Article

Impact of Labour Force Survey methodological changes on labour productivity, UK

Overview of changes to Labour Force Survey (LFS) methods as a result of the coronavirus pandemic, and their impacts on productivity statistics in 2020 and 2021. Changes include re-weighting for housing tenure and population estimates, and experimental imputation methods.

Table of contents

1 . Main points

- The re-weighting of Labour Force Survey (LFS) data in line with updated population estimates has little impact on whole economy or industry productivity statistics.

- The industries most affected were Accommodation and Food Services, and Recreation and Culture, with revisions to 2020 annual productivity growth of negative 0.5 and positive 1.0 percentage points, respectively.

- The experimental imputation methodology used for hours worked is not being used in our published estimates; this article provides indicative impacts.

- Whole economy 2020 annual growth in output per hour worked would be 1.1 percentage points higher using an experimental imputation methodology to derive hours data and follow a different pattern through 2020.

- The experimental imputation methodology would result in the largest differences in output per hour worked in the Accommodation and Food Services industry.

2 . Overview of re-weighting and productivity

Productivity is calculated by dividing a measure of output (Gross value added (GVA)) by a measure of input (hours worked, number of workers or number of jobs) - see Chapter 6 (Productivity) in Measuring the Economy. Our current estimates of labour metrics rely, in significant part, on the Labour Force Survey (LFS). This is the largest household study in the UK and provides official measures of employment and unemployment. The LFS is used, along with other sources, for the labour metrics used in productivity estimates, including hours worked.

Traditionally, changes in GVA and hours worked occur slowly and follow a similar pattern; if all else remains the same, an increase in the number of hours worked can be expected to result in an equivalent increase in GVA. This would result in zero change in productivity as the number of hours worked to produce a single unit of output remains unchanged. However, if one of these variables changes independently, it will result in a noticeable change in productivity.

At the start of the coronavirus (COVID-19) pandemic all LFS interviews that were previously conducted face-to-face were switched to telephone interviews. This mode change resulted in a non-response bias, especially for Wave 1. The introduction of housing tenure-based weights implemented in October 2020 was the first phase of improvements to labour market statistics. However, other challenges remained.

In January 2021 the Office for National Statistics (ONS) laid out a new approach to estimate population weights using information from HM Revenue and Customs (HMRC) Real Time Information (RTI), which was implemented from July 2021. This article presents indicative impacts of using the new population weights and methodology on productivity statistics. For further information about the impact of re-weighting on labour market statistics, see Impact of reweighting on Labour Force Survey key indicators, UK: 2020.

Our productivity flash estimates were the first to take on the new LFS population estimates and remain the best source of data and analysis on UK productivity until the release of our Productivity Overview on 7 October 2021. Further industry-level changes will also be introduced in our overview. This article provides indicative results to help users understand the impact this methodological change has had on whole economy and industry-level productivity estimates.

3 . Revisions to whole economy productivity because of population re-weighting of Labour Force Survey

We prefer to look at long-term changes in productivity such as annual growth, as this looks through short-term volatility observed in quarter-on-quarter growth rates. The new Labour Force Survey (LFS) population reweighting resulted in a 0.3 percentage point revision in annual growth, meaning growth in 2020 compared with 2019 was 0.7% (Figure 2). This revision does not change the overall narrative across the coronavirus (COVID-19) pandemic.

Figure 1 provides a more detailed view of the changes to whole economy hours worked and output per hour worked as a result of LFS population reweighting. The new weighting gives a slightly lower estimate of hours worked in Quarter 2 (Apr to June) 2020 (about 0.5% lower), followed by a slightly higher estimate between Quarter 3 (July to Sept) 2020 and Quarter 1 (Jan to Mar) 2021 (around 1.1% higher in each period). As gross value added (GVA) has not been revised; output per hour worked is revised down in Quarter 2 2020 (0.5%) and revised up in subsequent periods (around 1.1% in each quarter).

Figure 1: Labour Force Survey population reweighting resulted in slight changes in whole economy output per hour worked

Gross value added, hours worked, output per hour worked, Quarter 1 (Jan to Mar) 2020 to Quarter 1 2021, Index 2019 = 100

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Gross value added, hours worked, output per hour worked, Quarter 1 (Jan to Mar) 2020 to Quarter 1 2021, Index 2019 = 100
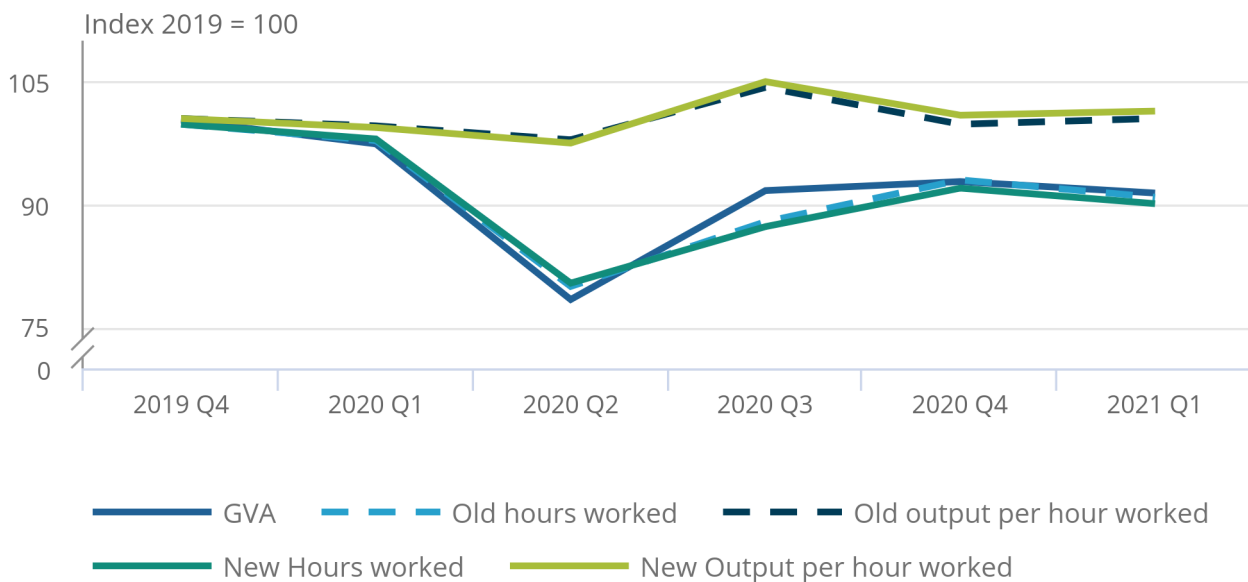
Source: Office for National Statistics

Notes:

1. Data provided are indicative and may not match data produced in our Flash or Quarterly productivity releases.

4 . Revisions to industry productivity because of population reweighting of LFS

Figure 2 illustrates changes to industry-level annual growth, which were mostly small, and are all lower than 1 percentage point. Unsurprisingly, the two industries most affected by pandemic-related restrictions, Accommodation and Food Services, and Recreation and Culture saw the largest revisions to hours worked and therefore annual output per hour worked growth. Productivity growth in 2020 is now around 0.5 percentage points lower in the Accommodation and Food Services industry, and around 1.0 percentage points higher in the Recreation and Culture industry. Along with the Accommodation and Food Services industry, the Water Supply industry was the only other industry to have annual productivity growth revised down.

Figure 2: Annual growth revisions to industry-level productivity were small

Percentage point difference in annual output per hour worked growth, 2020, UK

Source: Office for National Statistics

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Figure 3 shows broad uniformity in revisions at the industry level, with most industries following a similar pattern of revisions as the whole economy. Notable exceptions are again the Accommodation and Food Services, and Recreation and Culture industries, highlighted in Figure 3.

Figure 3: Revisions to industry-level output per hour worked were small across all industries

Percentage change in level of output per hour worked, Quarter 1 2020 to Quarter 1 2021, UK

Notes:

1. Data provided are indicative and may not match data produced in our Flash or Quarterly productivity releases.

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5 . Overview of experimental imputation methodology and productivity

The experimental imputation method was developed rapidly in response to the coronavirus (COVID-19) pandemic and gives a useful perspective on the degree of uncertainty in the data as a result of the rapid changes in the labour market. However, it is not our preferred approach or measure of hours worked as the methodology is not fully tested, has not been integrated with the main production systems at the Office for National Statistics (ONS), and does not have a consistent back series prior to 2020.

The normal imputation for non-response in the Labour Force Survey (LFS) is based on rolling forward previous responses. While this inertia approach is appropriate during periods of slow changes in the labour market, it is untested for the unprecedented rates of change associated with the pandemic. In parallel to the main LFS results, some experimental imputation models were used to look at the impact of using nearest neighbour imputation for a few key variables. This suggested that the normal imputation was relatively robust for estimating labour market status, but by rolling forward hours from a previous period, the size of the large movements in the number of hours worked may have been understated. Experimental estimates of hours worked were published alongside the normal estimates to give an indication of the impact.

Official labour market statistics have not taken on these changes, and the alternative methodology is only available from the start of 2020. As such, we do not intend to take these changes into official productivity statistics. However, given the uncertainty around these data, Sections 6 and 7 show the indicative impact that this methodology would have on productivity statistics. Indicative impacts are shown relative to estimates published in our economic commentary on 7 July 2021, and do not include the impact of population re-weighting described in earlier sections.

6 . Indicative impact of experimental imputation method on whole economy productivity

This section presents the impact on productivity statistics of using an experimental imputation method during the coronavirus (COVID-19) pandemic. We are not intending to implement these changes into official productivity or labour market statistics. However, they give a useful sense of the uncertainty in the data. See Section 5 warning for more details.

Whole economy annual growth for 2020 would be 1.1 percentage points higher using the experimental imputation methodology, at 1.5%, see Figure 5. This compares with 0.4% as published in the last National Statistics estimates published in our economic commentary on 7 July 2021, and 0.7% after accounting for the population reweighting of the Labour Force Survey (LFS) as described in Section 3.

Figure 4 illustrates how the experimental imputation methodology would lead estimates of hours worked to fall further between Quarter 1 (Jan to Mar) 2020 and Quarter 2 (Apr to June) 2020, but also recover quicker thereafter. As such, this would reduce the estimated number of hours worked in Quarter 2 substantially but would have little effect on Quarter 3 (Jul to Sept) 2020. Hours worked estimates would also be lower in Quarter 4 (Oct to Dec) 2020 and Quarter 1 2021.

Current estimates show a fall in productivity in Quarter 2 2020 since output (gross value added (GVA)) falls further than hours worked. Using the experimental imputation would see hours worked fall further than GVA, resulting in productivity increasing instead. The reverse happens in Quarter 3, where current estimates have a sharper rebound in GVA than hours worked (and an increase in productivity), while using the experimental imputation would lead hours worked to rebound more sharply and productivity to fall. By the end of 2020 and in 2021, productivity levels are similar using both imputation methodologies.

Figure 4: The experimental imputation methodology causes large changes in whole economy productivity

Gross value added, hours worked, output per hour worked, Quarter 1 (Jan to Mar) 2020 to Quarter 1 2021, Index 2019 = 100

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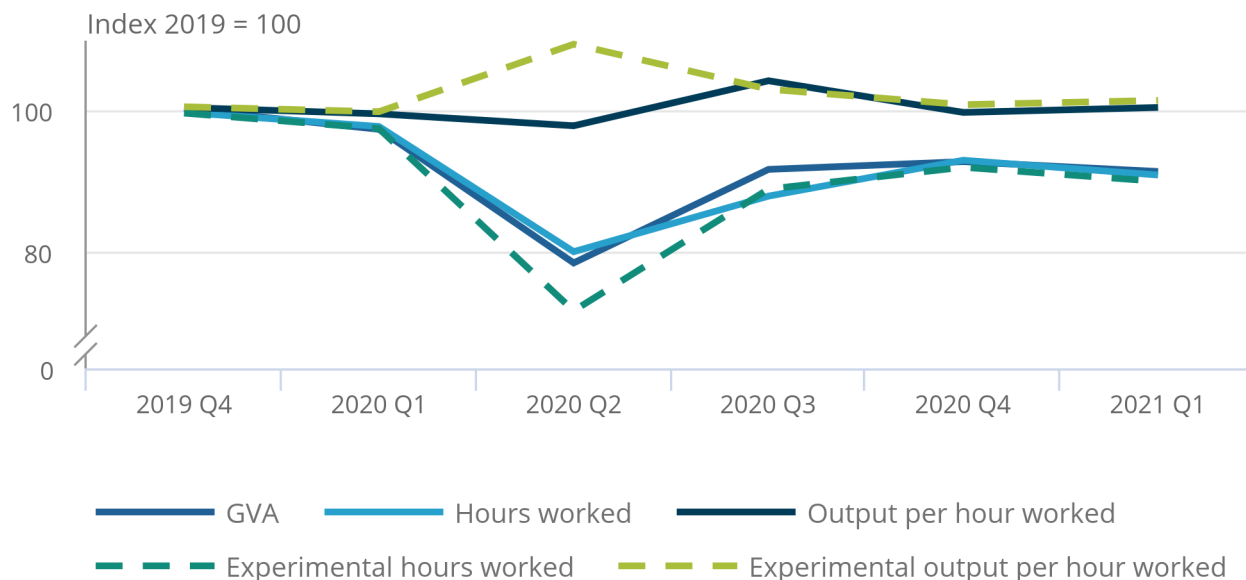
Source: Office for National Statistics

Notes:

1. Data provided are indicative and may not match data produced in our Flash or Quarterly productivity releases.

7 . Indicative impact of experimental imputation method on industry productivity

This section presents the impact on productivity statistics of using an experimental imputation method during the coronavirus (COVID-19) pandemic. We are not intending to implement these changes into official productivity or labour market statistics. However, they give a useful sense of the uncertainty in the data. See Section 5 warning for more details.

Like the whole economy, most industries would see faster (or, in many cases, less negative) productivity growth in 2020 if using the experimental imputation methodology. Agriculture is the only industry whose annual growth rate would be lower using the experimental imputation methodology, down 0.5 percentage points. The largest difference between methodologies is in Accommodation and Food Services, up 2.4 percentage points, although this still delivers an annual growth rate of negative 9.9% for 2020. The size of the impacts are likely to reflect the degree of furloughing in different industries, since the experimental imputation methodology is better at identifying workers dropping to zero hours between periods.

Figure 5: Productivity would be higher in most industries using the experimental imputation methodology

Percentage point difference in annual output per hour worked growth, 2020, UK

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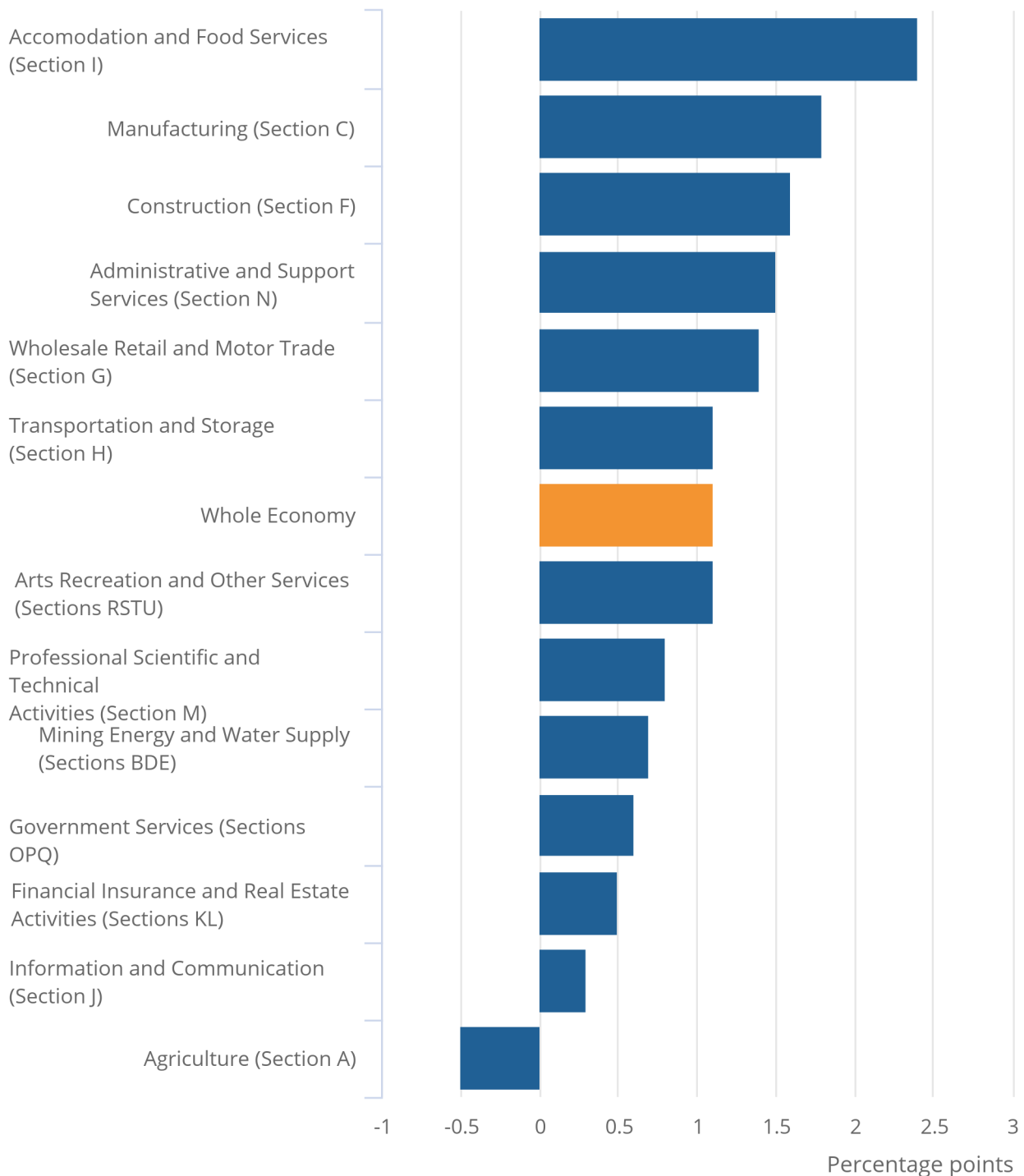
Source: Office for National Statistics

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The largest difference between the two methodologies occurs in Quarter 2 (Apr to June) 2020, as this is the period with the most rapid change in hours worked because of the introduction of the furlough scheme. The productivity of the Accommodation and Food Services industry is significantly different using the experimental imputation methodology - see Figure 6. In Quarter 2 2020, output per hour worked would be 52% higher than our official estimate and would be 13% lower in Quarter 3 2020. Although whole economy productivity would be roughly similar by Quarter 1 (Jan to Mar) 2020, Accommodation and Food Services would be 11.7% higher than official estimates, reflected a large degree of continued furloughing in this industry.

Figure 6: The experimental imputation methodology has the largest impact on the productivity of the Accommodation and Food Services industry.

Percentage change in level of output per hour worked, Quarter 1 2020 to Quarter 1 2021, UK

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8 . Glossary

Labour productivity

Labour productivity measures how many units of labour input is needed to produce a unit of output and is calculated by dividing output by labour input.

Labour inputs

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

Output

Output refers to gross value added (GVA), which is an estimate of the volume of goods and services produced after subtracting the volume of intermediate goods and services used in the production process (intermediate consumption). It is measured by industry, and in aggregate across industries for the UK

9 . Related links

UK productivity flash estimate: April to June 2021
Bulletin | Released 17 August 2021
Flash estimate of labour productivity for Quarter 2 (Apr to June) 2021 based on the latest data from the gross domestic product (GDP) first quarterly estimate and labour market statistics.

Labour market overview, UK: August 2021
Bulletin | Released 17 August 2021
Estimates of employment, unemployment, economic inactivity and other employment-related statistics for the UK.

Impact of reweighting on Labour Force Survey key indicators, UK: 2020
Bulletin | Released 8 July 2021
Indicative estimates of the Labour Force Survey (LFS) reweighting methodology on key indicators for January to March 2020 to October to December 2020.

Impact of reweighting on Labour Force Survey key indicators, UK countries: 2020
Bulletin | Released 8 July 2021
Indicative estimates of the Labour Force Survey (LFS) reweighting methodology on key indicators by UK country for January to March 2020 to October to December 2020.

Productivity economic commentary, UK: January to March 2021
Bulletin | Released 7 July 2021
The main findings from official statistics and analysis of UK productivity, presenting a summary of recent developments.