

Examining the Non-linear Impact of Government External Debt And Sukuk on Indonesia's Economic Growth

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ABSTRACT

Purpose: This study examines the non-linear impact of Indonesia's external debt on economic growth using the debt threshold curve proposed by Pattillo. It also compares external debt with sukuk, highlighting that Islamic bonds are relatively more stable and that sukuk, as a rapidly developing Islamic finance instrument, may follow a U-shaped relationship with growth. In this framework, sovereign sukuk (SBSN) are expected to support Indonesia's economic growth in the long term.

Method: The study employs the ARDL (Autoregressive Distributed Lag) approach to estimate the effect of external debt and SBSN on GDP, and uses the quadratic axis-of-symmetry formula to derive the optimal ratios of external debt and sukuk to GDP.

Results: The findings reveal an inverted U-shaped relationship between external debt and growth, consistent with the debt threshold hypothesis, and a U-shaped relationship for sukuk, indicated by a negative first-order sukuk coefficient and a positive squared term.

Conclusion: These results imply that while excessive external debt ultimately depresses growth, scaling up SBSN can foster long-run economic expansion.

Implication: Though current evidence is constrained by short sukuk time series and lack of sectoral SBSN data, future research should use richer, multi-country data, additional controls, and sector-disaggregated SBSN information.

Originality: The study is one of the first to jointly model external debt and sukuk using non-linear specifications, filling a gap in empirical work linking SBSN and GDP and offering a basis for subsequent research on sukuk's role in Indonesia's economic development.

ARTICLE INFO

Keywords:

debt threshold curve; government external debt; inverted U-shaped; state sukuk; sukuk threshold curve

Article info :

Received November 04, 2025

1st revision November 20, 2025

2nd revision November 28, 2028

Accepted April 15, 2026

Available online April 24, 2026

Published April 24, 2026

JEL Code:

D13, I31, J22, K31

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INTRODUCTION

Indonesia's foreign debt originated in the old, new, and reform orders, beginning in 1949 when the state inherited Dutch colonial obligations and relied heavily on foreign aid from countries such as the Netherlands, Germany, the United States, and Japan, with liabilities later surging from Rp269 trillion to Rp573 trillion during the 1997–1998 crisis and triggering IMF assistance of around \$43 billion that reoriented national policy toward a more liberal model, weakened state control over natural resources, and produced crisis-response measures that were often misaligned with constitutional principles and generated new problems across sectors (Lutfi et al., 2024). At the same time, the government's continued recourse to external borrowing is consistent with neoclassical growth theory, which posits a direct, positive relationship between public debt and economic growth on the assumption that borrowed funds are invested in productive, profit-generating activities, thereby improving capital mobilization and allocation, enhancing risk sharing, strengthening the domestic financial system, and ultimately enabling timely debt repayment and sustained output expansion (Gaies, 2019; Gaies et al., 2019; Ehikioya et al., 2020).

The Ministry of Finance states that one objective of issuing government debt is to support economic growth in line with neoclassical theory, which views loan funds as a means to finance productive investment and raise output. However, recent data show a growing disconnect between this theoretical expectation and Indonesia's actual macroeconomic performance: according to the Indonesian Foreign Debt Statistics Release (February 2026), government external debt reached about Rp3,519 trillion in the fourth quarter of 2024, yet economic growth in 2024 was projected to be stagnant, and in previous years rising debt frequently failed to coincide with higher growth and in some cases coincided with weaker growth (SULNI, February 2026). It then showed that the external debt curve continues to rise while GDP growth fluctuates and does not consistently follow the same upward trend, suggesting that increases in debt accumulation may, beyond a certain point, be associated with diminishing or even negative returns to growth.

To explain this apparent paradox, the study draws on Krugman's debt overhang theory, which argues that when external debt is perceived as unsustainably high, investors anticipate that a large share of future output will be used to repay creditors, discouraging investment and dampening growth (Krugman, 1988). Building on this, Pattillo et al. (2004) formalize the relationship between external debt and growth as an inverted U-shaped curve, in which low to moderate levels of debt can support growth, but once a threshold is exceeded, additional borrowing reduces growth; this study applies that framework to Indonesia by estimating the non-linear (quadratic) relationship and calculating the optimal level of external debt based on the debt threshold curve. Empirical studies in other countries corroborate this pattern, showing that short-term and domestic-currency public debt tend to support growth, whereas large stocks of long-term, private, and foreign-currency debt are associated with

lower growth (Le & Phan, 2022; Mahmud, 2025; Irughe et al., 2025), which implies that while external borrowing can temporarily foster convergence in lower-income economies, excessive and poorly structured foreign debt ultimately undermines long-run development.

Beyond macroeconomic efficiency, foreign debt also carries structural and political risks because it embeds persistent power imbalances between creditors and debtors; Suhadi (2022) argues that reliance on external loans to finance state projects threatens long-term sovereignty, as “technical” assessments by donor-country experts act as mechanisms of surveillance and control over the recipient’s economic policy space. From Sayyid Qutb’s perspective, this asymmetry transforms foreign debt into a tool of modern colonialism, in which financing from institutions such as the World Bank and IMF leads to heavier tax burdens, channels profits to banks and lenders, and legitimizes external interference in domestic governance, thereby turning economic dependence into political subordination (Qutb, 2000; Komarudin, 2021). In response to these structural and normative problems, Islam offers an alternative fiscal paradigm, and this study therefore introduces state sukuk (Surat Berharga Syariah Negara, SBSN) as an Islamic financial instrument that can help mitigate the harms of interest-based foreign debt; sukuk have grown rapidly in recent years and, when issued to finance infrastructure projects, can ease pressure on the state budget while remaining grounded in real-sector, asset-backed transactions (Haq et al., 2020; Latifah, 2020).

Indonesia’s sovereign sukuk (SBSN) has grown steadily, showing a consistent upward trend in outstanding value; however, its scale remains modest relative to government foreign debt, as official statistics report that in 2025 SBSN amounted to around Rp1,300 trillion, while external public debt reached Rp3,519 trillion, suggesting that the state continues to rely far more on conventional foreign borrowing as a quick financing solution despite its higher risk profile (Bank Indonesia, 2015–2025). This pattern is concerning because sukuk, structured through Sharia-compliant contracts that are fully anchored in real-sector activities, are directly linked to productive assets and have been used to finance extensive infrastructure—such as hundreds of kilometres of roads and railways, bridges, airports, seaports, and passenger terminals—while empirical studies show that Islamic bonds, including sukuk, tend to exhibit greater stability than conventional instruments under regional and global uncertainty and are increasingly recognized in international markets as a resilient financing tool (Latifah, 2020; Ramadayanti et al., 2017; Mitsaliyandito & Arundina, 2018; Benbekhti et al., 2019).

Against this backdrop, the present study posits that SBSN can contribute positively to Indonesia’s economic growth in the long run, even though its current volume is still relatively small and its short-term impact on growth has not yet become statistically or macroeconomically significant. By modelling sukuk within a U-shaped framework and contrasting it with the inverted U-shaped relationship hypothesized for foreign debt, the research addresses a gap in the literature, as prior empirical work rarely examines the explicit linkage between SBSN and GDP; consequently, the findings

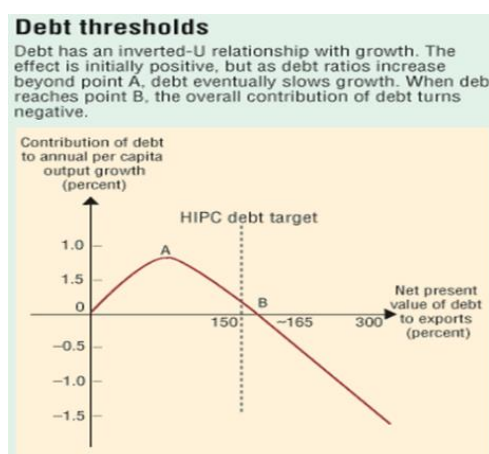
are intended to provide an initial analytical foundation for future scholars who seek to explore the role of state sukuk as a driver of national economic development and as a potential alternative to risk-laden foreign borrowing, particularly in the Indonesian context.

The adverse impact of external debt and state sukuk on a country's economic growth can be attributed to the following theories:

Debt Overhang Hypothesis (DPH)

Debt overhang theory explained by Krugman (1988) proves that when a country's external debt becomes so large that the present value of its future resources is insufficient to cover outstanding obligations, the debt stock turns into a heavy burden that discourages investment and slows growth (Ranci re, 2020). Excessive government external debt raises expected future taxes, increases the risk of currency depreciation and inflation, and makes investors reluctant to commit capital, so both public and private investment in productive sectors decline (Borensztein, 1990; Dawood et al., 2024). This mechanism is visible in Indonesia, where interest payments on government debt rose from IDR 156.01 trillion in 2015 to IDR 488.40 trillion in 2024, progressively squeezing fiscal space for infrastructure, education, and health and weakening long-run growth prospects (Ahmad, 2025; Dawood et al., 2024).

Debt Threshold Hypothesis



Resource : Pattillo et al (2002)

Figure 1. Debt Thresholds Curve

Pattillo et al. (2002) designed an inverted U-curve, shown in **Figure 1**, to explain the relationship between debt (in this case, foreign debt) and economic growth. When the country initially opened up to foreign loans, the effect of these loans was felt in the country's increased economic growth. The country can experience economic growth up to an optimal level at point A. Point A is called the optimal debt-to-GDP ratio (the growth-maximizing level of debt). When the debt ratio exceeds or is greater

than point A, overall economic growth will decline (although economic growth will still be positive). However, if the debtor country has reached point B, adding more foreign debt will have a negative impact on economic growth. In the theory proposed by Pattillo et al. (2002), countries should set an upper limit on external debt so that they can measure the extent to which external debt can positively contribute to the country's economic growth.

Government Sukuk Theory in Economic Growth

Because there is not yet a single, formal “sukuk growth theory,” researchers draw on existing frameworks such as endogenous growth theory to explain how sukuk can influence output by acting as an external driver of investment and capital accumulation (Ledhem & Mekidiche, 2020; Echchabi et al., 2018; Malikov, 2017; Mitsaliyandito et al., 2018; Smaoui & Nechi, 2017; Sari et al., 2022). In this view, sukuk operate like other financial securities that channel savings into productive projects, thereby expanding the capital stock and sustaining long-run economic growth through higher levels of investment.

Sukuk-based infrastructure financing is anchored in fiscal sustainability theory and Maqasid al-Shariah, which together require that public borrowing generate productive assets and social welfare, so SBSN proceeds are directed to infrastructure that raises productivity, tax capacity, and intergenerational equity while also improving living standards and reducing inequality (Ambarwati, 2025; Dusuki, 2020). Structurally, sukuk are divided into asset-backed and asset-based models: asset-backed sukuk confer true-sale ownership of underlying assets and thus provide stronger risk-sharing and Shariah credibility, whereas asset-based sukuk mainly expose investors to issuer credit risk and resemble conventional bonds economically, making them more scalable but also more vulnerable to default and weaker in substance-based compliance (Ahmed et al., 2019; Hidayat, 2018).

METHODOLOGY

This research is included in quantitative research, which is a systematic investigation that uses logical reasoning and hypotheses, following the principles of scientific thought and the research process (Berryman, 1999). To determine the influence of independent variables on the dependent variable, this study uses the ARDL (Autoregressive Distributed Lag) method. The type of data used in this study is secondary data or data obtained or collected by people conducting research from existing sources. The sample used to analyse the effect of government external public debt and state sukuk on Indonesia's economic growth was taken from the first quarter of 2015 to the fourth quarter of 2025. The dependent variable used in this study is economic growth, while the independent variables consist of external public debt and sukuk. In addition, this study will also use control variables such as trade openness and foreign investment. **Table 1** shows the definition of operational variables used in this research, which consists of the variable name, its definition, its units, and its resources.

Table 1. Operational Definition of Variables

No.	Variable Name	Definition	Units	Resource
1.	Government External Debt	Government external debt is debt held by the central government, including bilateral, multilateral, commercial, supplier, and government securities (SBN) issued both domestically and abroad and held by non-residents.	Billion Rupiah	SULNI
2.	State Sukuk (SBSN)	State sukuk are government securities issued based on Sharia principles, serving as proof of participation in SBSN assets, whether in Rupiah or foreign currency.	Billion Rupiah	SEKI
3.	Economic Growth	Economic growth is the process of continuous change in a country's economic conditions towards a better state over a certain period.	%	SEKI
4.	Foreign Direct Investment	Foreign investment is the transfer of capital, both tangible and intangible, from one country to another, with the aim of being used in that country to generate profits under the supervision of the capital owner, either in full or in part.	Billion Rupiah	SEKI
5.	Trade Openness	The trade openness level is used to determine how open an economy is in a region.	%	SEKI

The model for the optimal size of external debt (ULN) against economic growth (GROWTH) is written in the equation as follows:

$$GROWTH_t = \beta_0 + \beta_1 ULN_t + \beta_2 ULN_t^2 + \beta_3 FDI_t + \beta_4 OPEN_t + e_t \dots \dots \dots (1)$$

Where ULN2 is the non-linear form of the foreign debt variable (ULN). The equation for the ARDL model for equation (1) is written as follows:

$$\Delta GROWTH_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta GROWTH_{t-1} + \sum_{i=1}^n \alpha_{2i} \Delta ULN_{t-1} + \sum_{i=1}^n \alpha_{3i} ULN_{t-1}^2 + \sum_{i=1}^n \alpha_{4i} \Delta FDI_{t-1} + \sum_{i=1}^n \alpha_{5i} OPEN_{t-1} + \theta_1 GROWTH_{t-1} + \theta_2 ULN_{t-1} + \theta_3 ULN_{t-1}^2 + \theta_4 FDI_{t-1} + \theta_5 OPEN_{t-1} e_t \dots \dots \dots (2)$$

The model for the optimal size of SBSN against economic growth (GROWTH) is written in the equation as follows:

$$GROWTH_t = \beta_0 + \beta_1 SUKUK_t + \beta_2 SUKUK_t^2 + \beta_3 FDI_t + \beta_4 OPEN_t + e_t \dots \dots \dots (3)$$

Where SUKUK² are non-linear forms of the state sukuk (SUKUK) variable. The equation for the ARDL model for equation (3) is written as follows:

$$\Delta GROWTH_t = \alpha_0 + \sum_{i=1}^n \alpha_{1i} \Delta GROWTH_{t-1} + \sum_{i=1}^n \alpha_{2i} \Delta SUKUK_{t-1} + \sum_{i=1}^n \alpha_{3i} SUKUK_{t-1}^2 + \sum_{i=1}^n \alpha_{4i} \Delta FDI_{t-1} + \sum_{i=1}^n \alpha_{5i} OPEN_{t-1} + \theta_1 GROWTH_{t-1} + \theta_2 ULN_{t-1} + \theta_3 SUKUK_{t-1}^2 + \theta_4 FDI_{t-1} + \theta_5 OPEN_{t-1} + e_t \dots \dots \dots (4)$$

The inclusion of the variable ULN^2 helps in the empirical analysis of the quadratic-shaped debt threshold curve theory. The positive coefficient of the ULN_t linear term is related to the positive effect of external debt on output. The expected negative coefficient of the ULN_t^2 term is related to the quadratic function of economic growth, implying a negative effect of increasing external debt after a maximum value. This regression equation includes a linear term (ULN_t) and a negative quadratic term of the independent variable (ULN_t^2) in the estimation process.

RESULTS AND DISCUSSION

ARDL cointegration is attractive because, unlike many other methods, it does not require prior unit-root testing and can be applied when variables are $I(0)$, $I(1)$, or a mix of both (Emeka and Kelvin, 2016). It is also robust in small samples and appropriate when theory suggests a single long-run relationship among the variables. This helps avoid common misapplication and misinterpretation problems that arise with other cointegration techniques in time-series analysis. Moreover, ARDL can solve the problem of different stationarity levels, with none being stationary at the second difference level. Thus, this test meets ARDL estimation requirements since certain variables are stationary at the level and others are at the first difference level.

Table 2. Model 1. Non-linear Relationship of External Debt to Economic Growth

Phillips-Perron Test Equation
 Dependent Variable: D(ULN,2)
 Method: Least Squares
 Date: 07/04/26 Time: 12:58
 Sample (adjusted): 2015Q1 2025Q4
 Included observations: 51 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ULN(-1))	-1.121036	0.145732	-7.692450	0.0000
C	3333.191	1661.642	2.005962	0.0505
@TREND("2015Q1")	-45.35013	52.39346	-0.865568	0.3910
R-squared	0.552467	Mean dependent var		99.85738
Adjusted R-squared	0.533820	S.D. dependent var		7976.288
S.E. of regression	5446.001	Akaike info criterion		20.10017
Sum squared resid	1.42E+09	Schwarz criterion		20.21381
Log likelihood	-509.5544	Hannan-Quinn criter.		20.14360
F-statistic	29.62734	Durbin-Watson stat		1.916633
Prob(F-statistic)	0.000000			

The Phillips–Perron test for the external public debt variable (ULN) (Table 2), estimated with a constant and linear trend over the period 2015Q1–2025Q4, yields a statistically insignificant coefficient on the lagged level term ULN_{t-1} ($t = -1.38$, $p = 0.17$), so the null hypothesis of a unit root cannot be rejected. Accordingly, external public debt (ULN) is treated as a non-stationary series in levels and is

therefore used in first differences or analysed within a cointegration framework in the subsequent empirical procedures.

Table 3. ARDL Estimation Result of External Debt to Economic Growth

Dependent Variable: GROWTH			
Method: ARDL			
Selected Model: ARDL(4, 5, 5, 0, 1)			
Variable	Coefficient	Std. Error	t-Statistic
GROWTH(-1)	0.7295	0.1689	6.198730***
GROWTH(-2)	-0.2970	0.1970	-1.1109
GROWTH(-3)	0.1970	0.1787	0.7097
GROWTH(-4)	-0.4089	0.1789	-3.7967***
ULN	0.02967	0.2970	0.0870
ULN(-1)	-0.3890	0.3098	-1.0689
ULN(-2)	0.6879	0.3068	2.1689**
ULN(-3)	0.1198	0.3119	0.3720
ULN(-4)	-0.0986	0.2981	-0.3179
ULN(-5)	-0.4879	0.1798	-2.1687**
ULN ²	-0.0003	0.0007	-0.4869
ULN ² (-1)	0.0013	0.0009	1.5829
ULN ² (-2)	-0.0023	0.0009	-2.6031**
ULN ² (-3)	-0.0004	0.0009	-0.4752
ULN ² (-4)	0.0002	0.0008	0.2879
ULN ² (-5)	0.0019	0.0006	3.1976***
OPEN	0.0539	0.0257	2.0587**
FDI	0.0457	0.0309	1.2657
FDI(-1)	-0.0402	0.0326	-1.2343
C	-31.6237	12.6093	-2.5809**
Adjusted R-squared			0.8794
F-statistic			12.8098***

Description: *, **, *** significant $p < 0.1$; $p < 0.05$; $p < 0.01$.

Based on **Table 3**, it can be seen that the optimal lag length in model 1 is ARDL (4, 5, 5, 0, 1). The details are as follows: a) GROWTH has a lag length of 4; b) ULN has a lag length of 5; c) ULN2 has a lag length of 5; d) OPEN has a lag length of 0; e) FDI has a lag length of 1.

Autocorrelation Test

Table 4. Autocorrelation Test Result

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.4797	Prob. F(2,22)	0.6298
Obs*R-squared	1.9980	Prob. Chi-Square(2)	0.3709

Description: *, **, *** significant $p < 0.1$; $p < 0.05$; $p < 0.01$.

Based on **Table 4**, it can be seen that the probability of $\text{Obs} \cdot R^2$ is greater than 0.05 (0.37 > 0.05). Therefore, it can be concluded that this test accepts H_0 , or there is no autocorrelation problem in the model being studied.

As explained in previous chapters, this study will also examine whether the relationship between external debt and economic growth supports an inverted U-shaped relationship. If the results are supportive, this study can calculate the optimum size, or the peak point where external debt still positively influences economic growth, and after passing the peak, external debt becomes inefficient

in boosting economic growth. The results of the regression calculation for the relationship between external debt and economic growth are as follows:

Table 5. External Debt

ARDL Long Run Form		
Dependent Variable: GROWTH		
Selected Model: ARDL(4, 5, 5, 0, 1)		
Variable	Coefficient	t-Statistic
ULN	0.509769	3.0798***
ULN ²	-0.0025	-3.7908**
OPEN	0.0809	1.9685*
FDI	-0.05879	-1.6497

Description: *, **, *** significant $p < 0.1$; $p < 0.05$; $p < 0.01$.

Based on **Table 5**, it can be seen that the coefficient value of ULN is positive while the coefficient of ULN² is negative, so it can be said that the foreign debt model against economic growth supports an inverted U-shaped relationship. This value can be obtained from the following mathematical calculation: it can be seen that the coefficient of the foreign debt variable linearly (ULN) has a significant positive effect on economic growth (GROWTH) (H_a accepted), while the foreign debt variable non-linearly (ULN²) has a significant negative effect on economic growth (GROWTH) (H_a accepted). Therefore, it can be concluded that the foreign debt model on economic growth in this study supports an inverted U-shaped relationship.

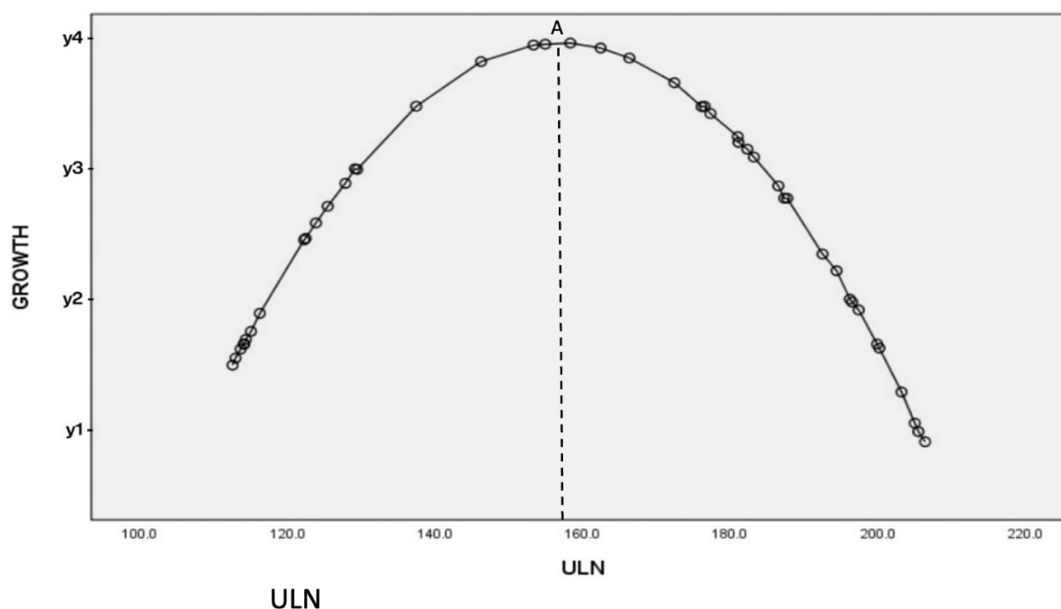


Figure 2. Indonesia's Debt Threshold Curve

Figure 2 shows the result of the curve formed by the regression generated by this study represent the proposed hypothesis, which suggests that the relationship between foreign debt and economic growth is non-linear, or more specifically, U-shaped. The curve above also confirms the

theory put forward in this study, namely the debt threshold hypothesis. The Debt Threshold Hypothesis was proposed by Pattillo et al. (2002), which explains that when a country initially opens up to foreign borrowing, the effect of this borrowing is felt in the country's increased economic growth. The country can experience economic growth up to an optimal level at point A. Point A is called the optimal debt-to-GDP ratio (the growth-maximizing level of debt). When the debt ratio exceeds or is greater than point A, overall economic growth will decline (although economic growth will still be positive). In the theory proposed by Pattillo et al. (2002), countries should set an upper limit on external debt so that they can measure the extent to which external debt can positively contribute to the country's economic growth.

The addition of foreign debt, in this study, still has a positive impact on Indonesia's economic growth. However, an increase in foreign debt that is not balanced by good foreign debt management will certainly harm a nation's economy. Foreign debt is closely linked to fluctuations in exchange rates, which are influenced by the highly dynamic global economy. In an uncertain global economy, developing countries face a variety of risks, including potential disruptions in developed countries' financial markets, significant declines in commodity prices, and increasing trade tensions. Developing countries with high levels of debt are vulnerable to global economic shocks (external shocks) (Kose, 2021). The sudden occurrence of global economic shocks, such as rapid interest rate hikes, has the potential to weaken growth, consequently triggering debt pressure on debtor countries. External shocks make it increasingly difficult to repay debt, potentially leading to a debt crisis in borrowing countries. This crisis is typically triggered by external shocks that cause a sharp increase in borrowing costs and monetary policy tightening in developed countries. The tightening of monetary policy in developed countries, which are usually creditor nations, suddenly halts capital flows to debtor countries. This has a multiplier effect on the economic activities of the debtor country, which can leave the debtor country short of funds for development financing. Additionally, high government debt can limit the effectiveness of fiscal stimulus. Additionally, this also hinders long-term growth due to the crowding-out effect between debt principal and interest payments and investments that can increase productivity (Kose, 2021).

Besides the global economic effects that can influence the risk of widening external debt, the risk of mismanagement can also pose an additional risk if the government increases the external debt ratio. Hassan & Meyer (2020) in their research revealed that countries should formulate their foreign debt management policies to reduce their dependence on foreign debt funds. The revenue generated domestically, particularly tax revenue, must be transformed and strengthened (in such a way that tax avoidance and evasion will be drastically reduced) to bridge the resulting expenditure gap. They must take practical steps to counter the misallocation and waste of loan funds. Additionally, the foreign loan

funds must be largely used to finance priority sectors such as bridging the infrastructure deficit, stimulating production, and other efforts that improve welfare and economic development.

As explained by Wahyu Utomo, Indonesia is currently still within the safe threshold for taking on foreign debt, which aligns with the findings of this study that foreign debt currently still has a positive impact on economic growth (Listiyani, 2025). However, in the long run, if foreign debt continues to increase, it could negatively impact economic growth, leading to contraction, considering the unavoidable risks of interest rates and exchange rates. As previously explained, foreign debt carries greater risk than domestic debt and should therefore be directed towards productive financing. However, looking at the structure of foreign debt allocation in Indonesia, it is evident that both before and after the pandemic, a significant portion of it was still directed towards consumption-oriented sectors.

Furthermore, the foreign debt ratio is not regulated in the country's highest law, which is the constitution. The overall debt ratio is indeed regulated in Law No. 17 of 2003 concerning State Finance, specifically in the explanation of Article 12 paragraph 3, which states that the budget deficit in question is limited to a maximum of 3% of Gross Domestic Product. The amount of borrowing is limited to a maximum of 60% of Gross Domestic Product. In Law No. 1 of 2004 concerning the State Treasury, Article 38 paragraph 4 states that the procedures for procuring debt and/or receiving grants, whether from domestic or foreign sources, as well as the transfer of foreign debt or grants to Regional Governments/SOEs/Regional SOEs, are regulated by government regulation.

The government regulation governing the procedures for procuring foreign loans and receiving grants is contained in Government Regulation No. 10 of 2011, Article 9 paragraph 1, which states that: "The Minister shall prepare a plan for the maximum limit of Foreign Loans, which shall be reviewed annually."

In the above paragraph, the authority over the maximum limit of foreign loans rests with the minister. Meanwhile, ministers appointed by the president only have a fixed term of office and can be replaced at any time through a reshuffling process. If the amount of foreign debt is not regulated by a high-level regulation, such as a law, there is concern that the foreign debt management policy will change with each change of minister. Therefore, this study suggests that foreign debt management should be regulated by law so that both the application for foreign debt and its management can be held accountable to the public in accordance with applicable laws.

Table 6. Model 2. Non-linear Relationship of Sukuk Against Economic Growth

Phillips-Perron Test Equation
 Dependent Variable: D(SUKUK,2)
 Method: Least Squares
 Date: 07/04/26 Time: 12:59
 Sample (adjusted): 2015Q1 2025Q5
 Included observations: 51 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(SUKUK(-1))	-1.366969	0.135227	-10.10866	0.0000
C	-3055.002	7951.395	-0.384210	0.7025
@TREND("2015Q1")	1117.264	278.5686	4.010732	0.0002
R-squared	0.680536	Mean dependent var		1142.391
Adjusted R-squared	0.667225	S.D. dependent var		47096.25
S.E. of regression	27168.26	Akaike info criterion		23.31451
Sum squared resid	3.54E+10	Schwarz criterion		23.42815
Log likelihood	-591.5200	Hannan-Quinn criter.		23.35793
F-statistic	51.12575	Durbin-Watson stat		2.104051
Prob(F-statistic)	0.000000			

Based on **Table 6**, The Phillips–Perron test for the sukuk variable was estimated in second differences with a constant and linear trend over the period 2015Q1–2025Q5. The lagged first difference term is large and highly significant (coefficient = -1.37 ; $t = -10.11$; $p < 0.01$), indicating that the second-differenced sukuk series is stationary and that shocks to the growth rate of sukuk dissipate quickly. In addition, the positive and statistically significant time trend in the second difference ($t = 4.01$; $p < 0.01$) suggests an upward acceleration in sukuk issuance over time, while the model as a whole provides a good fit ($R^2 \approx 0.68$; $DW \approx 2.10$), with no evidence of serious residual autocorrelation.

ARDL Estimation

Table 7. ARDL Estimation Result of Sukuk to Economic Growth

Dependent Variable: GROWTH			
Method: ARDL			
Selected Model: ARDL(2, 4, 4, 1, 5)			
Variable	Coefficient	Std. Error	t-Statistic
GROWTH(-1)	1.0032	0.1492	7.685***
GROWTH(-2)	-0.6897	0.1409	-3.798***
SUKUK	0.0189	0.0108	0.9048
SUKUK(-1)	-0.0179	0.0193	-1.278
SUKUK(-2)	0.0367	0.0140	2.598**
SUKUK(-3)	-0.0389	0.0198	-1.9087*
SUKUK(-4)	-0.0786	0.0120	-3.5987***
SUKUK ²	0.0000	0.0000	-3.5123***
SUKUK ² (-1)	0.0001	0.0000	3.78659***
SUKUK ² (-2)	0.0000	0.0000	-3.8593***
SUKUK ² (-3)	0.0001	0.0000	3.95983***
SUKUK ² (-4)	0.0001	0.0000	5.19769***
OPEN	0.0419	0.0263	1.6979
OPEN(-1)	-0.0293	0.0223	-1.1098
FDI	-0.0189	0.0321	-0.4308
FDI(-1)	0.0110	0.0442	0.2319
FDI(-2)	-0.1083	0.0431	-2.5938**
FDI(-3)	0.0768	0.0420	1.1732*
FDI(-4)	0.0212	0.0346	0.6310
FDI(-5)	0.1029	0.0430	2.4432**
C	2.5410	2.2420	1.1329
Adjusted R-squared			0.904198
F-statistic			19.2741983***

Description: *, **, *** significant $p < 0.1$; $p < 0.05$; $p < 0.01$.

Based on **Table 7**, it can be seen that the optimal lag length in model 3 is ARDL(2, 4, 4, 1, 5). The details are as follows: a) GROWTH has a lag length of 2; b) SUKUK has a lag length of 4; c) SUKUK2 has a lag length of 4; d) OPEN has a lag length of 1; e) FDI has a lag length of 5.

Autocorrelation Test

Table 8. Autocorrelation Result

Breusch-Godfrey Serial Correlation LM Test			
F-statistic	0.0534	Prob. F(2,22)	0.9479
Obs*R-squared	0.3130	Prob. Chi-Square(2)	0.8908

Description: *, **, *** significant $p < 0.1$; $p < 0.05$; $p < 0.01$.

Based on **Table 8**, it can be seen that the probability of $\text{Obs} \cdot R^2$ is greater than 0.05 ($0.89 > 0.05$). Therefore, it can be concluded that this test accepts H_0 , or there is no autocorrelation problem in the model being studied.

In addition to a non-linear relationship between external debt and economic growth, this study also expects a non-linear relationship between sukuk and economic growth. Unlike model 2, in model 3, the researcher expects a U-shaped relationship, meaning that at a certain point after sukuk is increased, it will actually boost economic growth. The regression results for the relationship between sukuk and economic growth are as follows:

Table 9. Optimum Size of State Sukuk

ARDL Long Run Form		
Dependent Variable: GROWTH		
Selected Model: ARDL(2, 4, 4, 1, 5)		
Variable	Coefficient	t-Statistic
SUKUK	-0.069127	-3.823***
SUKUK ²	8.35E-05	5.098***
OPEN	0.0198	0.314
FDI	0.1098	3.234***

Description: *, **, *** significant $p < 0.1$; $p < 0.05$; $p < 0.01$.

One of the strengths of this research is that it attempts to calculate whether the relationship between sukuk and economic growth has a U-shaped tendency, which is a type of study that is still very rarely conducted. To the best of the researcher's knowledge, there has been no research, particularly in Indonesia, that attempts to calculate the optimal size of sukuk in relation to economic growth. The reason the researcher wants to study this is the great potential of sukuk in the future, even though the current figures are very small, even when compared to foreign debt, which is a source of funding to cover the government's deficit. Based on the regression results in **Table 9**, the relationship curve between sukuk and economic growth can be illustrated as follows:

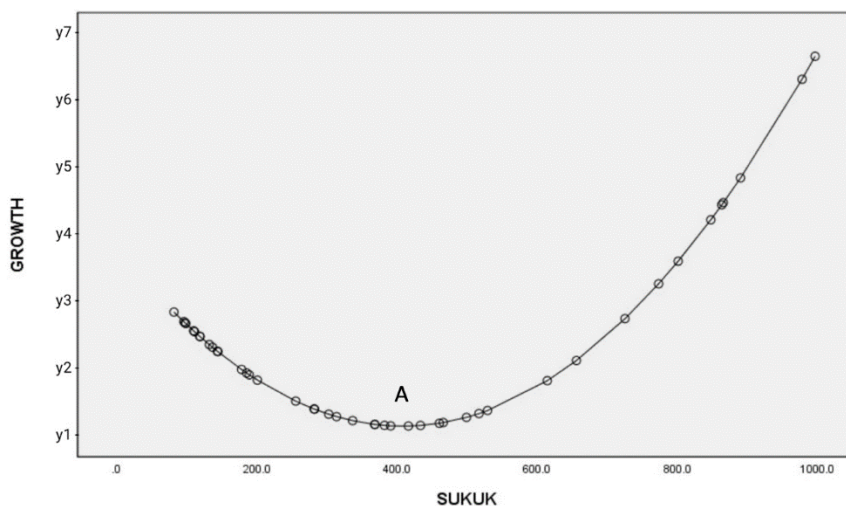


Figure 3. U-Shaped Relation Between Indonesia's Economic Growth and Sukuk

Based on **Figure 3**, it can be seen that up to point A, the influence of sovereign sukuk on Indonesia's economic growth still had a negative impact. Only after reaching point A will the influence of sovereign sukuk always have a positive impact on economic growth. The graph indicates that the influence of sukuk on economic growth is still small, and the potential to have a positive impact on economic growth can be achieved over a relatively long period. This threshold figure is also highly relative, depending on control variables, the choice of analytical tools, the determination of maximum lag, and the selected year.

Looking at the coefficient values obtained from the ARDL analysis in this fourth model, the coefficient values for sukuk and sukuk2 are still relatively very small, at -0.069127 and 0.0000835 , respectively. The numerical coefficients are tiny due to the sukuk variable's scale, but their statistical significance is still substantial. This indicates that although both variables influence Indonesia's economic growth, their impact is still relatively very small. Therefore, the multiplier effect generated by government sukuk has not yet been felt in economic growth.

The lack of a multiplier effect from government sukuk financing is due to the limited number of sectors financed by SBSN. SBSN has not been able to contribute significantly to economic growth because most SBSN are only focused on infrastructure financing; there is no SBSN financing targeting other important sectors such as agriculture, manufacturing, mining, oil and gas, and several other important sectors (Listiyani, 2025). Although SBSN is currently still in a development phase and its effects have not significantly impacted Indonesia's economic growth, this research still encourages the government to make SBSN the main financing source besides external debt. Besides eliminating the element of usury in its financing transactions, SBSN has proven to have a positive impact on the economy. There is much empirical evidence indicating that sukuk has a positive impact on economic growth. Khoutem (2014) presents evidence on the role of sukuk development in the Tunisian economy,

where the government has used sukuk as an effective means to finance infrastructure and agricultural projects (Hassan, 2022). The issuance of sukuk serves as an alternative funding source to bridge the liquidity gap, overcome resource scarcity, navigate international market crises, and meet urgent financing needs (Ledhem, 2023).

Furthermore, Malikov (2017) found that in the long run, there were significant positive changes in various indicators after the issuance of sukuk, including an increase in infrastructure provision, per capita GDP growth, and overall economic development in Malaysia. Additionally, although sukuk are more sensitive to changes in economic conditions, they remain more sustainable and stable during financial crises due to their strong link to both real and monetary economic fundamentals (Ahmad & Radzi, 2011).

CONCLUSION

In this study, its result is consistent with the proposed hypothesis, which suggests that the relationship between external debt and economic growth is non-linear, or more specifically, inverted U-shaped. Additionally, based on the concept of *maqasid al-shariah* advocated by Islam, foreign debt with usury contained within it will significantly impact the financial well-being of the country and the welfare of society at large, thus contradicting the principles of *maqasid al-shariah*.

This study supports the U-curve relationship between SBSN and Indonesia's economic growth, which indicates that although the influence of sukuk on economic growth will still be negative in the next few years due to the relatively small value of SBSN, in the future, massive increases in SBSN will have a continuous positive impact on Indonesia's economic growth. The numerical effect of sukuk on growth appears very small because the coefficients are scaled to the size of the sukuk variable, yet they remain statistically significant. This implies that, while sukuk and external debt both affect Indonesia's economic growth, the overall impact of sukuk is still limited and its multiplier effect on output has not yet materialised. One key reason is that SBSN financing is concentrated mainly in infrastructure, with little allocation to other strategic sectors such as agriculture, manufacturing, mining, and oil and gas.

Even though SBSN is still in a developmental stage and its macro impact is modest, the study supports positioning SBSN as a primary financing instrument alongside external debt, since it avoids usury. Moreover, empirical evidence from various countries shows that sukuk can positively support growth by funding infrastructure and agricultural projects and by helping close liquidity and resource gaps during periods of financial stress.

This study is subject to two principal limitations. First, because sovereign sukuk have been issued for fewer than 15 years, the available time-series observations are relatively limited, which may constrain the statistical power and robustness of the estimates. Second, although the estimated

coefficients indicate that sukuk exert a meaningful influence on aggregate economic growth, the observed relationship appears broadly favourable and may not fully capture the heterogeneity of their effects across the economy. In particular, sectoral output growth is likely to be more strongly associated with government sukuk, given that SBSN—unlike external public debt—is concentrated in specific sectors rather than distributed uniformly across all industries. However, the analysis could not incorporate this dimension because disaggregated data on SBSN utilisation by economic sector were unavailable.

It is anticipated that subsequent research will be able to use more comprehensive data with more variable control variables, or it will be able to use other comprehensive analysis tools with the data used. In addition, further research must be able to identify SBSN's size based on the economic sector. As a directorate that oversees SBSN, DJPPR Kementerian Keuangan RI should provide accurate data regarding SBSN's size based on that economic sector. Subsequently, the sample that is used can be more numerous and not limited to a single country, such as countries with utang outside of the top Asian countries or even countries with a majority Muslim population, such as OKI.

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