Article

Coronavirus and the effects on UK productivity measures

How the global coronavirus (COVID-19) pandemic and the wider containment efforts are expected to impact on UK productivity estimates, and challenges on data collection.

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1 . Main points

- The coronavirus (COVID-19) pandemic poses significant challenges in accurately measuring productivity; these include a range of issues affecting output and input data, and statistical issues such as seasonal adjustment of time series data.

- Specific issues for different productivity measures will vary; we expect large falls in output per worker and output per job metrics across the market sector; there will likely be falls in output per hour as well, but these will be less pronounced.

- There will be significant variation across industries in the magnitude and direction of impacts, and a greater level of revision to estimates over coming quarters is expected, hence initial productivity estimates should be treated with considerable caution.

- The effects of lower output per hour levels will have mixed effects on multi-factor productivity measures, as will challenges in assessing capital inputs used by private companies because of the use of household information and communication technology (ICT) and different patterns of capital scrappage and stranded capital.

- Health and education will be the most affected components of public service productivity as patterns and levels of output adjust but inputs remain either constant or increase.

- Unit labour costs in the private sector will rise as some workers will continue to be paid while they are temporarily away from work (referred to as furloughed); this effect may be more muted in the public sector, although some sectors, specifically education, may be more affected.

2 . Background

On 6 May 2020, the Office for National Statistics published articles that discuss the difficulties of compiling national accounts and labour market data since the onset of the coronavirus (COVID-19) pandemic in the UK. The topics addressed in these articles will affect productivity calculations, but there are also specific challenges in compiling productivity estimates at this time.

This article will discuss measurement challenges that are common across all productivity measures before discussing challenges specific to each measurement of productivity.

More about coronavirus

- Find the latest on coronavirus (COVID-19) in the UK.

- All ONS analysis, summarised in our coronavirus roundup.

- View all coronavirus data.

- Find out how our studies and surveys are serving public need.

3 . Why is productivity important?

Productivity is a measure of the output produced from a given level of inputs and is helpful at times like these as productivity growth can tell us:

- Which is changing faster, economic output or the inputs that go into creating it?

- Whether the impact of the restrictions caused by the coronavirus (COVID-19) are concentrated in certain industries, or affecting the whole economy?

- Whether certain regions are relatively more affected?

- In the longer-term, whether the UK has performed more strongly than its international competitors, and whether there have been longer-term implications because of changes in innovation, investment or structural elements of the economy?

4 . Measurement effects across productivity estimates

Certain coronavirus (COVID-19) impacts on the economy will be present across different measures of productivity. The most notable common issues are:

- those affecting output measures

- those affecting labour markets – the common input across productivity measures

- statistical issues – the most notable across productivity measures relates to seasonal adjustment

In addition, productivity estimates are strongly pro-cyclical and distorted by economic downturns. Should the pandemic lead to a recession, it will add to the challenges in measuring and interpreting changes to productivity growth in coming quarters.

Output

Different measures of output are used by the different productivity statistics published by the Office for National Statistics. In general, these are all commonly affected by the impact of the coronavirus and the policy response as described in the national accounts article published on 6 May 2020. We will ensure productivity statistics remain consistent with the national accounts, building on the methodological steps that have been taken.

Any decline in goods and services output, however measured, is unlikely to have occurred at exactly the same pace as the change in inputs, which will be revealed in productivity growth statistics. Quarterly national accounts data published on 13 May 2020 revealed the "Stay at home" guidance has led to reduced production for businesses in construction, transportation and many parts of the hospitality industry.

However, some sectors have demonstrated growing output (for example, pharmaceuticals and paper products). These industries are likely to show growing productivity across the various measures produced unless inputs have grown faster to achieve the increases in output (for example, through increased overtime working).

We therefore expect that in our standard decomposition analyses, which break down productivity growth into the impact of each industry and a component reflecting the impact of relative changes in the allocation of resources between industries (the allocation effect), that this allocation effect may move significantly to reflect this distorting pattern in the short-term. Across all our measures we continue to stress the importance of viewing productivity through a long-term lens. As such the quarter-on-same-quarter-a-year-ago measure will continue to be our headline measure, although we will present the quarter-on-quarter growth rates alongside these.

In the public sector, there are a number of particular challenges, which were outlined in [Coronavirus and the effects on UK GDP](). School closures and falls in NHS elective and outpatient procedures are likely to be the most significant factors affecting public service productivity measures. Where inputs have been maintained but there are significant output movements, or re-allocation between activities, as in health, we would expect to see the largest movements in productivity.

Labour market data

Labour often responds quickly to changes in economic circumstances. As described in our [labour market article]() of 6 May 2020, the particular policies implemented impact on the different measures of labour productivity quite differently.

The interventions that are likely to be most significant in terms of the direct impact on data used to compile productivity estimates are the [Coronavirus Job Retention Scheme]() (CJRS, also referred to as "furloughing") and the [Self-Employment Income Support Scheme]() (SEISS). These schemes aim to keep people engaged as workers and part of the labour market, even if they work no hours.

Under the CJRS, if employers are unable to maintain their current workforce, they are able to furlough employees who "can apply for a grant that covers 80% of their usual monthly wage costs, up to £2,500 a month, plus the associated employer National Insurance contributions and pension contributions (up to the level of the minimum automatic enrolment employer pension contribution) on that subsidised furlough pay". Furloughed employees must not work for the employer during this period but can work for other employers if their contract allows.

Our [labour productivity]() publication usually presents three different measures: output per hour worked, output per job and output per worker. Each of these measures may react differently to "furloughing".

Employees who have been "furloughed" will be treated as:

- continuing to be employed in terms of our jobs and workers measures

- their hours will be set to zero; this downward effect on hours may be marginally dampened by hours in second jobs, whether those jobs are existing or new

The result of this change for employees is that hours will fall significantly, while workers and jobs are likely to fall at a much slower rate, and second jobs may have increased. This will create a notable divergence between the labour productivity measures. Output per worker and output per job are likely to fall much more than output per hour. This is the result of workers' employment being temporarily unrelated to their companies' production.

Under the SEISS scheme people who are self-employed or a member of a partnership in the UK can claim a taxable grant worth 80% of trading profits up to a maximum of £2,500 a month. Eligibility requires that trading profits do not exceed £50,000 and that more than half of recipients' total income is derived from self-employment. Unlike the CJRS, those in self-employment who receive the payment may continue to work in the same job. As such:

- the self-employed receiving SEISS will continue to count towards our measures of jobs and workers

- there may be a fall in hours worked by this group, driven by changes in patterns of demand

The policy should dampen falls in self-employed output and may result in some self-employed people continuing to work some hours. As such, the effects on different productivity measures of this policy will be more marginal that those of the CJRS.

Seasonal adjustment

The purpose of seasonal adjustment is to allow meaningful comparisons between consecutive time periods, by estimating and removing systematic and calendar-related events that are associated with the time of the year and arrangement of the calendar. However, it is important to ensure that large shocks to the economy do not distort the estimation of such systematic effects.

We regularly review our seasonal adjustment specifications, in line with best practice (PDF, 544KB) guidelines. We will continue to do so, in line with international guidance (PDF, 93KB) on the analysis of time series during the coronavirus (COVID-19) crisis.

5 . Specific measurement difficulties for ONS productivity measures

Labour productivity

In normal times, there are likely to be similarities in the long-term trends of the three measures of labour productivity (output per hour worked, output per worker and output per job). That is because the majority of workers have only one job, bringing output per job in line with output per worker. The differences between these measures are a factor of how many workers have second jobs and how much workers can do in an hour worked.

The divergence we expect to see as a result of the coronavirus (COVID-19) pandemic will be driven by some workers, such as those covered by the Coronavirus Job Retention Scheme (CJRS), being separated from the productive activities for which they are paid. These workers will still be employed, but their hours and output will be zero.

In theory, this is a temporary effect – their skills are unaffected and the capital they use still exists, but there could be longer-term effects on productivity from the pandemic. For example, some businesses may cease trading, others will adapt their practices and may use more remote workers if they are able to, and worker behaviour could shift over time.

The effects these factors have on productivity will depend on whether companies that cease trading are more or less productive that the average UK company and how workers and businesses adapt to new practices, which may affect future productivity growth rates.

In the short-term, there may also be industries that display "negative productivity". Industries where businesses have completely ceased trading, (for example, public houses and certain manufacturing companies), will see output fall to zero and might even have negative gross value added (GVA) if they have to maintain fixed costs. We are currently exploring this issue and, if necessary, will provide further commentary in future publications.

Multi-factor productivity

Multi-factor productivity (MFP) calculates the extent to which productivity growth is caused by improvements in the ways that any given quantity of labour and capital are deployed, with higher MFP getting more output from the same inputs.

The effects of the coronavirus on labour inputs will be similar to those of the labour productivity measures described previously. In general, MFP estimates also use additional information on worker characteristics, including sex, age and highest education level achieved. The ability to produce this level of detail in a timely fashion may be disrupted by the quality of the data available. If we need to revise MFP methods these will be clearly signposted in the relevant publications.

There may also be other effects from the coronavirus that will feed into these estimates. For example, the labour input used in MFP calculations is weighted by the wage that workers receive, based on the assumption that workers receive the value they create, known as their marginal product. Furloughed workers will see a 20% fall in their wages under the Coronavirus Job Retention Scheme (CJRS) while those who continue to work will not. The distribution of these employees across industries will be uneven and it is possible the distribution will also be uneven across the worker characteristics measured by MFP.

Additionally, some high-paid furloughed workers might experience a wage cap under the CJRS, although the effects of this are likely to be marginal. We are currently exploring this issue and how best to present results that are affected by this. We currently consider making no adjustments for this to maintain consistency with the national accounts but would welcome user input to productivity@ons.gov.uk.

The measure of capital inputs used in MFP calculations are also likely to be affected both in terms of rates of new investment, but also in terms of capital scrappage and "stranded capital" – for example, a machine in a factory that workers cannot enter. The capital still exists but is stranded from taking part in productive activity. As such measures of capital inputs in some industries will, in the short-term, be over-estimated.

Meanwhile investment in information and communication technology assets may have increased as companies adjusted to their staff working remotely under the lockdown. This may affect different industries in different ways. We are currently investigating methods for improving estimates of capital scrappage, and hence how to adjust capital services estimates.

Compounding these issues is the fact that some remote workers will be using their own equipment (certainly buildings, low-tech "office" equipment and wifi, but possibly also printers, phones and devices). These are outside the national accounts production boundary, resulting in an under-estimate of deployed capital services in industries where home working has occurred.

Although these two issues will offset each other to some extent, they are unlikely to be equal. We will explore this further in future publications.

Public service productivity

Public services represent around 20% of the UK economy. To estimate total public service productivity (PSP), we use expenditure information at current prices for the inputs purchased by the government to produce public services, the price indices to adjust the current price expenditure for changes in the prices of inputs, and the volume measure of government public service output.

Healthcare and education are the two largest service areas by expenditure share. In 2017, they respectively counted 37.5% and 17.7% of total public sector expenditure (Public service productivity: total, UK, 2017). Therefore, the impacts of the coronavirus for these areas is considered in more detail in the following sections.

Healthcare

The Office for National Statistics publishes estimates of healthcare inputs in the UK from 1995 onwards. Labour inputs are mainly measured through a Laspeyres cost-weighted labour index (CWLI), which is based on data for three elements: labour (which includes changes in the number of full-time equivalent employees of the health service), goods and services (that comprise the intermediate consumption of equipment used by healthcare providers), and capital (such as buildings and vehicles). The delivery of these measures is largely unaffected by the pandemic.

However, the impact of the coronavirus (COVID-19) on total healthcare output is more significant. The increase of non-elective inpatients will push up aggregate healthcare output because of the weights applied. The rise in the number of emergency cases will have a similar impact. However, these values might be balanced by other activities in the healthcare system that were reduced or suspended to limit the spread of the coronavirus.

For example, the closure of dental and ophthalmic activities, the postponement of outpatient activities and elective procedures will likely have an important impact on the final estimates. We recognise that measuring these effects is complicated and it will involve important considerations to ensure the precision and accuracy of our estimates.

Our estimates might be affected by the suspension of some data collections by the NHS in England, which includes information on dental services and, particularly important at this moment, of patients in critical care. Methods to address this are outlined in Coronavirus and the effects on UK GDP.

Education

Education output is measured by the number of students in the educational system at various stages and it is adjusted for quality using attainment measures.

The policy response to the coronavirus (COVID-19) pandemic, specifically the closure of schools across the UK, represents a significant challenge for our measures. To take into account the changes that have happened over the last months, Coronavirus and the impact on measures of UK government education output outlines how output measures have been adjusted for the number of students that are currently attending schools (the children of key workers and vulnerable children) and remote learning.

The input index of education includes three main elements: labour, goods and services, and capital. In the final estimates, these elements are categorised in local authority direct labour, central government indirect labour (measured using teacher and school support staff numbers), goods and services (such as school equipment and energy costs, office costs and higher education courses), and consumption of fixed capital (which primarily comprises buildings). The delivery of these measures is largely unaffected by the pandemic.

Unit labour costs

Unit labour costs measures the labour compensation required to produce one unit of output. The coronavirus (COVID-19) pandemic can be expected to lead to extremely high unit labour and unit wage costs relative to historical levels across the private sector. This is because the payments made under the Coronavirus Job Retention Scheme (CJRS) policy go directly to employers, who then transfer them onto their employees as wages. The Self-Employment Income Support Scheme (SEISS) will potentially have a similar impact on the self-employed.

As explained in the Coronavirus and the effects on UK GDP article, these payments are treated as subsidies in the national accounts and the payments to employees are treated as compensation of employees. As a result, despite falling output from their workers, the fall in their wages and total compensation will be limited by government subsidies.

Sectional unit labour costs, which are experimental statistics looking at the cost for different sectors of the economy, are under a methodology review to make improvements in published data. They will not be published in the next round of quarterly productivity publications on 7 July 2020.

6 . Conclusions

National statistical institutes (NSIs) face significant practical challenges in measuring productivity during the coronavirus pandemic, which may lead to higher levels of uncertainty and a greater level of revision to estimates over coming quarters. We have explained the main issues that we expect to encounter and some of the steps that we are taking to help better understand and, where possible, tackle these challenges. We will closely monitor the situation and provide updates to this statement as and when appropriate.