FACTORS THAT INFLUENCE *MONEY* / M2 *MONEY* IN INDONESIA (DATA PERIOD Q1.2001 - Q4.2015)

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ABSTRACT

This study aims to analyze the demand for money (broad money / M2) with a model that uses the condition of non-stationary data so that it can estimate the need for money in the economy. The period of data studied is from Q1.2001-Q4.2015. The analysis technique used is the *Vector Error Correction Model* (VECM) by conducting data stationarity tests, cointegration tests, lag feasibility tests, VECM Estimates, *Granger Causality Test,* and *Impulse Response Function* analysis to determine the effect of*shock* from other variables.

The results of this study indicate that: 1) GDP has a positive influence both in the short and long term on the money supply (M2); 2) Exchange rates or exchange rates also have a positive influence on M2; 3) Interest rates negatively affect M2;4) Inflation has a positive effect on M2.

Keywords: *Money supply (M2), GDP, exchange rate / exchange rate, interest rates and inflation*

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INTRODUCTION

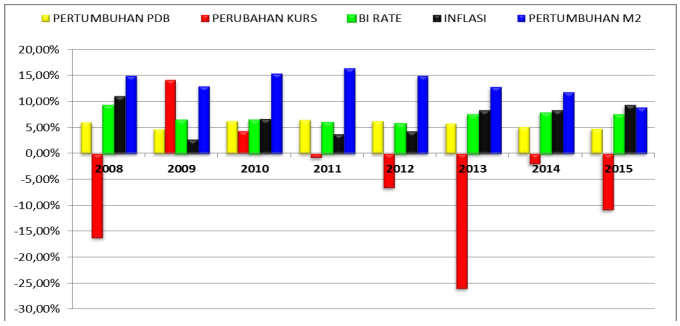
In achieving the one-state economic goals macroeconomic policies that can be used are monetary and fiscal policies. Both of these policies support and complement each other so that goals are achieved effectively. In terms of monetary policy, the main objective of Bank Indonesia (hereinafter referred to as BI) is based on Law No. 23 of 1999, as amended by Law No. 3 of 2004, is achieving and maintaining the stability of the rupiah value to be able to control the inflation rate as targeted.

Money as an economic pulse that facilitates and facilitates all economic activities causes the demand for money to be very large from time to time, so that it will be a problem for a government to make the situation a balance between money demand and supply. In controlling the inflation rate, BI maintains a balance between the money supply and the demand for public money. BI calculates accurately to determine the money supply so that there is no excess supply which can cause high inflation than targeted. Therefore, BI as the monetary authority must be able to determine the variables that must be measured so that the money supply is in accordance with the demand for money. In the table and graph below, we can see the development of the Indonesian economy in the last 8 years with Gross Domestic Product which is always increasing.

Table 1.1.
Development of GDP, Exchange Rate, Interest Rate, Inflation and M2 Money Supply in Indonesia

TAHUN	PERTUMBUHAN PDB	PERUBAHAN KURS	BI RATE	INFLASI	PERTUMBUHAN M2
2008	6,01%	-16,25%	9,25%	11,06%	14,92%
2009	4,63%	14,16%	6,50%	2,78%	12,95%
2010	6,22%	4,35%	6,50%	6,69%	15,40%
2011	6,49%	-0,86%	6,00%	3,79%	16,43%
2012	6,26%	-6,64%	5,75%	4,30%	14,95%
2013	5,73%	-26,05%	7,50%	8,38%	12,79%
2014	5,06%	-2,06%	7,75%	8,36%	11,87%
2015	4,79%	-10,89%	7,50%	9,35%	8,95%

Graph 1.1.
Development of GDP, Exchange Rate, Interest Rate, Inflation and Money Supply M2



From the data presented above we can see that when the 2008 global economic crisis that initially occurred in America then spread to several countries in the world, Indonesia's GDP growth remained stable at 6.01% due to the strong demand for domestic goods and services, especially for private consumption. On the other hand, the most pronounced impact of the crisis was the high inflation and weakening of the rupiah exchange rate which caused the growth of the money supply in this broad sense (M2) by 14 , 92 %. To overcome this problem the

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government takes a policy by raising the BI rate to 9 , 25 % so that the money supply in the community can be absorbed. The positive impact of the policy of raising the new BI rate was felt in 2009 with M2 growth of only 12 , 95 %. An interesting phenomenon also occurred in 2009 originating from non-macroeconomic factors, namely where the Legislative Election and the President that we know together in the short term will have an impact on increasing M2 demand which is quite high, did not occur that year but only emerged in the following year due to increased GDP and Inflation in 2010.

M2 growth at 16.43% in 2011 was closely related to GDP growth which reached 6.49%. As a result of high GDP growth, it encourages an increase in government spending / investment which causes a considerable increase in M2 demand. In this case if the government wants to target to pursue high economic growth, then the consequences that must be considered beforehand are M2 growth which will also experience a fairly high increase. The effect of gross domestic product (GDP) and interest rates on the demand for M2 money supply, namely variations in GDP can cause variations in the money supply, due to demand

Demand is determined by the level of income and interest rate. That is, if national income increases, the demand for money will increase, but because the money supply does not change, there will be excess demand for money in the community. Therefore, the interest rate must be raised to absorb the excess money supply in the community.

Too much money in the community in a government indicates that the country's economy is not good enough to cause a weakening of the exchange rate / US dollar exchange rate and rising inflation in the country. An increase in exchange rates is called depreciation of the domestic currency. Foreign currencies are becoming more expensive, this means the relative value of the domestic currency has dropped. While the decline in exchange rates is called the appreciation of the domestic currency. Foreign currencies are cheaper, this means that the relative value of domestic currencies is increasing. Depreciation of the rupiah against the US dollar resulted in US dollar holders selling their dollars and buying rupiah and then saved in the form of rupiah savings, which caused M2 money supply to increase.

Many studies on the demand for money with various models, but the theory of money demand studied is still often faced with various empirical phenomena that are not easily solved such as the selection of independent variables, form and function models such as linear or non- linear models, short-term money demand models or long term of the model to be estimated and others.

Departing from the above problems, this study tries to find a model that can estimate the demand for money circulating M2 in the future in the Indonesian economy due to the influence of GDP, BI rate, Exchange rate

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and inflation on demand for money, using time series data non-stationary in Indonesia in the period of Q1.2001 - Q4.2015.

METHODOLOGY

This research period began from the first quarter of 2001, with the consideration that at that time the Indonesian economy was in a stable condition, the inflation rate was also under control. Based on these considerations, it is assumed that the demand for rupiah at that time is in equilibrium so that it can be assumed that the demand for money is equal to the money supply (Md = Ms).

The data used is secondary data, namely data obtained from other parties in the form of ready data and published to the public by Bank Indonesia and the Central Statistics Agency. The data used (required) in this study are as follows:

a) M2 data as a dependent variable that shows the money supply in the broadest sense,
b) GDP based on constant prices (base year 2000) as an independent variable that describes the growth and level of welfare of an economy,
c) Inflation as an independent variable that shows the size of the change in price increases,
d) The BI rate is the benchmark interest rate set by Bank Indonesia from July 2005 to the present,
e) Exchange rate as a variable of economic openness, the exchange rate used is the nominal exchange rate of the Rupiah against the Dollar.

With the sampling period during 2001, d. 2015, the number of observations made using quarterly time series data as much as 60 quarters by observing the five variables mentioned above.

The definition of each operational variable used in this study is shown in the table below.

Table 3.1. Operational Definition of Variables

NO	VARIABLE	DEFENITION	SOURCE	SIZE
1	Broad Money/M2	Money circulates in a broad sense consisting of M1 (currency and demand deposits) plus quasi money	Bank Indonesia data	Rasio
2	GDP	Size for growth and level of welfare an economy countries are calculated based on the price of the year 2000	data from the Central Statistics Agency	Rasio
3	Inflation	The increase in the general price of goods is continuously measured by the inflation rate on the basis of the Consumer Price Index	data from the Central Statistics Agency	Rasio
4	interest rate	The interest rate is the benchmark interest rate issued by Bank Indonesia	Bank Indonesia data	Rasio
5	Kurs	The exchange rate of the Rupiah against the United States Dollar	Bank Indonesia data	Rasio

Analysis Method
Vector Autoregression (VAR) Model

VAR analysis can be said to be a very useful analysis tool, both in understanding the reciprocal relationship between economic variables and in the formation of a structured economic model. Broadly speaking, there are four things you want to get from forming a system equations, which basically can be provided with the VAR method, namely: data description, forecasting, structural inference, and policy analysis. Meanwhile, the advantages of the VAR analysis method (Enders, 1995 in Hadi, 2003) include:

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a) Simple, because between exogenous and endogenous variables do not need to be distinguished,
b) The estimation tends to be simple because the Ordinary Least Square (OLS) method can be applied to each equation individually,
c) The forecast results of this method have been proven in many cases to be better than the use of simultaneous equation models.

In the VAR analysis method it is assumed that a variable is a function of the lag of the variable itself and of the past values of all endogenous variables contained in the observed model. In the VAR analysis model there are no exogenous variables.

Based on the form, the commonly used VAR methods are unrestricted VAR, restricted VAR, and Structural VAR. Unrestricted VAR (ordinary VAR) is used when in VAR formation, and data is stationary at the level level. The restricted VAR form is called the Vector Error Correction Model (VECM). Additional restrictions are given because the existence of data that is not stationary but is cointegrated. The VECM specification restricts the long-term relationship of endogenous variables to converge into their cointegrated relationship, but still allows the existence of short-term dynamics. Meanwhile, like VECM, basically Structural VAR (SVAR) is also the form of the VAR that is estimated. The difference lies in the restriction which is based on strong theoretical relationships between the variables used in the VAR system. Therefore the SVAR form is also often referred to as atheoritical VAR.

VECM is used to estimate the model in this study because the characteristics of this method can be used as a forecasting instrument for the estimated variables, it is important to use it as a policy determinant regarding the intended variable.

Empirical Model with Vector Autoregression (VAR)

The equation model used in this study is as follows:

$$M2 = \alpha_1 \sum_{i=1}^{P} \beta_{i1} M2_{t-i} + \sum_{i=1}^{P} \beta_{i1} PDB_{t-i} + \sum_{i=1}^{P} \beta_{i} \; + \sum_{i=1}^{P} \beta_{i1} SB_{t-i} + \sum_{i=1}^{P} \beta_{i1} Inflasi_{t-i} + e_{1t} \quad \text{..... (3.2)}$$

$$PDB = \alpha_2 \sum_{i=1}^{P} \beta_{i2} M2_{t-i} + \sum_{i=1}^{P} \beta_{i2} PDB_{t-i} + \sum_{i=1}^{P} \beta_{i2} \; + \sum_{i=1}^{P} \beta_{i2} SB_{t-i} + \sum_{i=1}^{P} \beta_{i2} Inflasi_{t-i} + e_{2t} \quad \text{..... (3.3)}$$

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$$Kurs = \alpha_3 \sum_{i=1}^{P} \beta_{i3}\, M2_{t-i} + \sum_{i=1}^{P} \beta_{i3}\, PDB_{t-i} + \sum_{i=1}^{P} \beta_{i3}\, Kurs_{t-i} + \sum_{i=1}^{P} \beta_{i3}\, SB_{t-i} + \sum_{i=1}^{P} \beta_{i3}\, Inflasi_{t-i} + e_{3t}$$

$$SB = \alpha_4 \sum_{i=1}^{P} \beta_{i4}\, M2_{t-i} + \sum_{i=1}^{P} \beta_{i4}\, PDB_{t-i} + \sum_{i=1}^{P} \beta_{i4}\, Kurs_{t-i} + \sum_{i=1}^{P} \beta_{i4}\, SB_{t-i} + \sum_{i=1}^{P} \beta_{i4}\, Inflasi_{t-i} + e_{4t}$$

$$Inflasi = \alpha_5 \sum_{i=1}^{P} \beta_{i5}\, M2_{t-i} + \sum_{i=1}^{P} \beta_{i5}\, PDB_{t-i} + \sum_{i=1}^{P} \beta_{i5}\, Kurs_{t-i} + \sum_{i=1}^{P} \beta_{i5}\, SB_{t-i} + \sum_{i=1}^{P} \beta_{i5}\, Inflasi_{t-i} + e_{5t}$$

In equations 3.2 to 3.6 specify the relationship of each variable with all variables studied including the variable itself.

Stages in Vector Autoregression (VAR) Analysis

The preparation of the Vector Autoregression (VAR) model in this study includes several stages. Before the various stages of testing and calculation are carried out, the unit must be equalized first. The next stage is to conduct stationarity test on the data used, determine the maximum lag and optimal lag to be used, perform the VAR model stability test, cointegration test, causality test, and VAR model estimation, and the last is to analyze the results of Impulse Response and Variance Decomposition.

Data stationarity

In conducting research, stationary data is an important prerequisite, especially if the data in the study uses a relatively long time series because it can produce pseudo-regression (between the dependent variable and the actual independent variable). Because it can identify false regression, data stationarity tests can support an explanation of the behavior of a data or model based on certain economic theories. The method used in this stationarity test is the unit root test method or also known as the Augmented Dickey-Fuller Test (ADF), which is formulated as follows (Gujarati, 2003):

$$DX_t = a_0 + a_1 BX_t \sum_1^k bk\, B^k DX_t \qquad \text{..... (3.6)}$$

Where:
DXt = Xt - Xt-1
B = lag operation (backward lag operator)
Xt = variable observed in period t
T = time trend

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In the VAR model it is required to use the same degree of integration, so that if there is data that is not stationary at the level, then the overall data used is first difference data.

Cointegration Test

Cointegration test is intended to find out the behavior of data, whether it has the intended long-term relationship. Cointegration testing needs to be done to avoid phenomena of false regression and complementary testing of stationarity. Then the next step is to do a cointegration test on these variables. There are several ways to test cointegration, including: Engle-Granger (EG) cointegration test and Johansen test.

The hypothesis in this study is: it is assumed that all independent variables consisting of GDP, Exchange Rate, BI rate (Interest Rate) and Inflation, significantly have a positive effect on the M2 dependent variable, except for the Interest Rate variable which has a negative effect. Against this hypothesis, the Johansen test will then be used to conduct cointegration testing. The results of the Johansen Cointegration Test are in the form of a comparison between the Trace Statistic values calculated with a critical value at a confidence level of 5% or 1%. If the value of the Trace Statistic is smaller than the critical value, it can be concluded that there is no cointegration between the two variables.

Feasibility Test Lag

Determination of optimal lag is a very important stage in the VAR model considering the purpose of building a VAR model is to see the behavior and relationships of each variable in the system. For this purpose, several criteria can be used as follows:

Akaike Information Criterion (AIC): $-2 (\int / T) + 2 (k + T)$
Schwartz Information Criterion (SIC): $-2 (\int / T) + k \log (T) / T$
Hannan-Quinn Information Criterion (HQ): $-2 (\int / T) + 2k \log (\log(T)) / T$

Where:
$\int$ = Sum of Squared Residual,

T = Number of Observations,

k = Estimated Parameters.

Determining the optimal lag using the information criteria is obtained by selecting criteria that have the smallest value among the various lags proposed. It is possible to build VAR models as many as n equations containing lags as much as ρ lag and n variables into the VAR model considering all variables that are relevant and have economic effects can be included in the equation of the VAR model.

Stability Testing of the VAR Model

In testing the stability of the VAR model, it can be used AR Roots Table. The stability of the VAR system can be seen from the root inverse values of the characteristics of the polynominal value (Yahya, 2007), which can be seen from the modulus below the AR-roots table. If the overall modulus value is below one, the system is called stable. If the VAR system is stable, the sentence will appear below the test results: No root lies outside the

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unit circle and VAR satisfies the stability condition.

Estimated Vector Autoregression (VAR) Model

The estimation in this VAR study uses the number of lags that have been determined based on the optimal lag calculation criteria. With the Eviews 9 program, six equations for each variable are produced. Furthermore, the implementation of the analysis in the VAR model will be emphasized on Forecasting, Impulse Response Function (IRF), and Forecast Error Decomposition Variance (FEDV).

Granger Causality Testing

The causality test is intended to determine which variables occur first, or in other words, this test is intended to find out that of the two related variables, which variable causes the other variables to change. Among the several available tests, the Granger causality test is the most popular method (Kuncoro, 2003). In this study the proposed hypothesis is assumed that all independent variables consisting of GDP, Exchange Rate, Interest Rate and Inflation, significantly have a positive effect on the dependent variable: M2, except for the Interest Rate variable which has a negative effect. Determination If the probability value of the above hypothesis is smaller than the tolerable error value of 0.05, it is decided to reject H0. This is interpreted that between one variable and another variable mutually influence each other.

Impulse Response Function (IRF)

According to Juanda and Junaidi (2012), the VAR model can be used to see the impact of changing one variable on another variable dynamically. The trick is to give a shock to one of the endogenous variables. The given shock is usually one standard deviation from a variable (called innovations). The search for the effect of shock experienced by a variable on the value of all variables at present and in some future periods is called the Impulse Response Function (IRF) technique. Basically Impulse Response describes the path (path) where a variable will return to its balance after experiencing a shock (shock) from other variables.

RESULTS AND DISCUSSION

Before estimating using the VAR model, the data from the variables to be examined must first be stationary by performing the unit root test. If the time series data used is not stationary at level level, I (0) then the unit data is tested again on the first difference, I (1). In addition to testing the unit roots to get a stable variance, the data can be tested again to see whether there is a long-term relationship or not through a cointegration test. However, if the variables in this study are not entirely stationary at the level but there is a cointegration relationship, it is recommended to use the VECM model (Widarjono, 2007). Then, in this chapter, the results of the

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autocorrelation test will also be shown so that there is no correlation in the error term between periods.

Data stationarity

Stationarity testing is the most important stage in analyze time series data to see whether there is a root unit contained between variables so that the relationship between variables in the equation become valid. Based on unit root test results at the level as shown in the table below it is found that the five variables have unit root, which means original research data is not stationary.

Table 4.1.
Roots Unit Test Results (ADF Test)

Series: LNM2, LNPDB, LNKURS, LNSB, LNINFLASI
Date: 08/03/17 Time: 10:37
Sample: 2001Q1 2015Q4

Method	Statistic	Prob.**
ADF - Fisher Chi-square	81.6932	0.0000
ADF - Choi Z-stat	-6.71091	0.0000

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

Intermediate ADF test results D(GROUP02)

Source: eviews 9 (data processed)

With the initial hypothesis (H0) the data is not stationary, then the result unit root testing at the level indicates that the absolute value of ADF statistics obtained for all variables smaller than the critical value of Kinon Mc. Thus H0 is accepted, which means all research variables have not stationary. Stationarity test results shown in Table 4.1 show that not all research variables are stationary. To ensure the presence or absence of unit root, the stationarity test at the first level of differentiation is continued. From stationarity test shown in table 4.2. obtained a probability that is smaller than alpha 0.05 so that it can be said that all variables are stationary at the first differentiation.

Table, 4.2.
Data stationarity test at the 1st Difference level

Probability	Variables	Conclusion
M2	0.9822	Not Stationary
GDP	0.9692	Not Stationary
Exchange Rate	0.8372	Not Stationary
Interest Rate	0.1108	Not Stationary
Inflation	0.1509	Not Stationary

Source: Eviews 9 (data processed)

Cointegration Test

On variables that are not stationary, but then become stationary after differentiation, there is a high probability that cointegration will occur or there is a long-term relationship between the two (Winarno, 2007). Cointegration test is intended to find out the behavior of data, whether it has the intended long-term relationship. In accordance with one of the research questions in this thesis, the relationship pattern analyzed is limited to the pattern of the relationship between the money supply represented by the M2 instrument and Gross Domestic Product (GDP), Exchange

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Rate (exchange rate), interest rate (SB) and Inflation. The following are the results of the cointegration test with Johansen's method.

Table 4.3
Number of Cointegration Relations

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.594735	102.1622	69.81889	0.0000
At most 1 *	0.309357	50.67892	47.85613	0.0265
At most 2	0.278382	29.58141	29.79707	0.0529
At most 3	0.159858	10.98460	15.49471	0.2124
At most 4	0.018357	1.056086	3.841466	0.3041

Source: eviews 9 (data processed)

Cointegration testing using Johansen's method, as presented in Table 4.3, shows that at the 95% significance level, there is a cointegration relationship between research variables at most 1 equation. Although there is no model with the VAR equation, however, this research will continue to build a model with VECM at the level.

Feasibility Test Lag

Before forming the VAR model it is necessary to determine the optimum lag length, because the exogenous variable used is nothing but the lag of the endogenous variable and also the exogenous variable. To determine the optimum lag, we use the Schwarz Information Criteria (SIC) criteria. The optimum lag length obtained from the results of E-Views based on SIC criteria is 2, as shown in the following table:

Table 4.4. Lag Criteria Test

VAR Lag Order Selection Criteria
Endogenous variables: LNM2 LNPDB LNKURS LNSB LNINFLASI
Exogenous variables:
Sample: 2001Q1 2015Q4
Included observations: 55

Lag	LogL	LR	FPE	AIC	SC	HQ
1	336.5956	NA	8.28e-12	-11.33075	-10.41833	-10.97791
2	389.8194	87.09341	3.02e-12	-12.35707	-10.53222*	-11.65139*
3	416.0184	38.10768	3.04e-12	-12.40067	-9.663398	-11.34214
4	458.1208	53.58482*	1.81e-12	-13.02257	-9.372877	-11.61121
5	488.5941	33.24362	1.78e-12*	-13.22160*	-8.659483	-11.45740

Source: eviews 9 (data processed)

After obtaining the optimal lag value based on the Lag SC creativity test, the second lag is the smallest SC of -10.53222. Then based on optimal lag the results of autoregression estimation are as follows:

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Table 4.5.
Results of the Vector Error Correction Model Estimation

Vector Error Correction Estimates
Date: 02/04/17 Time: 23:32
Sample (adjusted): 2001Q4 2015Q4
Included observations: 57 after adjustments
Standard errors in ( ) & t-statistics in [ ]

Cointegrating Eq:	CointEq1
LNM2(-1)	1.000000
LNPDB(-1)	-8.434602 (0.86324) [-9.77090]
LNKURS(-1)	-0.415815 (0.10127) [-4.10585]
LNSB(-1)	0.004593 (0.00358) [1.28118]
LNINFLASI(-1)	0.004212 (0.00217) [1.94090]
@TREND(01Q1)	0.038411 (0.00543) [7.07424]
C	42.38122

Error Correction:	D(LNM2)	D(LNPDB)	D(LNKURS)	D(LNSB)	D(LNINFLASI)
CointEq1	-0.068205 (0.04242) [-1.60790]	0.220946 (0.02296) [9.62437]	-0.082556 (0.10481) [-0.78764]	-2.497970 (2.65524) [-0.94077]	-9.336639 (8.78087) [-1.06329]
D(LNM2(-1))	-0.273238 (0.16225) [-1.68404]	-0.330737 (0.08781) [-3.76651]	-0.443996 (0.40091) [-1.10746]	10.59938 (10.1563) [1.04363]	23.47785 (33.5867) [0.69902]
D(LNM2(-2))	0.080141 (0.12071) [0.66390]	-0.384950 (0.06533) [-5.89241]	-0.175983 (0.29828) [-0.59000]	-3.591933 (7.55616) [-0.47536]	-4.011375 (24.9882) [-0.16053]
D(LNPDB(-1))	0.488359 (0.26698) [1.82921]	0.528220 (0.14449) [3.65580]	-0.105475 (0.65969) [-0.15989]	-0.799089 (16.7117) [-0.04782]	-66.84654 (55.2656) [-1.20955]
D(LNPDB(-2))	0.120890 (0.23151) [0.52217]	0.214293 (0.12529) [1.71031]	0.343497 (0.57205) [0.60046]	-18.27921 (14.4917) [-1.26135]	-82.30916 (47.9242) [-1.71749]
D(LNKURS(-1))	-1.67E-05 (0.06262) [-0.00027]	0.060016 (0.03389) [1.77093]	0.043923 (0.15473) [0.28387]	-0.775774 (3.91969) [-0.19792]	-13.69608 (12.9624) [-1.05660]
D(LNKURS(-2))	-0.030190 (0.05989) [-0.50412]	0.064783 (0.03241) [1.99888]	0.005884 (0.14797) [0.03977]	2.703943 (3.74856) [0.72133]	-22.13381 (12.3965) [-1.78549]

Source; Calculation Results Eviews 9

Description: *** significant at α = 1%, ** significant at α = 5%, * significant at α = 10%

According to the table above, the value of the R ^ 2 variable number of economic growth explains the dependent variable in the VECM model of 62% and 38% explained by other variables outside the model, the GDP variable describes the dependent variable in the VECM model of 82% and 18% explained by other variables outside the model. Exchange Rate Variables explain the dependent variable in the VECM model of 17% while 83% is explained by other variables outside the model, interest rate growth variables explain the dependent variable in the VECM model is 54% and the other 46% is explained by other variables outside the model. While the inflation growth variable is able to explain the dependent variable in the VECM model only by 35% while the remaining 65% is explained by other variables outside the model.

At the output produced by the author above, based on the t-stat value many variables in the model are not significant when compared to the t-table with a 95% confidence level; df = 34 is worth 2.03. However, this does not merely indicate that the variable is not theoretically meaningful because in the estimation of the VECM model there are stochastic trends and cointegration which causes data to be unable to move freely and data imbalances occur in different time periods. However, all variables in the study have positive Adj R2 values. This indicates

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that there is no misspecification in the research model.

Granger Causality Test

Test with Granger's Causality to see whether a variable has a two-way relationship or only one direction. The following are the results of the causality test using the Granger's Causality method

Table 4.6. Test results of the Granger Causality Test

VEC Granger Causality/Block Exogeneity Wald Tests
Sample: 2001Q1 2015Q4
Included observations: 57

Dependent variable: D(LNM2)

Excluded	Chi-sq	df	Prob.
(LNPDB)	28.22320	2	0.0000
D(LNKURS)	0.284837	2	0.8673
D(LNSB)	3.018927	2	0.2210
D(LNINFLASI)	3.271634	2	0.1948
All	37.83449	8	0.0000

Source: Eviews9 (Data processed)

Based on the results of the Granger / Block Exogenity Wald Test causality test, although each variable proxied as an independent variable is theoretically insignificant only the GDP variable is significant. Simply the significance of a strong GDP variable is caused by the characteristics of the GDP variable as a macroeconomic variable has a reciprocal relationship to variables M2 and other variables in the model besides that because VAR has an atheistic nature or can ignore the existing theoretical structure. But overall these variables have a significant influence on M2. Thus, it can be concluded that all independent variables of GDP, Exchange Rate, Interest Rate, and Inflation significantly have a causality relationship to the money supply (M2).

Impulse Response Function Analysis

The Impulse Response Function Test is used to see the effect of shock from a series / variable on another series / variable. A shock on endogenous variables will affect the variable itself and will spread to other endogenous variables. The IRF gives direction to the relationship of the magnitude of influence between endogenous variables. The estimation made for the IRF focuses on the response of a variable to the change in one standard deviation from the variable itself and from the other variables contained in modelVAR.

M2 Response to Shock or Changes in GDP

The VECM estimation results show that among other variables the economic growth variable proxied by Gross Domestic Product (GDP) has a parameter coefficient R2 of 0.8239 or 82.39% capable of individually influencing the money supply positively and significantly. Long-term and short-term projections of M2 can be seen in the graph below,

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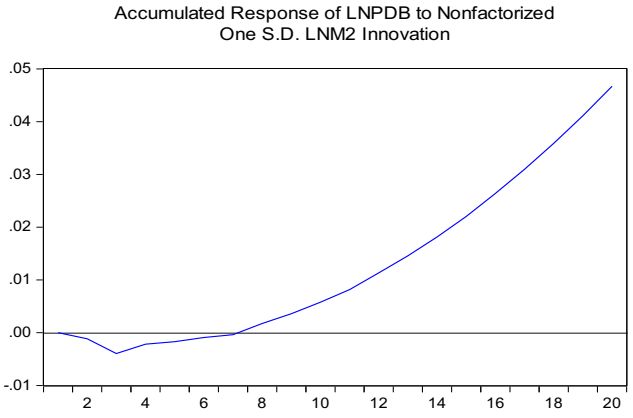
Graph 4.1 Impulse Response to the Money Supply (M2) Against the Absence of GDP Shocks (Economic Growth)



Source: Eviews 9 (data processed)

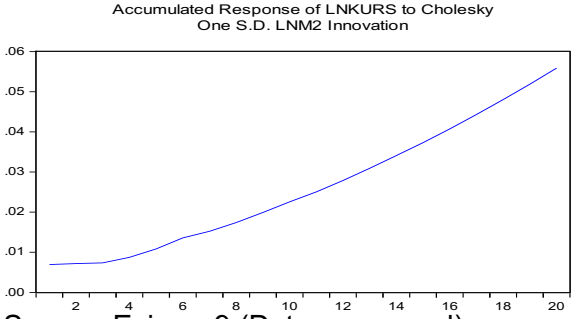
The graph above shows forecasting the money supply in the next 20 time periods with shock (1) (1) standard deviation, in the first period to 20 or in the short term and long term economic growth will then increase the growth of the money supply in society. This can be explained as follows In the broad sense, money supply is the sum of money circulating in the narrow sense with quasi money. Quasi or near money is public deposits in commercial banks in the form of time deposits and savings. Quasi money is classified as money supply, on the grounds that these two forms of public savings can be disbursed into cash by the owner, for various transactions.

The money supply is positively related to Indonesia's economic growth. This means that the higher the money supply, then Indonesia's economic growth will increase. the amount of money has a positive and significant effect on economic growth. Based on the Keynesian hypothesis, namely, the supply of money (Money Supply) has a positive influence on output and economic growth. If there is an excess of the money supply, Bank Indonesia will take a policy (reduce) the interest rate. This condition encourages investors to invest, which in turn will create an increase in output and trigger economic growth. Conversely, demand for money will have a negative relationship to output, rising demand for money will have an impact on increasing interest rates and ultimately resulting in a decrease in output.

M2 Response to Shock / Change in Exchange Rate

The estimation results show that the exchange variable has a coefficient R2 of 0.1731 or 17.31% able to influence the money supply, this can be concluded because the exchange rate or exchange rate can be defined as the external variable of the economy, because the shock arises due to fluctuations in the international economy.

Graph 4.2
Impulse Response Amount of Money Supply (M2) Against the existence of Exchange Rate Shocks (Economic Growth)



Source: Eviews 9 (Data processed)

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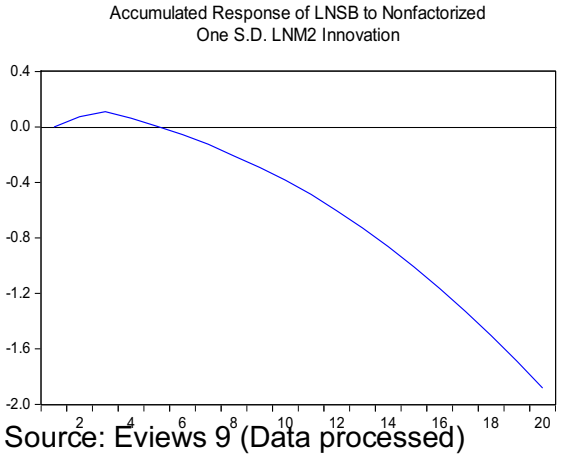
The graph above shows the growth in the money supply due to shock one standard deviation by changes in exchange rates or exchange rates, in the short term from the first to the 4th period the money supply in the community still grows steadily and is slowly caused by adjustments due to changes in value exchange but later in the period of 5 to 20 or in the long term, there is an increase in the money supply that moves constantly and continuously.

This can be explained that the exchange rate has a significant effect on the money supply in Indonesia and the direction is positive. If the exchange rate increases, the money supply will increase, and vice versa if the exchange rate appreciates, the money supply will decrease. This is due to the increase in exchange rates, domestic interest rates have decreased and inflation has increased and in the end the money supply has also increased. This is in accordance with the opinion of Krugman (2003: 111) which states that the decline in domestic money supply causes the domestic currency to experience appreciation.

M2 Response to Shock / Changes in Interest Rates

Based on the impulse response of the money supply (M2) to the shock generated by one standard deviation of the interest rate, it can be seen that there is an increase in the initial 4 periods, but then in the long run a decrease in the money supply in the community.

Graph 4.3
Impulse Response Amount of Money Supply (M2) Against the existence of Interest Rate Shocks (Economic Growth)



Source: Eviews 9 (Data processed)

Partially, domestic interest rates have a significant and negative effect on the money supply in Indonesia. There is a significant and negative influence between domestic interest rates on the money supply in Indonesia which indicates that the money supply in Indonesia is determined by domestic interest in the opposite direction. If interest rates increase, the money supply will decrease. This is due to the interest rate policy in overcoming inflation, because if high inflation is one of the monetary policies to decrease inflation it is to raise interest rates, so that investors invest a lot of capital into Indonesia, and prices of domestic goods can be controlled or experienced decline.

This decline in prices will cause the amount of money in circulation to decrease. Vice versa, if the interest rate decreases, the money supply will increase. This is in accordance with the opinion of Dorbusch (2008: 356), which states that the demand for

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real money balance responds negatively to the interest rate. An increase in interest rates will reduce the money supply. This research is also in line with the opinion of Mishkin (2001: 193), which states that domestic interest rates are negatively related to the money supply, which means that if the interest rate decreases the money supply increases. Research conducted by Rendra (2006) is also in line with the results of this study, which states that domestic interest rates have a significant negative effect on the money supply in Indonesia.

M2 Response to Shock / Changes in Inflation

The inflation parameter estimation coefficient in the VECM equation shows that R2 inflation is 0.36 or it can be said that the ability of inflation to affect the money supply is 36% and the other 64% is explained outside the variable so that inflation can have a positive effect on the money supply.

The impulse response results show that in the short term from 1 - 3 period shows a downward trend this is because for people who have a steady income, experiencing a decline in the value of money Because of inflation, but with adjustments to the level of income then then in the long run in the period the third and so on shows an increase in the money supply in the community because they want and do not want the community to pay more for consumption, so even though the proportion of the level of sales remains low, the amount of money actually increases because of the general increase in the price of goods. Friedman and Schwartz wrote two papers that documented the sources and effects of changes in the quantity of money during the period 1867 - 1960 and 1867-1975 in the United States. Empirically, Friedman and Schwartz managed to verify the relationship between inflation and the growth of the money supply. The results of Friedman and Schwartz's research show that in the United States decades with high money growth tend to have high inflation, and decades with low money growth tend to have low inflation.

The same results were obtained from a comparison of the average rate of inflation and the average rate of growth of money in more than 100 countries during the 1990s. In the study, there is a clear relationship between money growth and inflation. Countries with high money growth tend to have high inflation, while countries with low money growth tend to have low inflation. However, according to Mankiw (2003), the close relationship between inflation and the money supply cannot be seen in the short term. This inflation theory works best in the long run, not in the short term. Thus, the relationship between money growth and inflation in the monthly data will not be as tight as the relationship between them if seen over a period of 10 years. Inflation has a positive impact and a negative impact - depending on whether inflation is severe or not. If inflation is mild, it has a positive influence in the sense that it can drive the economy better, namely

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increasing national income and making people excited to work, save and invest. On the contrary, in times of severe inflation, that is when there is uncontrolled inflation (hyperinflation), the situation the economy became chaotic and the economy felt sluggish. People become less eager to work, save, or invest and produce because prices are increasing rapidly. Recipients of fixed income such as civil servants or private employees and workers will also be overwhelmed to bear and compensate for the price so that their lives will decline and deteriorate over time.

For people who have a fixed income, inflation is very detrimental. We take the example of a retired civil servant in 1990. In 1990, his pension was enough to meet his needs, but in 2003 — or thirteen years later, the purchasing power of his money might only be half. That is, his pension is no longer enough to meet his life needs. Conversely, people who rely on profit based income, such as entrepreneurs, are not harmed by inflation. The same is true of employees who work in companies with salaries following the inflation rate.

Inflation also causes people to be reluctant to save because the value of money decreases even though savings generate interest, but if the inflation rate is above interest, the value of money will continue to decline. If people are reluctant to save, the business world and investment will be difficult to develop, because for the business world to grow it requires funds from banks obtained from community savings. For people who borrow money from banks (debtors), inflation is profitable, because when paying debt to creditors, the value of money is lower than when borrowing. Conversely, creditors or parties who lend money will suffer losses because the value of return money is lower than when borrowing.

For producers, inflation can be profitable if the income earned is higher than the increase in production costs. If this happens, producers will be encouraged to double their production (usually occurs in large entrepreneurs). However, if inflation causes an increase in production costs to ultimately harm the producers, then producers are reluctant to continue production. Manufacturers can stop their production temporarily. In fact, if it is unable to keep up with the inflation rate, the business of the producer may go bankrupt (usually occurs in small entrepreneurs). In general, inflation can result in reduced investment in a country, encourage an increase in interest rates, encourage speculative investment, failure to implement development, economic instability, balance of payments deficits, and a decline in the level of life and welfare of society.

Analysis of Variance Decomposition

If the correlation between economic variables has a small value, it means that it can be said that these variables are not too important (Enders, 2010). Previous analysis was used to track the impact of shocks or

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shock from endogenous variables on other variables in the VAR system. While the analysis of Variance Decomposition describes the relative importance of each variable in the VAR system because of the shock or shock. The following is a table that shows the results of the analysis of Variance Decomposition:

Tabel Variance Decomposition

Variance Decomposition of LNM2:

Period	S.E.	LNM2	LNPDB	LNKURS	LNSB	LNINFLASI
1	0.009440	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.012473	80.49125	17.63269	0.007709	1.650005	1.868337
3	0.014476	79.10211	13.82803	0.220273	4.219976	2.629612
4	0.015790	79.74242	12.46718	0.317556	4.81301	2.659835
5	0.017927	82.59898	9.901479	0.266051	5.122518	2.110971
6	0.019774	79.57807	13.16717	0.220234	4.88763	2.146894
7	0.021265	78.71791	12.5166	0.232314	6.235436	2.297742
8	0.022288	78.51381	12.33801	0.242856	6.564979	2.340346
9	0.023588	79.67852	11.27411	0.216873	6.684975	2.145531
10	0.024816	79.20579	12.03211	0.196223	6.684975	2.105239
AVERAGE	0.018184	81.762886	11.515738	0.192009	4.686350	2.030451

Source: eviews 9 (data processed)

Based on the variance decomposition of growth, it can be seen that in the first period, in addition to being influenced by the variable Money supply itself, the money supply is also influenced by the variables GDP, exchange rates, interest rates and inflation. The contribution of the influence of the GDP variable on the money supply variable (M2) ranges from 0.00% to 27.67%, and the ability of the exchange rate variable to explain the variable economic growth from the initial period to the end of the period. the economy is getting bigger, but in the first period it cannot be explained by the ER ratio. Same with the variable economic growth variable Exchange Rate also in the first period can not explain the movement of economic growth, the ability of Exchange Rate explains the variable Amount of Money Supply and then enlarges in period 2 and so on will contribute in the long run. Based on the results of the variance decomposition it can be seen that the interest rate variable is able to explain the movement of the variable money supply and can be said to remain stable both in the short and long term.

The contribution of the inflation ratio to M2 variability ranged from 0% at the beginning of the period to 23.56% at the end of the period, and the composition of this variance remained stable in the short to long term because it continued to increase.

CONCLUSION

In general, it can be said that the increase in GDP increases the money supply because the GDP has a significant positive effect on the money supply in Indonesia. In addition, based on the estimation results using the VECM model, it can be concluded that:

1) Variables Economic growth in a proxy with GDP has a positive relationship both in the short term and in the long term with the variable money supply or M2, so that if there is an increase in the rate of economic growth, it will automatically increase the

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money supply in society as excess demand for consumption expenditure.

2) VECM analysis also shows that the exchange rate or exchange rate also has a positive relationship with M2 where at the beginning of the period M2 movements are still stable even when entering the 4th period, the shock of the exchange rate against M2 makes an increase in the money supply in society. increasing exchange rates, domestic interest rates have decreased and inflation has increased and in the end the money supply has also increased. This is consistent with the opinion of Krugman (2003: 111) which states that the decline in domestic money supply causes the domestic currency to appreciate.

3) Based on the results of the impulse response, it shows that the interest rate variable is negative with the money supply, if the interest rate increases, the money supply will decrease. This is due to the interest rate policy in overcoming inflation, because if high inflation is one of the monetary policies to reduce inflation it is to increase interest rates, so that many investors invest in Indonesia and prices of domestic goods can be controlled or decreased . This decline in prices will cause the amount of money in circulation to decrease.

4) While the M2 movement caused by inflation shock has a positive trend for 20 forecasting periods, in the initial 3 periods of shock there has been a decrease in M2, but then slowly increased due to adjustments in income and consumption that people inevitably have to do with prices more than before the rise in inflation.

5.2. Suggestion

Based on the conclusions from the research results, several efforts need to be made to stabilize the money supply in Indonesia, including:

1) In taking monetary policy, both expansive and contractive (playing interest rates) need to pay attention to economic conditions. Because it can cause economic growth to decline and can trigger inflation. In addition, it is also necessary to consider the effectiveness of the policy to be determined can really have a positive influence on national economic growth.

2) Bank Indonesia as a central bank should be able to create a stable climate towards the money supply and inflation so as not to disrupt the rate of economic growth. Therefore Indonesian banks as the central bank need information about the development and behavior of the money supply in the community. This is used so that Indonesian banks as monetary authorities can determine monetary policy properly and appropriately so that the economy can run well.

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