NOWCASTING MALAYSIA'S GDP

Veronica S. Jamilat

INTRODUCTION

Time-series forecasts are often used in a wide range of economic activities. While Autoregressive models are known for their flexibility in handling a wide range of different time series patterns, nowcasting Gross Domestic Products (GDP) using Dynamic Factor Model (DFM) provides more promising results during the recessionary periods (Siliverstovs B., 2021). The DFM by Giannone et al. (2017) is a very short-term forecast that uses mixed-frequency variables and has been tested for accuracy in many countries. Like other countries, the ongoing global economic recession caused by COVID-19 pandemic brought new challenges in forecasting Malaysia's GDP growth. This paper attempts a nowcasting method using DFM to estimate Malaysian GDP using economic indicators and related variables.

LITERATURE REVIEW

Giannone et al. (2017) concluded that the DFM nowcasting techniques (introduced in 2008) overall produce results at least as good as those obtained from institutional and private-sector forecasts; the advantage lies in the usage of the algorithm that makes it free from herding and other biases. On the other hand, Siliverstovs B. (2021) found a very strong variation in the forecasting ability of the DFM across the United States's business cycle phases; the DFM delivers superior forecast accuracy during the recessionary quarters inferior predictions for the expansionary period. To improve the model estimation, Alifatussaadah et al. (2019) suggested that fiscal data inclusion may help produce a better early estimate of Indonesia's GDP growth.

OBJECTIVE

To nowcast Malaysia's GDP using DFM by selecting the variable set of economic indicators and compare with the Autoregressive model (AR) and Autoregressive Integrated Moving Average model (ARIMA).

METHOD

The nowcasting model used is similar to the one illustrated in Serge et al. (2019) using nowcasting package in R, which then compared with ARIMA model and Autoregressive model of 2, AR(2); the benchmark model (Siliverstovs B., 2021). The selection of variable set for DFM is based on Pearson's correlation coefficient, r involving 103 possible economic indicators and variables. Lastly, the model evaluation is based on each model's Root Mean Square Error of Prediction (RMSEP).

RESULTS AND DISCUSSION

The data on 103 economic indicators and variables such as Consumer Price Index, Industrial Production Index, Exports and Imports including fiscal variables such as Brent price and bank loans were gathered from various sources. The selection of variables for the next stage in performing DFM is based on a correlation coefficient, r value of 0.70 or more (Figure 1). A total of 78 variables were selected for the next stage.

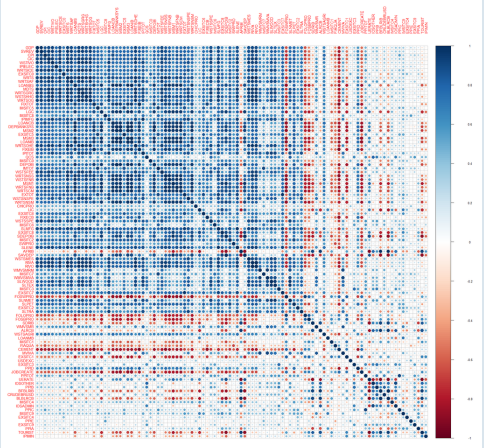

Figure 1: Correlations with GDP

Numerous factors influence changes in GDP, and these factors can be decomposed into several parts. By using DFM, a set of factors that have proximity will be made into a limited of factors. As shown in Figure 2, 71 selected variables (7 variables were excluded due to more than 33.33% of missing value) were clustered into three (3) factors. The classic forecasting method of ARIMA and AR(2) were performed using the GDP series from 2006 (at 2015 constant prices).

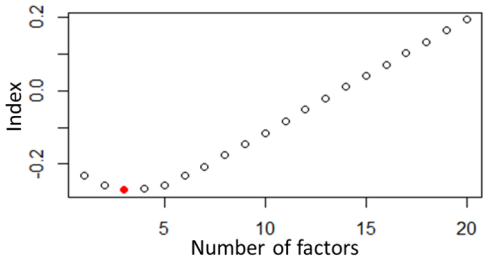

Figure 2: Number of factors determined based on 71 variables

The results of nowcast using DFM for one year period (from second quarter of 2020 to second quarter of 2021) were compared with ARIMA and AR(2) forecasts. Figure 3 illustrates the GDP time series and the estimation results using all three models.

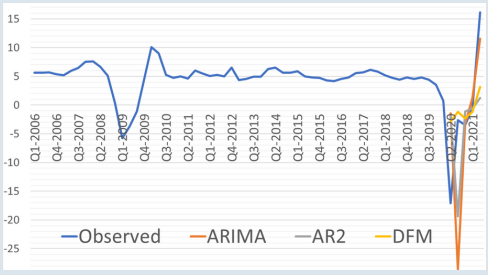

Figure 3: GDP Nowcasting vs Forecasting

As suggested by various literature, Root Mean Square Error of Prediction (RMSEP) is used to evaluate the performance of these models.

Method	Model	RMSEP
Forecasting	ARIMA(1,0,0)(0,0,1)[4]	13.739
	Autoregressive model of 2, *AR(2)*	12.136
Nowcasting	Dynamic Factor Model (DFM)	8.6516

Figure 4: Root Mean Square Error of Prediction (RMSEP)

Based on RMSEP of all models (Figure 4), DFM generated the smallest value, which makes DFM offers a better estimate for Malaysia's GDP in terms of early estimates. Nevertheless, attempting to nowcast DFM using earlier series seems challenging due to insufficient variables with more extended back series. However, the Neural Network model may resolve this issue.

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