

Analysis of the Effect of Interest Rates and Bonds on Economic Growth with the Exchange Rate as a Moderating Variable in Indonesia

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JBEEM
February 2026

Received 9 January 2026
Revised 30 January 2026
Accepted 28 February 2026

Abstract

This study was designed to examine and analyze the extent to which interest rates and bonds affect economic growth in Indonesia, by positioning the exchange rate as a moderating variable. The population coverage in this study includes all Indonesian macroeconomic data, and 26 observations were selected as the sample through the application of purposive sampling. The estimation approach used in this study is multiple regression analysis. All data used are secondary data covering the variables of interest rates, bonds, exchange rates, and Indonesia's economic growth during the period from 2002 to 2025. The results show that, based on partial testing (t-test), both the interest rate and bond variables individually have a significant effect on economic growth in Indonesia. Likewise, through simultaneous testing (F-test), the two variables jointly have a significant effect on economic growth. However, the exchange rate variable is not proven to moderate the relationship between interest rates and bonds and Indonesia's economic growth during the observation period.

Keyword Interest Rates, Bonds, Economic Growth, Exchange Rate

Introduction

Economic growth is one of the fundamental indicators that consistently becomes a main priority in a country's macroeconomic management. An increase in economic growth directly reflects improvements in people's per capita income while also opening broader opportunities for economic development across various sectors. According to [Kuznets \(1995\)](#), economic growth can be defined as a country's ability to provide various types of economic goods and services that continue to develop over time in order to meet the increasingly growing needs of its population. This capacity is supported not only by technological progress but also by relevant institutional readiness and ideological adaptation ([Jhingan, 2010](#)).

Fluctuations in a country's economic growth are an unavoidable phenomenon, especially when unexpected external shocks occur. The impact of the Covid-19 pandemic, which struck the world in early 2020, is a clear example of how a global health crisis can massively shake the foundations of the economy. The implementation of mobility restrictions, bans on gatherings, and limitations on social and economic activities directly reduced household consumption, investment, and overall business activity. Tourism, accommodation, restaurants, the creative economy, and transportation were among the sectors most affected by declining visits from both domestic and international tourists. Maintained economic growth stability, or even an increasing growth trend, has been shown to reduce unemployment and poverty, promote more equitable social welfare, and suppress the potential for social inequality ([Murniati & Lestari, 2023](#)).

Interest rates play a highly crucial role as a monetary policy instrument in determining the direction and intensity of fund flows in the economy. Fundamentally, the interest rate reflects the price of using money over a certain period. When interest rates are at a low level, the incentive to consume and invest strengthens because borrowing costs become more

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Journal of Business Evolution
and Economic Management
Vol. 1, No. 1
pp. 1-12
PT. Cendekia Mandiri Nusantara
E-ISSN:
DOI:

affordable, so economic growth tends to increase. Conversely, high interest rates encourage people to restrain spending and prefer saving funds, which can ultimately slow the pace of economic growth (Fadhl & Ismail, 2024). In Indonesia, the policy interest rate is represented by the BI Rate or the BI 7-Day Reverse Repo Rate issued by Bank Indonesia as the monetary authority. A high-interest-rate policy may increase the cost of capital, reduce export competitiveness in international markets, hinder the investment climate, and lead to a decline in national production capacity (Boediono, 2016). In addition to banking, the capital market plays a strategic role in the financial system and contributes to financing economic development (Levine & Zervos, 1998). One of the main instruments traded in the capital market and highly relevant to economic growth is bonds. Bonds are an alternative source of long-term funding for governments, corporations, and individuals, especially when bank credit procedures become stricter and relatively more expensive. Ouandlous (2010) emphasizes that capital markets, including bond markets, function as providers of capital to finance long-term productive projects that ultimately encourage overall economic productivity.

The Indonesian government actively uses the issuance of government securities or bonds as a fiscal instrument to promote economic growth, particularly in financing budget deficits and strategic infrastructure projects. Fahmi (2013) defines bonds as securities issued to the public that include provisions such as nominal value, coupon rate, maturity, issuer identity, and other matters regulated under applicable regulations. Government bonds receive higher trust from investors than corporate bonds because their default risk is very minimal, considering the full guarantee provided by the government. Over time, non-bank ownership of government bonds in Indonesia has shown a significant upward trend (Pratama et al., 2023). In this study, the exchange rate is positioned as a moderating variable that is assumed to strengthen or weaken the relationship between interest rates and bonds and economic growth. The exchange rate is the price of one currency expressed in the currency of another country. Positive exchange-rate dynamics, in the form of rupiah appreciation, provide encouraging signals to the market because they reflect improving economic fundamentals. This condition in turn affects the increase in securities prices, including bonds, and encourages monetary policy easing in the form of lower interest rates that can further stimulate economic growth (Okonkwo & Ajibo, 2023).

Literature Review and Hypothesis Development

Economic Growth

Economic growth is defined as a process of increasing per capita output over the long term (Boediono, 2018). This definition includes at least three main dimensions: process, per capita output, and long-term orientation. Economic growth is not solely related to an increase in total output or Gross Domestic Product (GDP), but also considers population dynamics, because per capita output is obtained by dividing total GDP by the population. Therefore, a comprehensive analysis of economic growth must consider the development of both variables simultaneously.

The long-term time dimension is an aspect that cannot be ignored in defining economic growth. An economy is considered to be growing if, over a sufficiently long period, for example 10, 20, or even 50 years, per capita output shows an increasing tendency. Although short-term declines in per capita output may occur due to temporary factors such as natural disasters or economic crises, such conditions do not necessarily negate the existence of economic growth as long as the long-term trend remains positive.

Interest Rates

Bank Indonesia Certificates (SBI) are monetary policy instruments used by Bank Indonesia to manage liquidity and the stability of the national financial system (Neldi et al., 2021). In practice, interest rates are divided into two main types: nominal interest rates, which do not yet account for inflation, and real interest rates, which have been adjusted for the inflation rate. The function of interest rates in the economy is diverse, ranging from an instrument for controlling inflation, stimulating investment, to regulating the money supply. Attractive interest-rate levels are also often considered by investors when allocating funds between banking instruments such as deposits or SBI and capital-market instruments such as stocks (Andriyani & Armereo, 2016).

Bank Indonesia adjusts its policy interest rate based on future inflation projections. If inflation is projected to exceed the established target, Bank Indonesia tends to raise interest rates to suppress inflationary pressure. Conversely, if the economy requires stimulus and inflation is projected to be below target, interest rates are lowered to encourage economic expansion. Thus, interest rates reflect overall economic conditions, where every change in macroeconomic conditions is responded to by Bank Indonesia through appropriate interest-rate adjustments (Kuttner & Mosser, 2023).

Bonds

Government bonds are defined as debt securities issued by the government to other parties in order to obtain funds to finance various national development programs (Zubir, 2012). This instrument represents the largest and most liquid component of Indonesia's debt market and is considered to have very low credit risk because it is fully guaranteed by the government. The unique characteristics of government bonds are the certainty of interest payments at a predetermined rate and a clear principal repayment period. Meanwhile, Rahardjo (2004) explains that the presence of government bonds in the domestic market is a fiscal strategy designed to absorb excess liquidity while simultaneously covering the state budget deficit.

The development of the bond market in Indonesia reflects investor confidence in the country's fiscal and monetary stability. Funds collected from bond issuance are expected to be allocated productively to sectors with high multiplier effects on economic growth, such as infrastructure, education, and health. Thus, bonds function not only as financing instruments but also as catalysts for long-term economic growth (Greenwood et al., 2022).

Exchange Rate

The exchange rate or foreign exchange rate describes the relative price of a national currency against another country's currency (Sukirno, 2013). In the context of international trade, the exchange rate functions as a conversion mechanism that connects cross-border economic transactions using different currencies (Salvatore, 2014). The exchange rate can be classified into two types: the nominal exchange rate, which reflects the value comparison between two currencies, and the real exchange rate, which reflects the relative purchasing power of goods and services across countries (Mankiw et al., 2006).

Exchange-rate dynamics are strongly influenced by the interaction between the supply of and demand for foreign exchange in the market. Demand for foreign exchange is generally driven by the need to pay for imports and other foreign transactions, while the supply of foreign exchange comes from export revenues and foreign capital inflows. A currency is said to appreciate when the balance of payments records a surplus and to depreciate when it records a

deficit (Nopirin, 2000). Stable exchange-rate movements are one of the important prerequisites for the sustainability of investment activity and continuous economic growth (Ha et al., 2023).

The Relationship between Interest Rates and Economic Growth

The transmission of monetary policy through interest rates to real economic activity occurs through several interconnected channels. An increase in the BI Rate will encourage higher lending and deposit rates in the banking system, which then encourages people to save rather than consume. This condition reduces the amount of money circulating in society and lowers aggregate demand. From the business perspective, higher capital costs encourage business actors to reduce investment, causing economic activity to slow down. This mechanism ultimately also functions to suppress inflationary pressure (Fadhl & Ismail, 2024). Conversely, lower interest rates create conditions conducive to credit expansion, consumption, and investment, which positively affect economic growth.

H1: Interest rates have a negative and significant effect on economic growth in Indonesia.

The Relationship Between Bonds and Economic Growth

The development of the bond market contributes to economic growth through two main channels. The first channel is through increasing firms' production capacity. When corporations issue bonds to obtain investment funding, the additional capital enables the expansion of production capacity, leading to increased aggregate output and economic growth. The second channel is through productive government spending. Government bonds serve as efficient budget-financing instruments when a fiscal deficit occurs. The funds raised can be used for infrastructure development and the provision of public goods that improve overall economic productivity. Thus, both corporate bonds and government bonds play a role in promoting economic growth (Greenwood et al., 2022).

H2: Bonds have a positive and significant effect on economic growth in Indonesia.

The Effect of the Exchange Rate in Moderating Interest Rates and Bonds on Economic Growth

The exchange rate has the potential to strengthen or weaken the impact of interest rates and bonds on economic growth. Appreciation of the rupiah against the U.S. dollar reflects healthy economic fundamentals and increases foreign investor confidence, which indirectly may increase bond returns and expand the investor base. On the other hand, exchange-rate depreciation may increase fiscal risk related to foreign-currency-denominated debt and encourage inflation expectations, which ultimately affect interest-rate policy (Ha et al., 2023). The interaction among these three variables creates a complexity that is interesting to examine empirically, particularly in the context of Indonesia's economy, which continued to develop during the 2002-2025 period.

H3: The exchange rate is able to moderate the relationship between interest rates and bonds and economic growth in Indonesia.

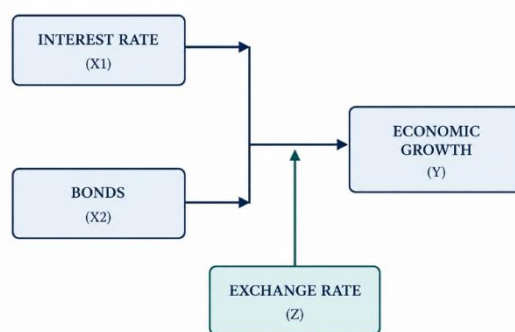


Figure 1. Research Framework

Methods

This study uses a quantitative approach with an associative design aimed at identifying and measuring causal relationships among the variables studied. This approach was chosen because it enables systematic and objective hypothesis testing based on measurable empirical evidence. The population in this study includes all relevant Indonesian macroeconomic data, covering interest rates, bonds, exchange rates, and economic growth. Based on criteria established through purposive sampling, 26 observations were selected as the research sample, namely annual data from 2002 to 2025.

The data analysis method used in this study is multiple regression analysis to test the effect of independent variables on the dependent variable, as well as the residual test to examine the role of the moderating variable. All research data were processed using SPSS (Statistical Package for Social Science). Multiple regression analysis was chosen because it can accommodate the simultaneous testing of the effect of two or more independent variables on one dependent variable. The model was built in two stages: Model I for the main multiple regression and Model II for testing the moderation effect through the residual test.

The secondary data used in this study were obtained from official publications of Statistics Indonesia (BPS), Bank Indonesia annual reports, the Ministry of Finance of the Republic of Indonesia, and Indonesia Stock Exchange (IDX) data. All variables were measured annually during the 2002-2025 research period. Interest rates are represented by the BI Rate/BI 7-Day Reverse Repo Rate, bonds are measured by the total value of outstanding government bonds, the exchange rate refers to the rupiah exchange rate against the U.S. dollar, and economic growth is measured by the real GDP growth rate.

Results

Classical Assumption Test

Normality Test

The normality test was conducted to verify whether the residuals in the regression model have a normal distribution, which is one of the important prerequisites in parametric regression analysis. Violation of the normality assumption may result in invalid statistical inference, especially with a relatively small sample size. Testing was conducted through graphical inspection of the standardized residual histogram. Based on the test results, the histogram shows a distribution forming a symmetrical bell-shaped curve, indicating that the model residuals meet the normality assumption. Therefore, the regression model built is appropriate for further hypothesis testing.

Multicollinearity Test

The multicollinearity test aims to detect whether there is a strong correlation among the independent variables in the regression model. Serious multicollinearity will make regression coefficient estimates unstable and difficult to interpret individually. Testing was conducted by analyzing the Tolerance and Variance Inflation Factor (VIF) values for each independent variable.

Table 1. Multicollinearity Test

Model	Tolerance	VIF
(Constant)	-	-
Interest Rates	.541	1.848
Bonds	.541	1.848

Source: Data Processing Results, 2025

Based on the test results, the Tolerance values for the interest rate and bond variables are each above 0.10, and their VIF values are below the threshold value of 10. This condition indicates that there is no meaningful multicollinearity problem among the independent variables in the model, so the regression coefficient estimates can be considered stable and reliable.

Hypothesis Testing

Multiple Linear Regression of Interest Rates and Bonds on Economic Growth

To obtain the estimated effect of the independent variables (interest rates and bonds) on the dependent variable (economic growth), secondary data sourced from BPS and Bank Indonesia covering the period from 2002 to 2025 were used, with a total of 26 observations. Data processing was carried out using the Ordinary Least Square (OLS) method with the assistance of the SPSS program.

Table 2. Multiple Linear Regression Results

Model	B	Std. Error	Beta	t	Sig.
(Constant)	8.143	.712		11.436	.000
Interest Rates	-.263	.071	-.801	-3.972	.001
Bonds	.001	.000	.934	4.621	.000

Dependent Variable: GDP | Source: Data Processing Results, 2025

From the regression estimation results above, the model equation formed is as follows:

$$Y = 8.143 - 0.263 X_1 + 0.001 X_2$$

Model Interpretation

Interest Rates (X_1) are proven to have a negative effect on economic growth in Indonesia, as indicated by the regression coefficient value of -0.263. Econometrically, the interpretation is that every 1% increase in interest rates will be followed by a 0.263% decrease in economic growth, assuming other variables are held constant (*ceteris paribus*). This result is consistent with macroeconomic theory, which states that an increase in interest rates tends to suppress investment and consumption activities.

Bonds (X2) show a positive effect on economic growth, with a regression coefficient value of 0.001. This means that every 1% increase in bond value will contribute to a 0.001% increase in economic growth, assuming other variables remain constant. Although the coefficient is relatively small, this effect remains statistically significant because the absolute value of outstanding government bonds is very large.

Individual Regression Coefficient Test (t-test)

The partial test results for the interest rate variable produced a t-statistic of -3.972 with a significance probability of 0.001. Because the probability value is smaller than the significance level of 0.05 ($0.001 < 0.05$) and the t-statistic exceeds the t-table value ($-3.972 < -2.064$), H1 is accepted. In conclusion, interest rates have a significant and negative effect on economic growth in Indonesia at a 95% confidence level.

For the bond variable, the t-statistic obtained was 4.621 with a significance probability of 0.000. Because the probability is smaller than 0.05 ($0.000 < 0.05$) and the t-statistic exceeds the t-table value ($4.621 > 2.064$), H2 is accepted. Thus, bonds are proven to have a significant and positive effect on economic growth in Indonesia at a 95% confidence level.

Simultaneous Regression Coefficient Test (F-test)

Table 3. ANOVA Test

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	14.382	2	7.191	11.204	.000b
Residual	14.734	23	.640		
Total	29.116	25			

Dependent Variable: GDP | Predictors: (Constant), Bonds, Interest Rates |
Source: Data Processing Results, 2025

Based on the ANOVA test results, the F-statistic is 11.204 with a significance probability of 0.000. Because the probability value is smaller than the significance level of 0.05 ($0.000 < 0.05$), H0 is rejected and Ha is accepted. This indicates that, jointly, the interest rate (X1) and bond (X2) variables have a significant effect on economic growth (Y) at a 95% confidence level.

Coefficient of Determination (R²)

Table 4. Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.830a	.689	.661	1.800

Source: Data Processing Results, 2025

The coefficient of determination test results show an R-square value of 0.689. This figure means that the interest rate and bond variables jointly explain 68.9% of the variation in Indonesia's economic growth, while the remaining 31.1% is explained by other factors not included in this research model, such as foreign investment, government spending, exports and imports, or total factor productivity.

Moderating Test Results (Residual Test)

The residual test was used as an alternative method to examine the ability of the moderating variable to influence the strength of the relationship between the independent variables and the dependent variable. A variable is declared a moderating variable if it simultaneously meets two requirements: the P-value (Sig.) is < 0.05 and the parameter coefficient is negative. The test results are presented in Tables 5 and 6 below.

Table 5. Residual Test (Equation 1 - Exchange Rate as Dependent Variable)

Model	B	Std. Error	Beta	t	Sig.
(Constant)	12843.217	1823.441		7.044	.000
Interest Rates	-251.349	168.217	-.338	-1.494	.149
Bonds	.847	.421	.443	2.012	.057

Dependent Variable: Exchange Rate | Source: Data Processing Results, 2025

Table 6. Residual Test (Equation 2 - Abres as Dependent Variable)

Model	B	Std. Error	Beta	t	Sig.
(Constant)	91.443	1108.327		.083	.935
GDP	279.814	218.432	.278	1.281	.213

Dependent Variable: Abres | Source: Data Processing Results, 2025

Based on the residual test results in the two tables above, the following two moderation regression equations are obtained:

$$Z = 12843.217 - 251.349 X_1 + 0.847 X_2 \dots\dots\dots (1)$$

$$|e| = 91.443 + 279.814 Y \dots\dots\dots (2)$$

The test results show that the significance value in the second equation is 0.213, which is greater than $\alpha = 0.05$ ($0.213 > 0.05$). In addition, the GDP parameter coefficient is positive (+279.814), not negative. These two conditions do not meet the moderating criteria, so it can be concluded that the exchange rate is not able to moderate the relationship between interest rates and bonds and Indonesia's economic growth during the 2002-2025 period. In other words, the exchange rate is not a moderating variable in the research model (H3 is not accepted).

Discussion

The Effect of Interest Rates on Economic Growth

The empirical estimation results in this study confirm that interest rates have a negative and significant effect on economic growth in Indonesia. This finding is fully consistent with the proposed hypothesis (H1 is accepted) and aligns with the applicable theoretical framework of monetary policy. Bank Indonesia systematically uses interest rates as an instrument to control inflation while also stimulating economic growth. Under conditions of high inflationary pressure, Bank Indonesia tends to raise interest rates to absorb liquidity and suppress aggregate demand. Conversely, when the economy requires a boost, a reduction in interest rates is pursued to expand credit and encourage consumption and investment (Kuttner & Mosser, 2023).

The negative transmission channel of interest rates to economic growth operates through several interrelated mechanisms. First, an increase in interest rates raises the cost of investment

credit, making business projects less financially profitable. Second, high interest rates encourage people to save in financial institutions rather than engage in productive consumption. Third, high interest rates make financial assets such as deposits more attractive than real-sector investment, causing a shift of capital that inhibits national output growth. The results of this study are in line with the findings of [Fadhl and Ismail \(2024\)](#) as well as [Okonkwo and Ajibo \(2023\)](#), which show a negative effect of interest rates on economic growth in developing countries.

The Effect of Bonds on Economic Growth

The bond variable is partially proven to have a positive and significant effect on Indonesia's economic growth, so H2 is accepted. This finding strengthens the argument that bond market development, especially government bonds, is an important pillar in a growth-oriented development financing strategy. Government bond issuance provides access to long-term funding sources that can be allocated to finance various infrastructure, social, and economic programs that have a large multiplier effect on the national economy.

The positive transmission mechanism of bonds to economic growth operates through two main channels. The first channel is through increased productive investment, where funds obtained from corporate bond issuance encourage the expansion of production capacity, which leads to increased output and employment absorption. The second channel is through increased productive government spending in priority development sectors. Well-managed government bonds are proven to be effective, transparent, and sustainable financing instruments ([Greenwood et al., 2022](#)). The results of this study are also consistent with the study by [Kim and Song \(2023\)](#), which found that domestic bond market development contributes positively to economic growth in Asia.

The Effect of the Exchange Rate as a Moderating Variable

The moderating test results show that the exchange rate is not proven to moderate the relationship between interest rates and bonds and Indonesia's economic growth. This finding does not support the proposed H3. The inability of the exchange rate to function as a moderator can be explained from several perspectives. First, during most of the observation period from 2002 to 2025, Indonesia's inflation rate was relatively controlled below 10%, so Bank Indonesia did not always make significant interest-rate adjustments. As a result, changes in the exchange rate did not necessarily correlate strongly with interest-rate dynamics in influencing economic growth ([Ha et al., 2023](#))

Second, the development of government bond values, which tended to increase from year to year, did not always move in line with the appreciation of the rupiah, considering that the composition of foreign and domestic ownership in the bond market continued to change. Third, Indonesia has increasingly developed the rupiah-denominated bond market (Government Securities/SBN), thereby limiting exposure to exchange-rate risk in bond financing. These conditions collectively create a mechanism that weakens the potential of the exchange rate as a moderator in the model developed. This finding is consistent with the results of [Mubarroq \(2024\)](#), who found that the exchange rate failed to function as a moderating variable in a similar Indonesian context.

Conclusion

Based on a series of empirical analyses of data for the 2002-2025 period with 26 observations, this study produces several important conclusions. First, based on the simultaneous test (F-test), interest rates and bonds jointly have a significant effect on Indonesia's economic growth at the 5% significance level. Second, based on partial testing (t-test), interest rates are proven to have a negative and significant effect on economic growth, while bonds are proven to have a positive and significant effect on Indonesia's economic growth. Third, the exchange rate is not proven to moderate the relationship between interest rates and bonds and Indonesia's economic growth. Fourth, the coefficient of determination (R^2) of 0.689 indicates that the two independent variables in the model are able to explain 68.9% of the variation in Indonesia's economic growth, while the remaining 31.1% is influenced by variables outside the model.

The policy implications of these findings emphasize the importance of careful and measured interest-rate management by Bank Indonesia to maintain a balance between inflation control and economic-growth stimulation. On the other hand, the expansion and deepening of the bond market should continue to be encouraged as a sustainable development financing instrument. Future research is advised to explore alternative moderating variables such as the inflation rate, foreign direct investment, or financial stability index, which may have stronger moderating ability in the context of Indonesia's economy.

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