

# Labour Productivity QMI

Quality and Methodology Information (QMI) for Labour productivity, detailing the strengths and limitations of the data, methods used and data uses and users.

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## Table of contents

1. [Methodology background](#)
2. [About this quality and methodology information report](#)
3. [Important points about labour productivity data](#)
4. [Quality summary](#)
5. [Quality characteristics of the labour productivity data](#)
6. [Methods used to produce the labour productivity data](#)
7. [Other information](#)
8. [Related links](#)
9. [Cite this Quality and methodology information \(QMI\)](#)

# 1 . Methodology background

National statistic: Includes both National and experimental statistics

Frequency: quarterly and annual

Geographic coverage: UK

Last revised: 12 June 2023

Related publications:

- [Productivity Overview, UK](#)
- [UK productivity flash estimates](#)

## 2 . About this quality and methodology information report

This quality and methodology report contains information on the quality characteristics of the data (including the five European Statistical System quality dimensions) as well as the methods used to create them.

The information in this report will help you to:

- understand the strengths and limitations of the data
- learn about existing uses and users of the data
- understand the methods used to create the data
- help you to decide suitable uses for the data
- reduce the risk of misusing data

## 3 . Important points about labour productivity data

Labour productivity is useful in analysing the relationship between economic growth and labour over a given period. In interpreting these statistics, users should keep the following points in mind.

- Output per hour is our preferred measure of labour productivity because it accounts for different working patterns; it is calculated for the whole economy and for each industry by dividing gross value added (GVA) by hours worked for that industry, and also by bespoke industries and the market sector.
- Output per worker is calculated for the whole economy and the market sector by dividing GVA by number of workers.
- Output per job is calculated for the whole economy and for each industry by dividing GVA by number of jobs for that industry, and also calculated for bespoke industries.
- For our headline measures, we use GVA in chain volume measure prices (CVM), which includes adjustments for price changes (inflation-adjusted), which are presented as an index; we also use GVA in current prices (CP), although changes in the price of inputs and outputs make this measure less useful for measuring changes in productivity over time.
- Productivity is a long-term measure, so it is more robust to compare against the quarter a year ago, instead of quarter-on-quarter, as this will account for volatility in the estimates.
- There is a trade-off between the level of disaggregation and reliability of productivity estimates, but productivity estimates are published at a level of aggregation that ensures a sufficient level of quality.

## 4 . Quality summary

## Overview

This report relates to the quarterly labour productivity statistics, details of which can be found on our [Labour productivity page](#), and for the main publications: [UK productivity flash estimates](#) and [Productivity overview UK](#).

The UK productivity flash estimates are produced based on data from the gross value added (GVA) first quarterly estimate while the Productivity overview UK estimates are produced using the latest quarterly estimate data from the GVA.

Labour productivity is defined as output per unit of labour input and effectively shows changes in output over time for the same amount of labour input.

The [Measuring the Economy e-book](#) provides comprehensive information on our productivity framework and methods. A brief summary is also available on our website as a [guide to productivity measures](#). More general challenges to producing productivity statistics can be found in Section 2.5.2 of the [OECD Productivity Manual](#) (PDF, 993KB). Labour productivity statistics have been published by us since 1998, and the current methodological structure dates from 2001.

Labour productivity statistics are derived by dividing output, as measured by GVA, by measures of labour input, namely: hours worked, number of workers and number of jobs. As such, the quality of these statistics reflects the quality of the source data.

The Quarterly National Accounts provide GVA. The estimates are from the [GDP balanced approach \(as shown in our Gross domestic product \(GDP\) QMI\)](#) for whole economy calculations and the [GDP output approach \(as shown in our GDP output approach -- low-level aggregates dataset\)](#) for industry breakdown calculations. [Quality](#) information on the quarterly national accounts is published in our [GDP quarterly national accounts, UK bulletin](#).

The quality of labour input data reflects the integration between two sources. The Labour Force Survey (LFS) is a household survey, which collects data from workers while the Short-term Employment Survey (STES) is a business survey, which collects data from employers. There can be large differences at the whole-economy level between movements in labour input estimates from these two sources. Notes on reconciliation of these differences are published in our [Reconciliation of estimates of jobs, UK: October 2022 article](#).

We operate dual methodologies for estimating employee jobs by industry from business survey data – Reporting Unit (RU) and Local Unit (LU) based approaches. These approaches produce different results in terms of levels and rates of change. Individual workplaces are known as "local units" and a group of LUs under common ownership is called an "enterprise". While the majority of RUs and enterprises are the same, larger enterprises have been split into RUs to make the reporting easier. For most of the business surveys we run, forms are sent to the RU rather than the LU, therefore to the head office rather than to individual workplaces. This enables us to gather information on a greater proportion of total business activity than would be possible by sending forms to a selection of LUs. Detailed industry figures compiled using the LU approach will therefore be different from industry figures using the RU approach, although the totals will be the same at the whole-economy level. At the industry-breakdown level, the Labour Market team publishes LU-based estimates as "workforce jobs" (WFJ), while the productivity estimates use RU-based estimates in line with the GVA National Account approach that uses RU-based estimates.

Estimates of output per hour worked are our preferred measure of Labour productivity at the whole-economy and industry level.

Quarter-on-quarter changes in labour productivity should be interpreted with caution because of difficulties in ensuring consistency of seasonal adjustment between the numerator (GVA) and denominator (labour market inputs).

In interpreting trends in productivity, users need to take account of a range of factors including structural restrictions on labour adjustment, and the complex relationship between economic outputs and factor inputs. More information can be found in Chapter 10 of the [OECD Productivity Manual \(PDF, 993KB\)](#).

## Uses and users

Productivity estimates are used by users both within and outside the government. In combination with other economic indicators, productivity estimates help build a comprehensive picture of the UK economy. The main users and uses of the series include:

- all governments that are focused on assessing trends in economic growth, employment, output capacity, fiscal policy or productivity growth
- the Bank of England (BoE) – uses productivity analysis to understand actual and trend levels of output, which enables it to assess current and future inflationary pressures in the economy, which is essential for monetary policy
- businesses – interested in understanding the implications of productivity trends for the UK's economic outlook and therefore for economic policy; they also use industry-level productivity estimates as a benchmark to compare their own productivity performance
- researchers and academics – productivity analysis is often included in papers and presentations on the economic performance of the UK
- international agencies – the International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD) and Eurostat compare productivity levels across countries and provide some insight into why differences exist

## Strengths and limitations

The main strengths of these data include:

- international comparability – the estimates are produced following international guidance such as the [OECD Productivity Manual \(PDF, 993KB\)](#), the [UN System of National Accounts \(SNA\) 2008](#) and [standards and guidelines from the International Labour Organization](#)
- coherence – the data provide coherence between various Office for National Statistics (ONS) estimates by recalibrating these estimates to ensure the numerator and denominator are on a consistent basis
- granularity – data are provided on a low-level industry basis
- contribution analysis – the data give a solid indication of how much each industry has contributed to productivity growth and to what extent this growth is the result of movements of labour input between industries
- timeliness – flash estimates provide an indication of productivity movements as soon as the data are available from other areas of the ONS
- flexibility – the approach to data compilation can be flexible enough to account for economic shifts, for example, to provide productivity data excluding furloughed workers during the coronavirus (COVID-19) pandemic

The main limitations of these data include:

- expectations – early estimates of GVA are based on incomplete data, so expectations of accuracy and reliability need to consider this aspect
- revisions – revisions to GVA data and to person weights used in labour market surveys are an inevitable consequence of the trade-off between timeliness and accuracy
- uncertainty – all estimates, by definition, are subject to statistical error, that refers to the uncertainty inherent in any process or calculation that uses sampling, estimation or modelling
- response rates – the LFS is voluntary and response rates to this survey have been falling for some time, reducing the reliability of estimates from this data source
- certain classifications – some LFS respondents incorrectly classify themselves as working in the public sector, for example, when they work for a private company that has a public sector contract, which might affect the accuracy of our market sector estimates

## Recent improvements

Improvements to our estimates come from improvements to source data, productivity methodology or the accessibility, clarity and interpretation of our data.

The first set of improvements includes those made to the national account data, for example, changes from the national accounts' improvement project included in the annual Blue Book improvement. It may also include changes to labour market sources, including updated information on person weights.

A second group includes greater granularity of data, including additional industry-level data.

The third group includes new approaches to ensure our data are accessible and easy to interpret.

## 5 . Quality characteristics of the labour productivity data

This document provides a range of information that describes the quality of the data and details any points that should be noted when using the output. We have developed [Guidelines for Measuring Statistical Quality](#) that are based upon the five European Statistical System (ESS) Quality Dimensions. This document addresses these quality dimensions and other important quality characteristics, which are:

### Relevance

(The degree to which statistical outputs meet users' needs.)

Labour productivity estimates are published for the whole economy, bespoke-level industries, section-level industries and division-level industries (by Standard Industrial Classification 2007, SIC2007) in index form (using a base year consistent with National Accounts) and in current prices (CP) GBP.

Market sector productivity estimates are based on the National Accounts definition of the market sector. The market sector gross value added (GVA) measure estimates market activity by excluding non-market activity (including the central government). The measure includes the output of public corporations.

For detailed information on which industry breakdowns are available for various labour productivity measures, please see the guidance and the table of content tables of our [output per hour worked dataset](#), [output per job dataset](#), our [output per worker dataset](#) and our [flash productivity by section dataset](#). We also publish a quarterly [Labour productivity time series](#).

We use several comparison periods to illustrate changes in productivity growth over time. We compare the latest quarter with:

- the same quarter one year previously (year-on-year growth) – this is our preferred shorter-term measure of growth and helps assess short-term changes while reducing the likelihood that movements reflect statistical volatility
- the previous quarter (quarter-on-quarter growth) – this allows assessment of the most recent changes
- the average value of quarters in 2019 (before the COVID-19 pandemic) – this allows the best possible assessment of changes resulting from the COVID-19 pandemic and related restrictions, that in the UK covered the period between Quarter 1 (Jan to Mar) 2020 to Quarter 3 (July to Sept) 2021

## Accuracy and reliability

(The degree of closeness between an estimate and the true value.)

As a derived statistic, the accuracy of the productivity estimates is largely determined by the accuracy of the output and labour inputs. The reliance on multiple data sources can make it difficult to achieve consistency. GVA estimates are published on a Reporting Unit (RU) basis while labour market statistics are published on a Local Unit (LU) basis. However, the labour market statistics used to create the labour input series are reconciled to an RU basis to achieve consistency with the output series.

Revisions to the productivity estimates are made in line with revisions to the output and labour inputs. Revisions to National Accounts data occur as new data become available. The [National Accounts Revisions Policy](#) provides more information about revisions to National Accounts data. Labour Force Survey (LFS) estimates are subject to revisions generated by mid-year population estimates and every 10 years they are revised to census totals. Workforce jobs (WFJ) estimates are revised annually when employee jobs are benchmarked to estimates from Business Register Employment Survey (BRES).

To maintain reliability of the productivity statistics, estimates are published at appropriate levels of aggregation and frequency.

## Coherence and comparability

Coherence is the degree to which data that are derived from different sources or methods, but refer to the same topic, are similar. Comparability is the degree to which data can be compared over time and domain for example, geographic level.

Labour productivity time series data cover the UK whole economy and industry sections using the [SIC2007](#). From October 2011, productivity estimates are classified according to SIC2007, previously SIC2003. Time series data available under the new industrial classification are shown in the [Labour productivity time series](#).

## Accessibility and clarity

Accessibility is the ease with which users can access the data, also reflecting the format in which the data are available, and the availability of supporting information. Clarity refers to the quality and sufficiency of the release details, illustrations and accompanying advice.

Labour productivity estimates are published on our [Labour productivity webpage](#).

Our recommended format for accessible content is a combination of HTML webpages for narrative, charts and graphs, with data being provided in usable formats such as CSV and Excel. Available formats for content published on our website but not produced by us, or referenced on our website but stored elsewhere, may vary. For further information please refer to the contact details at the beginning of this document.

For information regarding conditions of access to data, please refer to the links below:

- our [Terms and conditions information](#) (for data on the website)
- our [Accessibility statement for the Office for National Statistics](#) (the datasets associated with this release have been modified accordingly)

## Timeliness and punctuality

Timeliness refers to the lapse of time between publication and the period to which the data refer. Punctuality refers to the gap between planned and actual publication dates.

The labour productivity quarterly estimates are published with the following time lags: [UK productivity flash estimates](#) are published approximately six weeks after the end of the reference period, and [Productivity overview UK](#) is published approximately three months after the end of the reference period.

For more details on related releases, the UK National Statistics [Publication Hub](#) is available online and provides 12 months' advance notice of release dates. In the unlikely event of a change to the pre-announced release schedule, public attention will be drawn to the change and the reasons for the change will be explained, as set out in the [Statistics Authority's Code of Practice](#) and on our [Data Policies page](#).

## Concepts and definitions (including list of changes to definitions)

(Concepts and definitions describe the legislation governing the output and a description of the classifications used in the output.)

Labour productivity estimates are derived statistics, meaning they use other published data. The Office for National Statistics (ONS) National Accounts output data are governed by the conventions of the [European System of Accounts 1995 \(ESA95\)](#).

The definitions and concepts of the labour productivity statistics are compliant with relevant sections of the [OECD Productivity Manual \(PDF, 993KB\)](#), and our [ONS Productivity Handbook](#).

## Geography

Estimates are published on a UK geographic basis.

## Output quality

The statistics included in our [Productivity Overview, UK article](#) are badged as National Statistics and so meet the quality requirements of this status, while some of the statistics published in our [UK productivity flash estimates articles](#) are experimental.

## Why you can trust our data

The Labour productivity estimates are produced in accordance with the best practices set out in the [Statistics Authority's Code of Practice](#) and on our [ONS' Data Policies page](#).

Any revisions to the data are clearly identified as such and limitations are made known to all users.

# 6 . Methods used to produce the labour productivity data

## How we collect the data, main data sources and accuracy

A summary of these data sources is documented in Section 5, Quality characteristics of the labour productivity data, under the subheading, Accuracy and reliability.

## How we process the data

Labour productivity estimates are derived by dividing measures of output by some measures of labour inputs. Most of the output measures used in the Labour productivity statistical outputs are taken directly from the Office for National Statistics (ONS) National Accounts system and are measures of gross value added (GVA), for the whole economy, and industries of the economy for which productivity statistics are produced.

Labour inputs are measured by number of workers, filled jobs and hours worked. The number of workers is taken directly from the Labour Force Surveys (LFS) and is currently available only at the whole-economy level. This is known as "productivity workers". The second labour input measure is a measure of jobs, known as "productivity jobs" and the third measure is a measure of hours worked, known as "productivity hours". "Productivity jobs" and "productivity hours" are also available by industry.

The methodology for producing these estimates is discussed in greater detail in the following sections.

## Output per worker

Output per worker estimates are part of the [Output per worker](#) dataset that contains estimates for GVA, workers, and output per worker by whole economy and the market sector. It contains annual and quarterly statistics. The LFS collects information about employment on a headcount basis. This labour input series and GVA at the whole-economy level are used to derive the output per worker productivity series. Output per worker estimates are not currently published by industry as the LFS, in which individuals define for themselves the industries in which they work, is not a good measure to assign workers to industries.



## Output per job

Output per job estimates are part of the [Output per job](#) dataset that contains estimates for GVA, jobs and output per job by bespoke, section- and division-level industry, as defined by the SIC2007. It contains annual and quarterly statistics and estimates for industry quarter-on-quarter, year-on-year and quarter-on-year contributions to output per job.

Workforce jobs (WFJ) is a measure of the number and type of filled jobs in the workforce. It comprises employee, self-employed, HM forces and government supported trainee (GST) job estimates. These data come from the Short-term Employment Survey (STES), the LFS and administrative data sources. As some employees have more than one job, WFJ measures differ from headcount or "worker" measures of participants in the labour market.

For the purposes of estimating productivity, the employee jobs component of WFJ is used on a reporting unit (RU) basis, to achieve consistency with the measurement of output in the [National Accounts](#). The employee job series is added to the self-employed, HM forces and GST series to create a WFJ series, which is labelled "productivity jobs" to distinguish it from WFJ estimates published in the [Labour Market overview bulletin](#) which are on a local unit (LU) basis. The components of the Productivity jobs series are summed by industry as shown in the following equation and then scaled to the total UK LFS jobs.

Productivity jobs (industry i)=

employee Jobs (industry i RU based)

+ self-employed Jobs (industry i RU based)

+ HM Forces jobs (LFS)

+ GST jobs (LFS)

At the whole-economy level and by selected sections and subsections, GVA is divided by the jobs-based labour input series to derive the output per job productivity series.

## Output per hour

Output per hour worked estimates are part of the Output per hour worked dataset that contains estimates for GVA, hours worked and output per hour worked by bespoke, section and division-level industry, as defined by SIC2007. It contains annual and quarterly statistics and estimates for industry quarter-on-quarter, year-on-year and quarter-on-year contributions to whole economy output per hour worked. To produce estimates of output per hour worked by industry, an input labour series based on the total actual hours worked is required. An employee hours and government supported trainee (GST) hours series is created by multiplying the productivity jobs series by average weekly hours worked, recorded by the LFS. HM Forces hours data comes from Ministry of Defence (MoD). Unpaid family workers (UFW) hours worked are taken from the LFS. Self-employed total hours data come directly from the LFS. The components of the productivity hours series are summed by industry as shown in the following equation and then scaled to total UK LFS hours.

Productivity hours (industry i)=

employee Jobs (industry i RU based) x Avg hours (industry i, LFS)

+ self-employed hours (industry i RU based)

+ HM Forces jobs (LFS) x Fixed Avg hours (MoD)

+ GST jobs (LFS) x Avg hours (GST, LFS)

+ UFW jobs (LFS) x Avg hours (UFW, LFS)

At the whole-economy level and by selected sections and subsections, GVA is divided by the hours-based labour input series to derive the output per hour productivity series.

## Flash productivity estimates

To ensure timeliness, our [UK productivity flash estimates article](#) is produced alongside our [Labour Market overview bulletin](#) for each quarter, using the preliminary estimate of GVA and whole-economy hours and workers to produce whole-economy output per hour and output per worker.

Employee jobs are measured by business surveys (STES). For flash, the latest employee jobs estimates are unavailable. Flash includes [experimental](#) data, compiled by carrying estimates from the previous quarter from STES, that allocate workers to industries.

Employee jobs for each industry are added together with the self-employed jobs, and all industries are scaled up or down proportionately to match the WFJ total for the UK.

Productivity hours are aggregated on a quarterly basis. Employee hours worked for each industry are calculated from employee jobs for that industry, combined with weekly hours per job for that industry. Weekly hours per job are measured from the LFS. Self-employed hours worked in each industry are measured by the LFS. Employee hours for each industry are added together with self-employed hours on a quarterly basis, and all industries are scaled up or down proportionately to match the WFJ total hours worked for the UK.

More details on the flash by industry methodology is described in the "Guidance" tab of our [accompanying flash productivity by section dataset](#).

## Market sector productivity estimates

Market sector workers are calculated by taking LFS workers less public sector workers plus public corporation workers. In addition, an adjustment is made to account for the exclusion of English Further Education Corporations and Sixth Form Colleges from Quarter 2 (Apr to June) 2012 onward. Market sector hours are then calculated by multiplying the workers series with average hours for the market sector from the LFS. These labour input series are used to calculate output per worker and output per hour using chain volume measures (CVM) GVA for the market sector.

## How we analyse and interpret the data

Labour productivity estimates are calculated as a ratio between a measure of output (GVA) and some measures of labour input (hours worked, workers and jobs). The findings are shown in a series of charts for stakeholders within the ONS, and the reasons behind changes in the figures are identified as far as possible. The data are then published for use by various external stakeholders, who are welcomed to provide feedback, show us how they use the statistic and provide guidance on where we should focus future work in labour productivity.

## How we quality assure and validate the data

A number of procedures are followed to quality assure the data. These processes are applied at all stages of the production process, at both granular and aggregate levels.

Quality assurance is carried out at all of the important stages of processing. This is followed by a larger scale quality assurance, involving ONS experts on labour market and National Accounts. This made it possible to check the accuracy of the data and the processing system simultaneously.

Visual presentations are created from the processed data. These presentations are used for internal analysis to highlight important data points or patterns that may warrant further investigation.

## How we disseminate the data

A summary of these data sources is documented in Section 5, Quality characteristics of the labour productivity data under the subheading, Accessibility and clarity.

## How we review and maintain the data processes

Further revisions to the estimates may be required in accordance with, for example, changes to source data. This follows [ONS' Revisions Policy](#). Our [Guide to statistical revisions](#) is also available.

## 7 . Other information

### Assessment of user needs and perceptions

The processes for finding out about uses and users, and their views on the statistical products.

The Labour Productivity team is responsible for producing the Labour productivity statistics. The team maintains a productivity mailbox ([productivity@ons.gov.uk](mailto:productivity@ons.gov.uk)), which is an important means of engagement with productivity users. Through this medium and wider communication, we have created a user group list, which is used to consult with our users.

Reviewing communication from users, the most common requests are for availability of additional data, additional details by industry, data on the intermediate series used to calculate the published estimates and the future timing of productivity releases.

As part of our user engagement strategy and at the request of main users, the Productivity team holds the Productivity user engagement meetings from 2021 and ad-hoc discussions with users to assess their needs and gather their inputs.

## 8 . Related links

### [European System of Accounts 1995 \(ESA95\)](#)

Guidelines | Released 24 November 1999

Defines the accounting rules which needed so that the economies of the Member States can be described in quantitative terms in a consistent reliable and comparable manner.

### [Gross domestic product \(GDP\) QMI](#)

Methodology | Released 8 April 2022

Quality and Methodology Information for gross domestic product (GDP), detailing the strengths and limitations of the data, methods used and data uses and users.

### [GDP output approach \(low-level aggregates\)](#)

Dataset | Released 12 May 2023

Annual and quarterly low-level aggregates of UK output gross value added (GVA) on a constant- and current-price basis.

### [International Labour Organization](#)

Guidelines

Standards and guidelines on labour statistics from the International Labour Organization.

### [Measuring the Economy](#)

Dataset

Chapter on productivity and why it is important.

### [OECD Productivity Manual \(PDF, 993KB\)](#)

Manual

Measurement of aggregate and industry-level productivity growth.

### [Quarterly National Accounts](#)

Bulletin | Released 31 March 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.

### [UN System of National Accounts \(SNA\) 2008](#)

Guidelines | Released 2008

Latest version of the international statistical standard for the national accounts, adopted by the United Nations Statistical Commission

## 9 . Cite this Quality and methodology information (QMI)

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