

## The Impact of Money Supply (M2) and Inflation on BI Rate Indonesia

Annisa Meutia Nanda<sup>1</sup>, Reyna Raudhatul Wardha<sup>1</sup>, Muhammad Daffa Rizki<sup>1</sup>, Miksalmina Miksalmina<sup>1</sup>, Muhammad Abrar<sup>1\*</sup>, Fairuzabadi Fairuzabadi<sup>1</sup>

<sup>1</sup>Faculty of Economics and Business, Universitas Syiah Kuala, Indonesia

\*Corresponding: [muhammadabrar@usk.ac.id](mailto:muhammadabrar@usk.ac.id)

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### Abstract

This study explores the impact of money supply (M2) and inflation on the reference interest rate set by Bank Indonesia within the context of the country's monetary policy framework. A quantitative approach was utilized, employing multiple linear regression analysis on time series data spanning from January 2015 to December 2024. The study assesses both the individual and joint effects of these key macroeconomic variables. Data were obtained from official reports published by Bank Indonesia along with the Central Statistics Agency (BPS), then analyzed using the EViews 12 software. The empirical results reveal that inflation exerts a positive and a notable statistical influence on the BI Rate, with a regression coefficient of 0.452 and a probability value of 0.0000 ( $<0.05$ ). In contrast, the money supply (M2) displays a negative yet statistically insignificant relationship with the BI Rate, indicated by a coefficient of -0.304 and a probability of 0.4777 ( $>0.05$ ). The simultaneous testing results further demonstrate that both variables jointly exert a significant influence on the BI Rate, as shown by the F-test with a probability value of 0.0000. Furthermore, the coefficient of determination ( $R^2$ ) of 0.337 implies that M2 and inflation collectively account for approximately 33.7% of the variation in the BI Rate, while the remaining 66.3% is attributed to other determinants not captured in this model.

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## Introduction

Monetary policy serves as a key instrument in sustaining Indonesia's overall economic stability. Bank Indonesia employs the benchmark interest rate (BI Rate) as a primary mechanism to regulate inflation, stabilize the exchange rate, and support economic expansion. Adjustments in the BI Rate influence lending and saving behavior, as well as shape public and corporate perceptions regarding future monetary policy directions. Hence, the credibility and effectiveness of the BI Rate as a policy indicator are particularly important during times of heightened global uncertainty (Anwar et al., 2023)

One of the variables closely related to the BI Rate is the money supply (M2). According to the quantity theory of money, disproportionate growth in M2 relative to real output can trigger inflation. Such conditions require an appropriate monetary policy response. Empirical studies in Asia indicate that M2 growth significantly contributes to inflation (Nguyen, 2015). In Indonesia, fluctuations in M2 reflect banking liquidity and public behavior in saving or spending money, which must be anticipated by monetary authorities.

In addition to M2, Inflation remains the main priority within Indonesia's monetary policy framework. Since The introduction of the Inflation Targeting Framework (ITF) in 2005, Bank Indonesia has positioned inflation stabilization as the primary goal of its policy decisions. The ITF highlights the close connection between inflation trends and the BI Rate, where rising inflation is typically counteracted through an upward adjustment of the benchmark interest rate. Nonetheless, the implementation of the ITF continues to encounter several challenges, including a relatively fragile financial system and persistently high inflation expectations among the public (Wahyoe et al., 2023). This underscores the importance of maintaining the credibility of the monetary policy of Indonesia.

The transmission related to monetary policy through the banking sector also determines the effectiveness of the BI Rate. Changes in interest rates influence credit distribution, which ultimately affects investment, consumption, and economic growth (Wahyoe et al., 2023). Considering the impact of both domestic and global factors, the interrelationship among M2, inflation, and the BI Rate becomes an essential issue for analysis both as an academic contribution and as an input for Indonesia's monetary policy formulation. This paper have three research objective, first to analyze the effect of M2 on the BI Rate in Indonesia. Second, to analyze the impact of inflation on the BI Rate in Indonesia. Third, to determine the simultaneous relationship between M2 and inflation on the BI Rate. We hope this paper to enrich empirical literature on how money supply relates to (M2), inflation, and the BI Rate in Indonesia and enhance public understanding of how monetary factors influence interest rates and economic decision-making.

## Method

### *Type and Research Approach*

This research utilizes a quantitative methodology supported by time series econometric techniques. The use of a quantitative approach is appropriate, as the study seeks to empirically examine the influence of macroeconomic indicators namely money supply (M2) and inflation on the reference interest rate set by Bank Indonesia (BI Rate) through the analysis of numerical data. This method enables the identification and testing of causal relationships between variables using objective, systematic, and replicable statistical procedures.

### *Data Sources and Types*

This study utilizes secondary data in the form of monthly time series data covering the period 2015–2024. The data sources include:

- Bank Indonesia (BI): BI Rate and money supply (M2) data.
- Central Bureau of Statistics (BPS): Inflation data (CPI, year-on-year).
- Scientific publications and monetary economics journals: Supporting references for analysis and discussion.

Using secondary data enables a more accurate analysis of macroeconomic variables since such data are collected and processed by official institutions following national statistical standards.

### *Research Variables and Operational Definitions*

1. Dependent Variable (Y): BI Rate, the benchmark interest rate set by Bank Indonesia (% per year), reflecting the stance of monetary policy in maintaining price and exchange rate stability.

2. Independent Variable (X1): Money Supply (M2) broad money, consisting of currency in circulation, demand deposits, and quasi money (in billion rupiah).
3. Independent Variable (X2): Inflation, refers to the percentage change in the Consumer Price Index (CPI), which reflects the overall rise in the prices of goods and services within a given period, typically measured on an annual basis.

The operational definitions of these variables follow the official publications of Bank Indonesia and the Central Bureau of Statistics (BPS) to ensure high validity of the research results.

#### *Analytical Model*

The analytical model used in this study is Multiple Linear Regression (MLR), formulated as follows:

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \varepsilon_t$$

Where:

$Y_t$  = BI Rate in period t

$X_{1t}$  = Money Supply (M2) in period t

$X_{2t}$  = Inflation in period t

$\alpha$  = Constant (intercept)

$\beta_1, \beta_2$  = Regression coefficients for each independent variable

$\varepsilon_t$  = Error term

This model is used to measure the extent to which M2 and inflation influence the BI Rate, both partially and simultaneously, in Indonesia.

#### *Assumption and Statistical Tests*

Several tests are conducted to ensure that the regression results meet the BLUE (Best Linear Unbiased Estimator) criteria, as follows:

1. Normality Test (Jarque Bera Test)

This test is used to confirm that the residuals of the regression model are normally distributed. If the Jarque-Bera probability value is greater than 0.05, the residuals are considered normally distributed.

2. Wald Test

The Wald test is used to measure how much of the variation in the BI Rate can be explained by variations in M2 and inflation. A higher  $R^2$  value indicates that the model has strong explanatory power for the dependent variable.

3. F-Test (Simultaneous Test)

The F-test is used to determine whether all independent variables jointly have a significant effect on the BI Rate.

4. t-Test (Partial Test)

The t-test is used to assess the individual effect of each independent variable (M2 and inflation) separately on the BI Rate.

#### *Data Analysis Tool*

Data analysis is performed using EViews version 12, as it provides comprehensive capabilities for managing time series data, performing multiple linear regression, and conducting classical assumption and advanced statistical tests. The use of EViews ensures accurate and efficient outputs, allowing for systematic and measurable estimation and interpretation of results.

## Result and Discussion

### Regression Analysis Results

Based on the results of multiple linear regression estimation using the Ordinary Least Squares (OLS) method with data from January 2015 to December 2024 (120 observations), the following output was obtained:

Tabel 1. Statistic descriptive

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	8.436.142	6.791.372	1.242.815	1,50486111
Inflasi	0.452811	0.069938	6.525.801	0.0000
M2 (lmd)	-0.304062	0.426828	-0.712374	3,31736111
R-squared	0.337123	Prob(F-statistic)		0.000000
Adjusted R-squared	0.325792	Mean dependent var		5.204.167
S.E. of regression	0.996631	S.D. dependent var		1.217.426
Sum squared resid	116.913.613	Akaike info criterion		2.861.820
Log likelihood	-1.687.027	Schwarz criterion		2.931.508
Hannan-Quinn crit.	2.890.171	Durbin-Watson stat		0.061099

The dependent variable is BI Rate (BI), while the independent variables consist of inflation (INF) and money supply (M2 or LMD).

The constant value (C) of 8.436 indicates that when both inflation and money supply are equal to zero or assumed constant, the BI Rate would be around 8.43 percent. This value serves as the intercept of the regression equation and is not interpreted practically, but rather as the baseline of the model.

The regression analysis demonstrates that the money supply (M2) possesses a negative coefficient of -0.304 with a probability score of 0.4777, indicating that M2 does not significantly affect the BI Rate. Even though the Quantity Theory of Money (Fisher:  $MV = PT$ ) argues that an expansion in money supply generally causes increases in prices and interest rates, the statistical findings of this study do not substantiate that theoretical prediction.

This situation can be interpreted by considering Indonesia's monetary policy orientation. Since the implementation of the Inflation Targeting Framework (ITF) in 2005, Bank Indonesia has centered its policy strategy on maintaining price stability. While movements in M2 continue to be observed as part of the broader monetary indicators, decisions regarding the BI Rate are mainly driven by actual and projected inflation developments rather than direct fluctuations in money supply. As a result, variations in M2 during the research period were not found to exert a significant influence on the BI Rate.

The F-statistic value of 29.75 with a probability of 0.0000 ( $< 0.05$ ) shows that inflation and money supply jointly have a significant effect on the BI Rate. Thus, the regression model is considered valid and reliable for further analysis.

The Wald Test was conducted to determine whether there is a significant difference between the regression coefficients of inflation (INF) and money supply (M2). Based on the results obtained:

Tabel 2. Wald test

Test Statistic	Value	df	Probability
t-statistic	1.891.141	117	0,42430556
F-statistic	3.576.414	(1, 117)	0,42430556
Chi-square	3.576.414	1	0,40694444
Null Hypothesis: C(2) - C(3) = 0			
Null Hypothesis Summary:			
Normalized Restriction (0)	Value	Std. Error	

The data show a t-statistic = 1.891, F-statistic = 3.576, and Chi-square = 3.576 with a probability of approximately 0.06. These results indicate that at the 5 percent significance level, the difference in the effects of inflation and money supply on the BI Rate is not significant. However, at the 10 percent significance level, the difference approaches significance. Therefore, it can be interpreted that the influence of inflation on the BI Rate is relatively more dominant than that of money supply, although the difference in strength is not statistically strong.

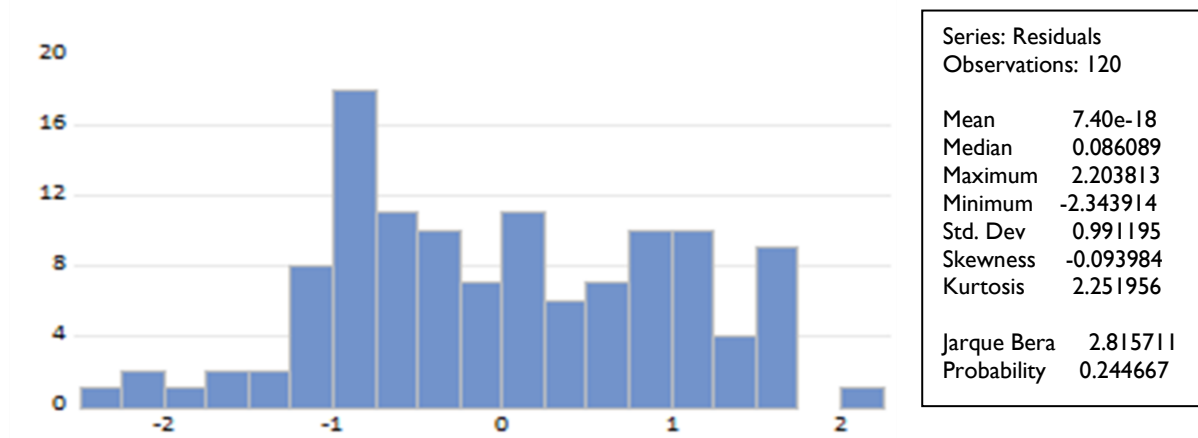


Figure 1. Normality test

The residual normality test was conducted to guarantee that the regression model meets the classical assumption regarding normal distribution. According to the Jarque-Bera test (Figure 1), the probability value obtained is 0.2446 ( $> 0.05$ ), indicating that the residuals are normally distributed. Moreover, the residual histogram shows a symmetrical distribution around zero, with a mean close to zero ( $7.40E-18$ ) and a standard deviation of 0.991. The skewness value of 0.259 and kurtosis of 2.25 support the assumption that the residuals do not deviate significantly from a normal distribution.

Therefore, the normality assumption is fulfilled, and the estimation results can be interpreted further.

## Policy and Implication

### *The Effect of Money Supply (M2) on the BI Rate*

The regression results indicate that the money supply (M2) has a negative coefficient of -0.304 with a probability value of 0.4777, implying that M2 does not have a statistically significant effect on the BI Rate. While the Quantity Theory of Money (Fisher:  $MV = PT$ ) posits that an increase in the money supply typically drives up prices and interest rates, the empirical evidence from this study does not substantiate a direct correlation between these variables.

This outcome can be understood within the framework of Indonesia's monetary policy. Since the adoption of the Inflation Targeting Framework (ITF) in 2005, Bank Indonesia has prioritized maintaining inflation stability as the central objective of its policy actions. Although M2 remains an observed indicator, adjustments to the BI Rate are generally guided by actual and anticipated inflation levels rather than by changes in money supply itself. Consequently, variations in M2 during the study period were found to have an insignificant influence on the BI Rate.

### *The Effect of Inflation on the BI Rate*

The regression results indicate that inflation has a positive and statistically significant impact on the BI Rate, as reflected by a coefficient of 0.452 and a probability value of 0.0000. This suggests that a 1 percent increase in inflation corresponds to an estimated 0.452 percent rise in the BI Rate.

This finding is consistent with monetary policy theory, which states that a central bank raises its benchmark interest rate to control inflationary pressure. When inflation rises, Bank Indonesia increases the BI Rate to reduce aggregate demand and stabilize prices. For example, during the 2013–2015 period, when inflation in Indonesia surged due to fuel price hikes, Bank Indonesia responded by increasing the BI Rate to maintain price stability and support the rupiah exchange rate.

Therefore, this finding supports the conclusion that inflation is a key determinant of the BI Rate. Bank Indonesia consistently uses the BI Rate as an instrument to manage price stability and inflation expectations.

### *The Joint Effect of Money Supply (M2) and Inflation on the BI Rate*

Although money supply (M2) does not have a significant partial effect, the F-test results show that inflation and money supply jointly have a significant effect on the BI Rate. This implies that both variables remain relevant in explaining the variation in the BI Rate, even though the dominant effect comes from inflation.

The Wald test also reinforces this finding, indicating that the coefficient of inflation is larger than that of M2, although the difference is not significant at the 5 percent level. This reflects that in Indonesia's monetary policy practice, inflation is the main factor driving BI Rate adjustments, while M2 serves as a supporting factor that does not directly influence the benchmark interest rate.

Overall, both inflation and money supply (M2) affect the BI Rate, with inflation exerting a more dominant influence. Partially, only inflation significantly affects the BI Rate. This indicates that although M2 contributes to the model, Bank Indonesia primarily focuses its interest rate policy on inflation control. Thus, the influence of M2 on the BI

Rate is limited, compared to the stronger and more direct role of inflation, which remains the central focus of Indonesia's monetary policy.

The findings of this research reveal that the money supply (M2) does not exert a significant influence on the BI Rate, whereas inflation demonstrates a positive and significant relationship with it. This outcome suggests that Bank Indonesia places greater emphasis on managing inflation when setting its benchmark interest rate, since elevated inflation can diminish purchasing power and threaten economic stability. Moreover, the combined effect of M2 and inflation on the BI Rate is statistically significant, implying that both variables are still pertinent in explaining movements in the policy rate. In summary, the BI Rate in Indonesia is more heavily shaped by inflationary trends than by variations in money supply. Consequently, it is advisable for Bank Indonesia to further reinforce the Inflation Targeting Framework (ITF) and maintain vigilant supervision over M2 growth to preserve monetary and financial stability. Strengthening these efforts would allow the central bank to achieve an equilibrium between price stability and economic expansion an essential condition for long-term sustainable growth. A well-executed monetary policy framework will also bolster investor trust, mitigate uncertainty, and foster overall economic resilience. In addition, a consistent and transparent policy environment enables firms and households to make sound investment and consumption decisions, thereby contributing positively to Indonesia's economic advancement. Finally, Bank Indonesia's steadfast dedication to maintaining low and stable inflation not only safeguards household purchasing power but also enhances the country's competitiveness in global markets. Through continued prioritization of inflation control and policy stability, Bank Indonesia can significantly support Indonesia's enduring economic prosperity and stability.

**Conflict Interest:** The authors declare no conflict of interest.

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