

Article

Real-time turning point indicators: a UK focus

The UK's experience of producing real-time turning point indicators over the last 50 years, covering the development of UK cyclical indicators to the recent development of faster indicators. This is an economic review article.

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1 . Background

One of the major challenges for economists and policymakers is the ability to identify turning points, particularly in real time. This not only reflects the lag between the publication of official estimates and the period to which those figures refer, but also the inherently increased levels of uncertainty around such points in the cycle. With limited information available in real time, it is hard to assess whether a new estimate reflects a change in the trend or is merely volatility around the existing trend. There also can be increased scope for data revisions, complicating the ability to identify turning points.

This helps explain why users look at a wide range of coincident and leading indicators. These include those that tell us what is taking place now and those that tell us more about what might take place in the future, which may contain news on the state of the economy. The recent increase in the volume of data and technological capacity to handle such information has increased the potential to develop real-time indicators. One of the main recommendations of the [Independent Review of UK Economic Statistics](#) was to "explore the potential for using new techniques of collecting and analysing big data" in helping develop real-time indicators of economic activity.

The Economic Statistics Centre of Excellence (ESCoE) has carried out a review of international practices, investigating the range of [real-time turning point indicators](#) that are published by National Statistical Institutes (NSIs). It finds that there are many indicators that are compiled and produced but that there are also a range of communication practices that NSIs engage in.

This article provides more information about the experience of the UK over the last 50 years, providing an overview of the development of UK cyclical indicators in the 1970s to the recent development of "faster indicators" that explore the potential of administrative and alternative information. This has taken on prominence in recent weeks as economists look to understand the ongoing impacts from the coronavirus (COVID-19) pandemic and how countries are responding to contain the virus. There has been an increase in demand for developing indicators that offer real-time insights into how this will impact on particular industries, how private and public spending will be affected, and how the returns to labour and capital will be hit.

We also show how we are proposing to respond to the challenge of communicating [uncertainty](#) around turning points, which has yet to be formally implemented by other NSIs. We then conclude with how we are looking to take this research forward in improving how we track movements in the UK economy closer to real time.

2 . A brief history of UK cyclical indicators

In the UK, we do not publish turning point indicators. But this has not always been the case. The Central Statistical Office (CSO) - the forerunner to the Office for National Statistics (ONS) - published a range of cyclical indicators from the mid-1970s, in response to the increasing focus on business cycles. The initial research identified around 150 indicators. A wide range of criteria were applied in selecting the final indicators, which included:

- exhibiting cyclical behaviour
- showing conformity with the "reference cycle" (that is, the peaks and troughs of these indicators should match the turning points in the economic cycle)
- displaying relevance to the underlying state of the economy
- placing emphasis on leading indicators
- covering a wide range of industries

These were then produced as composite indicators, based on their timing classification (that is, whether these indicators were leading, coincident or lagging in nature) as this would be less impacted by irregular movements in individual indicators.

While proposed developments were put forward to help improve the forecasting power of these indicators, there was a reluctance for these to be implemented given that there was some concern that the changes would be "akin to forecasting levels of gross domestic product (GDP)", and these were discontinued in the 1990s.

Another main concern was the range of indicators would typically be selected based on how these performed at turning points. However, given that there are only a limited number of points in the economy to look at, the news content of these cyclical indicators would likely vary from one cycle to the next and there was no clear consensus on the optimal mix of indicators. It was recognised that in-depth research would need to be undertaken such that that "the indicators are maintaining their relationship with GDP" and that a "continuous investigation of the alternatives" would be required. The changes in these cyclical indicators should reflect changes in the economy. This might also explain why these indicators were able to track broad movements in the cycle, if selected ex-post, but the real-time performance of the indicators was not as robust.

The conceptual construction of these cyclical indicators was based on the prior that the economic cycle would last for a fixed five-year period, which was also a concern. However, history has shown that the profile of the cycle is not fixed; the change in the structure of the UK economy over time helps explain why the length of the cycle has changed over time. It is only in hindsight that the length can be identified, so this would always be a challenge in producing real-time cyclical indicators. Given that this detrending and smoothing process could also impact on the statistical properties of these indicators, the robustness of these cyclical indicators was challenged, especially as this could lead to an apparent cycle being identified.

3 . Faster indicators

Recent history

One of the main themes of the [Independent Review of UK Economic Statistics](#) is how "the volume of data - both public and private - that can be employed in principle in measuring the economy, together with the technological capacity for handling it, has exploded as a result of the digital revolution". It highlights how there is now much more potential to collect and analyse "big data". This could offer new insights into "nowcasting". And given the challenges of identifying turning points in real time, the ability to produce faster indicators that might provide a useful signal can be particularly insightful to producers and users.

In 2019, the UK produced its first set of "[faster indicators](#)". This was the first for a National Statistical Institute (NSI), in response to the challenge of producing outputs that meet the growing demand for more timely information. These indicators have the potential to allow for early identification of large changes in the UK economy, and include:

- [Value Added Tax \(VAT\) returns](#): we have constructed diffusion indices of reported turnover and expenditure data, while also tracking changes in VAT reporting behaviour
- [shipping](#): we have produced indicators of the time spent in port by ships, and the frequency of visits to ports, for the 10 largest ports in the UK; these indicators are likely to be important in supplementing our understanding of international trade activity
- [road traffic](#): we have developed indicators of average traffic counts and average traffic speeds for the whole of England and 13 main English ports, which has the potential to improve our understanding of domestic and international trade in goods in the UK economy for localised geographies

The volume, timeliness and frequency of such information is integral in its ability to provide an early picture of the state of the economy. It may therefore aid policymakers in their ability to keep a close to real-time view of developments. These indicators may have the power to improve the performance of nowcasting or forecasting models. For example, [recent analysis](#) finds that the VAT returns offer "promise for indicating large changes in the economy quickly", as the turnover diffusion index estimate for Quarter 2 (Apr to June) 2008 recorded a fall in activity, five months before the official gross domestic product (GDP) estimate first recorded such a contraction in real time.

One feature of the VAT-based indices that is also relevant is that it is constructed as a diffusion index. These indices focus on whether that indicator is trending upward or downward, rather than the magnitude of that change. That is, it captures the proportion of firms that report an increase or decrease in activity from one period to the next. These are commonly used in unofficial indicators, such as business surveys, and are often considered as an indicator of the breadth of change. There are times when it picks up a mid-expansion-slowdown or a false signal. However, these can be particularly useful in identifying major turning points, where cyclical changes in the economy are likely to be impacting on a large proportion of businesses. Given that there can be more emphasis on looking at a range of indicators in turning point analysis, we now produce a "heatmap" to help users look across the range of VAT indicators that are available. The heatmap captures the extent to which the VAT indices are from their long-run average, which can be useful in seeing whether there is a common signal and to identify changes in particular VAT indicators.

Coronavirus (COVID-19)

The need for timely and high-frequency information on the state of the economy has become particularly heightened in recent weeks in response to the coronavirus (COVID-19) pandemic. The spread of the virus and the measures being taken to contain it are expected to have a large adverse impact on the UK and global economy this year. This highlights the potential for developing leading and coincident indicators in helping policymakers and economists track the impacts in a timely manner, to improve our understanding of how these effects will play out.

The latest projections produced by the [International Monetary Fund \(IMF\)](#) forecast a fall in the global economy of 3.0% this year, while the UK is expected to contract by 6.5%; these would be larger effects than those experienced in the 2008 financial crisis. The IMF cites the effects of "infections reduce labor supply", "quarantines, regional lockdowns, and social distancing ... curtail mobility" and that "workplace closures disrupt supply chains and lower productivity". It also highlights how the effects of "layoffs, income declines, fear of contagion, and heightened uncertainty" will weigh on GDP this year. In producing a "reference" scenario¹, the [Office for Budget Responsibility \(OBR\)](#) finds that UK GDP might fall by as much as 35% in Quarter 2 (Apr to June) 2020. These anticipated effects on the UK economy are based on the effects of reducing the demand for goods and services and the impact on the ability of businesses to supply those goods and services.

Understanding the channels through which the UK economy is likely to be impacted will help identify which close to real-time indicators have the most potential. For example, there is likely to be a reduction in the supply of labour; this could be because workers are asked to stay at home or they choose to do so to care for relatives or through fear of being exposed. Wider containment efforts may lead to lower capacity utilisation within firms. The disruptions to production processes will likely have knock-on impacts through global supply chains, likely leading to lower production of final and intermediate products. The potential reduction in income and spending as well as the impacts of heightened uncertainty of business and consumer confidence may weigh on private demand, as will any tightening in financial conditions.

Given the lack of official estimates available at this stage, there is much interest in compiling high-frequency indicators that have the potential to provide an early sign of how the UK and global economy has been impacted so far. These would complement the range of business surveys published elsewhere in the UK. [Social distancing](#) has been introduced worldwide in an effort to reduce the transmission of COVID-19, and there is scope in looking at real-time indicators to see how this enforced change in consumer and business behaviour is impacting on economic activity. For instance, card payments may offer insights on a change in spending patterns by households, while it might be possible to corroborate that effect on the output produced of those industries that are most likely to be impacted. For example, economic commentators have commented on how these restrictions have led to a fall in the number of restaurant bookings, a decline in the volume of electricity consumption and a reduction in global daily flight numbers.

Recent research by the Economic Statistics Centre of Excellence (ESCoE) found that business surveys are one of the most popular ways for NSIs to produce leading indicators. This allows business managers to provide information about their order books and production plans, for example. We have tended not to conduct such surveys in the UK. However, given recent developments, we are looking to deliver information to understand the impact of COVID-19 in close to real time. We have implemented the Business Impact of COVID-19 Survey (BICS), which will be carried out every fortnight over the coming months. This will provide qualitative information on turnover, workforce, prices and trade, helping policymakers and economists understand the effects on the UK economy in a more timely manner. Given the higher levels of uncertainty around recording some of these effects around such points in the cycle, these business surveys have the potential to offer further insights around these business dynamics.

For the [two-week period in mid-March](#), the initial findings included how 45% of respondents reported that turnover was lower than expected for the time of year. There were also impacts on the labour market, as over a quarter of respondents commented that they were reducing staff levels and reducing the number of working hours. For those businesses that carry out international trade, over half of exporters and importers had reported that trade had been affected by COVID-19.

We have also developed [experimental](#) weekly online price indices for several high-demand products. These were selected using anecdotal evidence on products that saw increased demand from consumers during the early stage of the pandemic, such as long-life food and health, household and hygiene products. Prices were scraped from several UK retailers and have the potential to provide timely indicators of the inflationary effects on these products, reflecting how demand and supply is likely to have been affected.

Notes for: Faster indicators

1. This is not to be considered a central forecast of what is most likely to happen; this is an illustrative scenario of what might happen if there is a three-month lockdown.

4 . Communicating data uncertainty

The challenge of identifying turning points in real time is further complicated by the scope of data uncertainty. Revisions¹ reflect the inherent trade-off between timeliness and accuracy in compiling estimates of gross domestic product (GDP). While these are an inevitable feature of producing timely estimates, revisions impact on the ability to identify turning points, which has been likened to "trying to aim at a moving target, without ever knowing if you really hit it". Recent analysis finds that the experience of the UK, and internationally, highlight that there is a tendency for revisions to be more pronounced at such points of the cycle, so there is scope to improve how we communicate data uncertainty.

The Government Statistical Service (GSS) sets out the [principles of how to communicate information about the level of uncertainty around official estimates](#). It highlights the role of "clear language and visualisation techniques" to help provide more user context of why estimates are subject to uncertainty and how this can impact on how figures should be interpreted. As such, producing quantitative measures² of uncertainty could be useful.

However, there has so far been little progress by National Statistical Institutes (NSIs) in looking to improve how such uncertainty is explicitly communicated. In the UK, we are explicit that GDP estimates are revised as part of the production process, reflecting the incorporation of new data and methodological improvements. We publish real-time versions of GDP and undertake [regular updates](#) to show the extent to which early estimates are biased. While this provides users with some insights into the potential scale of revisions, this has never been formalised to the extent that it has quantified the uncertainty around the GDP point estimate.

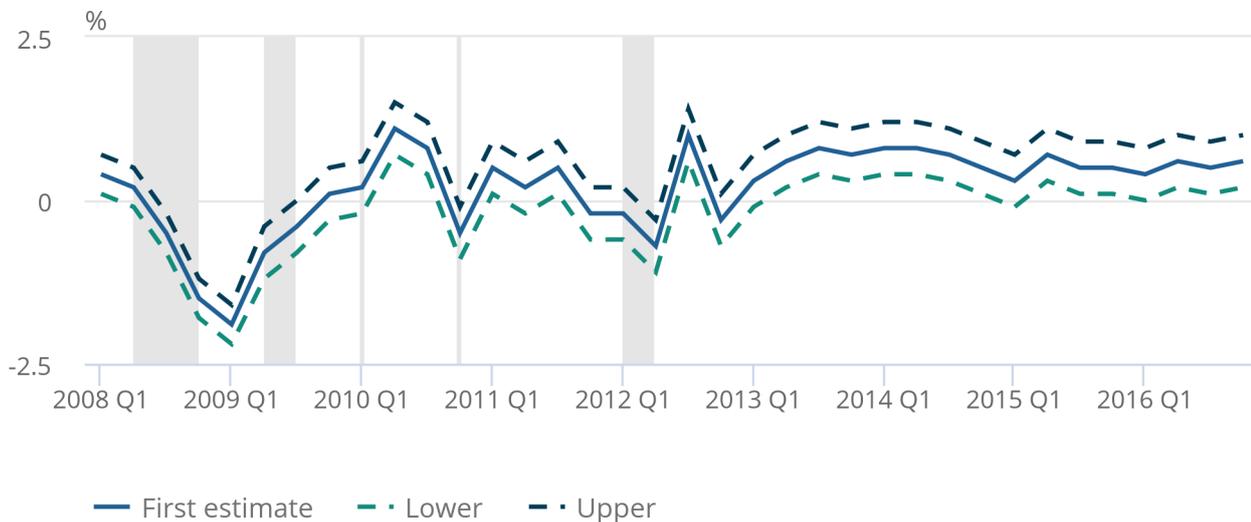
As part of our efforts to [improve public engagement](#), we are considering whether to publish [confidence intervals](#)³ around our latest point estimates. These show how likely it will be that the "final" GDP value will be outside these intervals, estimated using the statistical properties of past revisions, which are considered a proxy of data uncertainty today (Figure 1). We hope that this will help explain the challenges of identifying turning points in real time while also conveying that there is a range of possible outcomes. This might encourage further consideration of the wider range of information available in real time, including official and unofficial indicators of underlying activity in the real economy for those who are looking to track the performance of the economy.

Figure 1: There is approximately a two-in-three chance that the “final” estimate will be within the confidence intervals

Confidence intervals and the first estimate of quarter-on-quarter gross domestic product (GDP) growth

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Confidence intervals and the first estimate of quarter-on-quarter gross domestic product (GDP) growth



Source: Office for National Statistics – Real-time turning point indicators: a UK focus

Notes:

1. The 68% confidence intervals are based on statistical properties of revisions between the first and “final” estimate of gross domestic product (GDP), computed over a rolling 10-year window and applying a normal distribution.
2. These confidence intervals imply there is approximately a two-in-three chance that the “final” estimate will be within the estimated range.
3. Q1 equals Quarter 1 (January to March), Q2 equals Quarter 2 (April to June), Q3 equals Quarter 3 (July to September) and Q4 equals Quarter 4 (October to December).

Notes for: Communicating data uncertainty

1. According to 'A History of National Accounting', the UK is the only country to have attempted to explicitly measure and publish measures of quality for their national accounts, which was then updated in favour of revisions analysis. This involved the grading of components in the UK National Accounts according to three grades based on margins of error.
2. The sampling error captures the difference between an estimate and its true value. It is possible to approximate this by estimating the standard errors. This allows users to assess the accuracy of a point estimate: the lower the standard error, the closer the estimate is likely to be to its true value. If estimates of the true growth rate were obtained from numerous samples, then approximately two-thirds of these estimates would be less than one standard error away from the true value, and approximately 95% of them would be less than two standard errors away from the true value. Standard errors are often shown as confidence intervals. However, it is not possible to produce standard errors for GDP, given that it is effectively a composite indicator that is produced from a range of surveys.
3. The confidence intervals are based on the statistical properties of GDP revisions over a rolling 10-year window, which helps consider the structural and cyclical features of data revisions. The confidence intervals here do not explicitly adjust for the state of the economic cycle, in part reflecting that the state of the economic cycle would have to be assessed first.

5 . Conclusions

The experience of the global financial crisis in 2008 reinforced the interest in developing "[an internationally comparable set of cyclical composite indicators for business cycle analysis](#)". That said, this did recognise that the role of National Statistical Institutes (NSIs) might range from "the direct compilation of such indicators or in the provision of critical support to compilers in other national agencies". In a review of international practices, the Economic Statistics Centre of Excellence (ESCoE) explores the range of real-time turning point indicators that are published, including the experience of the UK.

The UK previously published a range of cyclical indicators from the mid-1970s. The peaks and troughs of these indicators would match the turning points in the economic cycle, covering a range of leading, coincident and lagging indicators. However, these were discontinued in the mid-1990s, in part reflecting some of the conceptual challenges raised by wider stakeholders at the time. This does not necessarily mean that there is no value in such indicators, particularly at a time when the increase in the volume of data and technological capacity provides new opportunities to exploit the potential in developing real-time indicators of economic activity. Initial work focused on studying reported turnover and expenditure figures in Value Added Tax (VAT) returns, the time spent in port by ships and the frequency of visits to ports, and traffic counts.

The volume, timeliness and frequency of such information is integral in its ability to provide an early picture of the state of the economy, providing insights into how demand and supply is evolving in the UK. This has become more apparent in recent weeks in light of the coronavirus (COVID-19) pandemic, which is expected to have pronounced impacts on global demand and supply. The potential to develop real-time indicators to help in tracking turning points has never been more apparent. This includes looking at how we can provide timelier insights into how particular industries are being affected, the extent to which a change in consumer and business behaviour will impact on private spending, and how this will lead to a change in labour and capital income. We have implemented the Business Impact of COVID-19 Survey (BICS) in response, providing insights into how turnover, workforce, prices and trade are being affected. We also aim to carry out other pieces of bespoke analysis to help policymakers understand the economic effects over the coming months.

6 . Authors

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