Analysis of the Interdependence of Monetary Instruments against Real Money Demand in Indonesia

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Abstract: This research aims to determine how the relationship between variables gross domestic product, interest rates, exchange rates, and inflation against the demand for real money (M1) in Indonesia. The data used in the study of this empirical data for the time series of the year 1987-2017 derived from Bank Indonesia and the Central Bureau of Statistics (BPS). The analysis method in this research is The Vector Error Correction Model (VECM). The results showed there is a direct relationship between the exchange rates with demand for real money (M1). And there is a direct relationship with the demand for real money (M1) with inflation. The results of the study also showed the gross domestic product of influential negative and significantly affect the demand for real money in the short-term. Variable exchange rates, interest rates and inflation effect no effect against the demand for real money (M1) in the short-term. The demand for real money (M1) in Indonesia in the long-term be influenced in a positive and significant by the variable gross domestic product, exchange rates, interest rate. While the variable is a negative and significant effect of inflation against the demand for real money (M1) in Indonesia in the long-term.

1 INTRODUCTION

The money created in the economy aims to launch exchange-traded activities and trade, or in other words, the money was defined as objects that are approved by the community as a mediator to hold someone or trade. Money Kartal is money issued by the central bank both banknotes or coins that are circulating in the community. (Prawoto, 2010:18).

The money supply is often linked to interest rates, economic growth, and the development of prices. The phenomenon is happening in Indonesia showed at the time the money supply increases tend to encourage price increases of goods in General, resulting in inflation. Conversely, when the money supply decreased, economic activity will slow down that led to the decline in production levels that followed price increases of goods.

Request money greatly affects the economy of Indonesia it can be reinforced with the theory of the demand for money. Many of the theories that discuss the request for money. According to the classical doctrine, money has no influence on the rill, no sector of its effect on interest rates, employment opportunities or national income (Nopirin, 2009). At the beginning of this theory is not intended to explain why communities save money. But more on the role of on the money. Therefore some of the theory with familiar classics such as Irving Fisher's theory only describes the relationship the number of coins, turnover, volume, and price of the goods. And Marshall's theory that only describes the relationship of the nominal value of money, prices, income, and the proportion of the demand for money.

The theory of money demand continues to grow and then comes the theory that further deepens the theory Keynes is a theory developed by Baumol and Tobin who explained that requests money for the purpose of transactions affected interest rates (Nopirin, 2007). Because when high-interest rates then that will reduce an individual means of payment in the form of cash and money to expand the securities. Otherwise, once the interest rates low so the individual will reproduce the cash money.

An overview of the linkages of the development of monetary instruments with real money demand (M1) can be seen in the picture below.
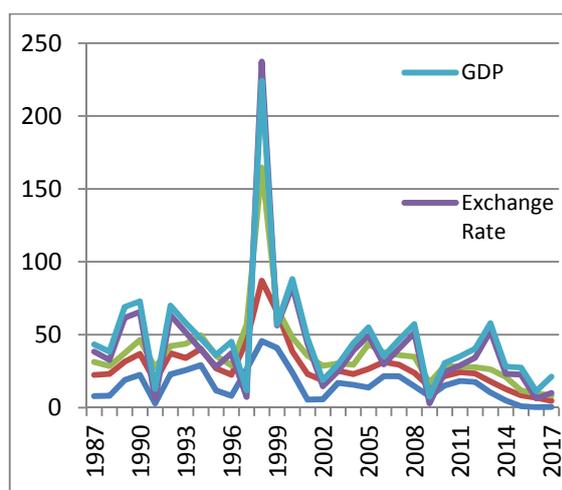
Figure 1: The trend of the real money demand (M1) and monetary instruments variable in Indonesia year 1987-2017

Based on Figure 1 shows that the demand for real money year 2008 experienced a decline of 21.44 percent to 14.63 percent. When the world economy is hit by the global economic crisis, the impact is felt in Indonesia that led to the economic climate in the country also come into effect, the peak occurred in the year 2008. GDP growth the year 2008 noted the development of a fairly good about 14.63 percent in the middle of the occurrence of the external turmoil. In late 2008, however, the exchange rate of rupiah currency from rising of rupiahs per dollar into 9,419 10,950 rupiahs per dollar and at the same time the banks start to tighten its credit policies. Then in mid-2008 world oil prices rising back up to reach above 145 U.S. dollars per barrel and followed a financial crisis in America in 2008. The economic impact on the countries of Europe, Asia and Indonesia are also included. Finally back pressing the rupiah exchange rate in 2008 reached almost 10,950 rupiah per dollar. Changes in interest rates and the sharp inflation occurred in the year 2008, inflation has a high influence on the demand for real money (M1).

Thus, the phenomenon of money demand monetary interest to research. Identify economic quantities that affect the demand for money through various studies theory, empirical studies and the phenomenon of data that has been done previously showed the importance of the development of research request for money in Indonesia. In General, this research examines the relationship between the independent variable and the dependent variable in the short-term and long-term. The purpose of this research is to analyze the association between variables Bank Indonesia interest rate (BI Rate),

inflation (INF), the exchange rate (EXC), and the GDP against the demand for real money (M1) in Indonesia.

2 THEORETICAL FRAMEWORK

Money has a negative relationship with the level of interest rates. Keynes stated that the community has confidence the presence of a normal interest rate. If the securities are held at the time the interest rate goes up, it will be incurred losses. This can be avoided by way of reducing the Securities and adds cash money. The higher the interest rate, the higher the cost of holding cash money anyway so desire cash money holding it down. Conversely, when interest rates go down means the cost of holding money in cash is also getting low so cash money demand rises (Nopirin, 2009).

Purchasing Power Parity theory predicts that the decline in domestic purchasing power of the currency indicated by the domestic price level would relate to currency appreciation proportionately. In short, there are two versions of the theory of purchasing power parity, i.e. the interpretation of absolute and relative. According to the interpretation of the absolute purchasing power parity, a comparison of the value of one currency with another currency (exchange rate) is determined by the price level in their respective countries. So the exchange rate is based on a comparison of purchasing power. While according to the interpretation of relative purchasing power parity exchange rate saying that power parity based on price changes (Nopirin, 2009).

In the quantity theory of money theory of money demand, Fisher and Keynes ware mainly for the purpose of the transaction stated that demand for money depends on income. The higher the income, the greater the desire then would cash money. It can be seen from the behavior of the community level high revenues, will usually do more transactions than the community that its revenues are lower. This means that when revenues increase, then spending more and more money so that also to deals increases (Nopirin, 2009).

3 RESEARCH METHOD

The data will be used in this research in the form of secondary data. Secondary data that will be used is the data time series during the year 1987-2017

which is the total amount of data Bank Indonesia interest rate (BI Rate), inflation (INF), the exchange rate (EXC), and the GDP against the demand for real money (M1) in Indonesia. The data can be taken from the Bank Indonesia (BI) and the Central Bureau of Statistics (BPS) or via the official website of each of the institutions (www.bi.go.id and www.bps.go.id).

Methods of data analysis used in this study was a statistical analysis method with equation model VECM (vector error correction model) which consists of the initial test variables by using the root test a unit test that uses Augmented Dickey-Fuller. If the present level of stationary data then continued with the usual VAR equations (VAR unrestricted) which comprise two equations to determine the optimal VAR order and continued with the Granger test method using Johansen. The last stage is doing the estimation methods of VAR and accompanying the VECM, namely test causality, function response to shock (the Impulse Response Function/IRF), and decomposition of variants (Forecast Error Variance Decomposition/FEVD). This study uses statistics programs help E-Views version 7.

4 ANALYSIS

4.1 Stationer Test

The first thing to do is to examine whether the data is stationary or not. This Stasioneritas test needs to be done because a regression analysis should not be done when the data used is not stationary and normally if it still has done the resulting equations then are a spurious regression. The test methods used in this Test method is stationeries Unit Root Test or also known as the test of the Augmented Dickey-Fuller (ADF).

4.1.1 Unit Root Test

The value of the test results with the Augmented Dickey-Fuller (ADF), indicated by the value of the statistical regression coefficients t on the observed variable (X). If the value is greater than the value of the ADF test critical values MacKinnon on the level of the 1 percent, 5 percent, or 10 percent, then the stationary means data.

Based on table 1 that Bank Indonesia interest rate (BI Rate), and the demand for real money (M1) in Indonesia is not significant at the $\alpha = 5$ percent. Because not stationary at the zero degrees, then it

needs to be done again using stationarity test the degree of integration of the single.

Table 1: Unit Root Test Results

Variables	Value ADF	Critical Value McKinnon ($\alpha = 5\%$)	Desc
M1	-1.178163	-2.971853	Non-Stationary
GDP	-3.918175	-2.963972	Stationary
EXC	-3.292333	-2.963972	Stationary
BI Rate	-1.566971	-2.963972	Non-Stationary
INF	-5.751641	-2.963972	Stationary

4.1.2 Integration Test

A test of the degree of integration is a test done to measure at the level of difference to how data all the variables are stationary. The taking of decision is when the count of an ADF variable is greater than the critical value of MacKinnon, means the variable is stationary, and vice versa.

Based on table 2 that variable Bank Indonesia interest rate (BI Rate), inflation (INF), the exchange rate (EXC), and the GDP against the demand for real money (M1) in Indonesia has been stationary at the same degree, that is one degree, shown from the ADF value calculate more than the value of the critical (Mackinnon critical values) at $\alpha = 5\%$. Thus, the Granger test requires a stationary data at the same degree can be used.

Table 2: Integration Test Results

Variables	Value ADF	Critical Value McKinnon ($\alpha = 5\%$)	Desc
M1	-4.327986	-2.971853	Stationary
GDP	-6.849849	-2.967767	Stationary
EXC	-6.776012	-2.967767	Stationary
BI Rate	-5.525270	-2.967767	Stationary
INF	-6.249907	-2.967767	Stationary

4.1.3 Cointegration Test

Granger test is a test of unit roots test and degree of integration. Granger test meant to know the behavior of the data in the long term between related variables is there Granger or not as you see fit by economic theory. To do this test used Granger Johansen test. The taking of decision is when the value of the Trace Statistic>Critical Value and the value of Max-

Eigen Statistics>Critical Value, meaning between these variables in long-term relations equilibrium, and vice versa.

Table 3: Cointegration Test Results

Hypothesis	Trace Statistic	Critical Value (α = 5%)	Prob
None*	159.3965	68.81889	0.00000
At most 1*	94.54151	47.85613	0.0000
At most 2*	45.73188	29.79707	0.0004
At most 3*	19.68411	15.49471	0.0110
At most 4*	8.431014	3.841466	0.0037

Based on table 3 that there are equations that model in Granger. Thus, an appropriate model to be used in this research is the Vector Error Correction models (VECM).

4.2 Estimation Vector Error Correction Model (VECM)

Based on table 4 provides statistical information for each equation of variables DM1, DGDP, DEXC, DBIRATE and DINF and the very bottom is the information thoroughly. Numbers in brackets show the first standard error numbers are locked up while the bottom shows a value of the t-statistic.

VECM estimation results in the table above show that in the long run, the first of the variable gross domestic product had a positive relationship towards the demand for real money amounting to 0.052397 and a significant increase in the probability of 10 percent. These results show that long-term changes in the gross domestic product will be followed by the demand for real money with direct direction. If an increase in the amount of 1 billion rupiahs in a gross domestic product will be followed by an increase in the demand for real money amounting to 0.052397 percent.

Second, the variable exchange rate against the real money demand relationship 0.788160 of positive and significant at probability 10 percent. Thus, in the event of an increase of 1 percent on the exchange rate of 1 the rupiah per dollar will be followed by a decrease in the demand for real money amounting to 0.788160 percent.

Third, the variable interest rate against the demand for real money has a positive relation of 0.376107 and significant at probability 10 percent. Thus, in the event of an increase of 1 percent on the interest rate will be followed by a rise in the demand for real money amounting to 0.376107 percent.

Fourth, variable Inflation against real money demand relationship -0.353164 negative and significant at the 10 percent probability. Thus, in the event of an increase of 1 percent in Inflation will be followed by a decrease in the demand for money is real of 0.353164 percent

Table 4: Estimation VECM Test Results

Variables	Coefisien	t-statistic	t-table	Interpretation
		Short-Term		
CointEq1	-0.026682	-0.17219	1.708	-
D(LNM1(-1))	0.376741	1.25117	1.708	Significant
D(LNM1(-2))	-0.503353	1.78474	1.708	Significant
D(LNGDP(-1))	-0.022355	-0.86417	1.708	No Significant
D(LNGDP(-2))	-0.025873	-1.13753	1.708	Significant
D(LNEXC(-1))	-0.090153	-0.82788	1.708	No Significant
D(LNEXC(-2))	0.066214	0.64058	1.708	No Significant
D(LNBI_RATE(-1))	-0.085115	-0.95540	1.708	No Significant
D(LNBI_RATE(-2))	0.049293	0.77486	1.708	No Significant
D(LNINF(-1))	0.040693	0.76302	1.708	No Significant
D(LNINF(-2))	-0.000278	-0.00811	1.708	No Significant
C	0.004730	0.28041	-	-
		Long-Term		
LNM1(-1)	1.000000	-	-	-
LNGDP(-1)	0.052397	1.06432	1.708	Significant
LNEXC(-1)	0.788160	11.6121	1.708	Significant
LNBI_RATE(-1)	0.376107	3.34553	1.708	Significant
LNINF(-1)	-0.353164	4.56870	1.708	Significant
C	-0.192489	-	-	-

On the model of equation VECM, where each variable influence each other (exogenous) and may also be affected (endogenous). The first equation, DM1 which is a query variable real money as an endogenous variable is affected by the variable demand for real money yourself (DM1), gross domestic product (DGDP), exchange rates (DEXC), the interest rate of Bank Indonesia (DBI RATE) and inflation (DINF) next could be explained on the model equations are given below. The resulting equation in the VECM estimation is as follows:

$$D(LNM1) = 0.004730 - 0.022355 \ D(LNGDP(-1) - 0.025873 \ D(LNGDP(-2)) - 0.090153 \ D(LNEXC(-1)) + 0.066214 \ D(LNEXC(-2) - 0.085115 \ D(LNBI \ RATE(-1)) + 0.049293 \ D(LNBI \ RATE(2)) + 0.040693 \ D(LNINF(-1)) - 0.000278 \ D(LNINF(-2)) - 0.026682 \ ECT$$

As for the VECM equation for the long-term are as follows:

$$LNM1 = - 0.192489 + 0.052397 \ LNPDB(-1) + 0.788160 \ LNEXC(1) + 0.376107 \ LNBI \ RATE(-1)) - 0.353164 \ LNINF(-1)$$

The first equation with endogenous variables requests real money (M1), where a variabel gross domestic product, inflation, exchange rate and a variable interest rate do not give significant effects against the movement of real money demand. The demand for real money (M1) was also significantly influenced by the movement itself on two and one years earlier. Real money demand relationship

pattern (M1) and himself is negative except for the previous two years related positively. The relationship of real money demand and gross domestic product are insignificant and have a positive relationship for the two to a year earlier. The relationship between real money demand and inflation was not significant and has a negative relationship for two to a year earlier. Real money demand a relationship and exchange rate were not significant and negative except for two months before that deal was positive. Real money demand relationship and significant interest rate on one-month before and have a positive relationship one year earlier and have a negative relationship to the previous two years.

The results of this equation indicates that any increase in the product gross domestic at this time, it will be an increase in the demand for real money in the next one to two years. The increase in Inflation at the moment will have an impact on the decline in the demand for real money one and twenty years after. The increase in the exchange rate when. This will result in increased demand for real money one year later, but then leads to a decrease in the two years thereafter. An increase in the current interest rate will lower the demand for real money in one year afterward. but later led to a decrease in the two years thereafter. Within the same way, we can interpret the equations with the dependent variables etc.

4.3 Estimation Impulse Response Function (IRF)

To know a variable response to changes or shock that occurs from the variable itself with other variables in this study used the analysis of impulse response. Following the results of the analysis of impulse response:
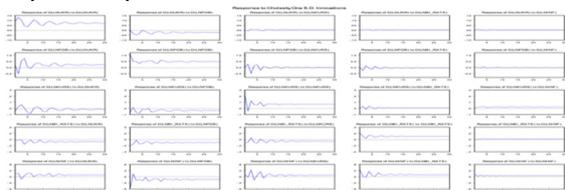
Figure 2: The Impulse Response Function

The variable demand for real money (M1) at the change of one (1) standard deviation experience a decrease. The response continues to be negative with declining small fluctuations after the next 10 years. The GDP variable on changes one (1) standard deviation of GDP alone showed the value of positive response at one year next and experience negative response on one the following year. Next at one month later inflation experience positive and negative responses one month there after in turns until the end of the period.

4.4 EstimationVariance Decomposition

After he had done the testing against the impulse response, then the next to perform testing of the decomposition of the variant that aims to find out donations variant of variables against the demand for real money (M1).

In the first period, the analysis of variance showed that the decomposition forecast error variance from the demand for real money on the first period determined by himself in the amount of 100 per cent, while the variable contribution of gross domestic product, exchange rate, Bank Indonesia interest rates and inflation are not able to explain the variability of the demand for real money (M1) of 0 percent.

5 CONCLUSIONS

The condition is the amount of money circulating in the economy of Indonesia is dominated with the influence of interest rates and inflation. It refers to the theory the interest rate transmission explained that the role of the monetary sector is still pretty. It is important in controlling the number of money in circulation. The Government through the Central banks still hold strong control to control the economy in Indonesia. Economic growth was also considerable effect on rates interest rate, inflation and the amount of money in circulation. But based on the results of impulse response, these variables quickly back to a point of stability caused economic growth only give short-term influence.

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