Research sheds light on how economies may respond to COVID-19 restrictions

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New research from the Imperial College COVID-19 Response Team sheds light on how economies might respond to different levels of

COVID-19 restrictions.

In the latest report, the researchers developed new methods to forecast Purchasing Managers' Indices (PMIs) during and after the COVID-19 pandemic and the potential impact of government virus mitigation strategies.

PMIs, which survey managers at private businesses on their purchasing intentions, are a leading indicator of the direction of economic activity.

The researchers, from the Statistics section of the Department of Mathematics, produced six-month forecasts of the UK composite PMI series under different scenarios of COVID-19 mitigation strategies, ranging from easing, to staying unchanged, to tightening between October 2020 and April 2021.

The new method also incorporates real-time data on the progress of the pandemic.

The researchers created a novel network time series model, which borrows strength from across thirteen world economies over time viewed as a network.

GDP forecasts

Gross domestic product (GDP) economic forecasts were then obtained by modeling the relationship between GDP and PMI using a mixed data sampling (MIDAS) regression model that links monthly PMI indices with quarterly GDP.

The team's results suggested that there would be a 4.5% difference in 2021 Q1 GDP growth and a 4.8% difference in 2021 Q2 GDP growth between the easing and tightening scenarios.

In September 2020, under a tightening scenario, the researchers used the model to estimate a drop in GDP of 1.2% for Q1 2021, with prediction ranges of -5.8 to 2.9. The actual value turned out to be a drop of 1.6%, which was close to the prediction and well within the prediction interval.

The researchers also predicted an increase of 3.2% for Q2 2021, with prediction ranges of -2.0 to 7.1. This prediction was for a linearly easing scenario from November 2020 until April 2021.

The recently announced Office for National Statistics first GDP estimate for Q2 2021 turned out to be a 4.8% increase, which is again well within the [prediction](#) range, but the actual underlying conditions were lockdown until 8 March 2021, then a gradual easing.

The research will be presented as a [Discussion Paper](#) at a Plenary session of the Royal Statistical Society International Conference this September.

A new way of forecasting the economic impact of COVID-19

Professor Guy Nason, from the Department of Mathematics, said: "This research has revealed a new way to forecast the impact to an economy under different levels of COVID-19 restrictions.

"By integrating economic indicators, people behavioral indices and [real-time data](#) from the pandemic we are able to [forecast](#) a country's economic performance.

"We are very excited by this methodology and pleased with its performance. It could be a useful tool when trying to understand the economic implications of different virus mitigation strategies."

James Wei, from the Department of Mathematics, said: "It is our hope that this kind of research can bring greater attention to the exciting field of network time series analysis. We see a lot of potential for similar methods to be applied to fields across both the social and natural sciences."

More information: Quantifying the Economic Response to COVID-19 Mitigations and Death Rates via Forecasting Purchasing Managers' Indices Using Generalised Network Autoregressive Models with Exogenous Variables. www.imperial.ac.uk/mrc-global- … 45-economic-resonse/

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