Analysis of Money Demand in Indonesia Period 2009-2018

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Abstract

The research aims to analyze the effect of exchange rate, equivalent rate, third party fund (DPK), index production industry (IPI), inflation, and interest rate on the money demand (M2) in Indonesia. The research implements Error Correction Model (ECM). The results indicated that, the five variables (inflation, exchange rate, industrial production index (IPI), equivalent rate and third party fund (DPK) significantly affected money demand (M2) both in short term and long term. Meanwhile, in the short term interest rate has a negative and not significant effect on money demand (M2) and in the long term interest rate has a negative and significant effect on money demand (M2) in Indonesia.

Keywords: Money Demand (M2), index production industry (IPI)), equivalent rate, third party fund (DPK), Inflation, exchange rate, Interest Rate and Error Correction Model (ECM).

A.   Background of Study

Money demand examines what motivates people to hold money balances. Assuming from the estimations of money demand equations, the monetary authority can adopt which monetary policies are better to implement under the present economic situations. A balanced demand function for money has long been considered as a requirement for the use of monetary aggregates in the establishment of policy (Goldfeld and Sichel, 1990). The effectiveness and success of a monetary programme crucially depend on a stable money demand function. The stable money demand function ensures that it would have predictable impacts on other economic variables such as inflation, interest rates, national income, exchange rate and private investments (Halicioglu and Ugur, 2005). The economists have identified three major motives for holding money: (a). transactions, since money is the medium of exchange. (b). as a precautionary motive. (c). to subtract the riskiness of a portfolio of assets by including some money in the portfolio, since the value of money is very stable compared to stocks, bonds, or real estate. The importance of money demand to the economy makes the theory continued to controversy and develops from time to time. The debate over the theory of demand for money cannot be separated from the debate between the two poles (Classic and Keynes). Money demand for transactions and precautions are depending on the income level where an increasing income affects the money demand and the rising in interest rates may lower the money demand. If the

economy of a country is a human body, then the heart will be the central bank that works to pump blood to give life to the whole body, the central bank pumps money into the economy to make it stay healthy and grow. Sometimes economies need less money and sometimes they need more.

For any central bank, issue of the money demand function is one of the most important guiding policy issues that help decide whether to use the monetary targeting strategy or inflation targeting strategy in the monetary policy in bringing the desired changes in the economy. Stable money demand function enables the central bank accurately to predict money demand and hence control the money supply (using monetary policy instruments) in order to reach the primary goal of monetary policy and price stability. In recent years, a commercial bank is the core of the financial system in each country. The basic business bank such as raising funds from excessive parties then channeling them back to the society within a certain period of time. The presence of Sharia Banks is one solution to increase public confidence in banking activities, especially in Indonesia. The implementation of a profit-sharing system is the cornerstone in their operational, either in funding, deposit and financing. In the profit-sharing method, inflation typically favors employers and automatically increased the revenue of depositors. Extra money demand resulting in increased income entrepreneurs. In the practicing of profit sharing method, the profit will be accepted by the banks and depositors in accordance with nisbah. Therefore, Islamic banks more responsive to inflation and customers do not have to worry about the level of inflation and interest rates.

The existence of Islamic Banking is expected to be a solution to the failure of the interest-based banking system. Even though inflation continues to occur, the presence of Sharia Banks is still evident from the growth of third party funds (DPK) collected by Islamic Banks. Based on the research, the Islamic banking system is more resistant to crisis compared to conventional banks. These indicated by several indications; (1) Growth in deposits, assets, labor costs and output (financing and operating income) on average, both before and after the global crisis, tends to increase; (2) The efficiency of Islamic banking before and after the global crisis, generally included in the efficient condition; (3) There is no significant difference in efficiency performance Islamic banking before and after the global crisis; (4) The profit sharing system, profit orientation and long-term profits and partnership relations between banks and customers are one of the factors supporting the resilience of Islamic banking facing the economic crisis. Even though, Islamic bank third-party funds (DPK) experienced growth every year, yet Ismal (2011), explained that the motives of customers to invest their capital through Islamic banks are based on several motives; (1) religious motives, (2) motives for maximum profitability, and (3) motives to obtain banking transaction facilities. Third party funds are funds collected by banks originating from society, either individuals or business entities. Third party funds (DPK) have a greater proportion than other funding sources, therefore Islamic banks are always trying to increase third party funds (DPK).

A country's economic stability is closely related to the performance of financial institutions. Economic stability is a benchmark for sustainable economic development. However, the problem of economic stability is also a classic problem for developed

countries that face problems of stability and economic growth. Research on money demand based on the Islamic economic system is still rare in Indonesia. Thus, it is expected that the presence of this research will provide enrichment in academic literature and other research related to the demand for money based on the Islamic economic system. In addition, this research will contribute additional forms of third party funds and equivalent level variables that have not been widely used. This research will use the variable money demand (M2), industrial production index (IPI), inflation, interest rates, exchange rates, third party funds (DPK) and the equivalent exchange rate.

B.   Problem's Formulation

How are the effect of third party fund, equivalent rate (profit sharing), inflation, industrial production index (IPI), interest rate, exchange rate on money demand (M2) in Indonesia?

C.   Literature Review

The literature review in this research, begins with the study of several theories related to the topics discussed. The theory is discussed as a basis for testing its truth. In addition, it also traced the results of previous related studies, hence it can be seen the findings and models used.

Money demand theory: from an economic point of view, money is an asset that can be used for transactions. According to (Samuelson, 2001: 186) money is everything as a medium of exchange or payment tool that generally accepted. There is a difference of opinion among economists about how to define the most appropriate money. Two basic approaches are used: transaction approach and liquidity approach (Widayatsari and Mayes, 2012: 23). The definition of money demand can be divided into two: limited understanding and broad understanding. In a limited understanding, money demand is the currency in circulation plus demand deposits owned by individuals, companies and government institutions. In a broad sense, money demand includes: (i) currency in circulation, (ii) demand deposits, (iii) quasi money, quasi money consisting of time deposits, savings and foreign (private) foreign currency (savings) accounts. Money demand in this broad sense is also called economic liquidity or M2. The narrow sense of money demand is always abbreviated with M1 (Sukirno, 2012: 281).

Inflation theory: Inflation is a tendency to increase prices in general and continuously (Boediono 1999). An increase in the price of one or two goods cannot be called inflation, unless the price increase results in an increase in the price of other goods. In the long run, inflation is believed to be a phenomenon in the monetary concept. In the short term, inflation is influenced by the relative elasticity of wages, prices and the interest rate. Therefore, there are fundamental differences about the factors that cause inflation. Types of inflation classification According to Nopirin (1997): creeping inflation, which is inflation at a rate of less than 10% per year. Galloping inflation is inflation rate of more than 10% to less than 100% per year. hyperinflation is the rate of more than 100% per year. Inflation has a bad impact on the economy, individuals and society as follows: (1) Inflation

creates uncertainty regarding economic conditions in the future which will reduce investment. (2) causing a balance of payments problem (deficit) due to bad inflation to the economy and society. (3) worsen the distribution of income. (4) real income decreases. Inflation as a macroeconomic phenomenon, is not only caused by economic variables, but also by social and political variables. This is because of the invisible hand which is very easy to change. Efforts to understand the level of inflation in a country require an understanding of aspects that in fact affect the inflation rate significantly. Therefore, we can choose one or a combination of existing theories. A number of theories (Mandelker and Tandon 1985; Geske and Roll 1983; Vows 1987; Taguchi 1995; Adrangi, Chatarth and Raffiee 1999; Black, Coriigan, and Dowd 2000) state that, inflation is influenced by the money demand, government spending and the exchange rate.

Interest rate theory: interest rate is the price of using money for a certain period. In addition, interest rates can also be interpreted as a price to be paid if there is an exchange between one rupiah today and one rupiah later (Boediono, 2001: 76). According to (Sasono, 2003: 239), interest rates are the price of the use of money for a certain period or the price of the use of money at this time will be returned at a future time. Indonesian interest rates are divided into several parts, one of which is the BI rate. It is a policy interest rate that reflects the monetary policy stance set by Bank Indonesia and announced to the public (Bank Indonesia). According to (Sunariyah, 2004: 81), several functions of interest rates are as follows: as an attraction for customers who have more funds to invest and interest rates can be used as monetary tools in order to control the supply and demand of money circulating in an economy.

Industrial production index (IPI) theory: the Industrial Production Index (IPI) is an economic indicator released by the board of the US Federal Reserve Bank, measuring changes in the value of total inflation adjusted for production output from producers, mining companies, electricity, water supply and the gas industry. It is usually does not include the construction industry. Industrial production index (IPI) is usually arranged to measure the increase and decrease in production output. The reference year for the index is 2000 and the base level is set at 100. The data used in preparing this report was obtained from the Bureau of Labor Statistics and trade associations. The data includes all physical inputs and outputs used in the production process. Industrial production index (IPI) is usually released to the market on a monthly basis, around 16 days after the month of review is over. Release time is 9:15 US Eastern Time. The data was released on the federal reserve bank's webpage and also in an independent news feed from bloomberg and reuters thomas.

Exchange rate theory: the exchange rate (foreign exchange rate) is the relative price of a country's currency against another country's currency (Abhimanyu, 2004: 6). Basically, the exchange rate is influenced by foreign exchange demand and supply. There are several factors that affect foreign exchange demand and supply (Firdaus and Arianti, 2008: 133): (1) payment for Imports: The higher the import of goods and services, the higher the demand for foreign exchange thus the exchange rate will tend to weaken and vice versa. (2) capital Outflow: The greater the capital outflow, the greater the demand for foreign exchange and ultimately weakens the exchange rate. Capital outflows include payment of debt to residents of the country, both private and government to foreign parties and

placement of funds abroad. (3) speculation Activities: the more foreign exchange speculation activities, the greater the demand for foreign exchange thus weakening the exchange rate of the domestic currency against foreign currencies. (4) receipts from exports: the greater the volume of receipts from exports of goods and services, the greater the amount of foreign exchange owned by a country and will encourage a stronger exchange rate (appreciation) and vice versa. (5) capital inflow: the greater the capital flow entering into a country, the exchange rate tends to strengthen. Capital flow can be in the form of foreign debt, portfolio investment or foreign direct investment (Firdaus and Arianti, 2008: 134).

Equivalent rate theory: equivalent rate is the rate of return from an investment or fund raising by a bank. Equivalent rate also means the rate of return on investment that has been invested. The role of the equivalent rate is the same as the interest in conventional banks, which gives an idea of how much the return on investment is invested. The equivalent rate is calculated at the end of every month after the investment carried out yields. Equivalent instruments in Islamic banks differ from interest. Conventional banks compete very competitive in setting deposit rates, to attract prospective customers. The distribution of profits is determined at the beginning by calculating the amount of interest expense from funds deposited or borrowed and is greatly influenced by interest rates. The higher interest rates will be followed by rising deposit and loan interest rates. equivalent rate is equal to the profit sharing of future results, means that it has been confirmed at the beginning and that means usury. Accordingly, the equivalent value is a calculation for results by converting profit sharing for each of the third party fund products in the form of a percentage.

Third party fund (DPK) theory: fund collection and distribution is the main focus of Islamic bank activities, to be able to channel funds optimally, banks must have the ability to raise third-party funds because these deposits are the main source of financing for Islamic banks. According to Sukirno (2000), the function of a central bank is to create currency for transactions, trade, payment of income in the economy. In order to maintain the smooth operation of an economy, the central bank needs to increase money demand. The more money in circulation, the more it encourages people to save. It can be concluded that the growth of money demand increases third-party funds in banks. According to Tohari (2010), an increase in money demand responded to Islamic banking financing because the increase in money demand affected the increasing amount of third-party funds. If the increase in third-party funds is not immediately channelled into financing, they will be suffering losses due to the obligation to provide a ratio to deposits that have been collected.

Previous Study:

Thohari (2010), variables used are exchange rates, inflation, the money demand, third-party funds and mudharabah. It is using the path analysis method. From the results, the first substructure shows that the variable exchange rate (rupiah), inflation and the money demand (M2) have a significant effect on the third party fund (DPK) and the second test shows that the variable money demand and deposits have a significant effect on mudharabah financing.

Setiadi (2012), this research used the quarterly time series from 1999: Q1 to 2010: Q4. The results showed (1) in the short term and long term inflation has a positive and significant impact on money demand. (2) in the short run interest rate negative and not significant affect money demand, and long term has a negative and significant effect on money demand in Indonesia. (3) the GDP variable in the short run is not significant, while the long run has a positive and significant impact on the demand for money in Indonesia. (4) Error Correction Term marked positive and significant indicate valid models and can be used to estimate the demand for money in Indonesia. Based on the results concluded that, significant inflation variable affecting the money demand in Indonesia both in the short and long run. The interest rate and GDP variable in the short run are not significant, while in the long run, both are a significant effect on money demand.

Arfidan (2017), this research type is explanatory research with the quantitative approach. Population in this research is time series (monthly data) of money demand (M2), inflation, interest rate, rupiah exchange rate to US dollar. The type of data is the secondar data from 2011-2015 which is available and published by Bank Indonesia. Data analysis techniques in this study using multiple linear regression analysis. The results of this study indicate that (1) the variables of money demand, CPI inflation, SBI interest rate significantly influence the exchange rate of rupiah/US dollar simultaneously, (2) partially the money demand has significant influence on the exchange rate/US dollar; (3) interest rate has a significant influence on the exchange rate/US dollar; (4) inflation has no significant effect on the exchange rate/US dollar.

D.   Methodology
In this research consists of variables used such as: third party funds (DPK), equivalent rates, inflation, industrial production index (IPI), interest rates, exchange rates and money demand (M2). The data used is secondary data (time series). Monthly data from 2009 to 2018. Data originated from reports and information published by the Central Statistics Agency (BPS) and Bank Indonesia Economic Statistics (SEKI) and other sources related to this research. The research used an error correction model (ECM), which is an error correction model belongs to a category of multiple time series models most commonly used for data where the underlying variables have a long-run stochastic trend, also known as a co-integration. Error correction model (ECM) is an approach useful for estimating short-term and long-term effects of one-time series on another. The term error-correction relates to the fact that last periods deviation from a long-run equilibrium, the error, influences its short-run dynamics. Thus, ECM directly estimates the speed at which a dependent variable returns to equilibrium after a change in other variables.

Test data behavior
Data behavior test is a test performed on time series data before modelling, this test includes a stationarity test, integration degree test, and co-integration test. The stages of testing this data behavior are:

1. Stationarity test
A random or stochastic process is a collection of random variables in the order of time. Every time series data that we have is data from the results of the stochastic process.

A data from a random process is said to be stationary if it meets the criteria, namely: if the average and constant variants over time and covariance between the two-time series data only depend on the lag between two specific time periods (Widarjono, 2009: 354). To view stationary data or not, in the research using a unit root test. If the unit root test results show that the data has not been stationary at the level, the research data will be carried out at the first level of differentiation until the data becomes stationary (integration degree test) and free from taper regression.

2. Unit root test

Unit root testing aims to find out whether the data used is stationary or not. Data can be said to be stationary if it does not contain unit roots and vice versa. It can be done with the Dickey-Fuller test and the Philips-Peron (PP) test which is part of the unit root test. To find out whether it is containing of unit root, the research using Augmented Dick-Fuller test. The advantage of this method is to assume that the process of forming an error term of a variable does not follow a certain function.

3. Integration test

Testing the degree of integration can be done if stationarity using the unit root test at the level indicates that the data is not stationary, so it needs to be stationary by differentiating the research variable data.

4. Cointegration test

Cointegration test is closely related to testing the possibility of a long-term equilibrium relationship between economic variables as desired by economic theory (Insukindro, 2001: 121). The cointegration test of two or more-time series data shows that there is a long term relationship between them. Time series data can be said to be cointegrated if the residue from the regression level is stationary, then the regression level will provide the right estimate for the long-term relationship.

5. Classic assumption test

Testing classical assumptions to find out the results of the regression analysis fulfill the best linear unbiased estimator (BLUE) criteria. The classic assumption test consists of heteroscedasticity test, autocorrelation test, multicollinearity test, and normality test.

6. Multicollinearity test

Used to show a linear relationship between independent variables in the regression model. If the free variables are perfectly correlated, then it is called perfect multicoleration.

7. Heteroscedasticity test

A situation that occurs, when the standard deviation of disturbance variables is not the same for every observation. Therefore, it is very important to do the test, whether the estimated results obtained contain heteroscedasticity or not, the method that can be used is to do the Goldfeld-Quand test (Sumodiningrat, 2002: 261).

8. Autocorrelation test

Is the existence of two observations that use time series data, where there is a relationship between residual or disturbance variables that indicate a cycle, hence variables are no longer random but have a certain pattern. The existence of autocorrelation can cause problems with the assessment obtained (Sumodiningrat, 2002: 231).

9. Normality test

To test whether normal or not a confounding factor, it is necessary to do a normality test using the Jarque fallow test. Another way to see whether the data is normally distributed is by using the JB test or probability value.

10. Error correction model test (ECM)

Error Correction Model is a testing method that can be used to find a balance model in the long run. To state whether the ECM model used valid or not, the Error Correction Term (ECT) coefficient must be significant. If this coefficient is not significant, then the model is not suitable and further specifications need to be changed. (Insukindro, 1993: 12-16). In this research, the error correction model (ECM) used has been freed through the stationarity test, integration degree test, cointegration test and classic assumption test, so that the ECM model is feasible to use and analyze. The analysis aims to determine the effect of independent variables on the dependent variable in the short term and long term. The process of an appropriate ECM model is used in this research, to find out the relationships short and long term, the econometric models are as follows:

$$DM2 = a + \beta_1 DINF + \beta_2 IPI + \beta_3 DEX.RATE + \beta_4 DEQ.RATE + \beta_5 DINT.RATE + \beta_6 DDPK + \beta_7 ECT$$

E.   Result and analysis

1. Stationarity data test

Table 1. The result of Unit Root test (at level)

Variable	Value ADF t statistic	Prob.*	Explanation
M2	-0.056199	0.9506	Not Stationary
INF	2.126552	0.9999	Not Stationary
IPI	-0.195938	0.9347	Not Stationary
INTRATE	-1.703877	0.4267	Not Stationary
EQRATE	-2.207590	0.2048	Not Stationary
EXRATE	-2.070144	0.2571	Not Stationary
DPK	0.089332	0.9636	Not Stationary

The table above shows that, money demand (M2), inflation, interest rate, industrial production index (IPI), equivalent rate, exchange rate and third party fund are not stationary at level. It is indicated by the augmented dickey fuller value t-statistic smaller than the critical value of MacKinnon at a significance level of 5% or a probability smaller than 0.05. Thus, it is necessary to test the degree of integration at first difference.

2. Integration test

Table 2. Result Augmented Dickey Fuller test (at First Difference)

Variable	Value ADF t statistic	Prob.*	Explanation
M2	-8.956735	0.0000	Stationary
INF	-15.29296	0.0000	Stationary
IPI	-11.40974	0.0000	Stationary
INTRATE	-11.43494	0.0000	Stationary
EQRATE	-11.08068	0.0000	Stationary
EXRATE	-12.00616	0.0000	Stationary
DPK	-11.11692	0.0000	Stationary

The results of the integration degree test above, it can be seen that all variables stationary at first difference. It is indicated from the augmented dickey fuller value of money demand, inflation, interest rate, index production industry (IPI), equivalent rate, interest rate and third party fund greater than the critical value of MacKinnon. Data shows the probability value (p-value) of each variable smaller than critical values (5%).

3. Co-integration test

a. Johansen Cointegration Test

The results of co-integration test, if the value of the trace statistic and max eigenvalue statistic are greater than the critical value of 0.05. It can be concluded that there is a co-integration between dependent and independent variables. The following table shows the results of Johansen's co-integration:

Table 3. Co-integration Johansen Test

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.322720	129.9645	125.6154	0.0265
At most 1	0.268438	85.15237	95.75366	0.2141
At most 2	0.134332	49.20650	69.81889	0.6719
At most 3	0.122956	32.61735	47.85613	0.5780
At most 4	0.079994	17.52955	29.79707	0.6009
At most 5	0.066707	7.941377	15.49471	0.4717
At most 6	1.99E-05	0.002287	3.841466	0.9599

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.322720	44.81211	46.23142	0.0705
At most 1	0.268438	35.94587	40.07757	0.1358
At most 2	0.134332	16.58915	33.87687	0.9365
At most 3	0.122956	15.08780	27.58434	0.7412
At most 4	0.079994	9.588174	21.13162	0.7823
At most 5	0.066707	7.939090	14.26460	0.3849
At most 6	1.99E-05	0.002287	3.841466	0.9599

Based on the result above, the trace statistic test and Max Eigenvalue Statistic, shows the existence of co-integration at the significance level = 5%, especially in the variable at most 1. Hence, it can be concluded that the independent variables have a long-term relationship to the dependent variable.

b. Co-integration residual based test

Co-integration tests are intended to test whether regression residuals are stationary or not (Engle and Granger, 1987). If there is one or more different degrees of integration, the variable cannot be co-integrated (Engle and Granger, 1987).

Table 4. Engle granger cointegration test regression value

Null Hypothesis: D(RESID) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-8.921561	0.0000
Test critical values:	1% level	-3.488063	
	5% level	-2.886732	
	10% level	-2.580281	

Based on the table above, it is known that the augmented dickey fuller (ADF) t-statistic value is greater than the critical value of MacKinnon at the real level of 5% and 10%, so that the residual stationary regression equation is at the level. Thus, the residual does not contain unit roots, it can be interpreted that the variables used in this research have a long-term or co-integrated relationship.

4. Multicollinearity test

Multicollinearity is the occurrence of high Intercorelations among independent variables in a multiple regression model. Multicollinearity can lead to skewed or misleading results when a researcher or analyst attempts to determine how well each independent variable can be used most effectively to predict or understand the dependent variable in a statistical model. In general, multicollinearity can lead to wider confidence intervals and less reliable probability values for the independent variables. That is, the statistical inferences from a model with multicollinearity may not be dependable.

Table 5. The result of multicollinearity test

Correlation t-Statistic Probability	INF	INTRATE	IPI	EQRATE	EXRATE	DPK
INF	1.000000					

INTRATE	-0.002939	1.000000				
	-0.031928	-----				
	0.9746	-----				
IPI	0.045678	-0.488340	1.000000			
	0.496713	-6.078853	-----			
	0.6203	0.0000	-----			
EQRATE	0.220887	0.111461	-0.246542	1.000000		
	2.460213	1.218366	-2.763435	-----		
	0.0153	0.2255	0.0066	-----		
EXRATE	-0.100992	-0.235481	0.607699	-0.008069	1.000000	
	-1.102694	-2.631991	8.312227	-0.087657	-----	
	0.2724	0.0096	0.0000	0.9303	-----	
DPK	0.102763	-0.451636	0.664916	-0.051081	0.521499	1.000000
	1.122236	-5.498772	9.670189	-0.555604	6.639221	-----
	0.2640	0.0000	0.0000	0.5795	0.0000	-----

Based on the table above, it can be seen that all independent variables do not have the correlation coefficient > 0.85. Thus, there is no Multicollinearity problem.

5. Heteroscedasticity test

To determine the presence of heteroscedasticity, the White test was implemented. By comparing, the chi squares count ($\chi 2$) is smaller than the critical value of chi squares ($\chi 2$). Then the alternative hypothesis of heteroscedasticity in the model is rejected. The method

to detect the presence of heteroscedasticity in this research using White Test. Heteroscedasticity testing done with the eviews 9 program, and the regression results are obtained as below:

Table 6. The results of heteroscedasticity test

Model	Heteroscedasticity test: White			
Short term	F-statistic	1.126062	Prob. F(7,111)	0.3520
	Obs*R-squared	7.890228	Prob. Chi-square (7)	0.3424
Long term	F-statistic	0.300576	Prob. F(6,113)	0.9354
	Obs*R-squared	1.885089	Prob. Chi-square (6)	0.9300

Based on the result table 4.7 shows that, in short term R-squared was 7.890228 and probability. Chi-square was 0.3424. Meanwhile, in long term R-squared was 1.885089 and probability chi-square was 0.9300 greater than $\alpha = 0,05$. It is mean that Ho is rejected (heteroscedasticity does not occur).

6. Autocorrelation test

To detect autocorrelation problems, the LM test is used. It is very useful for identifying autocorrelation problems, not only in the first degree but also at the degree level. If the LM test results are in the null hypothesis (Ho); the value of chi squares calculated ($\chi2$) < than the critical value of chi squares ($\chi2$), it can be concluded that the estimation model does not have autocorrelation and vice versa.

Table 7. The result of autocorrelation test

Model	Breusch-godfrey serial correlation LM-test			
Short term	F-statistic	1.215255	Prob. F(12,99)	0.2835
	Obs*R-squared	15.27855	Prob. Chi-square (12)	0.2266
Long term	F-statistic	1.612066	Prob. F(12,101)	0.0999
	Obs*R-squared	19.28937	Prob. Chi-square (12)	0.0818

Testing of autocorrelation using the Breusch-Godfrey Serial Correlation LM Test, table 4.8 showed that, F-statistic 1.215255 and the result of probability 0.2266 greater than $\alpha = 0,05$ in short term. Meanwhile, in long term F-statistic 1.612066 and the probability 0.0818. It can be concluded that, the resulting equation does not contain autocorrelation problem.

7. Normality test

Jarque Bera normality test to determine whether the error term detects a normal distribution (Gujarati, 1995). The results of the normality test can be seen below:

Table 8. The results of normality test Jarque-Bera statistic

Model	JB-Test	Sig	explanation
Short term	2.749507	0.252902	Normal
Long term	5.21212	0.073825	Normal

In the normality test using Jarque-Bera, it shows the probability of 0.252902 in short term and 0.073825 in long term is greater than $\alpha = 0.05$. Hence, the equation can be said to be normally distributed.

8. Short term regression model

Error Correction Model is a testing method used to find a balance model in the long run. If in the short term there is disequilibrium, but in the long run experiencing balance, then these differences need to be corrected by the ECM with an adjustment of the Error Correction Term (ECT). To state whether the ECM model used is correct or not, the Error Correct Term (ECT) coefficient must be significant. If the coefficient is not significant, it means that the model is not suitable and needs further changes (Insukindro, 1993, 12). The ECT value is used to find short and long term coefficient differences. Therefore, this value is often called disequilibrium error. The results of processing data using eviews as follows:

Table 9. The Results of short term model

Variable	Coefficient	Prob.
C	-6208.743	0.9350
D(INF)	118728.6	0.0253
D(INTRATE)	-163257.1	0.0923
D(IPI)	38875.36	0.0000
D(EXRATE)	222.2542	0.0000
D(EQRATE)	213272.7	0.0000
D(DPK)	262532.0	0.0029
ECT(-1)	-0.842784	0.0000
Adjusted R Squared	0.761720	
F Statistic	54.88783	
Prob (F-Statistic)	0.00000	

Based on the estimation of the dynamic ECM model, the OLS regression function as follows:

$$\Delta M2 = -6208.743 + 118728.6\Delta INF - 163257.1\ \Delta INTRATE + 38875.36\ \Delta IPI + 222.254\Delta EXRATE + 213272.7\Delta EQRATE + 262532.0\Delta DPK - 0.842784\ ECT(-1)$$

Error correction model (ECM) is used to test the short-term relationship, which is seen from the regression equation by estimating the dynamics of Error Correction Term (ECT). From the test results above the model shows that inflation, industrial production index (IPI), exchange rate, equivalent rate and third party fund (DPK) variables have a significant effect on the money demand (M2) variable. Meanwhile, the interest rate variable has no significant effect on the money demand (M2) variable. In the short term, the independent variable (inflation, industrial production index (IPI), exchange rate, interest rate, equivalent rate and third party fund (DPK) affect the dependent variable money demand (M2) by 76,17%, simultaneously. And the remaining 23,83% is affected by other variables not mentioned in the research.

9. Long term regression model

If the stationary residuals at degree (first difference), it can be concluded that there is a long term co-integration or variables having a long term relationship. The results are as follows:

Table 10. The results of long term model

Variable	Coefficient	Prob.
C	-3016843.	0.0094
INF	135694.5	0.0066
INTRATE	-118967.1	0.0047
IPI	19622.26	0.0195
EXRATE	199.0961	0.0003
EQRATE	161818.4	0.0067
DPK	257414.1	0.0058
Adjusted R Squared	0.558432	
F Statistic	26.08240	
Prob (F-Statistic)	0.0000	

Based on the estimation results of the table above, mathematical equations can be made as follows:

M2 = -3016843 +135694.5 INF -118967.1 INTRATE + 19622.26 IPI + 199.0961EXRATE +161818.4 EQRATE + 257414.1 DPK

The results of the long-term regression model can be seen that, all independent variables (inflation, industrial production index (IPI), exchange rate, interest rate, equivalent rate and third party fund (DPK)) significantly affected the dependent variable money demand (M2). The long-term test results it is known that, the independent variables inflation, industrial production index (IPI), exchange rate, interest rate, equivalent rate and third party fund (DPK) affect the dependent variable money demand (M2) of 55.84% simultaneously, while the remaining 44.16% is influenced by other variables not mentioned in this study.

From the results of the data analysis above, it will be explained the discussion on each independent variable as follows:

The effect of inflation on money demand (M2) states that, inflation has a positive and significant effect on money demand (M2) both in short term and long term. This can be seen from the probability value smaller than 0.05, indicating that inflation in Indonesia is determined by changes in money demand (M2) in the same direction if inflation rises, money demand (M2) will increase and vice viersa. This result is in line that, inflation in Indonesia is also caused by the increasing amount of money circulating in society. Money demand is economic liquidity that affects people's economic activities. Money demand comes from society's income and expenditure. One of the factors of money demand volatility is the interest rate (BI rate). If interest rates rise, the interest rates on loans and deposits will increase. Conversely, if interest rates decrease, credit and deposit rates will also decrease. When interest rates rise, people are competing to save and money demand decreases. In the real sector, an increase in interest rates will have an impact on rising production costs. Thus, investors will reduce their investment. On the contrary, if interest rates decrease, the desire to save money decreases. This is considered beneficial for the real sector because it can reduce production costs. However, the increase in consumption because people prefer consumption over saving.

The effect of interest rate on money demand (M2) states that, interest rate variable has a negative and not significant on money demand (M2) in the short term, it can be seen from the probability value greater than 0.05. Meanwhile, it has a negative and significant effect on money demand (M2) in the long term. This can be seen from the probability value smaller than 0.05. Indicating that, an increase in interest rate causes money demand will decrease and vice viersa. Interest rates are not significant in the short term because society is sensitive to the current economic conditions. society is more rational in managing their funds, because of unexpected economic fluctuations hence people prefer to hold their portfolios (assets) rather than keep their money in the bank. The long-term results are consistent with economic theory that the relationship between interest rates and money demand is negative. The results of this study are also in accordance with Keynes's theory of money demand. According to Keynes, there is a negative relationship between the demand for money for speculative purposes and the interest rate. If the government sets high interest rates, it is expected that the public will be careful in using money or the level of consumption of the society will be reduced, as to reduce the money

demand in circulation. Money demand conditions are dominated by the influence of interest rates and inflation. This refers to the theory of interest rate transmission which explains that the role of the monetary sector is still quite important in controlling the amount of money in circulation. The government through the central bank control the economy in Indonesia. Economic growth is quite influential on interest rates, inflation and the amount of money in circulation.

The effect of industrial production index on money demand (M2) states that, industrial production index (IPI) has a positive and significant effect on money demand (M2) both in short term and long term. This can be seen from both probability value smaller than 0.05. An increase in the industrial production index (IPI) in the short term and long term impacting on the increase in money demand. Industrial production index (IPI) is usually set to measure the increase and decrease in production. The higher the industrial production index (IPI), the greater the production of goods and services. If the production of goods and services in the country higher, it also indicates that the country's economic growth is increasing. Increased economic growth causes an increase in money demand (M2). In industrial societies, the value of transactions and the velocity of money are relatively higher compared to agrarian societies, because the production process requires more money in a short time. On the contrary, agrarian societies require a longer production time (harvest) and the amount of money used is also relatively smaller. As a result, the money in circulation will tend to be smaller.

The effect of exchange rate on money demand (M2) states that, exchange rate has a positive and significant effect on money demand (M2) both in short term and long term. This can be seen from both probability value smaller than 0.05. An increase the exchange rate in the short term and long term impacting on the increase in money demand. The higher the exchange rate, the more the money demand (M2) needed. The results of this research are in accordance with Suprianta (2007), where the exchange rate has a positive and significant effect on the money demand, means that if the dollar exchange rate increases, the amount of money circulating in the society will increase. Money demand has a positive and significant effect on the exchange rate of the rupiah against the US dollar. This shows that, an increase in money demand will increase the exchange rate, where the value of the rupiah depreciates against the US dollar, and vice versa. The further decrease in money demand will reduce the exchange rate, which means the value of the rupiah will appreciate against the US dollar. circulation of foreign exchange reserves (balance of payments) as a result of excess demand or supply of money. If there is an excess of the money demand, the balance of payments will be in deficit and vice versa. This causes the public to buy foreign securities or imports thus there is an outflow of capital, which means that demand for foreign currency rises while demand for the currency itself decreases (Nopirin, 1997: 222). If the government increases the money supply, it will reduce the interest rate and stimulate foreign investment hence, there will be capital outflow and the foreign exchange rate will increase. rising money demand will increase the price of goods measured by (term of money) while at the same time will increase the price of foreign

exchange as measured by the domestic currency (Herlambang, 2001). This result also supports the results of a study conducted by Atmadja (2002) that variable money supply has a significant influence on the movement of the rupiah exchange rate against the US dollar. According to Joseph (1999), that the influence of money demand has a positive relationship with the exchange rate, where an increase in the money demand will cause depreciation pressures on the rupiah and the dollar (USD) to increase. This result is also reinforced by the purchasing power parity theory that an increase in the money supply will cause domestic inflation against foreign inflation, this will cause the domestic currency to decline compared to foreign currencies. The higher the domestic money demand will cause the domestic currency to depreciate.

The effect of equivalent rate on money demand (M2) states that, equivalent rate has a positive and significant effect on money demand (M2) both in short term and long term. This can be seen from both probability value smaller than 0.05. An increase the equivalent rate in the short term and long term impacting on the increase in money demand. Islamic banks must be able to maintain good financial performance in carrying out its operations. Thus, it can become an institution that prioritizes public trust. As a profit oriented institution like other financial institutions, the financial health of Islamic banks is very important, especially at the level of profitability. The increase in sharia banking profits was influenced by macro-economic conditions. This can be shown that, the development of Islamic banking depends on the demand of the society for products and services, whereas sharia bank customers generally still compare the rate of return (equivalent rate) that can be provided by Islamic banking to customers is the result of the distribution of funds. The results of the distribution of Islamic bank funds depend on the business profits of the borrowers, which of course will be influenced by macroeconomic conditions. Equivalent rate is an indication of the level of return from an investment or fund raising by a bank. Equivalent rate also means the rate of return on investment that has been invested. This role is like the interest rate on conventional banks, which gives a percentage rate of return on investment. The differences in calculation, interest is immediately agreed at the beginning of the contract before the investment runs. Whereas the equivalent rate is calculated by the bank at the end of each month after the investment carried out produces. The increase in money demand is associated with business cycle expansion. The increase in money demand will encourage companies or banks to source financing which will increase the company's or bank's expansion in a wider market share and have an impact on improving company performance. The improvement in the company's performance is reflected in the increased profit side. Hence, the company can be the choice of investors who invest their capital. When money demand rises, expectations of prices will also increase causing interest rates in the economy to decline. A decrease in interest rates will have an impact on the shift of investors to invest funds hoping to get a higher return in the future. Money demand is one of the macro policies used by the government to stabilize economic conditions. Therefore, changes in money demand will affect banking conditions. When money demand increases, the instrument used by the government is to raise interest

rates. Raising interest rates will stimulate people to invest their funds in banks. Islamic banks as part of the banking industry will raise these funds. The amount of funds collected will increase the ability of Islamic banks to channel funds.

The effect of third party fund (DPK) on money demand (M2) states that, third party fund (DPK) has a positive and significant effect on money demand (M2) both in short term and long term. This can be seen from both probability value smaller than 0.05. An increase the third party fund (DPK) in the short term and long term impacting on the increase in money demand. The results of this research are supported by Thohari (2010), in his research conclude the variable exchange rate of the rupiah against the dollar, inflation and money demand (M2) have a significant effect on third party funds. Based on Said (2011), the results show that inflation, exchange rates, interest rates, and the money demand have a significant effect on third party funds. Meanwhile, the results of Rossar Maries's (2008: 71) research, concluded that the response shown by third party fund variables to the money demand (M2) was the reaction of Islamic banks in seeing the development and growth of money demand that had increased. This relates to the intermediary function of Islamic banks, as known sharia banks channel more financing to the small and medium business sector (UKM) or the real sector. Wijaya (2005), the relationship with money demand has a significant positive effect on collecting third party funds, which means that if money demand increases, third party funds also increase. Money demand consists of currencies outside the monetary system plus deposits owned by the community is generally kept in a bank. While money demand in a broad sense (M2) is the amount of M1 plus all time deposits and internal savings balances are only rupiah in the form of a bank. Thus the greater the third party funds consisting of public deposits (savings and deposits), the money demand also increases. Furthermore, the positive relationship between money demand and third party funds indicates that the funds raised in the society have increased. This provides additional fresh funds for national banks in general. The increase in money demand (M2) indicates an increase in public interest and trust to save or invest funds in time deposits, therefore third party funds are increasing. The increase in money demand provides opportunities for banks to carry out the intermediation function. The increase in money demand was responded by Islamic banking with increased financing. Therefore, an increase in money demand will increase the amount of third party funds. Third party funds are immediately channeled in the form of financing, because Islamic banks will suffer losses, due to the obligation to provide a ratio or nisbah to the third party funds that have been collected (Tohari, 2010: 86).

G. Conclusion

The five variables (inflation, exchange rate, equivalent rate, industrial production index (IPI), and third party funds (DPK) have a positive and significant effect on money demand (M2) both short term and long term. However, Interest rate variable has a negative and not significant effect in the short term. Whereas, in the long term interest rate variable has a negative and significant effect on money demand (M2). When interest rates increase, money demand decreases and vice versa. Money demand conditions in the Indonesian

economy are dominated by the influence of interest rates and inflation. This refers to the theory of interest rate transmission which explains that the role of the monetary sector is important in controlling money demand. The government through the central bank controls the economy in Indonesia, economic growth is quite influential on interest rates, inflation and demand. Bank Indonesia, as the monetary authority, is expected to maintain monetary stability through safeguarding against inflation, because research results in both the short and long term inflation have a significant effect on money demand in Indonesia. Referring to the results of the study, the government should be more careful in implementing monetary policies related to inflation, interest rates, exchange rates, industrial production index (IPI), equivalent rate and third party funds (DPK) which can affect the money supply (M2). The proceedings that must be taken are controlling money demand in order to be able to overcome the risks that will occur in the Indonesian economy.

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