

THE RELATIONSHIP BETWEEN INFLATION AND BI RATE IN INDONESIA USING GRANGER CAUSALITY ANALYSIS APPROACH

Destiana Indah Pertiwi^{1*}, Diah Setyorini Gunawan²

¹⁻² Faculty of Economic and Business, Jenderal Soedirman University, Indonesia

*Email corresponding author: destiana.pertiwi@mhs.unsoed.ac.id

Abstract

As a developing country, Indonesia is not immune to various economic problems such as inflation. In overcoming economic problems, Bank Indonesia, as the central bank, can implement various forms of monetary policy, particularly regarding interest rate adjustments and inflation. Bank Indonesia, as the central bank, has developed various monetary policies such as the Inflation Targeting Framework and BI Rate, which serve as signals for commercial banks in setting their respective interest rates, ultimately stabilizing the economy. The purpose of this study is to analyze the Granger causality between inflation and the BI rate. The data collection technique used in this study is secondary data obtained from Bank Indonesia using monthly data over five years for the inflation and BI rate variables. Hypothesis testing was conducted using the unit root test, determination of the optimal lag, and the Granger causality test. The results of this study indicate that the unit root test results show that inflation and the BI rate are stationary at the first difference level, then the optimum lag is at the lag 2 level, and the results of the Granger causality test show that inflation affects the BI rate in Indonesia in 2017-2023, then the BI rate affects inflation in Indonesia in 2017-2023. This indicates that there is a causal relationship between inflation and the BI rate.

Keywords: Inflation, Interest Rates, BI Rate, Indonesia, Granger Causality

INTRODUCTION

Developing countries, such as Indonesia, generally have economic structures that depend on the agricultural sector, which is often vulnerable to shocks that can disrupt economic stability. Economic problems, such as low economic growth, high unemployment rates, and high inflation, are the main focus because economic instability can trigger these problems. A continuous increase in the overall prices of goods and services is an indication of inflation (Indriyani, 2016). Economic stability can be measured through indicators of positive economic growth, low unemployment rates, and stable prices of goods and services as reflected in inflation rates. To date, inflation remains a major challenge in the Indonesian economy. In 2020, the Covid-19 pandemic struck, causing economies to collapse, including in Indonesia and other countries around the world. The crisis caused by this pandemic has affected all sectors, including the economy, and has also triggered an unprecedented crisis in the financial and health sectors. In addition, COVID-19 has changed the way people transact, with people switching from face-to-face transactions to digital methods in an effort to maintain social distancing.

Digitalization is developing rapidly, forcing many businesses to adapt quickly to these changes. Digitalization is changing the form of transactions for the sale and purchase of goods and services, so that further adjustments are needed to control price levels and inflation. Inflation is always and everywhere a conflict phenomenon, with different potential triggers (Hein, 2024). To prevent a recurrence of similar inflation, the Indonesian government has given the central bank full authority to handle monetary issues independently without government intervention. Monetary policy, particularly that related to interest rate adjustments and the regulation of the money supply, plays

an important role in controlling the rate of inflation (Gafurdjan, 2024). Based on Law No. 23 of 1999 concerning Bank Indonesia, which was later reinforced by Law No. 3 of 2004, the central bank has been given the authority to independently handle monetary issues in Indonesia. The primary tasks of Bank Indonesia (BI) include maintaining inflation stability, the exchange rate of the rupiah, controlling the money supply, and setting interest rates.

The role of the central bank not only affects the financial sector, but also has a significant impact on economic growth, inflation, and public welfare. In general, the central bank's duties include formulating and implementing monetary policy, regulating and supervising the banking sector, and managing and implementing the payment system (Bank Indonesia, 2024). Central bank communication, beyond its actions, is important because it helps to understand changes in the economic environment and the function of policy reactions, as well as reducing information asymmetry between the central bank and the public (Baranowski et al., 2021). Central bank communication becomes even more important in a low interest rate environment (Blinder et al., 2017). The higher the inflation experienced by an individual, the greater the likelihood that person will expect inflation to rise over the next twelve months (Conrad et al., 2022). As the central bank of the Republic of Indonesia, Bank Indonesia aims to maintain the stability of the rupiah, ensure the stability of the payment system, and ensure the continuity of financial system stability, with all these efforts aimed at supporting sustainable economic growth, in accordance with the P2SK Law.

Bank Indonesia, the Deposit Insurance Corporation, and the Financial Services Authority formulated the P2SK Law as a mitigation measure to deal with potential future crises. This law aims to strengthen the financial system and protect customers, as well as create a safer environment for digital transactions. With clear regulations in place, it is hoped that the public will be able to better understand and utilize technology wisely, thereby minimizing the negative impacts of digitalization. In this context, collaboration between the government, financial institutions, and the public is crucial for building a more resilient economy in the future. To anticipate high fluctuations in inflation rates, Bank Indonesia, as the central bank, has developed an Inflation Targeting Framework (ITF) as a monetary policy framework. The purpose of this framework is to maintain stable inflation rates. With this framework in place, Bank Indonesia openly announces to the public its inflation targets and the monetary policies that will be implemented to achieve the inflation targets set by the government. The inflation target can be achieved if monetary policy is implemented with a forward-looking approach, where monetary policy is evaluated periodically to ensure that future inflation developments remain in line with the set target (Bank Indonesia, 2024).

Interest rates are believed to influence inflation in Indonesia, where the interest rate is known as the BI Rate. The BI Rate serves as a signal for commercial banks in determining their interest rates, including those for savings, deposits, and loans. Interest rates can be understood as the price paid when exchanging the value of one rupiah today for the value of one rupiah in the future (Mahendra, 2016). Nominal interest rates are also considered a key predictor of future inflation (Booth & Ciner, 2001). The development of a country's economy is generally driven by two macroeconomic indicators: first, the interest rate (BI Rate), and second, inflation. In Fisher's theory, there is a positive relationship between interest rates and inflation, where the influence flows from inflation to interest rates. Conversely, in Wicksell's theory, there is a negative relationship between the two, with causality flowing from interest rates to inflation rates (Anari & Kolari, 2016). The strong Fisher effect will only appear in samples where inflation and interest rates have a trend (Mishkin, 1992). Rising inflation and increasing interest rates are signs that economic growth is slowing down. Bank Indonesia implements monetary policy using various instruments, one of which is interest rates. When the inflation rate tends to exceed the set target, Bank Indonesia will raise the BI Rate. The following presents data on inflation and interest rates in Indonesia from 2016 to 2023.

Table 1. Inflation (percent) and Interest Rates (percent) in Indonesia from 2016 to 2023.

Year	Inflation (percent)	Interest Rates (percent)
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2016	3.02	4.75
2017	3.61	4.25
2018	3.13	6.00
2019	2.72	5.00
2020	1.68	3.75
2021	1.87	3.50
2022	5.51	5.50
2023	2.61	6.00

Source: Bank Indonesia, 2024

The table above shows inflation and interest rate figures in percent. As can be seen in the table above, annual inflation and interest rates fluctuate. Generally, inflation and the BI rate have a negative or inverse relationship. When inflation rises and the economy faces pressure, Bank Indonesia (BI) will increase the BI rate with the aim of reducing the amount of money in circulation and increasing borrowing costs, thereby reducing consumption and investment. This will result in a decrease in demand for goods and services and alleviate inflationary pressure. When the BI rate increases, it affects the cost of borrowing, thereby reducing credit for both consumption and investment. This leads to a decrease in the money supply and a reduction in demand for goods and services, ultimately lowering inflation (Sari & Nurjannah, 2023). The interest rate has a negative relationship with the inflation rate (Hayat et al., 2021).

In 2017, 2018, 2021, and 2023, the relationship between inflation and interest rates was negatively correlated or reciprocal, meaning that when the BIs rate rose, inflation fell, and when the BI rate fell, inflation rose. However, in 2019, 2020, and 2022, the relationship between the BI rate and inflation was positively correlated, meaning that when the BI rate decreased, inflation decreased, and when the BI rate increased, inflation increased. This study aims to analyze the relationship between the BI rate and inflation, as well as inflation and the BI rate. Changes in the BI rate will also affect changes in inflation (Indrajaya, 2022). According to Silaban et al., (2021), interest rates affect inflation.

LITERATURE REVIEW AND HYPOTHESIS FORMULATION

Venieris and Sebold define inflation as “a sustained tendency for general prices (Putra, 2022). According to this definition, a general increase in prices that occurs only once is not a cause of inflation. Inflation is a general and continuous increase in the prices of goods and services over a certain period of time. An increase in the price of one or two goods alone cannot be called inflation, unless the increase spreads or causes price increases in other goods. The opposite of inflation is deflation (Bank Indonesia, 2025). Inflation is not merely high prices but a sustained process of price increases that mutually influence goods and services in the market. Inflation also means a continuous decline in the value of currency, thereby reducing purchasing power (Kementerian Keuangan RI Direktorat Jenderal Perbendaharaan, 2023). In Indonesia, inflation is measured by the Central Statistics Agency (BPS) using the Consumer Price Index (CPI). The BPS conducts surveys of prices for various goods and services that represent public consumption, then compares current prices with those from previous periods to calculate the inflation rate (Rahadhyar, 2024).

Interest is the charge on a loan, usually expressed as a percentage of the money borrowed. The interest rate is the price that connects the present and the future (Mankiw, 2018). Bank Indonesia states that the Bank Indonesia benchmark interest rate, commonly referred to as the BI Rate, is a benchmark interest rate policy with a one-month tenor issued to reflect the monetary policy implemented by Bank Indonesia since 1970 and announced to the public. Bank Indonesia, as the central bank of Indonesia, has the authority to regulate the benchmark interest rate to be used in the economy for a certain period of time. The BI Rate is the interest rate set by BI as an effort to achieve inflation expectations. As a benchmark interest rate, the BI Rate serves as a reference for

interest rate movements in the financial market. An increase or decrease in the BI Rate is expected to stabilize the movement of money circulation in society.

The BI Rate is the policy interest rate set by Bank Indonesia (BI) as the main reference for financial institutions in Indonesia in determining interest rates for financial products such as loans, savings, and deposits (Kemu & Ika, 2016). The BI Rate reflects the stance of Bank Indonesia's monetary policy and is announced periodically following the BI Board of Governors' Meeting, taking into account national economic conditions such as inflation, economic growth, and the stability of the rupiah exchange rate. The BI Rate serves as a monetary control instrument used by BI to achieve the primary objectives of monetary policy, namely maintaining the stability of the rupiah through inflation control and financial system stability (OCBC, 2023). Changes in the BI Rate will affect interbank interest rates, loan interest rates, and deposit interest rates at commercial banks, thereby directly impacting economic activities among the public. The following figure presents the research framework for this article.

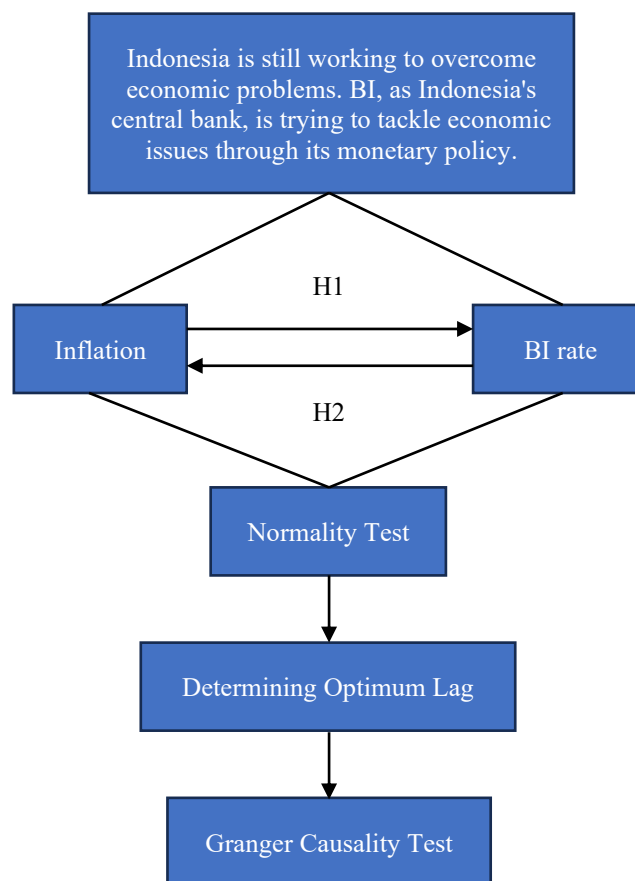


Figure 1. Research Framework

According to research by Pandiangan et al., (2025); Wahyuni et al., (2024); Yehosua et al., (2019) inflation affects interest rates, which means that changes in inflation will affect changes in the BI rate. According to research by Akhyar, (2024); Langi et al., (2014); Pratiwi, (2024) the BI rate has a significant effect on inflation, meaning that if the BI rate changes (increases/decreases), it will affect the increase or decrease in inflation. Based on this, the hypothesis in this study is as follows.

Hypothesis 1 (H1)

H₀₁ : Inflation has no effect on the BI rate

H_{a1} : Inflation has a significant effect on the BI rate

Hypothesis 2 (H2)

H₀₂ : The BI rate has no effect on inflation

H_{a2} : The BI rate has a significant effect on inflation

RESEARCH METHODS

This study analyzes quantitative associative secondary data. Secondary data is data obtained from other parties in the form of publications, data obtained from records, books, and magazines in the form of government financial reports, articles, and so on. Associative research aims to determine the relationship between two or more variables (Sujarweni & Wiratna, 2015). Quantitative research is research that produces findings that can be achieved (obtained) using statistical procedures or other methods of quantification (measurement). This study uses secondary data, namely inflation and interest rates/BI rates. Inflation data was obtained from data published by Bank Indonesia, using monthly data (January-December) from 2017 to 2023, with the unit of measurement being percent. BI rate data was obtained from data published by Bank Indonesia, using monthly data (January-December) from 2017 to 2023, with the unit of measurement being percent.

The analysis method used in this study is the Granger Causality Test, which aims to examine the reciprocal relationship between inflation and the BI rate in Indonesia. The steps to be taken in this study are stationarity testing, determining the optimum lag, and then Granger causality testing. Stationarity relates to the consistency of time series data movements. Time series data is said to be non-stationary if the mean and variance vary over time, or in other words, data is said to be stationary if it moves steadily and converges around its mean value without experiencing positive or negative trend fluctuations (Subanti & Hakim, 2014). Statistical analysis of stationarity in time series data can be conducted using several testing methods, including the Dickey-Fuller and Phillips-Perron unit root tests. However, in this study, the method developed by Dickey-Fuller was used.

The impact of an economic policy does not usually have an immediate effect on economic activity but requires time or a lag. In many cases of economic behavior, theory does not provide a definite answer as to how long this lag will be (Widarjono, 2018). Therefore, we must examine the data and then determine the accuracy of the lag length. There are several methods for doing this, including using the coefficient of determination and criteria proposed by the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SC).

After conducting the optimal lag test, we then conduct the Granger Causality test, which is used to determine the two-way, mutually influential relationship. Thus, if causality exists in economic behavior, there are no independent variables in the model. All variables are dependent variables. The decision regarding whether variable X influences Y and vice versa, whether Y influences X, is made using the F-test or can be seen from its probability. As per the F-test procedure, if the calculated F-value is greater than the table F-value (critical table value) at the significance level, then the two variables have a two-way causal relationship.

RESULTS AND DISCUSSION

1. Unit Root Test

Table 1 Results of Data Stationarity Tests at Level and First Difference Levels

Variable	ADF (Level)	ADF (First Difference)
Inflation	0.0645	0.0295
BI rate	0.5416	0.0006

Source: processed data, 2025

The table above shows the results of the stationarity test on the inflation and BI rate variables. The inflation variable is not stationary at the level but is stationary at the first difference level, where the probability at the first difference level is $0.0295 < 0.05$ (alpha 5 percent). The BI rate variable is not stationary at the level but is stationary at the first difference

level with a probability of $0.0006 < 0.05$ (alpha 5 percent). Therefore, the inflation and BI rate variables are stationary at the first difference level.

2. Determining the Optimum Lag

The optimum lag test is used to determine the length of the lag used in the study. The selection of the lag is very important because the length of the lag can affect the rejection or acceptance of the null hypothesis, resulting in bias in the estimation and producing inaccurate calculations (Ekananda, 2015). The length of the lag can be seen from the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SC) values.

Table 2. Results of Optimum Lag Determination

Variable	Lag	AIC	SC
Inflation & BI rate	0	5.663509	5.722209
	1	-0.147591	0.028510
	2	-0.451490*	-0.157987*

Source: processed data, 2025

Based on the results of determining the optimum lag, it shows that lag 2 is the most optimal lag, as indicated by the asterisk (*) in the AIC and SC methods. Thus, the results of determining the optimum lag for the inflation and BI rate variables are at lag 2, which is then followed by testing the reciprocal relationship using the Granger causality test.

3. Granger Causality Test

Table 3. Results of Granger Causality Test

Variable	F-Statistic	Prob.
BI rate does not Granger Cause Inflasi	3.34162	0.0406
Inflasi does not Granger Cause BI rate	2.99761	0.0558

Source: processed data, 2025

The results of the Granger causality test on inflation and BI rate variables at lag 2 are shown in the table above. The probability value of BI rate on inflation shows a figure of 0.0406, which is smaller than 0.10 (tolerance value of 10 percent), indicating a causal relationship. The probability value of inflation on the BI rate shows a figure of 0.0558, which is less than 0.10 (tolerance value of 10 percent), thus indicating a causal relationship. From these results, it can be concluded that at lag 2 there is a causal relationship between the inflation variable and the BI rate, where the inflation variable has an effect on the BI rate, and the BI rate variable has an effect on inflation. The results of this study are in line with previous studies, according to research by Pandiangan et al., (2025); Wahyuni et al., (2024); Yehosua et al., (2019) inflation affects interest rates, which means that changes in inflation will affect changes in the BI rate. According to research by Akhyar, (2024); Langi et al., (2014); Pratiwi, (2024) the BI rate has a significant effect on inflation, meaning that if the BI rate changes (increases/decreases), it will affect the increase or decrease in inflation.

CONCLUSION

Based on the results of the Granger causality test in the study on the analysis of causality between inflation and the Bank Indonesia (BI) benchmark interest rate in Indonesia for the period 2017-2023 (January-December), the author can draw conclusions and recommendations. The

conclusion of this study is that there is a two-way causal relationship between inflation and the BI Rate at lag 2, meaning that when inflation changes (increases or decreases), it will affect the BI Rate, and vice versa, when the BI Rate changes (increases or decreases), it will affect inflation. The causal effect of inflation on the BI Rate is not as significant as the causal effect of the BI Rate on inflation. This indicates that the implementation of policies to lower or raise inflation by Bank Indonesia has a time lag and cannot quickly influence the existing BI Rate. The recommendation in this study is that the government, in this case Bank Indonesia as the monetary authority in Indonesia, should maintain the stability of the money supply and the Bank of Indonesia's benchmark interest rate (BI Rate) in the community. Thus, both remain stable in each period because they are crucial monetary policy instruments in controlling economic stability.

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