

Article

Productivity trends in the UK: July to September 2024

Productivity estimates based on the gross domestic product (GDP) quarterly national accounts, UK inclusive wealth and income accounts and labour market statistics.

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1 . Main points

- This article reviews the impact that using different data sources has on our understanding of labour productivity trends.
- The review considers the recent reweighting of the Labour Force Survey (LFS), which increased measures of hours and workers, reducing labour productivity when using this source.
- Short- and medium-term trends deliver broadly consistent messages, which suggest substantial coherency between the different labour market statistics available.
- New inclusive wealth and income accounts present an alternative perspective; they indicate that non-traditional measures of productivity perform more strongly both between the financial downturn and the coronavirus (COVID-19) pandemic, and immediately after the pandemic.

Productivity measures using data other than the Labour Force Survey (LFS) are statistics produced using experimental methods and published for comparison purposes. Users should use them with caution.

2 . Background

Productivity is a long-term structural measure of the performance of economies. As reported in our [Impact of reweighting on Labour Force Survey key indicators: December 2024 article](#), work has been completed to carry out reweighting of our Labour Force Survey (LFS) estimates to reflect more up-to-date population and migration data.

The results in this article contain data consistent with labour market data from [Labour market overview, UK: January 2025 bulletin](#) and [GDP quarterly national accounts, UK: July to September 2024 bulletin](#). This article reviews the impact using different data sources has on our understanding of labour productivity trends, considering the recent reweighting of the LFS.

The LFS has been reweighted from January to March 2019, using more recent population estimates. The reweighted LFS estimates incorporate information on the size and composition of the UK population, based on 2022 mid-year estimates.

For England, Wales and Northern Ireland, they are projected forward using scaling factors from 2021-based national population projections, published in January 2024. For Scotland, they are projected forward using scaling factors from 2020-based national population projections, published in January 2023.

This reweighting has increased the UK population of those aged 16 to 64 years. The stronger growth in population estimates since mid-2022 has resulted in increased levels estimates across most of the labour market series. The reweighted LFS employment data reduce the gap between LFS and payroll estimates of the number of employees.

An amount of volatility will remain in LFS estimates until the recent improvements that have been implemented fully feed through the waves of the survey; therefore, caution is advised when interpreting changes in productivity headline rates.

As such, the reweighted estimates of output per hour worked (OPH) and output per worker (OPW) provided here are indicative. The Quarter 3 (July to Sept) 2024 estimates published in the [Productivity flash estimate and overview, UK: July to September 2024 and April to June 2024](#) remain our lead measures until the next publication on 18 February 2025.

3 . Trend analysis using different data sources

To develop the analysis of productivity trends, we needed to generate comparable data from each labour market data source. Each source has strengths and limitations depending on the purpose of the data collection and the source it is gathered from. For example, Pay As You Earn (PAYE) Real Time Information (RTI) and business survey data is collected from businesses and for this reason, data such as information on the self-employed, or on actual hours worked, is not available. In such cases, we use Labour Force Survey (LFS) data to fill these gaps. We continue to use the same measure of gross value added (GVA) throughout.

To calculate OPH from business surveys, we need hours worked per industry. We use employee jobs by industry taken from the Short-term Employment Surveys (STES) and then multiply this by employee average hours worked by job by industry from the LFS. We then use hours estimates from the LFS for the self-employed and unpaid family workers. Finally, we use LFS average hours worked by job multiplied with workforce jobs to calculate His Majesty's forces and government-supported trainee hours worked. These hours are then all aggregated to the whole economy. This method produced a higher number of total hours than LFS measures because of a larger number of total jobs from STES. A more in-depth comparison between similar measures of jobs can be found in our [Reconciliation of estimates of jobs. UK article](#).

The detailed method for PAYE RTI can be found in the "Flash estimates, produced using experimental methods, with different data sources" section of our [Productivity flash estimate and overview. UK article](#).

Trendlines were constructed using a linear regression after using the Cochrane-Orcutt (CO) estimation and are for visualisation purposes only. Statistical inference should be treated with caution. These trendlines differ to the compound annual growth rate (CAGR) trendlines within our regular bulletin, [Productivity flash estimate and overview. UK article](#).

Figures 1 and 2 provide estimates using the LFS, PAYE RTI and STES with CO linear regression trendlines.

The increase in total hours due to reweighting of the LFS has resulted in a lower output per hour worked (OPH) compared with before reweighting estimates. Indicative reweighted estimates of OPH for July to September decreased by 2.4% when compared with the same quarter a year ago, while the before reweighting estimate showed a decrease of 1.9%.

The trendlines generated for OPH deliver marginally different annual growth rates for Quarter 1 (Jan to Mar) 2009 to Quarter 3 (July to Sept) 2024, ranging from 0.40% from STES sourced estimates to 0.58% for LFS sourced estimates with the new weighting.

Figure 1: OPH trends between the different measures show broad alignment for 2009 to 2024

Output per hour worked (OPH): Labour Force Survey (LFS) old weights, LFS new weights, Real Time Information (RTI) and Short-term Employment Surveys (STES); trendline: LFS old weights, LFS new weights, RTI, STES, UK, index 2022 = 100, seasonally adjusted, Quarter 1 (Jan to Mar) 2009 to Quarter 3 (July to Sept) 2024

Notes

1. Total hours worked have been adjusted for the time period before reweighting for productivity purposes. For more details see [Section 7. Data sources and quality](#)

The increase in employment because of reweighting of the LFS resulted in the LFS trend being in far closer alignment, even across the whole time period, with lower output per worker (OPW) in more recent periods compared with estimates before reweighting. Indicative reweighted estimates of OPW for July to September 2024 decreased by 0.4% when compared with the same quarter a year ago, while the before reweighting estimate showed an increase of 0.2%.

The trends in figure 2 show greater variation, caused in substantial part by the time series for the PAYE RTI based metric being shorter, because of the time period this data is available for.

The annualised trend growth rates for OPW Quarter 1 (Jan to Mar) 2009 to Quarter 3 (July to Sept) 2024 vary between 0.33% for RTI sourced estimates and 0.46% for LFS sourced estimates using the new weightings.

Figure 2: OPW trends between the different measures show greater variation, caused in part by the shorter time series of Pay As You Earn data available to analyse

Output per worker (OPW): Labour Force Survey (LFS) old weights, LFS new weights and Real Time Information (RTI); trendline: LFS old weights, LFS new weights, RTI, UK, index 2022 = 100, seasonally adjusted, Quarter 1 (Jan to Mar) 2009 to Quarter 3 (July to Sept) 2024.

The revisions in productivity since the coronavirus (COVID-19) pandemic suggest that the underlying weakness in UK productivity growth remains.

Table 1 shows the CAGR of the trendlines for OPH and OPW from 1997 Q1 (Jan to Mar) onwards. CAGR is a metric used to measure the mean annual growth rate of a time series over a specified period, assuming the growth happens at a steady rate. The CAGR reflects the rate at which the value would have grown if it had grown at a consistent rate over the entire period. This provides a single annual growth rate that accurately represents the overall performance over time.

Table 1: CAGR from Quarter 1 (Jan to Mar) 1997 onwards
Compound annual growth rate (CAGR), whole economy, UK

Period	Data Source	OPH CAGR	OPW CAGR
Q1 1997 to Q3 2024	LFS Old weights	0.70%	0.66%
Q1 1997 to Q3 2024	LFS reweighted	0.66%	0.63%
Q1 1997 to Q3 2024	STES	0.67%	N/A
Q1 2009 to Q3 2024	LFS Old weights	0.62%	0.50%
Q1 2009 to Q3 2024	LFS reweighted	0.58%	0.46%
Q1 2014 to Q3 2024	RTI	0.54%	0.33%
Q1 2009 to Q3 2024	STES	0.40%	N/A

Source: Labour Force Survey, Real Time Information and Short-term Employment Surveys from the Office for National Statistics

Notes

1. The first period of data (that is, the first observation) is typically excluded because the Cochrane-Orcutt procedure relies on the differences between consecutive observations to estimate and correct for autocorrelation.

Breaking up a time series into distinct periods and analysing the trendlines within each period can provide a more nuanced understanding of underlying dynamics, especially when structural shifts or external shocks significantly affect the data.

For instance, examining the period from 1997 to the financial downturn in Quarter 4 (Oct to Dec) 2008 allows us to understand the pre-downturn economic environment, which was characterised by a period of robust growth and relative stability.

The period from 2009 to 2020, which covers the aftermath of the financial downturn and leads up to the coronavirus (COVID-19) pandemic, reflects a time of recovery, with shifts in economic policies, changes in consumer behaviour, and the gradual unwinding of crisis-era interventions.

Finally, breaking the data into the period from Quarter 1 (Jan to Mar) 2021 to Quarter 3 (July to Sept) 2024 allows us to isolate the after-effects of the pandemic, the ensuing global economic disruptions, and the recovery phase, which probably includes new factors such as inflationary pressures and supply chain challenges. By segmenting the time series in this way, we can identify how different macroeconomic conditions, policy changes, and global events shape the trends within each period.

Within the rest of this section, we focus on two time series periods. The first runs from Quarter 1 2009 to Quarter 4 2019 whilst the second runs from Quarter 1 2021 to Quarter 3 2024. Notice how we have chosen not to include 2020 within our statistics because of the issues with the coronavirus pandemic and the LFS during this period, further reducing already small number of periods we are using.

When applying linear regression to a small number of periods, caution is required, as it can lead to misleading conclusions. With limited data points, the regression model may not adequately capture the true underlying trends, seasonal variations, or other structural patterns in the dataset. Small sample sizes increase the risk of overfitting, where the model might appear to fit the data well but fails to generalise to unseen periods or broader contexts. Therefore, we can conclude that it is too early to determine the validity of trends post 2021 despite the downwards movements.

With those caveats in mind, Figure 3 shows the results of our CO models for OPH using the LFS, PAYE RTI and STES for both time periods, Quarter 1 2009 to Quarter 4 2019 and Quarter 1 2021 to Quarter 3 2024, whilst Figure 4 shows the equivalent information for OPW.

The annualised trend growth rates for OPH between Quarter 1 (Jan to Mar) 2009 to Quarter 4 (Oct to Dec) 2019 varied between 0.22% for STES sourced estimates and 0.83% for RTI sourced estimates. When looking at OPW, annual growth varied from 0.66% for reweighted LFS estimates to 0.74% for RTI sourced estimates.

Figure 3: OPH growth post-coronavirus (COVID-19) pandemic continues to be weak

Output per hour worked (OPH): Labour Force Survey (LFS) new weights, Real Time Information (RTI), Short-term Employment Surveys (STES); trendline: LFS new weights, RTI, STES, UK, seasonally adjusted, Quarter 1 (Jan to Mar) 2009 to Quarter 3 (July to Sept) 2024

Figure 4: OPW growth post-coronavirus (COVID-19) pandemic continues to be weak

Output per worker (OPW): Labour Force Survey (LFS) new weights, Real Time Information (RTI); trendline: LFS new weights, RTI, UK, seasonally adjusted, Quarter 1 (Jan to Mar) 2009 to Quarter 3 (July to Sept) 2024

Table 2 shows the CAGR of the trendlines for OPH and OPW for the periods pre- and post-coronavirus pandemic.

Table 2: Pre- and post-coronavirus (COVID-19) pandemic CAGR
Compound annual growth rate (CAGR), whole economy, UK

Period	Data Source	OPH CAGR	OPW CAGR
Q1 2009 to Q4 2019	LFS Old weights	0.54%	0.69%
Q1 2009 to Q4 2019	LFS reweighted	0.52%	0.66%
Q3 2014 to Q4 2019	RTI	0.83%	0.74%
Q1 2009 to Q4 2019	STES	0.22%	N/A
Q1 2021 to Q3 2024	LFS Old weights	0.03%	0.19%
Q1 2021 to Q3 2024	LFS reweighted	-0.58%	-0.30%
Q1 2021 to Q3 2024	RTI	-1.10%	-0.74%
Q1 2021 to Q3 2024	STES	-0.81%	N/A

Source: Labour Force Survey, Real Time Information and Short-term Employment Surveys from the Office for National Statistics

Notes

1. The first period of data (that is the first observation) is typically excluded because the Cochrane-Orcutt procedure relies on the differences between consecutive observations to estimate and correct for autocorrelation.

There are several conclusions that can be drawn from these data. Firstly, the reweighting of the LFS has brought the data sources closer together. Following reweighting, there is broad consistency of the different data sources, noting the common components derived from LFS do impose a degree of convergence.

In general, the data sources agree that the post-coronavirus pandemic period displays a fall in OPH and weaker downward trends in OPW. The differentials in the trends between OPH and OPW reflect the changing average number of hours worked. Since the coronavirus pandemic, average hours worked has marginally increased.

However, OPH is falling from a peak immediately post-coronavirus pandemic, which also represented a strong peak relative to the pre-coronavirus pandemic trend if it had been extrapolated forward. There remains the potential that the current downward trend includes an element of a reversion to trend. Whilst the most recent data undershoots the 2009 to 2019 trendlines, variation around this trend was observed in the period between the global economic downturn between 2007 and 2009 and coronavirus pandemic. Further observations are needed to suggest a new trend has commenced; in the same way the global economic downturn demonstrated a clear break with the pre-2008 trend.

Overall, further analysis, particularly at the industry level is required to understand if a new trend is establishing itself, and to provide insights on what may be the potential factors of this. Further research is ongoing and will be provided in either a new analysis article or alongside our regular bulletin.

4 . Alternate concepts of labour productivity

To comprehensively assess trends in labour productivity, it is important to not only look at different data sources but to also look at different concepts. In particular, what is (and is not) included in our definition of economic activity, as well as whether we adjust for the sustainability of this activity, can have a substantial effect on labour productivity measures.

We have recently begun publishing [inclusive wealth and income \(IWI\) accounts](#) that expand upon the national accounts to include all economic activity resulting from human, produced, and natural capital. These IWI accounts can be analysed in a similar way to national accounts data; in particular, they can be used to calculate gross value added (GVA) and net value added (NVA) data which can then be used to calculate labour productivity data.

In Figure 5 we use these IWI accounts alongside traditional national accounts and satellite accounts to derive and analyse new measures of labour productivity. These measures can be used to better understand the effect of two key phenomena on productivity: shifts in economic activity between household, market, and non-market production; and innovation leading to reduction in greenhouse gas emissions, which is not captured in output.

These IWI accounts enable the calculation of GVA and NVA statistics consistent with the production and asset boundaries of their inclusive income and inclusive wealth data. To compile these into labour productivity statistics, the IWI accounts include hours worked estimates, which includes work both paid and unpaid (that is, including unpaid household services). This draws on several data sources, prioritising comparability with the methods used to calculate GVA in household production and where possible using the same data sources. Where additional data sources are required, we use our [time use data](#) and labour accounting, similar to those used in the Office for National Statistics (ONS) labour productivity compilation, which better aligns and prioritises the data sources as much as possible.

Figure 5 presents two alternate productivity measures, inclusive GVA per hour and inclusive NVA per hour, alongside the traditional GVA per hour. Inclusive GVA adjusts traditional GVA by including:

- quality adjusting public service output
- unpaid household work
- investment in additional intangible assets
- ecosystem services outside the national accounts production boundary

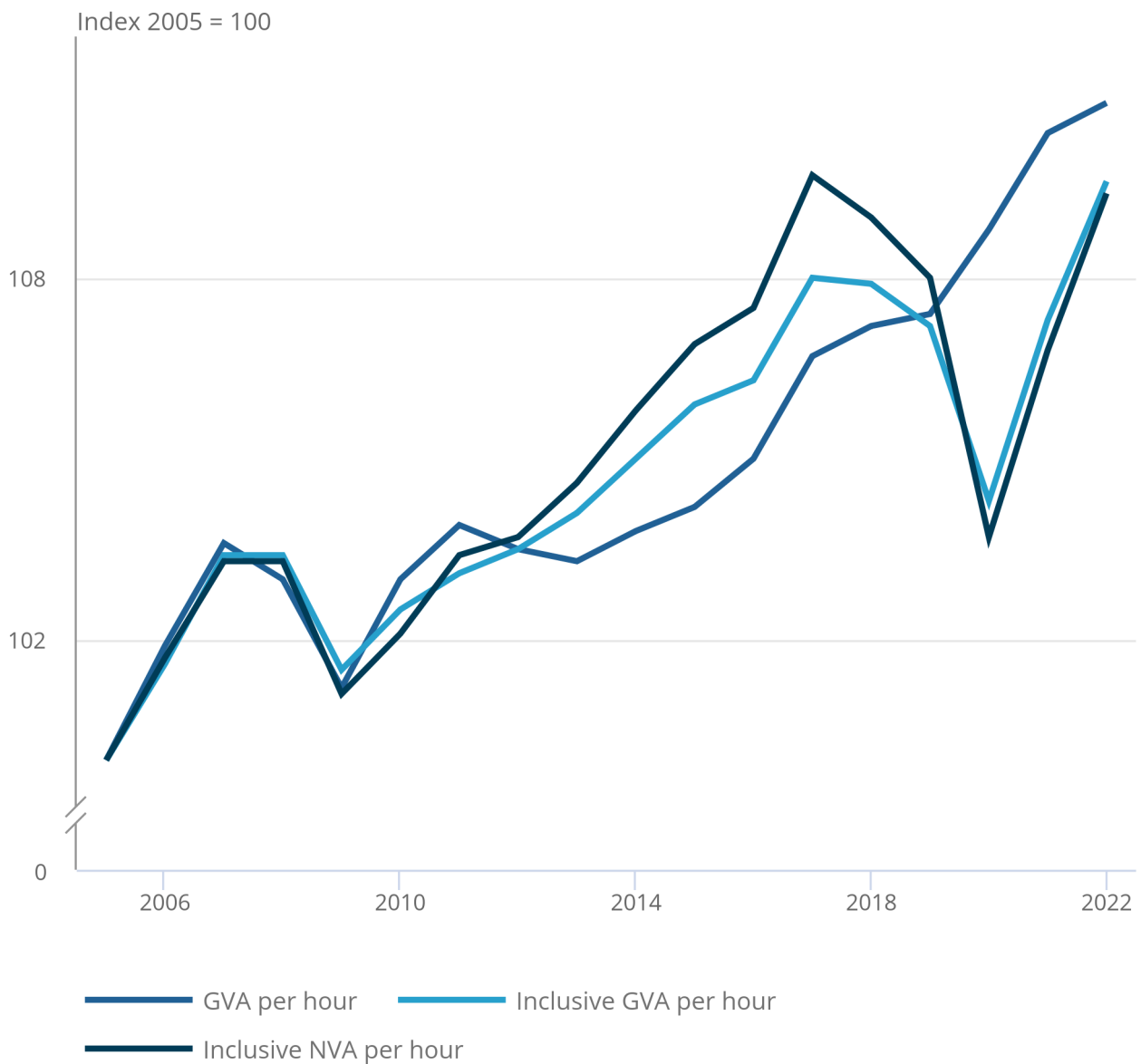
NVA then nets off, from GVA, capital consumption of produced and natural capital, including the depletion and degradation of the atmosphere associated with UK greenhouse gas emissions. More information about these adjustments can be found in our [UK inclusive wealth and income accounts article](#).

Figure 5: Alternative measures of labour productivity

Gross value added (GVA) per hour, inclusive GVA per hour, inclusive net value added (NVA) per hour, UK, 2005 to 2023

Figure 5: Alternative measures of labour productivity

Gross value added (GVA) per hour, inclusive GVA per hour, inclusive net value added (NVA) per hour, UK, 2005 to 2023



Source: Gross value added (GVA), inclusive GVA, and inclusive net value added (NVA) from the Office for National Statistics

Looking first at inclusive GVA per hour (the closest comparator to traditional labour productivity measures), growth up to 2018 was stronger. Inclusive GVA per hour grew by 8.7% between 2005 and 2018, compared with 7.2% for GVA per hour. This difference is largely explained by growth in the productivity of unpaid household work, which makes up over two thirds of all hours worked throughout this period, and the productivity of this work grew by 9.4%.

Similarly, the fall in inclusive GVA per hour in 2020 is largely explained by unpaid household work. In particular, while paid hours worked fell because of factors like lockdowns and furlough schemes, unpaid hours remained fairly constant, causing a proportional shift from relatively high productivity paid work to lower productivity unpaid work.

Inclusive NVA per hour takes account of capital consumption; it accounts for the fact that some amount of value in each period needs to be created just to replace the value of capital "used up" in the period. This measure of productivity grew even more strongly than inclusive GVA per hour between 2005 and 2018, by 9.9%. This is largely accounted for by reductions in greenhouse gas emissions over this period, which reduced the depletion of the atmosphere as a carbon sink. Equally, growth in the years post-coronavirus (COVID-19) pandemic averages of 1.1%, between 2021 and 2022, materially exceeding the traditional Labour Force Survey (LFS) based national accounts consistent estimate.

In conclusion, IWI accounts based estimates deliver faster growth both pre- and post-coronavirus pandemic, suggesting that the UK saw a relative shift in innovation and productivity growth towards non-traditional components of the wider economy.

5 . Data on productivity estimates

[Productivity, indicative reweighted estimates, UK](#)

Dataset | Released 3 December 2024

Output per hour worked and output per worker, whole economy. Quarterly statistics and growth rates for output per hour worked and output per worker produced, using old and new weighting methodology.

6 . Glossary

Gross value added

Gross value added (GVA) is the value generated by any unit engaged in production and the contributions of individual sectors or industries to gross domestic product (GDP).

Labour input

The preferred measure of labour input is hours worked ("productivity hours"), but workers and jobs ("productivity jobs") are also used.

Labour productivity

Labour productivity measures how many units of output are produced for each unit of labour input and is calculated by dividing output by labour input.

Output

Output refers to gross value added (GVA), which is an estimate of the volume of goods and services produced by an industry and in aggregate for the UK.

7 . Data sources and quality

Information on methods for the labour productivity data, its strengths and limitations, as well as the quality and accuracy of the data, is available in our [Labour productivity Quality and Methodology Information \(QMI\)](#).

On 2 November 2023, the Office for National Statistics (ONS) published our [Labour Force Survey: planned improvements and its reintroduction methodology](#) to enable the reintroduction of the Labour Force Survey (LFS) following its suspension in October, when falling response rates led to increased data uncertainty.

Following the development plan, we published our [Impact of reweighting on Labour Force Survey key indicators: 2024 article](#) on 5 February 2024 and the [Impact of reweighting on Labour Force Survey key indicators: December 2024 article](#) on 3 December 2024. Our [Labour market overview, UK: January 2025 bulletin](#) reinstated reweighted LFS on 18 July 2024. This bulletin uses the latest published reweighted LFS data.

The reweighting exercise has improved the representativeness of our LFS estimates for the period July to September 2022 onwards, reducing potential bias in our estimates.

Productivity data in this release reflect reweighted LFS data consistent with our [Labour market overview, UK: January 2025 bulletin](#). Whole economy estimates of workers are in line with our [Employment, unemployment and economic inactivity by age group dataset](#), released on 12 November 2024, in our [Labour market overview, UK: January 2025 bulletin](#).

Whole economy estimates of second jobs and total hours have been adjusted back to mid-2011 to ensure that headline productivity statistics can be assessed without a discontinuity, for the purposes of the productivity estimates, and are not part of the labour market release. Therefore, the adjusted productivity jobs and the adjusted productivity hours worked diverge slightly from the estimates in our [Full-time, part-time and temporary workers dataset](#) and our [Actual weekly hours worked dataset](#), in time periods from 2011 to 2022.

Imputed rental is excluded from "Industry L: real estate" and for "Industry B: mining and quarrying" employee average hours are calculated at section level.

New estimates of gross value added (GVA) are more volatile on a quarterly basis, especially in production industries. This reflects the use of new data and methods, but also challenges in reconciling quarterly and annual data, as explained in our [Recent challenges of balancing the three approaches of GDP article](#). As productivity is a structural feature of the economy, we continue to advise users to focus on long-term trends of productivity.

The Pay As You Earn (PAYE) Real Time Information (RTI) comes from our monthly [Earnings and employment from Pay As You Earn Real Time Information, UK: January 2025 bulletin](#), with estimates of payrolled employees and their pay from HM Revenue and Customs (HMRC). More information on the methods used to derive monthly employee and earnings estimates from PAYE RTI administrative data can be found in our [New methods for monthly earnings and employment estimates from Pay As You Earn Real Time Information \(PAYE RTI\) data: December 2019 article](#).

To help us meet user needs, please email productivity@ons.gov.uk with any feedback about our publication changes.

8 . Related links

[Labour market overview, UK: January 2025](#)

Bulletin | Released 21 January 2025

Estimates of employment, unemployment, economic inactivity, and other employment-related statistics for the UK.

[GDP quarterly national accounts, UK: July to September 2024](#)

Bulletin | Released 23 December 2024

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.

[Earnings and employment from Pay As You Earn Real Time Information, UK: January 2025](#)

Bulletin | Released 21 January 2025

Monthly estimates of payrolled employees and their pay from HM Revenue and Customs' (HMRC's) Pay As You Earn (PAYE) Real Time Information (RTI) data. This is a joint release between HMRC and the Office for National Statistics (ONS). These are official statistics in development.

[UK inclusive wealth and income accounts: 2005 to 2022](#)

Article | Released 13 November 2024

Estimates and analysis of economic progress, including a broader range of economic activities and assets than gross domestic product (GDP), like unpaid household services, ecosystem services, and more.

9 . Cite this statistical bulletin

Office for National Statistics (ONS), released 29 January 2025, ONS website, article [Productivity trends in the UK: July to September 2024](#)