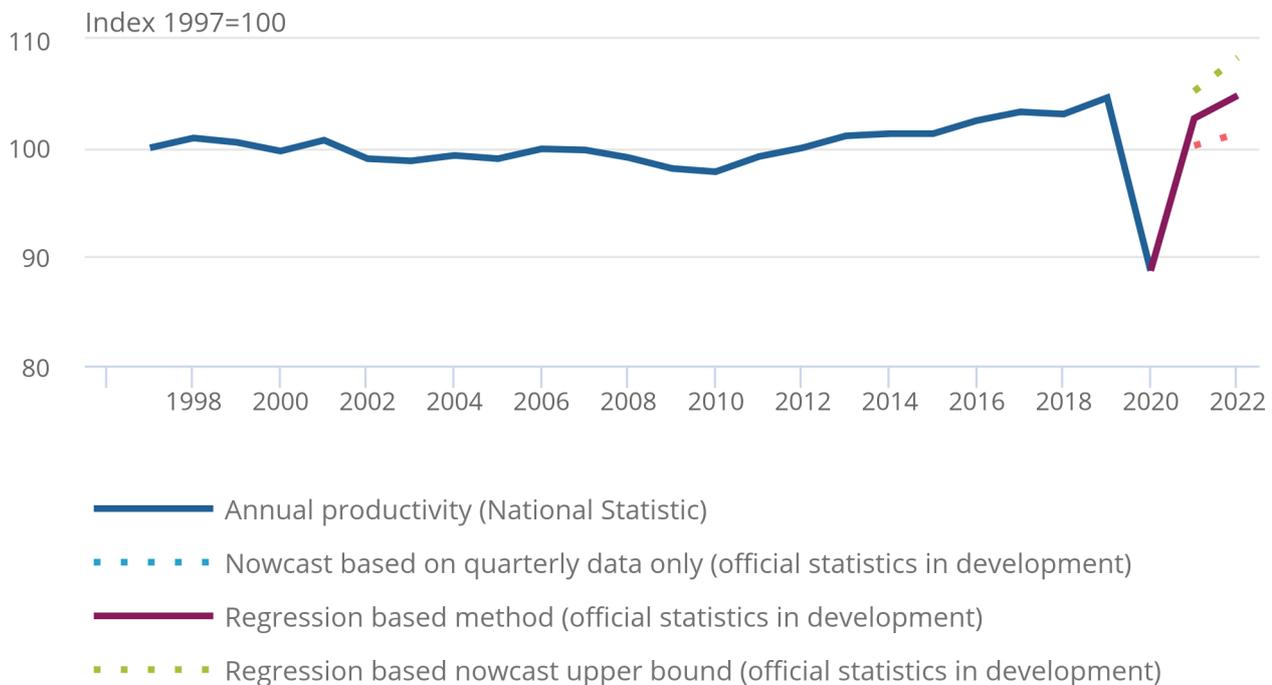
The estimates in Figure 4 differ from the measures published in our [Public service productivity, UK: 1997 to 2022](#) bulletin (and in the updated chart included as Figure 5 ). While the estimates in Figure 4 annualise the quarterly series for 2021 and 2022, the estimates in Figure 5 are based on the [experimental nowcast approach, which we first released in November 2023](#). The nowcasting approach differs from the quarterly by applying a quality adjustment element and using different data sources and methodology.

**Figure 5: Public service productivity may demonstrate a stronger "bounce-back" in 2021 using a dynamic regression nowcast approach**

Total public service productivity, UK, 1997 to 2020, and nowcast 2021 and 2022

Figure 5: Public service productivity may demonstrate a stronger "bounce-back" in 2021 using a dynamic regression nowcast approach

Total public service productivity, UK, 1997 to 2020, and nowcast 2021 and 2022



Source: Public service productivity from the Office for National Statistics

Notes:

1. Estimates for 2021 and 2022 are official statistics in development.
2. Confidence intervals are at the 95% level.
3. In response to additional data being available for healthcare outputs in 2021, we have applied a downward adjustment to the annualised quarterly healthcare and total output during that period.

We are working with our colleagues and experts to improve the nowcast approach, which will be updated in the future. These official statistics in development estimates for 2021 and 2022 should be treated with caution until our [total public service productivity annual estimates](#) are available for these years. We welcome feedback on this nowcast approach; please get in touch at [psp.review@ons.gov.uk](mailto:psp.review@ons.gov.uk).

## 7 . Revisions to public service productivity estimates

In line with the [National Accounts Revisions Policy](#), all time periods in the dataset are open for revision.

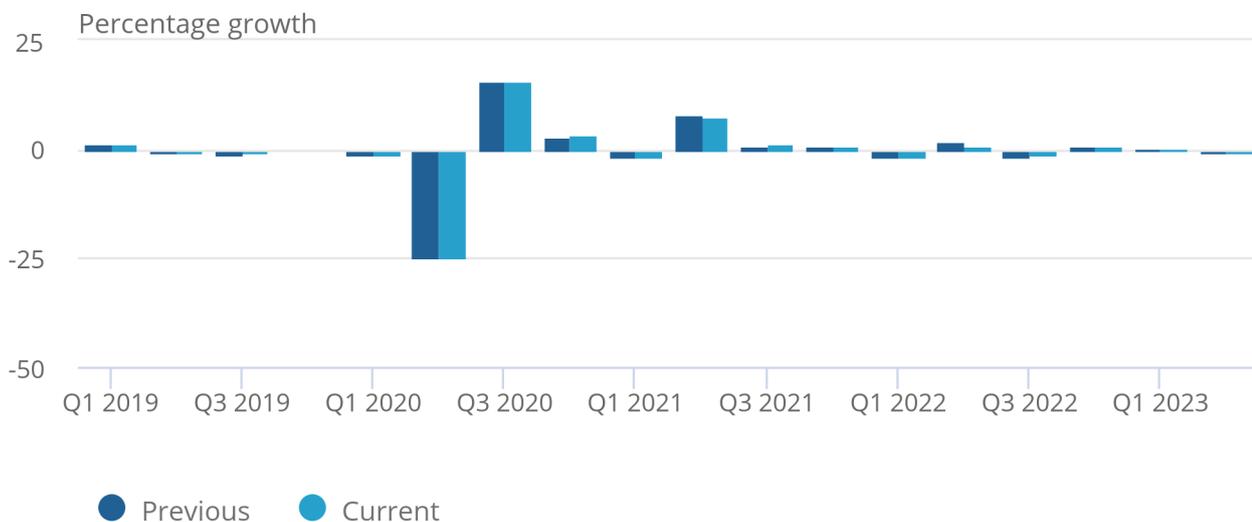
Figure 6 shows the [estimates published in the previous bulletin](#), and the revised estimates on public service productivity, following the changes mentioned in [Section 2: About these estimates](#).

### Figure 6: Public service productivity quarter-on-quarter revisions

Total public service productivity revisions, UK, Quarter 1 (Jan to Mar) 2019 to Quarter 2 (Apr to June) 2023

#### Figure 6: Public service productivity quarter-on-quarter revisions

Total public service productivity revisions, UK, Quarter 1 (Jan to Mar) 2019 to Quarter 2 (Apr to June) 2023



Source: Public service productivity from the Office for National Statistics

For more detailed information on revisions to productivity, inputs and output, please see [Table 4 in our accompanying dataset](#).

## 8 . Public service productivity: quarterly, UK, July to September 2023 data

[Public service productivity: quarterly, UK, July to September 2023](#)

Dataset | Released 15 January 2024

UK public service productivity for July to September 2023. Includes estimates of inputs, output, productivity and revisions. These are official statistics in development.

## 9 . Glossary

### Public services

These are services delivered by or paid for by government (central or local). If paid for by the government, they may be delivered by a private body – for example, the provision of nursery places by the private sector, where these places were funded by the government.

### Direct output measurement

Using a cost-weighted activity index to estimate the non-quality adjusted output of a service provided, such as the number of students in state schools, adjusted for attendance to produce an estimate of total hours of schooling delivered each year. Differs from indirect output measurement, where output is assumed equal to inputs.

### Quality adjustment

A statistical estimate of the change in the quality of a public service, using an appropriate metric, such as safety in prisons as part of the public order and safety adjustment.

### Classification of the Functions of Government

The [Classification of the Functions of Government](#) is the structure used to classify government activities. It is defined by the United Nations Statistics Division.

### Service area

The way we refer to the breakdown of public services into nine areas, closely following COFOG.

### Intermediate inputs

Also referred to as "goods and services", or "intermediate consumption" (the national accounts term). Intermediate inputs include goods and services used up in the provision of a public service, such as utilities, energy, professional services and medical supplies, among others.

### Deflator

A price index used to remove inflation effects from current price estimates of expenditure to provide a volume estimate.

### Nowcast

The nowcasts presented in this bulletin are a product of the observed annualised quarterly series in 2021 and 2022 and the relationship between the observed annual series and annualised quarterly series in 1997 to 2019 (excluding 2020 because of the impact of the coronavirus (COVID-19) pandemic). They are produced using an experimental, dynamic regression approach (an extension of autoregressive integrated moving average (ARIMA) modelling). In this method annualised quarterly data are used as predictors of the unavailable annual data.

## 10 . Measuring the data

### Data sources

Different sources and methods are used to produce the official statistics in development quarterly statistics and the National Statistics.

This release uses expenditure data from quarterly UK National Accounts, split into seven categories:

- healthcare
- education
- social protection
- justice and fire
- military defence
- central government services
- local government services

Data sources and methods differ from the annual publication, depending on data availability and appropriateness on a quarterly or annual basis. For example, some inputs measures that are available on an annual basis as direct measures are not available on a quarterly basis. These missing quarterly direct input measures may only be obtainable using indirect measures (deflated expenditure).

The National Statistic also uses different deflators to those used in this release to estimate those volumes of inputs. As such, estimates are not directly comparable between the quarterly and annual publications.

This release does not provide adjustments for the quality in public service output whereas the National Statistic does for some public output.

Estimates of productivity, inputs and output up to 2020 are reported on an annual basis and use data from our [Public service productivity, total, UK, 2020 article](#). Further information about the annual National Statistics release can be found in our [Public service productivity: total, UK, QMI](#).

Official statistics in development estimates differ from the annual estimates, as described in Section 9 of our [Sources and Methods for public service productivity estimates](#). Importantly, official statistics in development estimates do not apply quality adjustments.

## Revisions

These estimates reflect the revisions included in the [GDP quarterly national accounts, UK: July to September 2023](#).

## Measuring public service productivity

Productivity is calculated by dividing output by the respective inputs used to produce it. Therefore, productivity will 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.

Official statistics in development quarterly estimates of productivity are seasonally adjusted. In official statistics, it is common for the data time series to have regular, repeating, predictable variation (for example, the increase in retail sales in December). To help users interpret the series, national statistical institutes use a statistical method called seasonal adjustment to remove these effects.

We use the X11 algorithm in the X-13ARIMA-SEATS software to perform seasonal adjustment. Time series experts in the Office for National Statistics (ONS) review the seasonal adjustment each year. This includes checking for the impact of outliers. For the public sector productivity series, the coronavirus (COVID-19) pandemic period has been closely analysed for such outliers. The outliers are only included if they are judged by a time series expert to improve the seasonal adjustment. This judgement will include consideration of the charts, statistical tests and diagnostics. For the pandemic period, some series have additive outliers used to take account of the impact, while others have used level shifts. The annual seasonal adjustment reviews are conducted by time series experts, and all work is independently quality assured by another time series expert before leaving the team.

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 our [Gross domestic product \(GDP\) quarterly national accounts, UK: July to September 2023](#). 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.

Public service productivity is measured differently to labour productivity and multi-factor productivity and is not directly comparable. It reflects the volume of services delivered to end-users relative to the volume of total inputs (which comprise labour, intermediate consumption and capital). The measure is dominated by healthcare and education services because of their relative size.

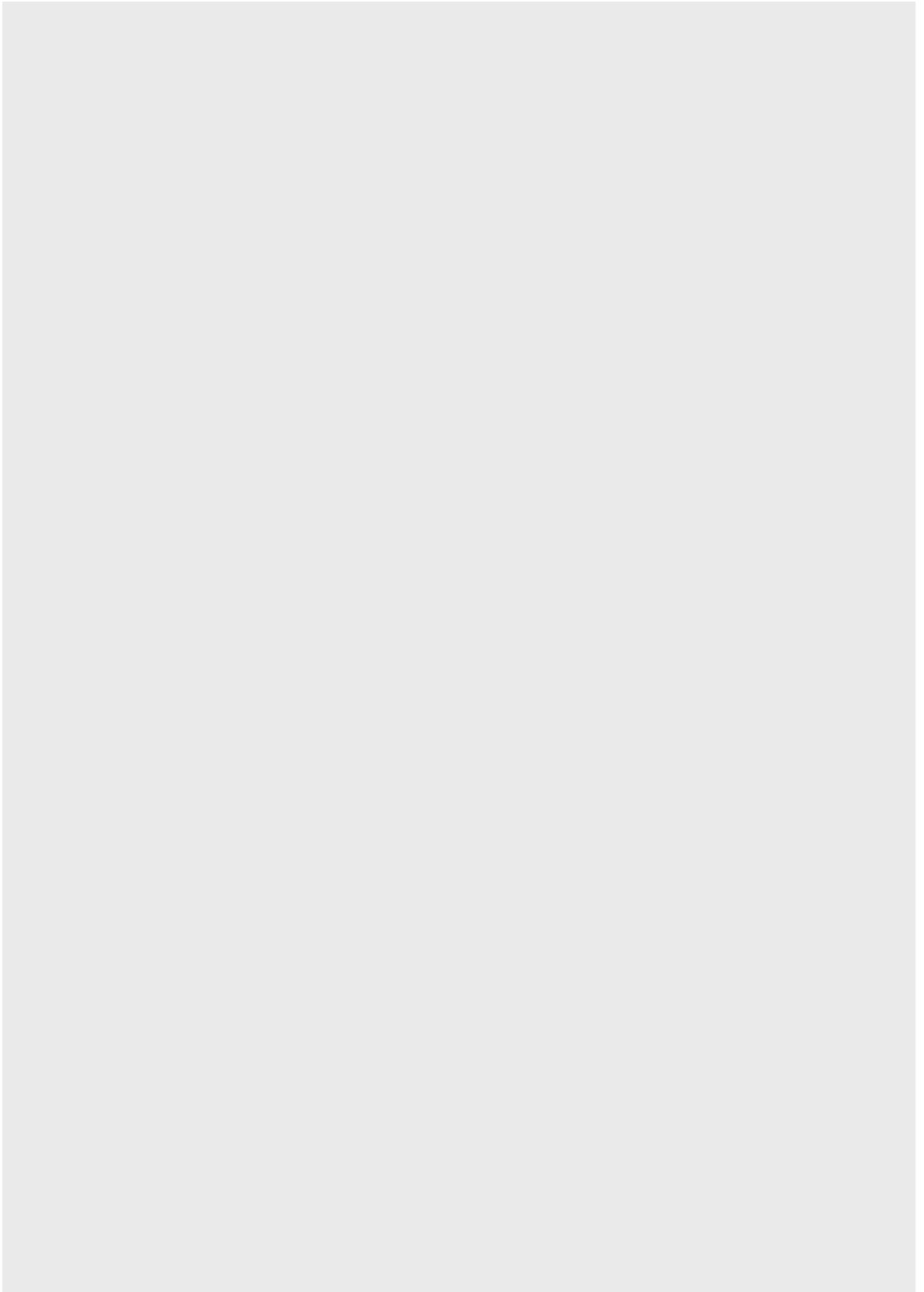
The estimates are not a measure of the productivity or efficiency of an individual worker within the public sector. For instance, while children within school received fewer hours of education at the start of the pandemic, a teacher may still have had to undertake additional work to modify lesson plans for remote learning. Public service productivity within this statistic only focuses on the education received by end users, or the healthcare services received by end-users, rather than the productivity of an individual teacher or an individual nurse to deliver a discrete task.

Similarly, the resource required to deliver some services within the NHS may have increased because of additional restrictions, such as the use of personal protective equipment, but the overall volume of NHS services may still have declined.

Public service productivity uses the expenditure definition of public services, that which defines general government final consumption expenditure (GGFCE). While including services where employees are central or local government, it also includes publicly funded private providers. This differs from the public sector, which extends to include public corporations but exclude publicly funded private providers to avoid double-counting.

These estimates should be considered a first estimate on public service productivity. The Office for National Statistics (ONS), together with [HM Treasury and other government departments](#), will continue to develop and improve its methods, which may lead to revisions of these preliminary estimates.

## 11 . Related links



### [GDP quarterly national accounts, UK: July to September 2023](#)

Bulletin | Released 22 December 2023

Revised quarterly estimate of gross domestic product (GDP) for the UK. Uses additional data to provide a more precise indication of economic growth than the first estimate.

### [Public service productivity, UK: 1997 to 2022](#)

Article | Released 17 November 2023

An overview of UK annual public service productivity between 1997 and 2020, and a new experimental measure for the path of annual UK public service productivity in 2021 and 2022.

### [Productivity overview, UK: April to June 2023](#)

Article | Released 24 October 2023

The main findings from official statistics and analysis of UK productivity, presenting a summary of recent developments.

### [Improvements to healthcare volume output in the quarterly national accounts](#)

Methodology | Last revised 25 September 2023

An overview of the improvements made to the coverage and cost-weights for quarterly government healthcare volume output for the UK.

### [Improvements to non-market adult social care output in the national accounts](#)

Methodology | Last revised 1 September 2023

Information on the updated methodology for measuring the output of non-market adult social care services.

### [Public service productivity: total, UK, 2020](#)

Article | Released 28 April 2023

Updated measures of output, inputs and productivity for UK public services between 1997 and 2020: service area breakdown, quality adjustment, latest revisions.

### [Public service productivity, healthcare, England: financial year ending 2021](#)

Article | Released 29 March 2023

Estimates of output, inputs and productivity for public service healthcare in England.

### [Public service productivity, adult social care, England: financial year ending 2021](#)

Article | Released 25 July 2022

Trends in publicly funded adult social care inputs, quantity and quality of output, and productivity in England, between financial year ending 1997 and financial year ending 2021.

### [Public service productivity: total, UK QMI](#)

Methodology | Released 25 July 2022

Quality and Methodology Information (QMI) report for the public service productivity: total, UK: 2019 release, detailing the strengths and limitations of the data, methods used and data uses and users.

### [Sources and methods for public service productivity estimates](#)

Methodology | Last revised 11 May 2022

Sources and methods information for the public service productivity: total, UK publication, detailing the main concepts, output and inputs measures by service area.

### [International comparisons of the measurement of non-market output during the COVID-19 pandemic](#)

Methodology | Last revised 21 February 2022

A joint Office for National Statistics and Organisation for Economic Co-operation and Development exploration of international differences in the methodologies used to measure non-market output and analysis of the implications for international comparisons of gross domestic product during the coronavirus (COVID-19) pandemic.

### [Improved methods for total public service productivity: total, UK, 2019](#)

Methodology | Last revised 20 January 2022

Explaining methodological improvements to education quality adjustment, children's social care, and healthcare output, used in the upcoming public service productivity article.

### [Public service productivity: quarterly, UK, October to December 2019](#)

Article | Released 7 April 2020

Official statistics in development 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.

## 12 . Cite this bulletin

Office for National Statistics (ONS), released 15 January 2024, ONS website, statistical bulletin, [Public service productivity, quarterly, UK: July to September 2023](#)