# THE IMPACT OF MONETARY POLICY SHOCKS IN INDONESIA

**Phany Ineke Putri**

Universitas Negeri Semarang

Email: phany@mail.unnes.ac.id

## ABSTRACT

Monetary policy is an important policy of a country in maintaining balance in the economy. This study aims to test impact of monetary policy shocks in Indonesia against to economic variables. The data used in this study are the level of domestic prices (P), economic growth (EG), interest rates (IR), and the real exchange rate (R) with quarterly time periods in 2019-quarter 3 in 2021. This research used the Structural Vector model Autoregression (SVAR). The result shows that the contribution of monetary policy instruments varies considerably to economic variables such as economic growth, the level of domestic prices, and the real exchange rate. But, the biggest contribution of the BI rate is felt by the variable price (inflation).

Keywords : Monetary; Shocks; Exchange Rate

## INTRODUCTION

Monetary policy is an important policy of a country in maintaining balance in the economy. Monetary policy is basically a policy that aims to achieve internal balance such as high economic growth, price stability, and equitable development and external balance (balance of payments balance) and the achievement of macroeconomic objectives namely maintaining economic stability that can be measured by employment opportunities, price stability, and a balanced international balance of payments (Amberg et al., 2022; Alves et al., 2022). Monetary policy influences real economic activity through various channels, including interest rates, monetary aggregates, credit, exchange rates, asset prices, and expectations (Karaca, 2017; Bu et al., 2021). Therefore, identification of monetary policy transmission is important for monetary policy makers in influencing economic growth.

Monetary policy taken by Bank Indonesia requires time lag in influencing economic activity, a transmission mechanism known as monetary transmission. One of the monetary policy instruments issued by Bank Indonesia is discount rate policy. As of January 2020, BI still maintains BI 7-Day RR of around 5%. This figure has persisted since October 2019. The rate is maintained at around 5% because the interest rate is considered to be consistent with the 2019 and 2020 inflation target of 3% (± 1%).

Bank Indonesia has an Inflation Targeting Framework (ITF) program in controlling inflation. The inflation rate, which is the ultimate goal of monetary policy,

throughout 2021 remained under control at around 1,3 percent to approximately 1,8 percent. The inflation rate throughout 2021 can be seen in Figure 1.

The impact of changes in the BI rate on the ultimate goal of inflation will be through various macroeconomic and financial variables. The impact of changes in the BI rate on the ultimate goal of inflation will be through various macroeconomic and financial variables. One of the variables affected by changes in the BI rate is the exchange rate variable. Because, the impact of changes in the BI rate through the exchange rate channel usually works faster than other channels. High spreads between domestic and foreign interest rates will encourage foreign capital inflows, which will cause the rupiah exchange rate to appreciate. The end result is a fall in exports and an increase in imports so that economic growth will decline.

The rupiah exchange rate throughout 2021 can be seen in Figure 2. The exchange rate of the rupiah throughout 2021 experienced an up and down phase. In the second and third quarters, the rupiah underwent depreciation due to uncertainty in the global economy and pressure on the balance of payments of Indonesia (NPI). Then the rupiah exchange rate moved stable in the fourth quarter of 2021 due to the policy adopted by BI to stabilize the rupiah exchange rate in accordance with its fundamental.

The impact of pressure on the rupiah exchange rate will impact export-import activities and gross domestic product (GDP). GDP measures the monetary value of final goods and services—that is, those that are bought by the final user—produced in a country in a given period of time (say a quarter or a year). It counts all of the output generated within the borders of a country.

Data on economic growth for each economic sector in 2019 can be seen in Table 1. Economic growth in 2021 reached a value of 3.69%, this increased in the previous year where economic growth was only -2,07%. This is because the covid pandemic has paralyzed the economic sector in Indonesia. Indonesia's economic growth is still supported by three main sectors, namely other service sectors; health and services companies, information and communication, electricity and gas supply.

Based on these matters, the accuracy in determining the BI rate greatly influences the ultimate goal of the monetary policy. However, the BI rate is not a truly exogenous variable. Determination of the BI rate by BI is highly influenced by various economic factors. The main factors that influence the determination of the BI rate by BI

include (1) inflation developments, (2) exchange rate developments, (3) developments in monetary conditions (such as the money supply, bank liquidity, capital adequacy ratio or CAR, nonperforming loans or NPL, etc.), and (4) developments in global economic conditions. In summary, shocks that occur at the BI rate will affect macroeconomic and financial variables. Likewise, the shocks that occur on factors that affect the determination of the BI rate, will also affect the determination of the BI rate by BI. So, between the BI rate and macroeconomic variables there is a pattern that influences one another or the feedback effect.

Based on the formulation of the problem, the purpose of this paper is to analyze monetary policy shocks in the open economy against macroeconomic variables such as inflation rates, real exchange rates, and economic growth. Research on the shock of monetary policy in several developed countries (such as the Organization for Economic Co-operation and Development or OECD and Europa Union or EU) and developing (such as Indonesia) has been many done and not just using one method, therefore it is deemed necessary to examine the impact of monetary policy shocks (for the case of Indonesia) using another method. This alternative method is seen as able to complement existing studies.

## LITERATURE REVIEW

### Monetary Policy Mechanisms

In an economy, economic policies that are usually taken are divided into 2 types, namely fiscal and monetary policies. One of the policies that is often taken to stabilize a country's economy is monetary policy (Wolf, 2020; Claus & Nguyen, 2020). Monetary policy is a government action in order to achieve the objectives of macroeconomic management (output, prices, and unemployment) by influencing the macro situation through the money market or in other words through the process of creating money or the money supply. Someone said that "monetary policy is manipulating monetary instruments in order to achieve price stability, low unemployment and sustainable economic growth" (Roberts, 2011; Chava & Hsu, 2020)).

Monetary policy relies on the relationship between interest rates in the economy and money supply to influence economic development goals, such as price control (inflation and exchange rates), economic growth, and the unemployment rate (Miranda & Ricco, 2021; Caraiani & Calin, 2020). This is possible because a country's monetary

authority generally has a single authority in printing and circulating official state money, so that the monetary authority can influence interest rates in the economy through its ability to change the money supply to achieve the ultimate goal of policy. The effect of monetary policy on the ultimate goal through various channels such as interest rates, exchange rates, asset prices, expectations, credit, and money (Insukindro, 2022; Furceri et al., 2018). The mechanism is referred to as the monetary policy transmission mechanism. Channels used by the BI rate to influence inflation include:

1. **An interest rate channel**

Expansive monetary policy causes a decrease in the real interest rate thereby lowering the cost of capital to encourage investment which then increases aggregate and output demand. Changes in the BI rate affect deposit rates and bank lending rates. If the economy is experiencing a downturn, BI can use an expansionary monetary policy through lowering interest rates to encourage economic activity. A decrease in the BI rate reduces the lending rates so that demand for credit from companies and households will increase. A reduction in lending rates will also reduce the cost of capital for companies to invest. This will all increase consumption and investment activities so that economic activity becomes more vibrant. Conversely, if inflationary pressure rises, BI responds by raising the BI rate to put the brakes on economic activity too quickly, thereby reducing inflationary pressures.

2. **Exchange rate channels**

The extent to which monetary policy can influence exchange rate movements is greatly influenced by the Uncovered Interest Rate Parity (UIP) theory. The UIP theory shows that changes in expectations of the nominal exchange rate in the future are closely related to differences in domestic and foreign interest rates. In the UIP theory, monetary policy authorities can influence the exchange rate, which in turn will affect the relative prices of goods at home and abroad, thereby affecting net exports and output. An increase in the BI rate, for example, will encourage an increase in the difference between interest rates in Indonesia and foreign interest rates 9Gupta & Marfiatia, 2018).

With the widening of the difference in interest rates encouraging foreign investors to invest capital in financial instruments in Indonesia such as SBI because they will get a higher rate of return. This flow of foreign capital will in turn encourage rupiah appreciation. The appreciation of the rupiah results in lower prices for imported goods

and our export goods abroad become more expensive or less competitive so that they will encourage imports and reduce exports. The decline in net exports will have an impact on declining economic growth and economic activity.

3. **Asset Price Channels**

In traditional monetary theory, monetary contraction through increasing the discount rate of financial assets can cause a decrease in asset prices which will then affect the real economy. The main mechanism through monetary policy shock is caused by changes in equity prices. First, Tobin's Q theory shows that when equity is cheaper than the cost of replacing capital, the company will not issue new equity to buy investment goods thereby reducing investment. Second, the price of equity may have a substantial wealth effect on consumption because of the permanent income hypothesis. An increase in stock prices will increase the value of financial wealth thereby increasing household lifetime resources and demand for consumption and output. Changes in BI interest rates affect the macro economy through changes in asset prices (Andrade & Ferroni, 2021).

An increase in interest rates will reduce the prices of assets such as stocks and bonds, thereby reducing the wealth of individuals and companies, which in turn reduces their ability to carry out economic activities such as consumption and investment.

4. **Expectation Channel**

Expectation channel, usually occurs in developed countries where financial markets function well and deeply. The impact of changes in interest rates on economic activity also affects public expectations of inflation (expectations channel). A decrease in interest rates is expected to encourage economic activity and ultimately inflation encourage workers to anticipate rising inflation by asking for higher wages. This wage will eventually be charged by producers to consumers through price increases.

5. **Credit Channel**

Asymmetrical information on financial markets provides the basis for credit channels in monetary transmission. Imperfections in the credit market can cause monetary contraction so that it leads to an increase external financial premiums faced by borrowers and decreased credit supply. Credit channels originating from imperfections in financial markets are divided into two types, namely bank-lending channel and balance-sheet channel. Bank-lending channels are based on the assumption that

monetary contraction, which can reduce bank reserves and bank deposits, decreases the quality of available bank loans. Channel balance sheet is related to the effect of monetary policy on the net worth of businesses and households. Monetary contractions can reduce a company's net worth through cash flows and the value of its collateral, thereby causing high external financial premiums related to the severity of the moral hazard problem. This reduces the level of loans, investment and output.

**6. Money channel**

In this channel, it is assumed that changes in reserve money will be transmitted to the money supply through the money multiplier, banks in the business will create money in them. The money view of monetary policy assumes that the movement of aggregate demand is in line with the balance of money used for financial transactions and influences the breakdown of nominal GDP between real GDP and the price level.

## METHOD

Method is a method of work that can be used to obtain something. While the research method can be interpreted as a work procedure in the research process, both in searching for data or disclosing existing phenomena (Zulkarnaen, W., et al., 2020). This study uses a quantitative approach in analyzing monetary policy shocks in the open economy against macroeconomic variables in Indonesia. The variables used in this study include the level of domestic prices (P), economic growth (EG), interest rates (IR), and the real exchange rate (R). This research using the Structural Vector model Autoregression (SVAR). This model is composed on the development of the Vector model Autoregression (VAR) based on map of the relationship between variables that exist in the VAR system. Therefore the model This SVAR is known as the VAR model which theoretical (Rizal Rahman, 2018).

Variables used in this study including exchange rates (ER), interest rates (IR), money supply (M2), Gross Domestic Product (GDP) and Inflation (INF). This research using the Structural Vector model Autoregression (SVAR). This model is composed on the development of the Vector model Autoregression (VAR) based on map of the relationship between variables in the VAR system.

This study uses the VAR / VECM estimation method to analyze monetary policy shocks in the open economy against macroeconomic variables in Indonesia. VAR model is a regression equation model that uses time series data relating to the problem of

stationarity and cointegration between variables in it. The first step in establishing a VAR model is to carry out the data stationarity test. If the stationary variable is at the level, we have an unrestricted VAR or VAR model at the level.

Conversely, if the data is not stationary at the level of level but stationary at the level of differentiation, it must be tested whether the data has a long-term relationship or not through cointegration testing. If the stationary data is at the level of differentiation but the variables are not co-integrated, then it is called the VAR in difference model. However, if there is cointegration, the VAR model is called the Vector Error Correction Model (VECM). This VECM model is a restricted VAR model (restricted VAR) due to cointegration which indicates a long-term relationship between variables in the VAR system. One of the benefits of using the VAR approach is the Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD). These two things are useful to see the dynamic characteristics of the VAR / VECM model.

## RESULT AND DISCUSSION

The first step taken in this study is to test the stationarity of the data using the Augmented Dickey-Fuller unit root test or ADF test. The ADF test results can be seen in Table 2. The results of the data stationary test show that all the variables used in this study were not stationary at the level but only stationary at the first distinction level

The second step to test the exision of co-integration between variables then VAR can only be done in the first instance, and can only estimate the short-term relationship between variables. Innovation accounting will not be meaningful for the long-term relationship between variables. If there is cointegration between variables, then VECM can be done using data levels to get a long-term relationship between variables. VECM can estimate short-term and long-term relationships between variables. The cointegration test used in this study is based on trace statistics. Complete cointegration test results can be seen in Table 3.

Based on Table 3, the cointegration test results show that the variables incorporated in this model have 3 cointegrated equations at a critical value of 5%. Because there is cointegration between variables, the VECM estimation method is used in this study. Before estimating using VECM, the next step is to determine the optimal lag length. Determination of the optimal lag length is very useful to eliminate the problems of autocorrelation and heterocedasticity (Gaussian residuals) in VECM.

The optimal lag determination test results, see Table 4, show that the optimal lag based on LR Test Statistics, Final Prediction Error (FPE) Criteria, and Akaike Information Criterion (AIC) is 4 while the Schwarz Information Criterion (SC) and Hannan-Quinnon Criterion (HQ) respectively 1 and 2. So, the optimal lag that will be used in this study is 4.

The next step is to estimate the VECM model with lag 4. The dynamic behavior of the VAR / VECM model can be seen through the response of each endogenous variable to the shocks on that variable or to other endogenous variables. IRF is used to see the response of a variable to the shock of other variables in the model while FEVD is used to see the contribution of a variable in explaining the variability of endogenous variables.

**Forecast Error Variance Decomposition**

After analyzing dynamic behavior via IRF, the characteristics of the model will be seen through FEVD. In Table 5 shows the FEVD for the model in this study.

Based on the results of FEVD, an important source of variation in inflation is the shock to inflation itself with the largest value among other variables, namely 53-62 percent in the second to tenth quarters. The monetary variable shock is quite large and is able to explain inflation with a proportion of 23-27 percent. Furthermore, other monetary variables that become an important source of inflation variation after the economic growth variable are 1 to 4 percent.

Another important source of variation in macroeconomic variables, namely economic growth, is the shock to economic growth itself with the largest value during the second to tenth quarters, which is 22-27 percent. Other monetary variables that become important sources of variation in economic growth during the second to tenth quarters are inflation, interest rates, and exchange rates. Inflation provides a surprise variation to economic growth by 8-14 percent, then the interest rate variable shock gives a variation to economic growth by 6-11 percent. Meanwhile, the exchange rate is a monetary variable that gives variation to economic growth with the smallest proportion, namely 1-2 percent.

## CONCLUSION

This research provides several important findings. First, based on the results of the IRF shows that the shock of monetary policy on economic growth, the level of

domestic prices, and the real exchange rate indicate a puzzle phenomenon. Namely a phenomenon in which the empirical results obtained are not in accordance with existing theories. This means that the facts that occur are not in harmony with the theory. Second, the contribution of monetary policy instruments varies considerably to economic variables such as economic growth, the level of domestic prices, and the real exchange rate. But, the biggest contribution of the BI rate is felt by the variable price (inflation). Generally changes in variables are caused by most changes in the variables themselves.

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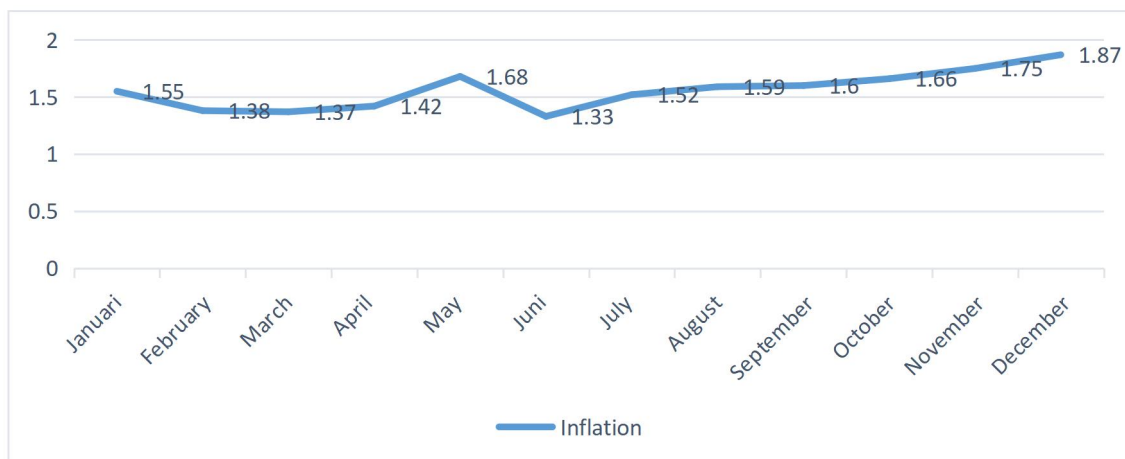
## FIGURE AND TABLE



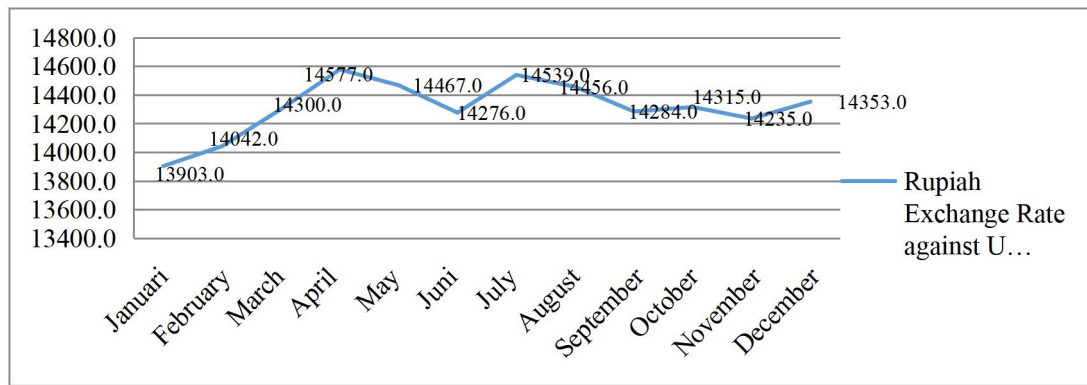Figure 1. Inflation During 2021
Source: Bank Indonesia, 2021

Figure 2. Exchange Rate Indonesia 2021
Source: Bank Indonesia, 2021

Table 1. Economic Growth Data by Sector in Indonesia

| Sector | 2018 | 2019 | 2020 | 2021 |
|---|---|---|---|---|
| Agriculture, Forestry and Fisheries | 3.91 | 3.64 | 1.77 | 1.84 |
| Mining and excavation | 2.16 | 1.22 | -1.95 | 4.00 |
| Processing industry | 4.27 | 3.80 | -2.93 | 3.67 |
| Electricity and Gas Supply | 5.47 | 4.04 | -2.34 | 5.55 |
| Water Supply, Waste Management, Waste and Recycling | 5.46 | 6.83 | 4.94 | 4.97 |
| Construction | 6.09 | 5.76 | -3.26 | 2.81 |
| Wholesale and Retail Trade; Car and Motorcycle Repair | 4.97 | 4.62 | -3.78 | 4.65 |
| Transportation and Warehousing | 7.01 | 6.40 | -15.05 | 3.24 |
| Provision of Accommodation and Food and Drink | 5.66 | 5.80 | -10.26 | 3.89 |
| Information and Communication | 7.04 | 9.41 | 10.61 | 6.81 |
| Financial Services and Insurance | 4.17 | 6.60 | 3.25 | 1.56 |
| Real Estate | 3.58 | 5.74 | 2.32 | 2.78 |
| Company Services | 8.64 | 10.25 | -5.44 | 0.73 |
| Government Administration, Defense and Social Security Mandatory | 7.02 | 4.67 | -0.03 | -0.33 |
| Education Services | 5.36 | 6.29 | 2.61 | 0.11 |
| Health Services and Social Activities | 7.13 | 8.68 | 11.56 | 10.46 |
| Other Services | 8.99 | 10.55 | -4.10 | 2.12 |
| Gross Domestic Product | 5.17 | 5.02 | -2.07 | 3.69 |

Source: Central Bureau Statistics, 2021

Table 2. Stationary Test Results

| No | Variable | Level | | 1st Difference | |
|---|---|---|---|---|---|
| | | t-statistics | p-value | t-statistics | p-value |
| 1. | EG | 0.5200 | 0.6605 | -10.2506 | 0.0000* |
| 2. | IR | -2.1604 | 0.2193 | -3.0823 | 0.0322** |
| 3. | R | -2.3624 | 0.2678 | -4.8492 | 0.0015* |
| 4. | P | -2.3133 | 0.5122 | -6.0395 | 0.0000* |

Note: (*), (**), (***), significant at 1 percent, 5 percent and 10 percent confidence levels.
Source: processed data Eviews 9.0.

Table 3. Cointegration Test Results

| Hypothesis | Trace Statistic | 0.05 Critical Value | Prob. |
|---|---|---|---|
| None* | 73.3241 | 68.8119 | 0.0002 |
| At most 1* | 23.5632 | 46.8262 | 0.0116 |
| At most 2* | 24.4812 | 23.7131 | 0.0389 |
| At most 3 | 12.5126 | 11.4627 | 0.0915 |

Source: processed data Eviews 9.0

Table 4. Optimal Lag Test Results

| Lag | LR | FPE | AIC | SC | HQ |
|-----|-----|-----|-----|-----|-----|
| 0 | NA | 1.62831 | 79.17187 | 78.37254 | 78.25343 |
| 1 | 436.7728 | 9.08165 | 68.33218 | 62.21448* | 69.69362 |
| 2 | 55.48145 | 5.74221 | 61.85417 | 70.03167 | 68.66421* |
| 3 | 21.92715 | 9.07883 | 61.23182 | 72.32714 | 70.41346 |
| 4 | 51.48270* | 4.21462* | 68.14581* | 72.39321 | 68.74144 |

Source: processed data Eviews

Note: *) shows the optimal lag.

Table 5. Forecast Error Variance Decomposition Results

| D (P) | | | | |
|-----|-----|-----|-----|-----|
| Period | D(P) | D(EG) | D(IR) | D(ER) |
| 2 | 62.41 | 4.53 | 23.92 | 3.73 |
| 4 | 53.82 | 3.12 | 24.26 | 3.41 |
| 6 | 60.23 | 1.62 | 27.64 | 3.23 |
| 8 | 56.13 | 2.35 | 27.43 | 4.21 |
| 10 | 53.43 | 1.82 | 25.41 | 3.67 |
| D (EG) | | | | |
| Period | D(P) | D(EG) | D(IR) | D(ER) |
| 2 | 8.94 | 22.82 | 11.32 | 2.32 |
| 4 | 14.03 | 23.56 | 8.24 | 1.46 |
| 6 | 12.65 | 24.31 | 9.45 | 1.53 |
| 8 | 11.78 | 27.24 | 7.03 | 1.84 |
| 10 | 14.25 | 25.16 | 6.52 | 2.51 |

Source: processed data Eviews