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# Assessing the Impact of Macroeconomic Variables on Project-Based Sukuk in Indonesia

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## Abstract

This study is aimed at examining the influence of variables such as Infrastructure Budget, Bank Indonesia Rate, Money Supply, and Bank Indonesia Sharia Certificate on Project-Based Sukuk over short and long-term periods. The research also evaluates the response given by Project-Based Sukuk to shocks in these variables, as well as their contributions to variations in Project-Based Sukuk. The Vector Error Correction Model (VECM) method, implemented through Eviews 10, was utilized in this study which employed monthly secondary data spanning the period 2016-2020. The findings suggest that, in the short term, the Infrastructure Budget variable positively affects PBS. Conversely, in the long term, the Money Supply variable negatively influences PBS. BI rate and Bank Indonesia Sharia Certificate variables appear to have no significant effect on PBS in either the short or long term. The Impulse Response Function test reveals that PBS responds positively to shocks in the Infrastructure Budget, negatively to shocks in the Bank Indonesia Sharia Certificate, and variably to shocks in the BI Rate and Money Supply. The Forecasting Error Variance Decomposition test indicates that PBS exerts the most significant influence on variance explanation. Sukuk is proposed as a viable alternative to bridge the financing gap for infrastructure development. The government is therefore urged to preserve economic stability, particularly concerning the Infrastructure Budget from the State Budget and the Money Supply, given their impact on sukuk development, which is crucial for infrastructure progression in Indonesia.

***Keywords:***

Infrastructure; project-based sukuk; macroeconomics; VECM

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## 1. Introduction

Infrastructure plays a pivotal role in propelling a nation's progress. The quality of a country's infrastructure serves as a barometer for assessing its economic growth, a principle that holds true for Indonesia. Superior infrastructure ensures the smooth conduct of economic activities. Conversely, substandard infrastructure can obstruct economic distribution, leading to inefficiencies (Gultom & Tini, 2020).

Comprehensive infrastructure influences the marginal productivity of public capital, which in turn has a bearing on reducing production costs in economic activities (Haris, 2009). Persistent efforts towards infrastructure development are essential to assist the Indonesian government in addressing primary challenges in developing nations, including poverty, unemployment, and inequity, in a measured and sustainable fashion.

An accelerated, directed, and sustainable infrastructure development is necessary to stimulate economic growth. Although the allocation of the infrastructure budget from the State Budget showed a consistent rise from 2016-2019, it was reduced in 2020 from IDR 423.3 trillion to IDR 281.1 trillion. This reduction was necessitated by the reallocation of funds to the health sector in response to the COVID-19 pandemic.

The mounting demand for infrastructure financing surpasses the capacity of the State Budget. This disparity between the financial requirements for infrastructure development and the government's ability to provide financing through the State Budget necessitates the exploration of alternative funding sources. In addressing this issue, the government often collaborates with the private sector on projects that have a high potential for revenue generation (Hariyanto, 2017).

External debt is another alternative source of infrastructure financing frequently employed by the government. There has been an increase in Indonesia's external debt, which reached US $417.53 billion at the end of the fourth quarter of 2020. The ratio of Indonesia's External Debt to Gross Domestic Product at the end of the same quarter was maintained at around 39.4%, suggesting a stable External Debt structure, provided it is appropriately managed. However, the government must minimize reliance on foreign debt for infrastructure project financing, as the interest system can pose a significant burden on the State Budget due to the high interest rates demanded by investors (Haq et al., 2020).

One interest-free source of infrastructure financing is through the utilization of Sukuk. The State Sukuk, in the form of Project-Based Sukuk (PBS), is established under Law Number 19 of 2008 concerning State Sharia Securities. It is aimed at addressing the State Budget deficit and financing government infrastructure projects, which serve as the basis for issuing Sukuk (underlying assets) for projects delineated in the State Budget (Hariyanto, 2017). Project-Based Sukuk can serve as an alternative means of financing suitable infrastructure projects due to its interest-free nature, thereby preventing additional burdens on the State Budget. The efficacy of Sukuk as a financing alternative for government expenditures and deficits has been substantiated in Malaysia. According to a study conducted by Benbekhti et al., (2019), Sukuk has proven to be an effective instrument for financing the Malaysian government's deficit.

The potential of Sukuk as an alternative to infrastructure financing to bridge the financing gap must be bolstered by appropriate policies to maintain macroeconomic stability in Indonesia, as this will influence money market conditions, particularly sukuk issuance. Several studies have examined the impact of macroeconomic factors on Sukuk issuance in Indonesia. Rahman et al., (2016) found that while the inflation rate variable had no significant negative effect on Sukuk prices, the BI (Bank Indonesia) rate had a significant

negative impact on Sukuk demand. M. Ardi (2018) demonstrated that economic growth and the money supply exerted a significant positive influence, while open unemployment and inflation had a significant negative impact on long-term sukuk issuance, which is affected by SBIS bonuses. Valentin & Anggraeni (2018) revealed that the Gross Domestic Product, the Money Supply (M1), and the Consumer Price Index had a negative and significant effect, while the open unemployment rate had a significant positive impact on the value of sukuk emissions. Suciningtias (2019) showed that exchange rates, inflation, and world gold prices significantly affected Sukuk's performance in the long run, while the BI rate, exchange rates, and world gold prices had a significant short-term impact. Ependi & Thamrin (2020) found that foreign exchange rates and the money supply significantly influenced the volume of corporate sukuk on offer. Lastly, Wafi et al., (2020) demonstrated that while SBIS had a positive effect, inflation and oil prices negatively impacted sukuk growth.

There were inconsistencies in the effects of macroeconomic variables on the development of PBS in Indonesia during the 2016-2020 period. The Infrastructure Budget in 2020 was 281.1 trillion rupiah, a decrease from 2019's 394.1 trillion rupiah. However, the level of PBS issuance in 2020 was 593.466 trillion rupiah, an increase from 2019's 412.298 trillion rupiah. This contrasts with Hariyanto's (2017) assertion that an increase in the Infrastructure Budget would lead to an increase in PBS issuance.

The BI rate in 2018 was 6%, an increase from 2017's 4.25%. However, PBS in 2018 was 305.676 trillion rupiah, an increase from 2017's 245.777 trillion rupiah. Rahman et al. (2016) found that the BI rate has a significant negative relationship with Sukuk. However, a separate study by Juaris et al. (2018) reported that the BI rate did not have a significant effect on SBSN in either the short or long term.

The Money Supply and PBS issuance both showed an increase from 2016 to 2020. Meanwhile, Valentin & Anggraeni's (2018) research indicated that the amount of money supply has a significant negative effect on the value of Sukuk issuance.

The Bank Indonesia Sharia Certificates in 2018 amounted to 6.93%, an increase from 2017's 5.27%. Simultaneously, the level of PBS issuance in 2018 was 305.676 trillion rupiah, an increase from 2017's 245.777 trillion rupiah. This contrasts with M. Ardi's (2018) research findings which suggested that a decrease in return would lead to an increase in sukuk issuance.

Given this context, Project-Based Sukuk can serve as an alternative solution to bridge the gap between the need for and the provision of financing for infrastructure projects in an interest-free manner. Its development must be enhanced to make a significant contribution to infrastructure development, facilitated by appropriate policies to maintain economic stability. The unique position of this research compared to previous studies lies in its focus on the 2016-2020 period, which includes the impact of the COVID-19 pandemic. This unprecedented event triggered shocks to the macroeconomic variables employed in this research. Therefore, the purpose of this study is to analyze the influence of the Infrastructure Budget, BI Rate, Money Supply, and Bank Indonesia Sharia Certificates on Project-Based Sukuk in Indonesia for the period 2016-2020.

## 2. Research Method

This study employs a quantitative approach leveraging secondary data. The variables examined in this research include Project-Based Sukuk (PBS), Infrastructure Budget (AI), BI rate (BIR), Money Supply (JUB), and Bank Indonesia Sharia Certificates (SBIS). The research samples consist of monthly data ranging from January 2016 to December 2020. These

samples were selected purposefully, using a documentation method. Key variables, such as Sukuk (PBS), Infrastructure Budget (AI), and Money Supply (JUB), are translated into natural logarithmic form, expressed in percentage (%). The study utilizes Vector Autoregression (VAR) or Vector Error Correction Model (VECM) analysis via Eviews 10 as its analytical tool. The VAR model is applied if the data in this study are stationary at the first level, whereas VECM is used if the data are not stationary.

The pre-estimation testing phase encompasses several tests: Stationery Test, which evaluates whether the data are stationary or not, thus determining if variables share the same degree of integration; Optimal Lag Test, conducted to mitigate the autocorrelation issue; VAR Model Stability Test, deemed stable if the unit root has a modulus value less than one; Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD) analysis, considered valid once the VAR model is stable; Granger causality test, which assesses if there is a causal relationship between research variables; and Johansson cointegration test, which evaluates whether the research variables have a long-term relationship based on non-stationary variables. Following these tests, the VAR or VECM is estimated to analyze the impact of the dependent or independent variables in both the short and long term. The Impulse Response Function (IRF) is then analyzed to discern the response of an endogenous variable to shocks on certain variables. The IRF can examine responses to independent change by one standard deviation. Lastly, the Forecast Error Variance Decomposition (FEVD) is used to determine changes in a variable marked by a change in error variance influenced by other variables.

The research employs the following models:

$$LnPBS_t = \beta_0 + \beta_1 LnAI_{t-1} + \beta_2 BIR_{t-1} + \beta_3 LnJUB_{t-1} + \beta_4 SBIS_{t-1} + \varepsilon t$$

$$LnAI_t = \beta_0 + \beta_1 LnPBS_{t-1} + \beta_2 BIR_{t-1} + \beta_3 LnJUB_{t-1} + \beta_4 SBIS_{t-1} + \varepsilon t$$

$$BIR_t = \beta_0 + \beta_1 LnPBS_{t-1} + \beta_2 LnAI_{t-1} + \beta_3 LnJUB_{t-1} + \beta_4 SBIS_{t-1} + \varepsilon t$$

$$LnJUB_t = \beta_0 + \beta_1 LnPBS_{t-1} + \beta_2 LnAI_{t-1} + \beta_3 BIR_{t-1} + \beta_4 SBIS_{t-1} + \varepsilon t$$

$$SBIS_t = \beta_0 + \beta_1 LnPBS_{t-1} + \beta_2 LnAI_{t-1} + \beta_3 BIR_{t-1} + \beta_4 LnJUB_{t-1} + \varepsilon t$$

Where:

LnPBS = Natural Logarithm of Project-Based Sukuk
LnAI = Natural Logarithm of the Infrastructure Budget
BIR = Bank Indonesia Interest Rate
SBIS = Yield of Bank Indonesia Sharia Certificates
$\beta_0$ = Intercept
$\epsilon t$ = Error term

## 3. Results and Discussion

### Stationarity Test

The Augmented Dickey-Fuller (ADF) method was utilized to conduct the stationarity test. If the ADF statistic is larger than the Mac Kinnon critical value, the data are considered stationary at the level because there is no unit root present. Conversely, if the ADF statistic is smaller than the Mac Kinnon critical value, the data are deemed non-stationary at the level. In the event of non-stationary data at the level, data differentiation is performed to attain data that are stationary at the same level. Below are the results of the stationarity test

conducted using the ADF method:

Table 1. Unit Root Test at First Level

| Variable | ADF Statistic | Mac Kinnon Critical Value | | | Prob. | Description |
|---|---|---|---|---|---|---|
| | | 1% | 5% | 10% | | |
| LnPBS | -2.149493 | -3.546099 | -2.911730 | -2.593551 | 0.2267 | Non-Stationary |
| LnAI | 2.280557 | -3.550396 | -2.913549 | -2.594521 | 0.9999 | Non-Stationary |
| BIR | -1.883829 | -3.548208 | -2.912631 | -2.594027 | 0.3375 | Non-Stationary |
| LnJUB | 0.139472 | -3.548208 | -2.912631 | -2.594027 | 0.9661 | Non-Stationary |
| SBIS | 0.152521 | -3.546099 | -2.911730 | -2.593551 | 0.9671 | Non-Stationary |

(Source: Data Analyzed by Researchers Using Eviews 10)

Table 2. Unit Root Test at First Difference

| Variable | ADF Statistic | Mac Kinnon Critical Value | | | Prob. | Description |
|---|---|---|---|---|---|---|
| | | 1% | 5% | 10% | | |
| LnPBS | -6.628370 | -3.550396 | -2.913549 | -2.594521 | 0.0000 | Stationary |
| LnAI | -0.384950 | -3.550396 | -2.913549 | -2.594521 | 0.9044 | Non-Stationary |
| BIR | -5.490447 | -3.548208 | -2.912631 | -2.594027 | 0.0000 | Stationary |
| LnJUB | -8.093723 | -3.550396 | -2.913549 | -2.594521 | 0.0000 | Stationary |
| SBIS | -5.741088 | -3.548208 | -2.912631 | -2.594027 | 0.0000 | Stationary |

(Source: Data Analyzed by Researchers Using Eviews 10)

Table 3. Unit Root Test at Second Difference

| Variable | ADF Statistic | Mac Kinnon Critical Value | | | Prob. | Description |
|---|---|---|---|---|---|---|
| | | 1% | 5% | 10% | | |
| LnPBS | -6.878940 | -3.560019 | -2.917650 | -2.596689 | 0.0000 | Stationary |
| LnAI | -11.47781 | -3.550396 | -2.913549 | -2.594521 | 0.0000 | Stationary |
| BIR | -7.655440 | -3.552666 | -2.914517 | -2.595033 | 0.0000 | Stationary |
| LnJUB | -7.215112 | -3.562669 | -2.918778 | -2.597285 | 0.0000 | Stationary |
| SBIS | -8.549658 | -3.555023 | -2.915522 | -2.595565 | 0.0000 | Stationary |

(Source: Data Analyzed by Researchers Using Eviews 10)

**Optimal Lag Test**

The Akaike Information Criteria (AIC) was employed in this study to determine the optimal lag, with the smallest value indicated by an asterisk (*) in the results.

Table 4. Optimal Lag Test Results

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | 363.6829 | NA | 9.11e-13 | -13.53520 | -13.34933 | -13.46373 |
| 1 | 415.4708 | 91.85021 | 3.33e-13 | -14.54607 | -13.43081* | -14.11719* |
| 2 | 442.7890 | 43.29674 | 3.13e-13* | -14.63355 | -12.58890 | -13.84728 |
| 3 | 467.9706 | 35.15927 | 3.32e-13 | -14.64040 | -11.66638 | -13.49673 |
| 4 | 486.8856 | 22.84074 | 4.77e-13 | -14.41078 | -10.50737 | -12.90972 |
| 5 | 528.4421 | 42.34059* | 3.23e-13 | -15.03555* | -10.20276 | -13.17709 |

(Source: Data Analyzed by Researchers Using Eviews 10)

The optimal lag test results show that the optimal lag, according to the smallest AIC criteria, is at lag 5.

**VAR Model Stability Test**

The VAR model is declared stable if the modulus value is less than 1. Below are the results of the VAR stability test in this study:

Table 5. VAR Stability Test Result

| Root | Modulus |
|---|---|
| 0.322188 + 0.885329i | 0.942132 |
| 0.322188 - 0.885329i | 0.942132 |
| -0.569943 + 0.730177i | 0.926279 |
| -0.569943 - 0.730177i | 0.926279 |
| -0.164329 - 0.893381i | 0.908368 |
| -0.164329 + 0.893381i | 0.908368 |
| -0.845642 + 0.312236i | 0.901444 |
| -0.845642 - 0.312236i | 0.901444 |
| 0.413300 - 0.800313i | 0.900732 |
| 0.413300 + 0.800313i | 0.900732 |
| -0.900471 | 0.900471 |
| -0.482233 - 0.742986i | 0.885763 |
| -0.482233 + 0.742986i | 0.885763 |
| -0.033263 - 0.839059i | 0.839718 |
| -0.033263 + 0.839059i | 0.839718 |
| -0.811842 + 0.081559i | 0.815928 |
| -0.811842 - 0.081559i | 0.815928 |
| 0.457665 - 0.664284i | 0.806678 |
| 0.457665 + 0.664284i | 0.806678 |
| -0.592690 + 0.537541i | 0.800144 |
| -0.592690 - 0.537541i | 0.800144 |
| 0.610902 + 0.309233i | 0.684709 |
| 0.610902 - 0.309233i | 0.684709 |
| 0.411000 - 0.432087i | 0.596339 |
| 0.411000 + 0.432087i | 0.596339 |

(Source: Data Analyzed by Researchers Using Eviews 10)

The results of the VAR stability test in this study indicate that the modulus values of all variables range from 0.596339 to 0.942132. Therefore, it can be concluded that the VAR model in this study is stable, and the results of the Impulse Response Function (IRF) and Forecasting Error Variance Decomposition (FEVD) tests can be considered valid.

**Granger Causality Test**

The Granger causality test is designed to ascertain the direction of the relationship between variables. If the probability value falls below the 5% significance level, the null hypothesis ($H_0$) is rejected, signifying a causal relationship between the variables. Conversely, if the probability value exceeds the 5% significance level, it indicates no causal relationship between the variables, and the null hypothesis ($H_0$) is accepted.

Table 6. Results of the Granger Causality Test

| Null Hypothesis: | Prob. | Result | Causal Relationship |
|---|---|---|---|
| LNAI does not Granger Cause LNPBS | 0.1547 | Accept $H_0$ | No relationship between |
| LNPBS does not Granger Cause LNAI | 0.4201 | Accept $H_0$ | PBS and AI |
| BIR does not Granger Cause LNPBS | 0.8797 | Accept $H_0$ | No relationship between |
| LNPBS does not Granger Cause BIR | 0.2033 | Accept $H_0$ | PBS and BIR |

| | | | |
|---|---|---|---|
| LNJUB does not Granger Cause LNPBS | 0.0108 | Reject $H_0$ | One-way relationship |
| LNPBS does not Granger Cause LNJUB | 0.1235 | Accept $H_0$ | between JUB and PBS |
| SBIS does not Granger Cause LNPBS | 0.7511 | Accept $H_0$ | No relationship between |
| LNPBS does not Granger Cause SBIS | 0.0729 | Accept $H_0$ | PBS and SBIS |
| BIR does not Granger Cause LNAI | 0.7501 | Accept $H_0$ | No relationship between |
| LNAI does not Granger Cause BIR | 0.2508 | Accept $H_0$ | AI and BIR |
| LNJUB does not Granger Cause LNAI | 0.6746 | Accept $H_0$ | No relationship between |
| LNAI does not Granger Cause LNJUB | 0.3023 | Accept $H_0$ | AI and JUB |
| SBIS does not Granger Cause LNAI | 0.3394 | Accept $H_0$ | No relationship between |
| LNAI does not Granger Cause SBIS | 0.3456 | Accept $H_0$ | AI and SBIS |
| LNJUB does not Granger Cause BIR | 0.1519 | Accept $H_0$ | No relationship between |
| BIR does not Granger Cause LNJUB | 0.7727 | Accept $H_0$ | BIR and JUB |
| SBIS does not Granger Cause BIR | 0.3517 | Accept $H_0$ | No relationship between |
| BIR does not Granger Cause SBIS | 0.2791 | Accept $H_0$ | BIR and SBIS |
| SBIS does not Granger Cause LNJUB | 0.2310 | Accept $H_0$ | No relationship between |
| LNJUB does not Granger Cause SBIS | 0.4084 | Accept $H_0$ | JUB and SBIS |

(Source: Data Analyzed by Researchers Using Eviews 10)

The findings indicate a unidirectional relationship between the Money Supply and Project-Based Sukuk, while no causality is observed among other variables.

**Johansen Cointegration Test**

The Johansen Cointegration Test is utilized to discern the existence of a cointegration relationship among the variables. When the trace statistic surpasses the critical value at a specified level of significance, it indicates a cointegration relationship within the equation.

Table 7. Results of the Johansen Cointegration Test

| Hypothesized No. of CE(s) | Eigenvalue | Trace Statistic | 0.05 Critical Value | Prob.** |
|---|---|---|---|---|
| None * | 0.586956 | 145.7701 | 60.06141 | 0.0000 |
| At most 1 * | 0.521277 | 98.02317 | 40.17493 | 0.0000 |
| At most 2 * | 0.407164 | 58.24500 | 24.27596 | 0.0000 |
| At most 3 * | 0.363174 | 30.01179 | 12.32090 | 0.0000 |
| At most 4 * | 0.099239 | 5.643808 | 4.129906 | 0.0208 |

(Source: Data Analyzed by Researchers Using Eviews 10)

At a significance level of 5%, the cointegration test results indicate five cointegrated equations, marked with an asterisk (*). However, the maximum number of cointegrated equations is the total number of variables minus one. Therefore, this study reveals four cointegrated relationships.

**Vector Error Correction Model (VECM) Estimation Result**

Table 8. Vector Error Correction Model (VECM) Estimation Results

| Variables | Coefficient Short Term | t-Statistic |
|---|---|---|
| CointEq1 | -0.194932 | -1.46303 |
| D(LNAI(-1),2) | 0.468645 | 0.72973 |
| D(LNAI(-2),2) | 1.676129 | 2.13227 |
| D(LNAI(-3),2) | 1.943661 | 2.31590 |
| D(LNAI(-4),2) | 0.224925 | 0.24758 |
| D(LNAI(-5),2) | 1.281833 | 1.78985 |

| | | |
|---|---|---|
| D(BIR(-1),2) | 0.014791 | 0.52313 |
| D(BIR(-2),2) | -0.003260 | -0.09211 |
| D(BIR(-3),2) | 0.006975 | 0.19192 |
| D(BIR(-4),2) | -0.002111 | -0.06371 |
| D(BIR(-5),2) | -0.004012 | -0.14877 |
| D(LNJUB(-1),2) | -2.266194 | -1.78233 |
| D(LNJUB(-2),2) | -0.974952 | -0.82426 |
| D(LNJUB(-3),2) | -0.096589 | -0.08983 |
| D(LNJUB(-4),2) | 0.776538 | 0.91375 |
| D(LNJUB(-5),2) | 0.804859 | 1.56470 |
| D(SBIS(-1),2) | 0.046738 | 1.05787 |
| D(SBIS(-2),2) | 0.012670 | 0.25660 |
| D(SBIS(-3),2) | -0.006871 | -0.14251 |
| D(SBIS(-4),2) | 0.018039 | 0.35165 |
| D(SBIS(-5),2) | 0.036054 | 0.96209 |
| | **Long Term** | |
| D(LNPBS(-1)) | 1.000000 | - |
| D(LNAI(-1)) | -0.386502 | -1.10836 |
| D(BIR(-1)) | 0.058706 | 0.52484 |
| D(LNJUB(-1)) | -10.77145 | -7.26875 |
| D(SBIS(-1)) | 0.214798 | 1.74626 |

(Source: Data Analyzed by Researchers Using Eviews 10)

The VECM test results reveal that in the short term, the Infrastructure Budget variable at the 2nd and 3rd lag has a significant positive impact on Project-Based Sukuk. This implies that the Infrastructure Budget of the 2nd and 3rd preceding periods significantly influences the current Project-Based Sukuk. A 1% increase in the Infrastructure Budget will lead to an increase in Project-Based Sukuk by 1.676129% and 1.943661%, respectively. In the short term, an error correction of 0.194932 is observed, indicating that a correction of 0.194932 is needed to achieve long-term equilibrium. In the long term, the Money Supply exerts a significant negative influence on Project-Based Sukuk. Specifically, a 1% increase in the Money Supply results in a 10.77% decrease in Project-Based Sukuk.

**Results of the Impulse Response Function Test**

The impulse response function results for the subsequent 20 periods show that a shock of 1 standard deviation to Project-Based Sukuk is responded to with an increase of 0.035787% in Project-Based Sukuk. This response continues to rise until the 20th period observed in this study.

A shock of 1 standard deviation to the Infrastructure Budget does not initially elicit a response from Project-Based Sukuk. However, after the second shock, Project-Based Sukuk increases by 0.006009% and continues to rise until the 5th and 6th periods, followed by a decrease. The shock response then increases again in the 7th period, continues through the 11th period, and decreases once more in the 12th period. From the 13th period onwards, the shock response continues to increase until the end of the observed period.

A shock of 1 standard deviation to the BI rate initially results in no response from the Project-Based Sukuk. However, in the second shock, Project-Based Sukuk increases by 0.001218%. From the 3rd to 6th shocks, Project-Based Sukuk responds positively, followed by a negative response to the 7th and 8th shocks. The 9th to 11th shocks are responded to negatively, whereas from the 12th shock until the end of the observed period, the response is positive.

A shock of 1 standard deviation to the money supply does not elicit a response from Project-Based Sukuk in the first period but results in a negative response in the second period. From the 3rd period until the end of the observation, Project-Based Sukuk responds positively, although the magnitude of the response fluctuates.

A shock of 1 standard deviation to the Bank Indonesia Sharia Certificate initially yields no response from Project-Based Sukuk. In the 2nd shock, Project-Based Sukuk increases by 0.000904%. From the 3rd shock until the end of the observed period, Project-Based Sukuk responds positively.

**Results of the Forecasting Error Variance Decomposition Test**

The results of the Forecasting Error Variance Decomposition test for the subsequent 20 periods indicate that, in the first month, the variance of Project-Based Sukuk is solely influenced by Project-Based Sukuk itself, accounting for 100% of the influence. Project-Based Sukuk begins to respond to shocks from other variables starting from the 2nd period. At the conclusion of this study's observations in the 20th period, the most significant contribution still comes from Project-Based Sukuk itself, accounting for 70.22255% of the influence. The Infrastructure Budget contributes 11.25378%, the BI rate contributes 2.449302%, the Money Supply contributes 8.626736%, and the Bank Indonesia Sharia Certificate contributes 7.447632%.

**Analysis of the Influence of Infrastructure Budget on Project-Based Sukuk**

Our findings indicate that in the short term, the Infrastructure Budget exerts a notable positive influence on Project-Based Sukuk. This aligns with Hariyanto's (2017) that an upswing in the Infrastructure Budget would fuel a surge in the release of Project-Based Sukuk. The government's unrelenting dedication to augmenting infrastructure development is evident in the annual escalation of state budget allocation for such endeavors. Nevertheless, the expansion of infrastructure development necessitates substantial financial resources that cannot be entirely covered by the state's infrastructure budget allocation. Resorting to foreign debt for financing infrastructure development would impose an additional interest on the state budget balance (Khatimah, 2017). Sukuk emerges as a viable alternative to bridge the disparity between the demand for infrastructure financing and the government's capacity to furnish interest-risk-free funds. Among the various types of Sukuk, State Sharia Securities, a form of Project-Based Sukuk, is particularly appealing due to its low-risk nature. It promises fixed returns to investors, and the government, as mandated by the constitution, guarantees the payments. Hence, the escalating allocation of the infrastructure budget from the state budget, coupled with the rapid growth of infrastructure development, is expected to trigger an increase in Sukuk issuance to counter the financing shortfall.

**Analysis of the Influence of BI Rate on Project-Based Sukuk**

Our findings reveal that the BI rate does not significantly influence Project-Based Sukuk, neither positively nor negatively, in both the short and long term. This is contrary to the findings of Rahman et al. (2016), who discovered a significant negative relationship between the BI rate and Sukuk, and Febriani et al. (2013), who reported that Sukuk investors in Indonesia are still swayed by conventional factors and do not solely rely on other considerations. Investors, being rational, utilize interest rates to forecast the price of Sukuk, thereby determining the anticipated returns.

**Analysis of the Influence of Money Supply (M2) on Project-Based Sukuk**

Our findings indicate that in the long term, the money supply has a notable negative impact on Project-Based Sukuk. This aligns with the research findings of Valentin & Anggraeni (2018), which highlighted that the money supply negatively influences the value of Sukuk issuance. Sukuk is often leveraged by the government as an instrument in open market operations to absorb circulating money in the society, one of which is through State Sharia Securities type Project-Based Sukuk*,* particularly in the short term if the money supply is not excessive (Rini, 2012). In the long run, a surge in the money supply will trigger inflation, prompting the government to elevate interest rates. An increase in interest rates adversely impacts issuers as the obligation to pay returns to investors escalates, subsequently leading to a decrease in Sukuk issuance.

**Analysis of the Influence of Bank Indonesia Sharia Certificate on Project-Based Sukuk**

Our research findings suggest that, in both the short and long term, Bank Indonesia Sharia Certificates do not significantly influence Project-Based Sukuk, neither positively nor negatively. This is primarily because Sukuk issuance in Indonesia is aimed at covering the budget deficit and financing infrastructure development. On the other hand, Bank Indonesia Sharia Certificates are short-term securities issued aimed at maintaining Rupiah stability through open market operations based on Sharia principles. This is in contrast to the assertion made by M. Ardi (2018), who claimed that the bonus of Bank Indonesia Sharia Certificates has a negative correlation with Sukuk. When there is a decline in the bonus of a Bank Indonesia Sharia Certificate, issuers tend to use it to issue Islamic bonds due to the lower yields they need to pay to investors, resulting in higher net profit.

## 4. Conclusion

Drawing upon the Vector Error Correction Model's estimations, it is evident that in the short term, the Infrastructure Budget variable exerts a significant positive impact on Project-Based Sukuk. In the long term, however, the money supply variable negatively affects Project-Based Sukuk significantly. The BI Rate and Bank Indonesia Sharia Certificates variables do not significantly influence Project-Based Sukuk in either the short or long term. The Impulse Response Function test results reveal that Project-Based Sukuk responds positively to shocks in the Infrastructure Budget, while it reacts negatively to shocks in the Bank Indonesia Sharia Certificate. Fluctuations in the BI Rate and the money supply provoke varied responses from Project-Based Sukuk, which can be either positive or negative. The Forecasting Error Variance Decomposition test shows that the Project-Based Sukuk variable has the most substantial impact on explaining the variance of Project-Based Sukuk, accounting for 70.22%. The next influential variable in explaining the variance of Project-Based Sukuk is the Infrastructure Budget, contributing 11.25%.

Sukuk can be utilized by the government as a potential instrument to bridge the financing gap caused by the government's limited capacity to provide financing through the state budget and the continuous need for public infrastructure that does not generate revenue for the state. The government is obliged to maintain economic stability, particularly regarding the Infrastructure Budget from the State Budget and the money supply, as it influences the development of Sukuk, which plays a crucial role in Indonesia's infrastructure development.

The limitation of this study lies in the Infrastructure Budget variable, which is available only in an annual format, necessitating its interpolation from annual to monthly data using Eviews 10. Future research could incorporate Sharia variables that are free from conventional factors such as interest rates, making them relevant to Sukuk-related topics.

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