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Prediction of Household Income by B40, M40 and T20

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ABSTRACT

Monitoring household income is vital for governments, banks, nongovernmental organizations, and others that involved in development strategies. Proxy indicators Naïve, Seasonal Naïve, Simple Exponential Smoothing, Holt's Trend, ARIMA, TBATS are the models used to estimate the household income for B40, M40 and T20 group in years 2021 and 2022.

After comparing the Mean Absolute Percentage Error (MAPE) of all these Models, we choose the smallest error as our method to predict the household income. For B40 and M40, Holt's Trend Method is chosen. Holt's Trend method using basic smoothing equation, level equation and trend equation to generate the forecasted value. On the other hand, T20 data will be suited in TBATS model with lowest MAPE. TBATS will predict the estimated value based on trigonometric regressor, transformation, autoregressive moving average error and trend to predict the forecasted value.

After using the models to fit the data, a graph with 95% prediction interval for each of the forecasted point will be generated to illustrate the result.

OBJECTIVE

To estimate the **future economic growth** in the relation of the income changes

To develop **new financial products** in financial institutions

RISK
To evaluate the **evolution of risk management** in borrowing for banks

To estimate the **allocation of money in helping the poverty** for government and nongovernment organizations

METHODOLOGY

Extraction of historical data from Department of Statistic Malaysia

Pre-processing of data to interpolate the missing data using spline function.

Partitioning of data into training and testing data set

Using Naïve Model, Simple Exponential Smoothing, Holt's Trend Method, ARIMA and TBATS to train and test the data.

Using Mean Absolute Percentage Error (MAPE) as measure to determine the best model and do the estimation.

RESULT AND DISCUSSION

Forecasting of Mean of B40 Household Income in Malaysia from 2020 to 2022

Forecasting of Mean of M40 Household Income in Malaysia from 2020 to 2022
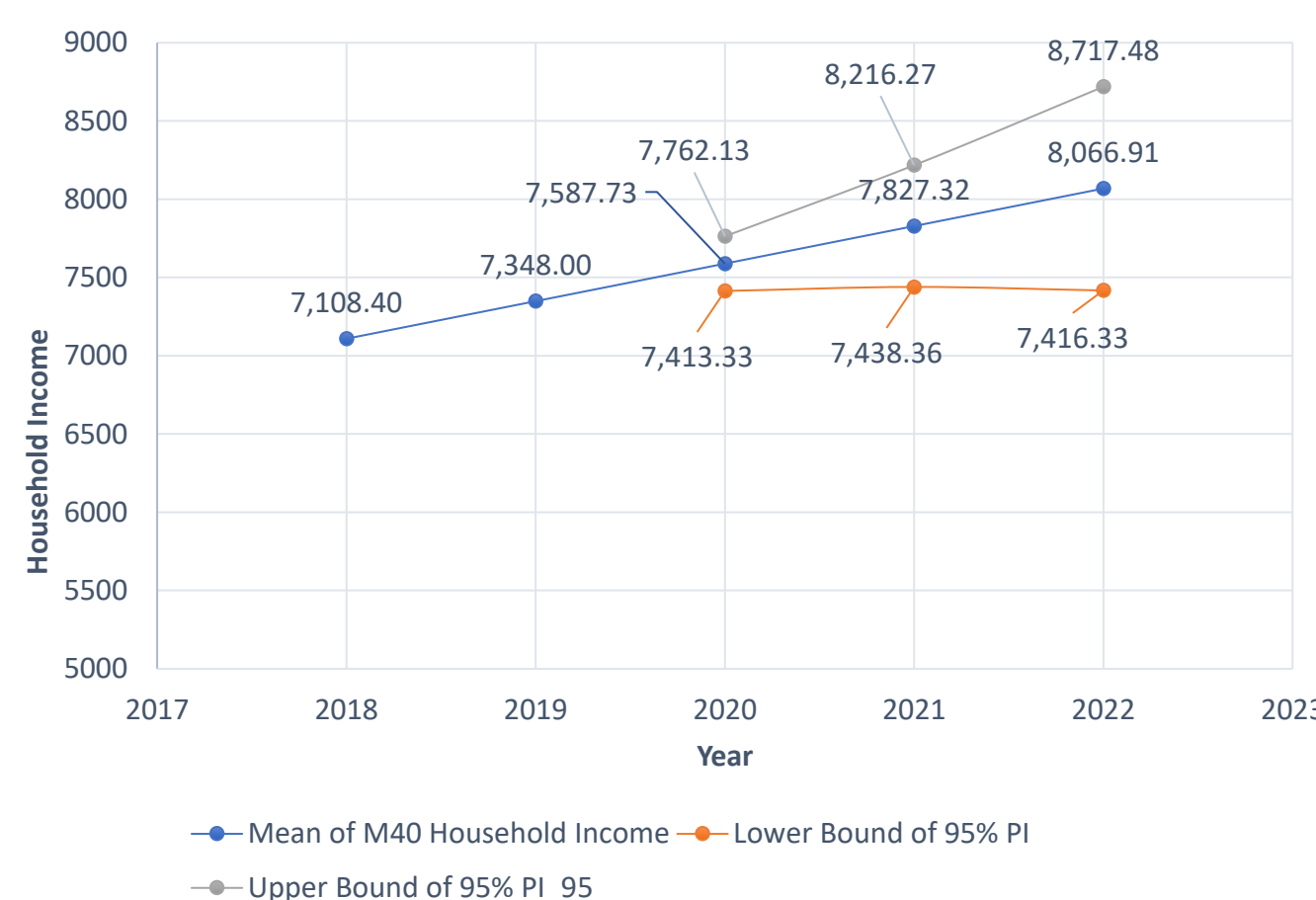

Forecasting of Mean of T20 Household Income in Malaysia from 2020 to 2022
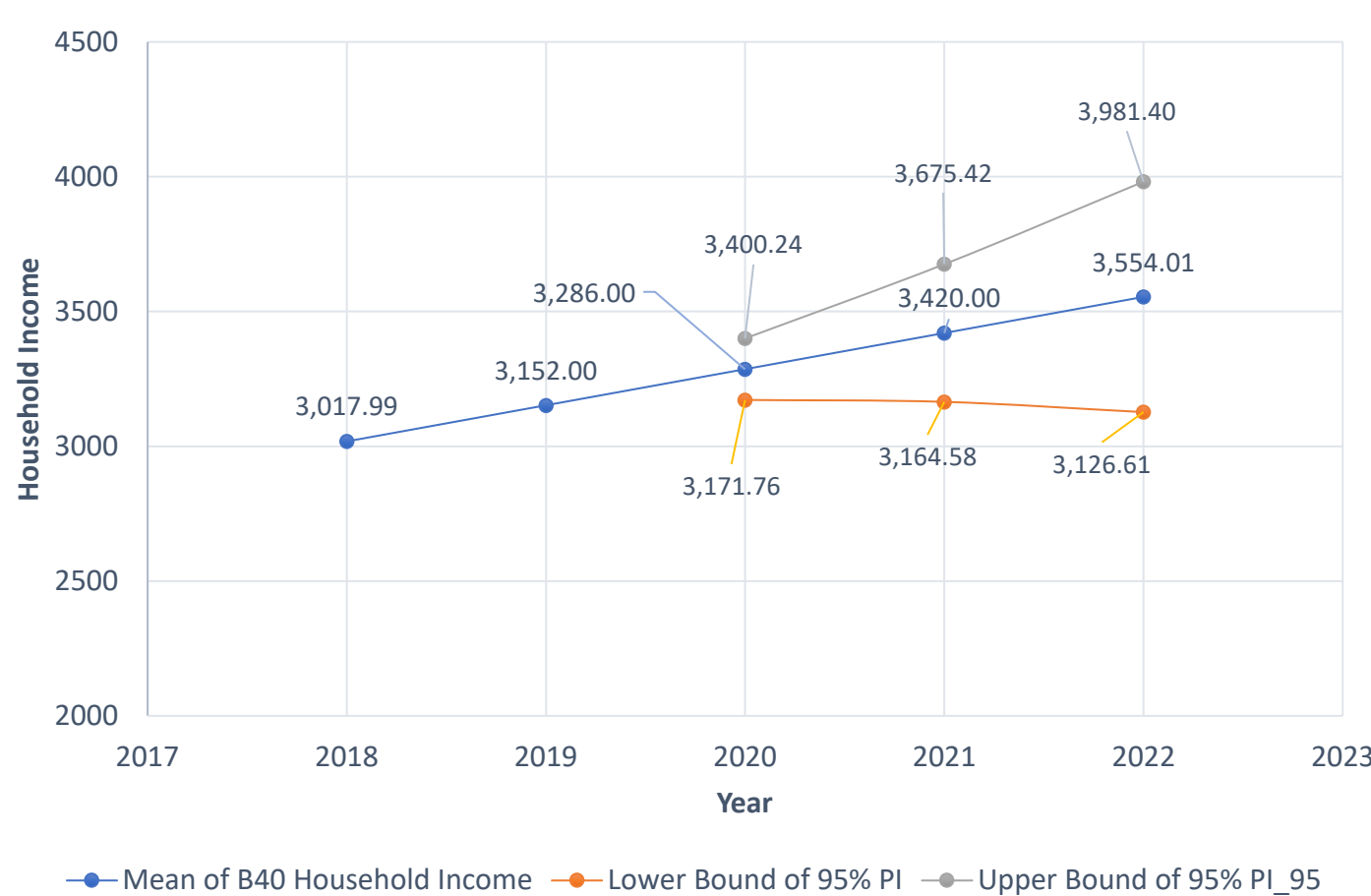
From the statistical analysis, it suggests that the forecasted income of B40 will be increased by RM134 for each year in 2020, 2021 and 2022 based on historical data.

It is important to note that, 95% prediction interval is graphed. This interval is plotted based on the standard deviation of the historical data. It means that we have 95% confident that this predicted value will be in between the interval. When the forecasted value is further from the present, the interval will larger.
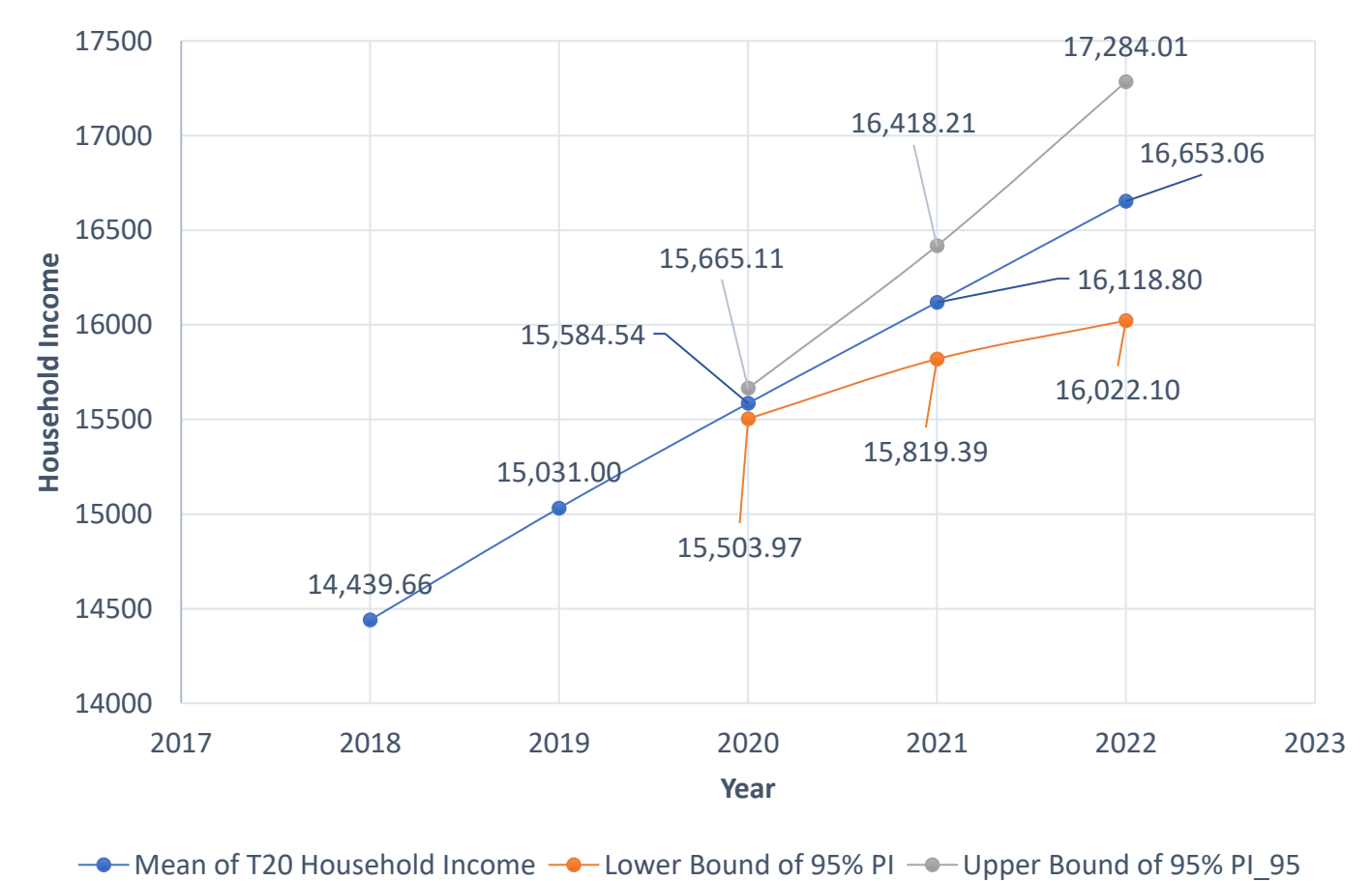
Similar to B40, statistical analysis suggests that the forecasted income of M40 will be incremented by RM240 for each year in 2020, 2021 and 2022.

Unlike B40, the 95% of prediction interval of M40 is larger than the 95% prediction interval of B40. In such a case, forecasted value of M40 will have lower confidence level to be predicted correctly compared with the B40's forecasted value.

For the case of T20, the forecasted value of 2020 will be increased by RM554. However, for year of 2021 and 2022, the analysis suggests that it will be increased by RM534 for each year.

It is clear that the 95% of prediction interval is the smallest among B40 and T20 income class. Hence, we have higher confidence to conclude that the forecasted value of T20 is better than M40 and B40 groups.

CONCLUSION

In general, the household income for B40, M40 and T20 income class are increased although, the rate of increment for each groups are different. It is reasonable as the estimation is based on yearly average basis. The historical data shows that although Malaysia experiences the financial crisis in 1997 and 2008, the yearly average household income still increase steadily. Hence, we can be optimistic to estimate that the yearly average household income from 2019 to 2020 and near future will be increased, even though we are experiencing COVID-19 pandemic.