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# The Analysis of Monetary Transmission Policy by Interest Rate Channel

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***Abstract:*** *The research objective is 1)To analyze the relationship between interest rates, inflation, IMM, and GDP on the effectiveness of monetary policy transmission in Indonesia. 2)To find out the amount of time needed for interest rates, inflation, IMM, and GDP to measure the effectiveness of monetary policy transmission. 3)To find out the contribution of interest rates, inflation, IMM, and GDP to respond to changes in monetary policy mechanisms. In this study, the author analyzes the mechanism of monetary policy transmission through the interest rate channel or Bank Indonesia Certificate (SBI) from 2007 to 2016. A span of 10 years is considered sufficient to study the description of macroeconomic policies in the monetary field. Variables used in this study include interest rates, gross domestic product (GDP), IMM, and inflation. The analytical tool used by vector auto regression (VAR) is usually used to project a system of time series variables and to analyze the dynamic impact of the disturbance factors contained in the variable system. To answer the first hypothesis and the second hypothesis, this study uses VAR analysis. Basically VAR analysis can be paired with a simultaneous equation model because VAR analysis must consider several endogenous variables together in a model. The final results of this study SBI variable have a long-term negative effect on inflation. When a bank buys SBI, it causes bank liquidity to decrease so that it is not distributed to the public. This condition reduces the money circulating in the community. IMM variable has a significant negative effect on inflation. When a bank experiences excess liquidity, IMM transactions occur with other banks that experience liquidity shortages. Funding is taken from liquidates as working capital. An increase in the real sector which will ultimately affect the decline in the level of inflation. The GDP variable has a positive effect. If the public demand for products exceeds the product supply capacity, then prices tend to increase, so that inflation rises. To prevent this, it must be balanced with an increase in supply.*

***Keywords: Interest Rates, Inflation, IMM, GDP, Monetary Policy Transmission***

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## I. Introduction

The transmission mechanism is the working process of the BI Rate until it finally affects inflation. This mechanism is based on the authority of Bank Indonesia, which initially determines the BI Rate so that it affects the economic and financial sector variables before reaching the final goal, namely inflation. To achieve this goal, Bank Indonesia set the BI Rate, which then affects inflation through the interest rate channel, credit channel, exchange rate channel, asset price channel, and expectations channel. Through open market operations, BI uses the SBI interest rate instrument to influence loan demand and ultimately affects aggregate demand.

The interest rate path is a Keynesian view where real long-term interest rates are most influential in the economy and can be explained by the IS-LM scheme. Monetary policy transmitted through the Interest Rate Path can be explained in two stages (Natsir, 2008). First, transmission in the monetary sector. Changes in monetary policy originating from changes in monetary instruments (rSBI) will affect the development of interbank rates, deposit rates, and lending rates. This transmission process requires a certain time lag. Second, transmission from the financial sector to the real sector depends on its effect on consumption and investment. The influence of interest rates on consumption occurs because the deposit rate is a component of public income (income effect) and credit interest rates as financing consumption (substitution effect). While the influence of interest rates on investment occurs because lending rates are a component of capital costs.

In the monetary policy that uses an inflation-targeting framework, an understanding of the transmission channel of monetary policy in the economy is needed. Because the amount of the inflation target set by the Central Bank and the achievement of the inflation target will be determined by which transmission line is more dominant in the economy. If this transmission mechanism is not well understood, it will result in a lack of credibility of the monetary policy determined. Thus, understanding the transmission mechanism is the key to directing monetary policy so that it can affect the real economy and the price level (Hasibuan, 2012).

The monetary policy transmission mechanism is the channel through which monetary policy can affect the ultimate goal of monetary policy. The standard monetary policy transmission mechanism starts from the

actions of the Central Bank through the change (shock) of monetary policy instruments. The monetary policy mechanism through various channels, including the interest rate channel, credit channel, exchange rate channel, asset price channel, and expectations channel. Meanwhile, monetary policy transmission through the exchange rate channel is still not optimal due to the strong role of market players' expectations in the future macroeconomic conditions. The interest rate channel emphasizes the importance of the price aspect in the financial market to various economic activities in the real sector. In this regard, the monetary policy adopted by the central bank will influence the development of various interest rates in the financial sector and subsequently will affect the inflation rate and real output.

The development of the banking intermediary function will affect the effectiveness of monetary policy in achieving its final target. As is generally known that monetary policy works by regulating the money supply by the monetary authority to be able to control macroeconomic conditions such as price stability and inflation. Under Law No. 23 of 1999 concerning Bank Indonesia and has been amended to become Law No. 3 of 2004, Indonesia's monetary policy is intended to be able to influence the sole objective of stabilizing the exchange rate and maintaining its stability which contains the sense of price stability (inflation rate) and the stability of the rupiah exchange rate so that later after achieving the intended target it will also affect Indonesia's economic growth. One of the instruments used by Bank Indonesia in conducting monetary control is through interest rates. Interest rates or through Bank Indonesia Certificates. Every change in interest rates (interest-rate channel), Bank Indonesia policy will be able to affect deposit rates and bank lending rates. If the economy is experiencing a downturn, BI can use expansionary monetary policy through lowering lending rates to encourage economic activity in the real sector.

The effectiveness of monetary policy and financial system stability can be monitored based on several important parameters that are not directly controlled by the central bank. These parameters such as elasticity of supply, demand for financial assets (securities) and real assets including deposit and lending rates are relatively more influenced by the structure of the financial system such as conditions and levels of financial market sophistication, competition, and the availability of other alternative sources of financing (Miller, 2004). Monetary Policy Effectiveness, namely the extent to which monetary policy pursued by the central bank (in whatever form) has a positive impact on the economy and society, in the sense of ability to increase economic growth; can improve the welfare of the community; can increase employment opportunities; can increase state foreign exchange earnings; and influencing other macro policies.

Research on the mechanism of monetary policy transmission explains how changes in monetary policy instruments can influence other macroeconomic variables until the goal of monetary policy is realized. How much influence on prices and activities in the real sector, it all depends on the behavior or response of banks and other businesses to changes in monetary policy instruments themselves. The impact of changes in interest rates on economic activity also affects public expectations. The decrease in interest rates is expected to encourage economic activity, and ultimately inflation encourages workers to anticipate rising inflation by receiving higher wages. Producers will eventually charge this wage to consumers through price increases. According to classical economists in Sukirno (2010:73) that interest rates determine the amount of investment savings to be made in the economy. Any change in interest rates will cause changes in patterns in household savings and demand for funds for corporate investment. Changes in interest rates will continue before the similarity between the amount of savings, and the amount of demand and investment is reached.

Uncertainty factors and new trends in question include several things. First, the empirical study of the channels of the monetary policy transmission mechanism in Indonesia, which has been suggested previously, has not yet reached the conclusion regarding which channels are more effective in realizing the goal of monetary policy. Second, there are new trends, both occurring in the monetary sector and the real sector, among others: (a) if the financial sector is developing well which is characterized by the effectiveness of the banking intermediary function, the transmission of the interest rate channel will be more effective compared to other channels, (b) along with the stability of the exchange rate, the transmission of the exchange rate channel will be more effective and (c) the channel of inflation expectations will be more effective in line with the increasingly credible monetary policy.

The complexity of the monetary policy transmission mechanism, as described above requires the need for analysis and research to map the operation of various existing transmission channels, whether the money supply channel, credit, interest rates, exchange rates, asset prices, or expectations, following economic and financial developments. Concerning monetary policy and theory, studies on monetary transmission like this usually aim to examine two important aspects. The first is to find out which transmission channels are the most dominant in the economy to be used as a basis for the formulation of monetary policy strategies (Warjiyo, 2004).

This phenomenon is contrary to the theory, which states that when the BI Rate increases, the lending interest rates, and savings interest rates will increase. This situation causes people to prefer to save their money

in savings account or term deposit account so that the government will hold more money and the price level on the market decreases because scarce buyers then the inflation rate will also decrease.

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## II. Literature Review

### 2.1 Monetary Policy

Mishkin (2004) states that monetary policy is all efforts or actions of the Central Bank in influencing the development of monetary variables (money supply, interest rates, lending, and exchange rates) to achieve specific economic goals. Monetary policy is basically a policy that aims to achieve internal balance (high economic growth, price stability, equitable development) and external balance (balance of payments balance) and the achievement of macroeconomic objectives, namely maintaining economic stabilization that can be measured by employment opportunities, price stability and a balanced international balance of payments. If stability in economic activity is disrupted, monetary policy can be used to restore (stabilization measures). The influence of monetary policy will first be felt by the banking sector, which is then transferred to the real sector.

### 2.2 Mechanism of Monetary Policy Transmission

The monetary policy transmission mechanism is the channel by which monetary policy determined by Bank Indonesia reaches the final target, namely controlled inflation. This policy process begins with Bank Indonesia setting the benchmark interest rate (BI Rate), which will affect inflation through the interest rate, exchange rate, asset prices, and credit lines. This mechanism occurs through interactions between the Central Bank, the banking and financial sectors, and the real sector. The mechanism in which the BI Rate changes works to affect inflation is often referred to as the monetary policy transmission mechanism. This mechanism describes the actions of Bank Indonesia through changes in monetary instruments and operational targets affecting various economic and financial variables before finally affecting the goal of inflation (Bank Indonesia).

### 2.3 Inflation

In simple terms, inflation is defined as rising prices in general and in a continuous period. An increase in the price of one or two items alone cannot be called inflation unless the increase is widespread in other goods. The opposite of inflation is called deflation (Bank Indonesia).

An indicator often used to measure inflation is the Consumer Price Index (CPI). Changes in the CPI from time to time show the price movements of goods and services consumed by the public. Since July 2008, the package of goods and services in the CPI basket has been carried out on the basis of a 2007 Cost of Living Survey conducted by the Central Bureau of Statistics. Inflation measured by CPI in Indonesia is grouped into seven expenditure groups (based on the Classification of individual consumption by purpose - COICOP), i.e.:

1. Foodstuffs Group
2. Processed Food, Beverage and Tobacco Groups
3. Housing Group
4. Clothing Group
5. Health Group
6. Education and Sports Group
7. Transportation and Communication Group.

### 2.4 Relationship between Inflation and Interest Rates

Economists call the interest rate paid by banks as the nominal interest rate and the increase in people's purchasing power as the real interest rate. If i express the nominal interest rate, r the real interest rate, and $\pi$ the rate of inflation, then the relationship between these three variables can be written as follows:

$$r = i - \pi$$

The above equation can be rearranged to:

$$i = r + \pi$$

it can be seen that the nominal interest rate is the sum of the real interest rate and the inflation rate. In the above equation, it is seen that the nominal interest rate is the sum between the real interest rate and the inflation rate, which shows that the interest rate can change for two reasons, namely the real interest rate that changes or inflation changes. So there is a positive relationship between the nominal interest rate with inflation where a one percent increase in the inflation rate will cause a one percent increase in the nominal interest rate.

### 2.5 Economic Growth

Economic growth is a process of changing in a country's economic conditions on an ongoing basis towards better conditions for a specified period. Economic growth can also be interpreted as a process of increasing the production capacity of an economy that is realized in the form of an increase in national income.

**2.6 Factors of Economic Growth**

**Human Resource Factors**

Similar to the development process, economic growth is also influenced by human resources. Human resources are the most crucial factor in the development process, the speed of the development process depends on how far the human resources as the subject of development have sufficient competence to carry out the development process.

**Natural Resource Factors**

Most developing countries rely on natural resources in carrying out the development process. However, natural resources alone do not guarantee the success of the economic development process, if they are not supported by the ability of human resources to manage the available natural resources. Included in these natural resources are soil fertility, mineral wealth, mining, forest product wealth and marine wealth.

**Science and Technology Factors**

The rapid development of science and technology encourages the acceleration of the development process, the change of work patterns that were initially using human hands replaced by sophisticated machines have an impact on aspects of efficiency, quality and quantity of a series of economic development activities undertaken and result in accelerated economic growth rate.

**Culture Factors**

Cultural factors have an impact on economic development. This factor can function as a generator or driver of the development process; however, it can also be a barrier to development. Cultures that can encourage development include hard work, honest, tenacious, and so on. While cultures that can hinder the development process including anarchist, selfish, wasteful, corruption, collusion, and nepotism..

**Capital Resources**

Human capital resources are needed to process natural resources and improve the quality of science and technology. Capital resources in the form of capital goods are essential for the development and the continuity of the economy because capital goods can also increase productivity.

**2.7 Effectiveness**

According to Hidayat (1986), effectiveness is a measure that states how far the target (quantity, quality, and time) has been achieved. The higher the percentage of targets achieved, the higher the effectiveness. While the definition of effectiveness according to Prasetyo Budi Saksono (1984) is how much the level of sticking of output achieved with the expected output of several inputs. From the notions of effectiveness it can be concluded that effectiveness is a measure that states how far the target (quantity, quality and time) has been achieved by management, which target has been determined in advance.

## III. Methodology

**3.1 Data and Data Sources**

In this study, the authors analyze the mechanism of monetary policy transmission through the interest rate channel or Bank Indonesia Certificate (SBI) from 2007 to 2016. A span of 10 years is considered sufficient to study the macroeconomic policy in the monetary field — data calculation and analysis using E-views software. Wahyu (2007) explains that E-views stands for Econometric Views. The uses of E-views include data analysis and evaluation, financial analysis, macroeconomic forecasting, simulation, sales forecasting, and cost analysis. Variables used in this study include interest rates, gross domestic product (GDP), interbank money market (IMM), and inflation.

**3.2 Analysis Techniques**

Vector Auto Regression (VAR) is usually used to project a time series variable system and to analyze the dynamic impact of a disturbance factor contained in the variable system. To answer the first hypothesis and the second hypothesis, this study uses VAR analysis. VAR analysis can be paired with a simultaneous equation model because in VAR analysis must consider several endogenous variables together in a model. The difference with the ordinary simultaneous equation model is that in the VAR analysis each variable besides being explained by its value in the past, is also influenced by the past value of all other endogenous variables in the observed model. Besides, in VAR analysis there are usually no exogenous variables in the model.

The advantages of VAR analysis include: (1) This method is simple, we do not need to worry about distinguishing between endogenous and exogenous variables; (2) The estimation is simple, where the ordinary OLS method can be applied to each equation separately; (3) The forecast results obtained using this method are in many cases better than the results obtained using a complex simultaneous equation model. Besides, VAR Analysis is also a handy analytical tool, both in understanding the interrelationship between economic variables and in the formation of a structured economic model.

Next, to answer the first hypothesis, namely how the flow of monetary policy transmission at commercial banks and rural banks through the interest rate channel using the Granger Causality Test analysis. This analysis aims to analyze each variable in influencing the other variables. The second and third hypotheses can be answered using Vector Auto Regression (VAR), and if there is cointegration, the technique used will develop into the Vector Error Correction Model (VECM). VAR is an equation system with n number of endogenous variables, where each variable is explained by its lag, present values and past other endogen variables in the model.

Furthermore, an impulse response function analysis is performed to answer the second hypothesis, which is looking at the response of an endogenous variable to the shocks of other variables in the model. And variance decomposition analysis is performed to answer the third hypothesis, which is to see the relative contribution of a variable in explaining the variability of its endogenous variables.

**3.3 VAR Test Stages**

In the case of stationary data in the differentiation process but not cointegrated, a VAR model can be formed VAR in difference. However, if there is cointegration, a Vector Error Correction Model (VECM) is formed, which is a restricted VAR model given that there is a cointegration that shows the long-term relationship between variables in the VAR model.

1. Stationarity Test (Unit Root Test)

The first step carried out in processing time series data is to test the stationarity or unit root test. Stationary data will tend to approach the average value and fluctuate around the average value or have a constant variation. If the data is stationary, the method chosen is the VAR method, and if it is not stationary, then it uses the VECM method.

This stationary assumption has important consequences for translating data in an economic model because stationary data will not be too varied and tend to approach the average value (Gujarati, 2003).

Stationary data tests were performed using unit root tests and integration tests. A critical concept in econometrics theory is the assumption of stationarity, and this assumption has significant consequences in explaining economic data and models.

2. Determination of Optimal Lag

Determination of the optimal lag using the information criteria is obtained by selecting the criteria that have the smallest value among the various lags submitted. It is possible to construct a VAR model of n equations containing lags of ρ lag and n variables into the VAR model, considering that all variables that are relevant and have economic effects can be included in the VAR model equation.

In this study, the authors used the Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC), Hannan-Quinn Information Criterion (HQ) to determine the optimal lag length. The VAR model will be estimated with different lag levels, and then the smallest value will be used as the optimal lag value.

AIC (k) = T in ((SSR (k))/T) + 2n

SC (k) = T in ((SSR (k))/T) + nln (T)

Explanation :

Q : Number of observations used

K : Lag Length

SSR : The residual sum of squares

In : number of parameters estimated

3. Granger Causality Test

Granger causality test looks at the influence of the past on current conditions so that this test is indeed appropriate for time series data. In the concept of Granger causality, two linear time series data sets are associated with dependent variables and independent variables are formulated in two forms of regression models.

4. Engle – Granger Causality Test

If the independent variable data and the dependent variable contain the unit root element or in other words are not stationary, but the linear combination of the two variables may be stationary. Like the equation below,

$$e\_t = Y\_t – \beta\_0 – \beta\_1 X\_t$$

The interference variable e_t, in this case, is a linear combination. If the interference variable e__t does not contain unit roots, stationary data or I (0), then the two variables are cointegrated, which means they have a long-term relationship. In general, it can be said that if the time series data Y and X are not stationary at the level of the level but become stationary at the same difference (difference) namely Y is I (d) and X is I (d) where d is the same level of differentiation then the two data are cointegrated. In other words, cointegration tests can only be done when the data used in research are integrated to the same degree. The concept of cointegration is basically to find out the long-term equilibrium among the observed variables. In this study, the cointegration

test uses the Engle-Granger test by first starting the regression equation and then getting the residual. From this residual, we then test it with the Phillips-Perron stationary test. Then from the estimated results of the Phillips-Perron statistical value compared with the critical value. The Phillips-Perron statistical value is obtained from the β1 coefficient. If the statistical value is higher than the critical value, the observed variables are cointegrated or have a long-term relationship and vice versa, the observed variables are not cointegrated.

5. VECM Estimation Model (Vector error Correction Model)

VECM is a form of restricted VAR. This additional restriction must be given because of the existence of data forms that are not stationary but cointegrated. VECM then utilizes the cointegration restriction information into its specifications. That is why VECM is often referred to as a VAR design for non-stationary series that has a cointegration relationship.

6. Impulse Respond Function (IRF)

Impulse responses track the response of endogenous variables in the VAR system due to shock or changes in the interference variable. To see the effects of a standard deviation of innovation variables on the current time value and future time values of endogenous variables contained in the observed model (Gujarati, 2003).

7. Forecast Error Variance Decomposition (FEVD)

FEVD is another method of dynamic systems using VAR. If the response to innovation shows the effect of an endogenous policy (shock) variable on other variables. Variance decomposition is used to compile an estimate of the variance error of a variable, namely how big is the difference between variations before and after shock, both shock originating from oneself and shock from other variables to see the relative influence of research variables on other variables. The procedure is by measuring the percentage of surprises for each variable (Alfian, 2011).

## IV. Result

### 4.1 Research Result

**Data Generating Process**

Before entering into the analysis phase of the VAR model, we must first do what is called a data generating process (DGP). DGP includes unit root tests, optimal lag testing, cointegration, and estimation of VAR models. This stage is important because in multivariate time-series models most of the data used contain unit roots so that the estimation results are false (spurious regression) and invalid (Gujarati, 2003).

Data Stationarity Test

**Table 1. Stationarity Test Result**

| Variabel | ADF-test Level | ADF-test 1st difference | Critical test 5% |
|---|---|---|---|
| INFLATION | -2.31 | -4.34 | -2.93 |
| GDP | -3.57 | -6.38 | -2.93 |
| IMM | -2.33 | -5.41 | -2.93 |
| SBI | -4.25 | -7.17 | -2.93 |

From the results of Augmented Dikey Fuller in table 1 above, it can be seen that the GDP and SBI data are at the level stage, while the data must be tested at the first difference level..

**Optimal Lag Testing**

**Table 2. Determination of Optimal Lag Length**

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -817.1034 | NA | 2.22e+14 | 44.38397 | 44.55812 | 44.44536 |
| 1 | -778.5460 | 66.69385 | 6.59e+13 | 43.16465 | 44.03541* | 43.47163 |
| 2 | -757.4601 | 31.91382* | 5.18e+13* | 42.88973* | 44.45711 | 43.44231* |

Table 2 shows that each criterion has a different optimal lag time reference. The LR criterion refers to a zero lag time, while the FPE, SC, AIC, and HQ criteria refer to a lag time of two 5% significance levels.

**Vector Autoregressive (VAR)**

**Table 3. VAR Result**

| | D(INFLATION) | D(GDP) | D(IMM) | D(SBI) |
|---|---|---|---|---|
| D(INFLATION(-1)) | -0.038889 | -0.000487 | 0.118078 | 11218.29 |
| | (0.16497) | (0.07773) | (0.04823) | (22576.4) |
| | [-0.23573] | [-0.00627] | [ 2.44803] | [ 0.49690] |
| D(INFLATION(-2)) | 0.090353 | -0.032329 | 0.035052 | -9525.263 |
| | (0.15903) | (0.07492) | (0.04650) | (21762.6) |
| | [ 0.56816] | [-0.43150] | [ 0.75388] | [-0.43769] |
| D(GDP(-1)) | -0.309664 | -0.504879 | 0.017861 | 14117.45 |
| | (0.38866) | (0.18311) | (0.11363) | (53187.7) |
| | [-0.79675] | [-2.75720] | [ 0.15718] | [ 0.26543] |
| D(GDP(-2)) | -0.606510 | -0.252225 | -0.099818 | 3106.804 |
| | (0.38777) | (0.18270) | (0.11338) | (53066.5) |
| | [-1.56408] | [-1.38058] | [-0.88042] | [ 0.05855] |
| D(IMM(-1)) | 2.164757 | -0.365530 | 0.606925 | 98628.78 |
| | (0.89808) | (0.42312) | (0.26257) | (122900.) |
| | [ 2.41044] | [-0.86390] | [ 2.31145] | [ 0.80251] |
| D(IMM(-2)) | -2.794567 | 0.145247 | -0.509535 | -22108.74 |
| | (0.68061) | (0.32066) | (0.19899) | (93140.2) |
| | [-4.10599] | [ 0.45296] | [-2.56059] | [-0.23737] |
| D(SBI(-1)) | -4.51E-06 | 8.04E-07 | -3.79E-06 | -0.861320 |
| | (2.1E-06) | (9.7E-07) | (6.0E-07) | (0.28062) |
| | [-2.19770] | [ 0.83204] | [-6.32807] | [-3.06930] |
| D(SBI(-2)) | 7.28E-06 | -8.83E-07 | 1.86E-06 | -0.092407 |
| | (3.1E-06) | (1.4E-06) | (9.0E-07) | (0.42011) |
| | [ 2.37302] | [-0.61066] | [ 2.07049] | [-0.21996] |
| C | -0.423056 | -0.114752 | -0.101346 | -1994.525 |
| | (0.77336) | (0.36436) | (0.22611) | (105833.) |
| | [-0.54704] | [-0.31494] | [-0.44821] | [-0.01885] |
| R-squared | 0.586439 | 0.257475 | 0.777721 | 0.404694 |

Based on the table above it is known that for the inflation equation, the coefficient of inflation in the previous period was -0.038. So it can be stated that an increase in inflation of 1% in the previous 1 period will reduce inflation in the current period by 0.038%. Inflation variables in the previous 2 periods, which showed a significant effect, with a coefficient of 0.090353. So it can be stated that an increase in inflation by 1% in the previous 2 periods will increase inflation in the current period by 0.090353%. And simultaneously, there is also a significant influence between inflation, GDP, IMM, and SBI in 1 to 2 previous periods to inflation in the current period. Adj value R2 of 0.468279, thus it can be said that the contribution of inflation, GDP, IMM, and SBI in 1 to 2 previous periods to inflation in the current period amounted to 46.83%.

While in the GDP equation, the coefficient of GDP in the previous 1 period is worth -0.5048. So it can be stated that an increase in GDP by 1% in the previous 1 period will reduce GDP in the current period by 0.5048%. The coefficient of GDP in the 2 previous periods was -0.2522. So it can be stated that increasing GDP by 1% in the previous 2 periods will decrease GDP in the current period by 0..2522%. And simultaneously, there is also a significant influence between inflation, GDP, IMM, and SBI in 1 to 2 previous periods to GDP in the current period. Adj value R2 of 0.045, thus it can be said that the contribution of inflation, GDP, IMM, and SBI in 1 to 2 the previous period to GDP in this period was 4.5%.

In the IMM equation, some variables have a significant effect on GDP in the 2 previous periods, IMM in the 2 previous periods. GDP coefficient in the previous 2 periods -0.0998. So it can be stated that increasing

GDP by 1% in the previous 2 periods will reduce PUAB in the current period by 0.0998%. While the coefficient of IMM 2 for the previous period was -0.509. So it can be stated that an increase in the interbank money market by 1% in the previous 2 periods will reduce the interbank money market in the current period by 0.509%. The coefficient of IMM 1 for the previous period was 0.606. So it can be stated that an increase in the IMM by 1% in the previous period will increase the IMM in the current period by 0.606%. Furthermore, simultaneously there is also a significant influence between inflation, GDP, IMM, and SBI in 1 to 2 previous periods to the IMM in the current period. Adj value R2 is 0.7142; thus it can be said that the contribution of INFLATION, GDP, IMM, and SBI to the IMM in the current period is 71.42%.

In the SBI equation, some variables have a significant effect, namely the SBI in the previous 1 period, which shows a significant effect, with a coefficient of -0.8613. So it can be stated that an increase in SBI by 1% in the previous period will decrease SBI in the current period by 0.8613%. Moreover, simultaneously there is a significant influence on INFLATION, GDP, IMM, and SBI 1 to 2 the previous period of SBI in the current period. Adj value R2 of 0.2346, thus it can be said that the contribution of INFLATION, GDP, IMM, and SBI in 1 to 2 previous periods to SBI in the current period was 23.46%. Table 3 is the estimation results based on VAR. For the inflation variable, the SBI variable significantly influences inflation in the first lag and second lag, with a probability value <0.05. For the GDP variable, the SBI variable significantly influences GDP in the first lag and second lag with probability values <0.05. For the IMM variable, the inflation variable and the SBI variable significantly affect the IMM, in the first lag and the second lag, with a probability value <0.05. For the SBI variable, there are no variables that affect the SBI with a total probability value> 0.05. The results in table 3 of 2007-2016 using the VAR model for Inflation (INF), Gross Domestic Product (GDP), Interbank Money Market (IMM) and Indonesian Interest Rates (SBI) are as follows:

INF = -0.423056 - 0.038889 INF (-1) + 0.090353 INF (-2) - 0.309664 GDP (-1) - 0.606510 GDP (-2) + 2.164757 IMM (-1) - 2.794567 IMM (-2) - 0.00045 SBI (-1) -1) + 0.00728 SBI (-2).

**4.2 Variance Decomposition**

**Tabel 4. Variance Decompotision Inflation**

| Period | S.E | D(INFLATION) | D(GDP) | D(IMM) | D(SBI) |
|---|---|---|---|---|---|
| 1 | 4.1599763 | 100.0000 | 0.000000 | 0.000000 | 0.000000 |
| 2 | 5.065625 | 84.65533 | 3.144789 | 2.542158 | 9.657724 |
| 3 | 5.415973 | 75.46767 | 5.461934 | 7.171606 | 11.89879 |
| 4 | 6.707566 | 58.11698 | 4.417812 | 14.72672 | 22.73849 |
| 20 | 7.1411183 | 53.37736 | 4.071307 | 18.79045 | 23.76088 |
| 40 | 11.768936 | 53.53213 | 4.124264 | 18.86534 | 23.77132 |

In the fourth quarter, all variables had contributed to the estimated error variance, where inflation contributed the most to inflation itself by 58.12%, gross domestic product by 4.42%, interbank money market by 14.73%, and interest rates by 22.74%, for the fourth quarter inflation remained the exogenous variable. For the medium term (20th quarter), inflation contributed the most to inflation itself by 53.38%, gross domestic product by 4.07%, interbank money market by 18.79%, and interest rates by 23.76%, for the 20th quarter inflation remained an exogenous variable.

For the long term, namely the 40th quarter, inflation contributed the most to inflation itself by 53.53%, gross domestic product by 4.12%, interbank money market by 18.87%, and interest rates by 23.77%. For the 40th quarter, inflation remained the most effective contribution to inflation itself being an exogenous variable.

We can see that the contribution of each variable in this study has decreased and also increased in each period. There was a decrease in the contribution of the variable inflation and gross domestic product from the short run to the medium run. While the interbank money market and interest rate variables have increased. Whereas for the medium to long term period, the variables that experienced an increase in contribution were all variables involved, namely inflation, money exchange between banks, gross domestic product and interest rates. But in the long term, the most significant contribution to inflation was inflation itself, which was 53.53%.

## V. Conclusions

The SBI variable has a long-term negative effect on inflation. When a bank buys SBI it causes bank liquidity to decrease so that it is not distributed to the public. This condition reduces the money circulating in the community. IMM variable has a significant negative effect on inflation. When a bank experiences excess liquidity, an IMM transaction occurs with other banks experiencing liquidity shortages. Funding is taken from liquidates as working capital — an increase in the real sector, which will ultimately affect the decline in inflation. The GDP variable has a positive effect. If the public demand for products exceeds the product supply

capacity, then prices tend to increase, so inflation rises. To prevent this, it must be balanced with an increase in supply. Based on the Stationary Test with the ADF Test on First Difference that SBI data, inflation, and GDP are stationary at the level, but the data on the IMM is not stationary at the level. Based on the estimation results based on the PUAB, SBI is significant in the first and second lag, PUAB is significant in the first and second lag, inflation is significant in the first lag. Moreover, estimation results based on inflation, SBI is significant in the first and second lag, IMM is significant in the first and second lag, and estimation results based on GDP, that GDP is significant in the first lag. For the Granger Causality Test, the results show that between the SBI Interest Rate and GDP have a one-way causality relationship, while the SBI in the sense that when GDP fluctuates, it will affect the development of SBI. For the Granger Causality Test, the IMM variable is significant in terms of influencing SBI and IMM is significant in terms of influencing inflation.

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