

# Application of Forecasting Methods to Predict Sukuk Assets in Indonesia

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This study aims to predict the development of total sukuk assets in Indonesia using a quantitative approach based on time series forecasting. The data used is secondary data on total Indonesian sukuk assets for the period 2002–2018 sourced from the Financial Services Authority (OJK). Three forecasting methods were used, namely Trend Analysis (regress over time), Multiplicative Decomposition, and Exponential Smoothing with Trend, with the help of POM-QM version 3 software. The results show that total sukuk assets in Indonesia experienced a significant growth trend during the observation period. Based on an accuracy evaluation using Mean Absolute Percent Error (MAPE), the Exponential Smoothing with Trend method produced the lowest error rate compared to the other two methods, making it the most reliable method for predicting Indonesian sukuk assets. These findings have important implications for regulators and market participants in formulating policies and strategies for developing the sukuk market in Indonesia.

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## INTRODUCTION

In the last two decades, Islamic financial instruments have experienced rapid growth at the global level, particularly sukuk as a Sharia-based financing instrument that is increasingly in demand by governments and corporations. Sukuk not only serves as an alternative financing instrument, but also as an investment instrument that supports financial system stability and sustainable economic development (Iqbal & Mirakhor, 2011).

Indonesia, as the country with the largest Muslim population in the world, has great potential in developing the sukuk market. Since the issuance of the first sukuk in the early 2000s, the value and volume of sukuk assets in Indonesia have shown significant growth, driven by regulatory support, infrastructure financing needs, and increasing public awareness of Islamic finance (Ascarya, 2015; OJK, 2019). However, global economic dynamics, changes in fiscal policy, and financial market conditions may affect the performance and growth prospects of sukuk in the future.

In the Islamic finance system, sukuk assets differ fundamentally from conventional fixed-income securities. Sukuk represent ownership claims over tangible assets, usufructs, or investment activities structured in accordance with Shariah principles. Consequently, the quality, composition, and utilization of underlying assets are critical to the credibility and sustainability of the sukuk market.

Indonesia has developed one of the world's largest sukuk asset bases, driven primarily by government issuance through Surat Berharga Syariah Negara (SBSN). Sukuk assets in Indonesia are not only financial instruments but also vehicles for infrastructure development, fiscal sustainability, and ethical investment.

Sukuk assets in Indonesia comprise sovereign sukuk assets and corporate sukuk assets, with sovereign sukuk accounting for the dominant share. These assets are recorded as part of the Islamic capital market and contribute significantly to total Islamic financial assets nationally. Sukuk assets allow the government to finance development projects without excessive reliance on conventional interest-based debt. Asset-based financing enhances fiscal discipline and transparency.

Sukuk assets constitute the backbone of Indonesia's Islamic capital market and represent the largest share of Islamic financial assets in the country. Dominated by sovereign sukuk, Indonesia's sukuk assets have expanded significantly in size, diversity, and economic relevance over the past two decades.

Sukuk assets in Indonesia represent a mature and evolving component of the Islamic financial system. Dominated by sovereign assets and increasingly diversified through sustainable and social instruments, sukuk assets play a vital role in financing development, promoting financial inclusion, and aligning economic growth with Islamic ethical principles. With continued innovation and effective asset management, sukuk assets will remain central to Indonesia's Islamic finance strategy.

In this context, predicting or forecasting total sukuk assets is important as a basis for decision-making for policymakers, investors, and Islamic finance industry players. Time series forecasting methods are widely used in financial studies to identify historical patterns and project future developments (Makridakis, Wheelwright, & Hyndman, 1998). Several previous studies have shown that using more than one forecasting method can provide a more comprehensive picture and enable evaluation of the most accurate method (Hyndman & Athanasopoulos, 2018).

Therefore, this study aims to predict the total sukuk assets in Indonesia using three commonly used forecasting methods, namely Trend Analysis, Multiplicative Decomposition, and Exponential Smoothing with Trend. In addition, this study also compares the accuracy levels of the three methods using the Mean Absolute Percent Error (MAPE) indicator to determine the most suitable method for projecting sukuk assets in Indonesia.

## DATA AND METHODOLOGY

This study attempts to predict the total sukuk assets in Indonesia. The data used are sukuk assets in Indonesia from 2002 to 2018. The data were obtained from the Financial Services Authority (OJK). The prediction methods used in this study are three *forecasting* methods, namely: (1) Trend Analysis, (2) Multiplicative Decomposition, and (3) Exponential Smoothing with Trend.

The *software* used as a tool is POM-QM Version 3. POM-QM stands for Production and Operations Management -- Quantitative Methods, an operations management software developed by Pearson Prentice Hall USA. POM-QM for Windows is software used for Production & Operations Management and Quantitative Methods, widely applied in teaching and applied research (linear programming, forecasting, inventory, queuing, etc.).

## RESULTS

Based on the results of data processing, the results of the total asset prediction calculations for Sukuk in Indonesia are as shown in the following table.

Table 1. Sukuk Prediction Calculation Results (Billion USD)

	<b>Trend</b>	<b>Multiplicative Decomposition</b>	<b>Exponential Smoothing</b>
2002	175	175	175
2003	740	740	740
2004	1394	1394	1394
2005	1979	1979	1979
2006	2179	2179	2179
2007	3029	3029	3029
2008	4958	4958	4958
2009	5621	5621	5621
2010	6121	6121	6121
2011	5876	5876	5876
2012	6883	6883	6883
2013	7553	7553	7553
2014	7105	7105	7105
2015	9902	9902	9902
2016	11878	11878	11,878
2017	15,740	15,740	15,740
2018	22023	22023	22023
2019*	15,913.97	15,934.59	22,799.81
2020	16,942.61	16,927.69	
2021*	17,971.24	17,994.66	
2022	18,999.88	18,983.28	
2023*	20,028.52	20,054.73	
MAPE	0.89	0.89	0.22

\*Prediction results

Based on Table 1, in general, total Sukuk assets worldwide from 2002 to 2018 experienced a significant increase. In 2002, the value was only USD 175 billion, while in 2018, total Sukuk assets in Indonesia increased to USD 22,023 billion.

The results of the prediction calculation for total Sukuk assets in Indonesia in 2019 using the trend analysis approach show a decline to USD 15,913 billion,

but an increase to USD 16,942 billion and USD 17,971 billion in 2020 and 2021. Total sukuk assets in 2022 and 2023 are predicted to increase to USD 18,999 billion and USD 20,028 billion. The following is a graph of *the trend analysis* method (regress over time) for sukuk assets, where the black line is the actual data and the blue dotted line is the predicted data.

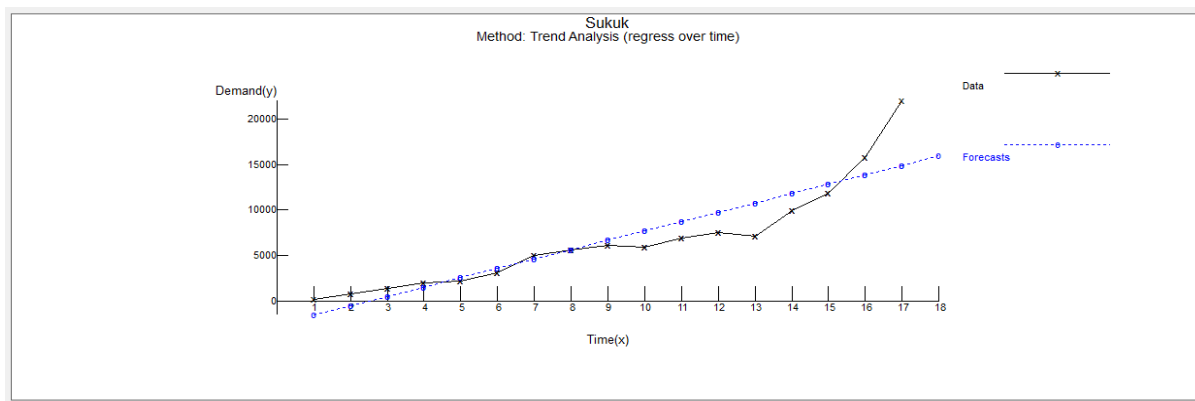


Figure 1. Trend Analysis Method

The results of the prediction calculation for total Sukuk assets in Indonesia in 2019 using the Multiplicative Decomposition approach show a slight decrease to USD 15,934 billion, but an increase in 2020 to USD 16,927 billion and in 2021 to USD 17,994 billion. Total Sukuk assets in 2022 and 2023 are

predicted to increase to USD 18,983 billion and USD 20,054 billion, respectively. The following is a graph of the results of the *Multiplicative Decomposition* method for Sukuk assets, where the black line is the actual data and the blue dotted line is the prediction data. The red line is the trend line.

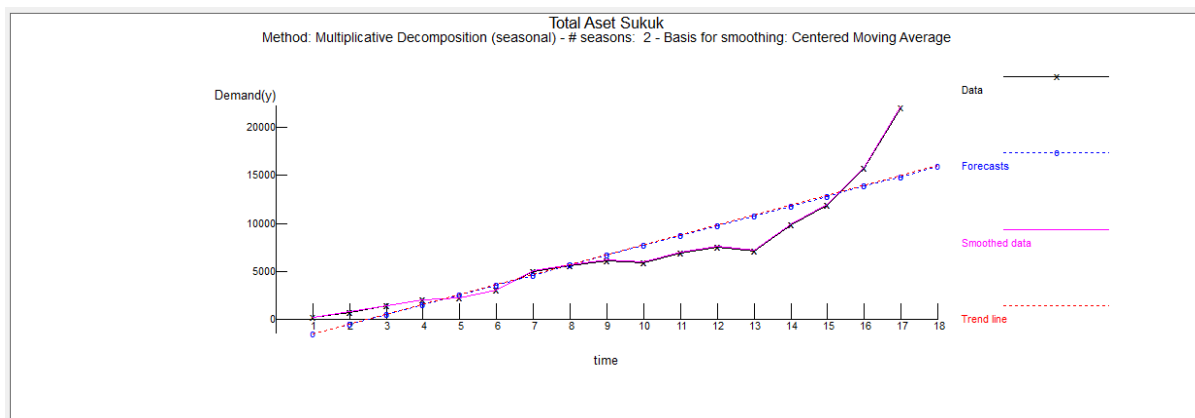


Figure 2. Multiplicative Decomposition Method

Finally, here are the results of the *Exponential Smoothing with trend* method. The results of the calculation of the global halal food and beverage industry market share for the Exponential Smoothing with trend approach only cover one year, namely 2019. In 2019, the

total Sukuk asset prediction increased to USD 22,799 billion. The following is a graph of the *Exponential Smoothing with Trend* method for the global Halal Food Industry market share, where the black line is the actual data and the blue dotted line is the prediction data.

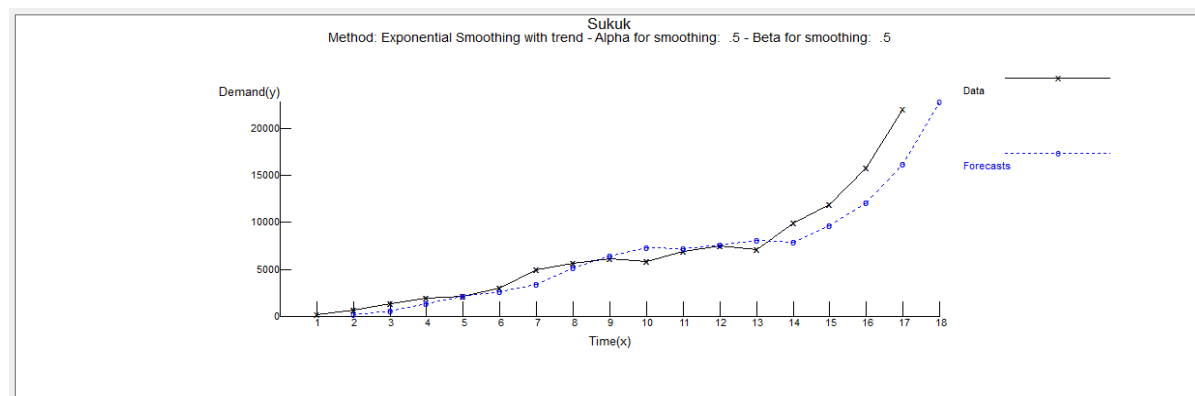


Figure 3. Exponential Smoothing with Trend Method

The MAPE (Mean Absolute Percent Error) value or the average error percentage for the three methods above is 0.89 for *Trend Analysis* and the *Multiplicative Decomposition* method, and 0.22 for the *Exponential Smoothing with Trend* method. This means that the third method is relatively better at predicting than the first and second methods (*Trend Analysis and Multiplicative Decomposition*).

The forecasting results show that historically, total sukuk assets in Indonesia have increased significantly during the 2002–2018 period. This increase reflects the increasingly strong role of sukuk as a financing and investment instrument in the national Islamic financial system. This finding is in line with the literature which states that the growth of sukuk in developing countries, including Indonesia, is influenced by long-term financing needs and government policy support (Said & Grassa, 2013).

Based on the Trend Analysis method, the sukuk asset projection shows short-term fluctuations, particularly a decline in the early years of the prediction period (2019), before increasing again in the following years. This pattern indicates that the linear trend method tends to be sensitive to changes in historical data and is less capable of capturing the nonlinear dynamics in sukuk asset growth. This is in line with Makridakis et al. (1998), who stated that simple trend-based models have limitations when the data shows high volatility.

The Multiplicative Decomposition method produces prediction patterns that are relatively similar to Trend Analysis, but with adjustments to seasonal components and trends. Although the annual data used does not explicitly show seasonal patterns, the decomposition approach still provides a smoother picture of long-term trends. However, the MAPE value, which is the same as the Trend Analysis method, shows that the advantages of this method in the context of Indonesian sukuk asset data are still limited.

Conversely, the Exponential Smoothing with Trend method showed the best performance based on the lowest MAPE indicator. This method is able to give greater weight to the latest data, making it more adaptive to changes in the growth pattern of sukuk assets. These findings are consistent with the research by Hyndman and Athanasopoulos (2018), which emphasizes that exponential smoothing with a trend component is very effective for economic and financial data that shows continuous growth.

Overall, the results of this study confirm that choosing the right forecasting method is very important

in projecting the development of sukuk assets. The Exponential Smoothing with Trend method can be used as a primary reference for regulators and industry players in developing projections and strategies for the sukuk market in Indonesia. In addition, these predictions can also be used as a basis for planning fiscal policy and national sharia financing.

## CONCLUSION

Based on the prediction results for 2019, it is estimated that the total Sukuk assets in Indonesia will be in the range of USD 15,913.97 billion to USD 22,799.81 billion. From these results, the pessimistic prediction value is USD 15,913.97 billion and the optimistic prediction value is USD 22,799.81 billion. Meanwhile, the realistic prediction value for total Sukuk assets in Indonesia is in the range of USD 15,934.59 billion. Based on statistical indicators, in this case the MAPE value, the *Exponential Smoothing with Trend* method is relatively better at predicting the total value of Sukuk in Indonesia compared to the *Trend Analysis (regress over time)* and *Multiplicative Decomposition* methods.

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