MONEY DEMAND: A STUDY ON THE INDONESIAN INFLUENTIAL FACTORS

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Abstract

The role of money demand in monetary policy is indisputable. This study analyzes the determinants of Indonesian money demand. It uses Insukindro-Error Correction Model, based on Keynesian and Monetarist theories. It finds that model based on Monetarist theory is preferable. Estimation on the chosen model suggests that money demand for real currency is influenced, in the short term, by total wealth, consumer price index, the red letter religious day, monetary crisis, and in the long term, by domestic interest rates, foreign interest rates, consumer price index, and stock price index. In addition, monetary policy using Certificate of Bank Indonesia, does not influence money demand.

Keywords: Money demand, keynesian and monetarist model, insukindro-error correction model
JEL classification numbers: E41, E49

Abstrak

Peran permintaan uang dalam kebijakan moneter tidak diragukan lagi. Studi ini menganalisis faktor-faktor penentu permintaan uang di Indonesia. Alat analisis yang digunakan adalah Insukindro-error correction model, dengan dasar teori Keynesian dan Monetaris. Studi ini menemukan bahwa model berdasarkan teori monetaris adalah model terbaik. Estimasi pada model tersebut menunjukkan bahwa permintaan mata uang riil dipengaruhi, dalam jangka pendek, oleh total kekayaan, indeks harga konsumen, hari libur agama, krisis moneter, dan dalam jangka panjang, oleh tingkat bunga domestik, tingkat bunga luar negeri, indeks harga konsumen, dan indeks harga saham. Studi ini juga menunjukkan bahwa kebijakan moneter, terutama yang menggunakan Sertifikat Bank Indonesia, tidak mempengaruhi permintaan uang.

Keywords: Permintaan uang, model keynesian dan monetarist, insukindro-error correction model
JEL classification numbers: E41, E49

INTRODUCTION

Money demand plays an important role in monetary policy within any economic situation. The literatures on money demand discuss either theoretical or empirical factor on money demand in both developing and developed countries are abundantly found. Meanwhile, it is indisputable that the monetary policy has reached its economics goals. According to Friedman (1968), the monetary policy can be of any contribution to reaching the economic stability through a strong monetary control. Since the emergence of Classical theory on money demand, there has been a long discussion of monetary economic analysis on the question of "what is the most suitable and eligible model to observe money demand behaviour among people?" This issue becomes crucial as different theory chosen by the observer will lead to different form and function of money demand model, resulting in different macroeconomic mechanism and economic policy as the implication (Insukindro, 1998).

The monetary phenomenon in Indonesia related to the estimation on the na-

tional additional currency money demand is implemented by considering the development on economic condition aimed at facilitating money endogeneity. The model of currency outside banks (COB) adopting Error correction Model (ECM) two-step Engle Granger approaches the estimation. The ECM model is basically a model concept of econometric-time series which appears to adjust the short run equilibrium with long run equilibrium through adjustment process. Meanwhile, the variable selection for COB equation is ad hoc and it is assumed that the macroeconomic variables such as GDP, inflation, interest rate s, and exchange value influence it. This means that a mistake on determining macroeconomic variables will result in an inaccuracy of the estimation on money demand in Indonesia, which in turn, the calculation on money supply in economy will not be accurate for the real economic needs.

Studies on theories and empiric on money demand reveals that many variables influence the money demand; however, wealth as one variable has not sufficient attention in any researches in Indonesia. This may happen as the Keynesian money demand analysis, which is a short term analysis, believes that the wealth is constant, in that it eventually is erased. Wealth is an important concept stated in Friedman economic analysis, in which Friedman also believes that wealth is consisting of human and non-human wealth. Therefore, this research will be directed to the development of money demand variables which are absent from any attention especially in developing countries, in addition to see the relation behaviour among variables.

Next, the attention will be focused on Keynesian and Friedman concept with his wealth variable, and also on the portfolio theory of the money demand which is influenced by risk factor together with the result from the money plus other non-monetary assets such as the expected real return of investment. Furthermore, the research is directed to see the effectiveness of the intervention of monetary policy by including the shock variable, especially the SBI (Certificate of Bank Indonesia) interest rate in affecting the money demand which is perceived as the intermediate target of a monetary policy. Other focus is on testing the model stability to see the stability of the parameters for the models in order to have reliable long term estimation in the monetary policy making. Besides the mentioned variables, the writer will also include the non-economic variables such as dummy variable of red -letters public holidays in addition to the dummy variable of monetary crisis together with shock variables in I-ECM model (Insukindro-Error Correction Model). The shock variable is the government-controlled variable, as like the interest rate of Certificate of Bank Indonesia. By doing so, one can find out the effectiveness of the intervention on monetary policy which affects the money demand (Yuliadi, 2006).

The goals of the research on the phenomena of currency and chartal money demand are specifically formulated as follows. (a) Analyzing the factors influencing the currency money demand in Indonesia. (b) Analyzing the effectiveness of controlling money demand by the Certificate of Bank Indonesia. (c) Formulating the model of currency money demand in Indonesia.

The development of money circulation is mostly influenced by many determinant factors of the money demand amongst society, where in the market equilibrium condition the amount of money demand is equivalent to money supply in economy. The theories on the influential factors of money demand are mostly written in literatures, starting from Classical theory to the present modern theory of monetary. The theories show the similarities and differences (theory gap) on the factors influencing the money demand among people. Classical theory states that the amount of money demand is influenced by income (Y)

positively. Meanwhile, Keynesian theory mentions that the money demand is influenced by the motives to keep the money: transaction and precaution motives, which are also influenced positively by an income. The speculation motive on the other hand is influenced negatively by the interest rates (*R*). The development of the theory is signed by the emergence of Friedman theory stating that the money demand is influenced by a lot of factors such as price (*P*) which negatively influences, return of obligation (*rb*), return of stock (*re*) also negatively influences, wealth (*W*) positively influences, preferences (*u*) positively influences.

The portfolio theory, the continuation of Friedman theory on the demand for money, mentions that the demand is influenced by quite similar factors of Friedman theory, only there has been additional factor such as the expected price (πe) which influences negatively. Meanwhile, the Baumol and Tobin's theory has different argument in that the money demand is influenced by how much the cost to hold the money which are rate of interest (*R*) and price (*P*) which can give a negative influence. Next, Mundell-Fleming theory states that the demand on the real money balance depends negatively on domestic rate of interest (*R*) which is determined by the world rate of interest (*R**) and positively influence the income (*Y*). Islam then offers other theory of money demand stating that money is principally provided for productive sector (transaction). Therefore the activity such as hoarding money needs to be discouraged. In other words, besides real income and level of inflation, the demand on money is also influenced by tax on inactive asset as a negative influence, total of government expense which is a positive influence, ratio of share between *shahibul mal* and *mudharib* in bank which is a negative influence, reserve requirement as the public policy, and objective information of society in the real condition of economy (Muhammad, 2002).

METHODS

This research will use secondary data during 1990-2008 which is a monthly data, therefore the number of data (*n*) is 228. The collected data covers: (a) currency money in million, (b) Gross Domestic Product as a constant price in 2000 in million rupiahs, (c) time deposit interest rate of 1 month in percentage, (d) the rate of interest of 3-month LIBOR in percentage, (e) exchange rate of rupiah against US dollar, (f) customers price index of 2002, (g) rate of interest of 3-month SBI in percentage, (h) Indonesia Composite Index on the closing index, (i) total wealth proxy from primary money and *GDP* with Friedman formulation.

Model Specification

To use the model of I-ECM, the writer conducts an observation on the model specification of the expected money demand, both in Keynesian (1) and Monetarist models (2) such as:

Model I (Keynesian):

$$Md_t^* = \alpha_{1.0} + \alpha_{1.1}GDP_t + \alpha_{1.2}RD1_t + \alpha_{1.3}RLN_t + \alpha_{1.4}ER_t + \alpha_{1.5}IHK_t + \alpha_{1.6}DUMHB1_t + \alpha_{1.7}DUMK_t \quad (1)$$

Model II (Monetarist) :

$$Md_t^* = \beta_{2.0} + \beta_{2.1}TW_t + \beta_{2.2}RD1_t + \beta_{2.3}RLN_t + \beta_{2.4}IHSG_t + \beta_{2.5}IHK_t + \beta_{2.6}DUMHB1_t + \beta_{2.6}DUMK_t \quad (2)$$

in a balance situation, both models are met, however, in economic system it is rare to find the balance; therefore, the observed economy is assumed to be in imbalanced situation. Generally, in this condition, the economic actors will find that the actual amount of the money on demand is different from that they need or plan. It is as-

sumed that the difference appears because of the shock and the late adjustment which follows; therefore, the difference can be found by using the two models (1) and (2) as follows: (Insukindro, 1998)

$$DE = Md_t^* - \alpha_{3.0} + \alpha_{3.1}GDP_t + \alpha_{3.2}RD_t + \alpha_{3.3}RLN_t + \alpha_{3.4}ER_t + \alpha_{3.5}IHK_t + \alpha_{3.6}DUMHB1_t + \alpha_{3.7}DUMK_t \quad (3)$$

$$DE = Md_t^* - \beta_{4.0} + \beta_{4.1}TW_t + \beta_{4.2}RD_t + \beta_{4.3}RLN_t + \beta_{4.4}IHSG_t + \beta_{4.5}IHK_t + \beta_{4.6}DUMHB1_t + \beta_{4.7}DUMK_t \quad (4)$$

The different value is known as disequilibrium error. And then by modifying the approach that has been developed in Domowitz and Elbadawi (1987), the function of the square cost of single period will be as follows:

$$C_t = \mu(MP_t - M_t^*)^2 + \sigma\{(1-B)(MP_t - jZ_t)\}^2 \quad (5)$$

$$MP_t = M_t - U_t \text{ dan } U_t = \lambda(Ud_t + (1 - \lambda) Us_t \quad (6)$$

Substitute the (6) equation to (5) equation leading to:

$$Ct = \mu(M_t - U_t - M_t^*)^2 + \sigma\{(1 - B)(M_t - U_t - jZ_t)\}^2 \quad (7)$$

Notes :

C is cost of economic actor
MP is quantity of planned money demanded in the short term
*M** is quantity of the planned money demanded in the long term
M is real money demanded
U is variable *shock shock variable*
Ud is variable of shock vector that influences the money demand.
Us is variable of shock vector that influences the money
B is *t*-lag operator

The first component of equation (7) is the cost of imbalances while the second one is the adjustment cost, μ and σ are the line vectors that give values to each cost. Z_t is the variable vector influencing the amount of money on demand and is perceived as linearly influenced by independent variables on model (1) and (2) above. *J* value mirrors the line vector that gives weight to the element $(1\text{-}B)Z_t$. The component then is included as adjustment cost component as it is seen that the observed system does not exist around the M_{t-1} environment and also because the growth of all variables in the model is constant (Insukindro, 1998).

The appearance of money demand variable in short term plan and shock U variables in the equation of (5), (6) and (7) are to cover the possibility of the emergence of unanticipated variable from both demand and supply. Next, substitute the Z_t as the function of GDP_t, $RD1_t$, RLN_t, ER_t, IHK_t, $dumHB_t$, $dumK_t$ (model I) and TW_t, $RD1_t$, RLN_t, $IHSG_t$, IHK_t, $DUMHB1_t$, $DUMK_t$ (model II), and therefore minimizing the cost function (7) to M_t resulted in:

$$Md_t = \alpha_{8.0} + \alpha_{8.1}GDP_t + \alpha_{8.2}RD1_t + \alpha_{8.3}RLNt + \alpha_{8.4}ER_t + \alpha_{8.5}IHK_t + \alpha_{8.6}DUMHB1_t + \alpha_{8.7}DUMK_t + \alpha_{8.8}GDP_{t-1} + \alpha_{8..9}RD1_{t-1} + \alpha_{8.10}RLN_{t-1} + \alpha_{8.11}ER_{t-1} + \alpha_{8.12}IHK_{t-1} + \alpha_{8.13}M_{t-1} + \alpha_{8.14}U_t + \alpha_{8.15}U_{t-1} \quad (8)$$

$$Md_t = \beta_{9.0} + \beta_{9.1}TW_t + \beta_{9.2}RD1_t + \beta_{9.3}RLN_t + \beta_{9.4}IHSG_t + \beta_{9.5}IHK_t + \beta_{9.6}DUMHB1_t + \beta_{9.7}DUMK_t + \beta_{9.8}TW_{t-1} + \beta_{9.9}RD1_{t-1} + \beta_{9.10}RLN_{t-1} + \beta_{9.11}IHSG_{t-1} + \beta_{9.12}IHK_{t-1} + \beta_{9.13}M_{t-1} + \beta_{9.14}U_t + \beta_{9.15}U_{t-1} \quad (9)$$

The equations of (8) and (9) covers the short term relation of money demand including level and the velocity of the existed variables even though the short term statistics can predict the long term relation of the related variable. The main problem is appraising both equations related to the level of model variable which is not sta-

tionary, If the variables of the model are not stationary then the model cannot be estimated by using OLS (ordinary least square) method as it will trigger the spurious regression or spurious correlation (Thomas, 1997 in Insukindro, 1998). As a solution, the change (*d*) on level of variable enabling the stationary condition is applied. Therefore, the equation of (8) and (9) should be reparameterized and stated in the form of log-linier and dependent variable with currency real money (*CRTL*) and real *CHARTAL* money (*GRRL*) are included, which results in the following model:

Model I (Keynesian)

$$d\ln CTRL_t = \alpha_{10.0} + \alpha_{10.1}\, d\ln PDB_t + \alpha_{10.2}\, dRD1_t + \alpha_{10.3}\, dRLN_t + \alpha_{10.4}\, d\ln ER_t + \alpha_{10.5}\, d\ln IHK_t + \alpha_{10.6}\, DUMHB1_t + \alpha_{10.7}\, DUMK_t + \alpha_{10.8}\, \ln BPDB_t + \alpha_{10.9}\, BRD1_t + \alpha_{10.10}\, BRLN_t + \alpha_{10.11}\, \ln BER_t + \alpha_{10.12}\, \ln BIHK_t + \alpha_{10.13}\, ECT + \alpha_{10.14}\, dU_t + \alpha_{10.15} BU_t \quad (10)$$

Model II (Monetarist)

$$d\ln CTRL_t = \beta_{11.0} + \beta_{11.1}\, d\ln TW_t + \beta_{11.2}\, dRD1_t + \beta_{11.3}\, dRLN_t + \beta_{11.4}\, d\ln IHK_t + \beta_{11.5}\, \ln dIHSG_t + \beta_{11.6}\, DUMHB1_t + \beta_{11.7}\, DUMK_t + \beta_{11.8}\, \ln BTW_t + \beta_{11.9}\, BRD1_t + \beta_{11.10}\, BRLN_t + \beta_{11.11}\, \ln BIHK_t + \beta_{11.12}\, \ln BIHSG_t + \beta_{11.13}\, ECT + \beta_{11.14}\, dU_t + \beta_{11.15}\, BU_t \quad (11)$$

where

Md is money demand,
CTRL is currency money demand,
GRRL is CHARTAL money demand,
PDB is national income,
*RD*1 is domestic rate of interest,
RLN is foreign interest rates,
IHK is price change,
IHSG is return of real stock,
TW is wealth,
*DUMHB*1 is *Dummy variable* of Eid Fitr,
DUMK is *Dummy variable* of economic crises,
ECT is coeficient of adjustment,
U is shock variable,
ER is exchange rate,
D is delta,
B is *t*-lag operator (*t* -1).

The characteristic of I-ECM model is valid as it meets the condition that the coefficient value of ECT is found $0 < \alpha_{10.13}$, $\beta_{11.13} < 1$ positive and statistically must be significant. If it meets the condition, then the I-ECM model can be used as a valid estimation method.

RESULTS DISCUSSION

Unit Root Test

The result of stationary test on Table 1 reveals that the variables can reach stationary level by testing the unit roots of Augmented Dickey-Fuller (ADF). There are 4 variables which are *CTRL*, *RD*, *SBI* and *DUMHB*1, as the value of ADF statistic absolute is larger than McKinnon statistic absolute on each α or the probability is below 10%. The data of *CTRL* reaches stationary on the critical value 5%, *RD* is in stationary on the critical value 10%, *SBI* on critical value 1% and *DUMHB* on critical value of 1%. Meanwhile the other variables are not stationer. As some data in the analysis are not stationary on the level or *I*(0) then the testing for the degree integration.

Table 1: Unit Roots Test on Each Level

No.	Variable	ADF	
		t-Statistic	Prob.
1	*CTRL*	-3.882**	0.0141
3	*GDP*	-0.397	0.9872
4	*RD*	-3.226*	0.0747
5	*RLN*	-1.921	0.6404
6	*IHSG*	-2.054	0.5683
7	*ER*	-2.852	0.1804
8	*IHK*	-1.594	0.7927
9	*SBI*	-4.025***	0.0093
10	*TW*	-0.999	0.9409
11	*DUMHB*1	-33.652***	0.0001
12	*DUMK*	-1.743	0.7288

Notes: ***, **, and * represent stationary at 1%, 5%, and 10%, respectively.

Source: Data Estimation.

Integration Test

The non stationary data on the test of unit roots is continued with the test on the unit roots of DF on the first difference to finally get the stationary data. If the expected result is not in the stationary situation then the unit root test on the second difference or *I*(2) is conducted, and etc. The calculation on unit roots of the first difference can be observed on the table 2 below. The table shows that the test of unit roots on the first difference for all variables reached stationary condition on the first difference on critical value 1%. It occurs as all the absolute values of ADF are larger than the absolute statistic of McKinnon or the probability value is lower than 1%. Therefore, if the level of the variables in the analysis has met the stationary level on the first difference, then it needs to undergo a change or delta on the level of variables enabling to reach the stationary condition or null integrated or *I*(0). By that way, the model can be estimated by using Ordinary Least Square (OLS).

Table 2: Result of Unit Root Test on the First Difference Equation Model

No.	Variable	ADF	
		t-Statistic	Prob.
1	*CT*	-14.741***	0.0000
2	*GDP*	-12.542***	0.0000
3	*RD*	-6.553***	0.0000
4	*RLN*	-10.065***	0.0000
5	*IHSG*	-11.523***	0.0000
6	*ER*	-12.089***	0.0000
7	*IHK*	-9.751***	0.0000
8	*SBI*	-8.585***	0.0000
9	*TW*	-15.492***	0.0000
11	*DUMHB*1	-29.609***	0.0000
12	*DUMK*	-15.009***	0.0000

Notes: ***, **, and * represent stationary at 1%, 5%, and 10%, respectively.
Source: Data estimation.

Cointegration Test

The first step to do the cointegration test is finding the residual data (e_t) on the regression model used in the analysis. The co-integrated test is using the basic model of money demand as in the model I and II previously. Having been found, the residual data is tested by using the root unit test in order to find out the stationary. Supposed the residual of the equation is stationary *I* (0) the variables then are cointegrated which means they have long term relation. Table 3 shows both the statistics and probability values of the residual co-integration from each model. From the table, the result of the estimation on the model of Augmented Dickey-Fuller shows that model I *CTRL* and model II *CTRL* have absolute values of ADF t-statistics which is larger than Mckinnon absolute statistic value or it also means that the probability is lower than 1 %, which means that there is an indication that the residual variable of each model for the level data does not contain root unit, or in other words, the residual variable is already in stationary condition *I*(0) on critical value 1%. It can be concluded then that the co-integration occurs among all variables involved in the model of the money demand. It means that in the long term, the balance or stability amongst the observed variables occurs.

Table 3: Cointegrated Test on the Money Demand Model

No.	Model	ADF	
		t-Statistic	Probability
1	Model I CTRL	-5.485***	0.0000
3	Model II CTRL	-2.871***	0.0042

Notes: ***, **, and * represent stationary at 1%, 5%, and 10%, respectively.

Source: Data estimation.

The Validity of Keynesian Currency Money Demand

Prior to analyzing the estimation on the model I of the Cartle Money Demand, the heteroscedasticity and Linearity model test is conducted. Using the calculation of White

heteroscedasticity test, it is found that the *CTRL* Model I does not contain heteroscedasticity as the $Obs*R^2$ value or χ^2 value of calculation model 35.075 is smaller than χ^2 critical value (on α = 5 % and df = 28) for 41,337 or by considering the *chi-square* probability value for 0.168 larger than 5%. Next on the linearity test, the model I *CRTL* with Ramsey RESET test shows that the calculated *F* is 10,246 larger than critical *F* on α = 5 % with df (1, 208) for 3,89 or by considering the statistic *F* probability 0.0016 lower than 5% so that the model significantly refused H_0 stating that the linear-shaped model means the non-linear one.

The estimation of Model 1 of real currency demand (Model 1 *CRTL*) as in Table 4 can be found by using OLS as all the key variables in I-ECM have the stationary data. The calculation using the facility of Eviews software package finds that the positive-marked *ECT* coefficient and significant means that it meets the expectancy and supports the result of the co-integration test which tells that *LNCTRL*, *LNGDP*, *RD*1, *RLN*, *LNER*, *LNIHK*, *DUMHB*1 and *DUMK* variables are co-integrated or they have the long-term balance.

The elasticity of each variable shows that in the short term, real currency demand is influenced by the real income (*GDP*) exchange rate (*ER*) and variable of public holiday (*DUMHB*1) significantly. Only then, the *GDP* variables have negative elasticity which does not meet the expectation of the theories where *GDP* variable has positive mark. However, the behaviour of the short term elasticity is different from that of a long term where *GDP* variable has positive mark. Then for other variables such as *RD*, *RLN*, ER, *IHK*, they have significant influence in the long term.

Table 4: Estimation Result on Keynesian Demand on Currency

No.	Variable	Model I CTRL	
		Coefficient	*t*-statistic
1	*D*(*LNGDP*)	-1.168770	-2.895010***
2	*D*(*RD*1)	0.000582	0.336216
3	*D*(*RLN*)	0.018267	1.568479
4	*D*(*LNER*)	0.108823	2.387914**
5	*D*(*LNIHK*)	-0.385718	-1.288357
6	*DUMHB*1	0.065970	8.323079***
7	*DUMK*	-0.030778	-1.282303
8	*LNGDP*(-1)	0.092357	1.712855*
9	*RD*1(-1)	-0.510696	-10.12094***
10	*RLN*(-1)	-0.506411	-10.09924***
11	*LNER*(-1)	-0.378403	-7.925595***
12	*LNIHK*(-1)	-0.558952	-8.468188***
13	*ECT*	0.509082	10.11144***
14	*D*(*SBI*)	0.001773	1.435725
15	*SBI*(-1)	-0.000696	-0.580261
16	*CONSTANT*	-4.610849	-5.862106***
R^2			0.501059
Adjusted R^2			0.465589
S.E. of regression			0.043254
Akaike info criterion			-3.375577
Schwarz criterion			-3.134171
F-statistic			14.12635***
Durbin-Watson stat			2.139931
N			227

Notes: ***, **, and * represent significant at 1%, 5%, and 10%, respectively.
Source: Data estimation.

Validity of Monetarist Currency Money Demand

As in the model I above, prior to the analysis of the estimated model, the model testing is conducted. Based on the White Heteroskedasticity test calculation for testing the heterocedasticity on the Monetarist model, it is found that the model II *CRTL* contains the heteroskedacity. The White Heteroscedasticity test calculation on the model II CTRL χ^2 value of the model calculation 74,195 bigger χ^2 value, critical (on α = 5 % with df = 28) as much 41,337 or by seeing the probability score of *chi-square* 0,000005 lower than 5 % which means that it doesn't pass the heteroscedasticity. Next, for linearity test, the model II *CTRL* with Ramsey RESET test found that calculated *F*-statistic is 0.041 lower than *F*-critical when α = 5 % with df (1;208) 3.89 or by considering the probability of statistic *F* = 0.839 larger than 5% so that the model does not significantly accept H_0 stating that the model is in linear shape.

The estimation model II *CTRL* in Table 5 has stationary variable that the model can be estimated using ordinary least squares. The computational result says that *ECT* coefficient marked positive and significant means it fits the expectation and supports co-integrated computational result which shows *LNCTRL*. *LNGDP*, *RD*1, *RLN*, *LNER*, *LNIHK*, *DUMHB* and *DUMK* variable has cointegrated or had a long-term balance relation. Furthermore, when viewed from the elasticity of each variable, it turns out that real currency money demand in the long run is apparently influenced by total wealth variable (*TWY*), holiday dummy (*HD*1), crisis dummy (*CD*). These have significant and positive influence; while consumer price index (*CPI*) has significant and negative influence, and other variables have insignificant influence over real currency money demand. Nevertheless, when viewed from the long-run elasticity, nearly all variables (*RD*1, *RLN*, *IHK*, *IHSG*) show significant influence.

Table 5: Estimation Result of Monetarist Currency Money Demand

No.	Variable	Model II CTRL	
		Coefficient	*t*-statistic
1	*D*(*LNTW*)	1.254340	12.36541***
2	*D*(*RD*1)	0.000435	0.275241
3	*D*(*RLN*)	0.010983	1.001083
4	*D*(*LNIHK*)	-0.416093	-1.676073*
5	*D*(*LNIHSG*)	-0.015180	-0.485971
6	*DUMHB*1	0.029197	3.716480***
7	*DUMK*	0.032622	1.738613*
8	*LNTW*(-1)	-0.031392	-0.672944
9	*RD*1(-1)	-0.155842	-4.07462***
10	*RLN*(-1)	-0.154652	-4.328383***
11	*LNIHK*(-1)	-0.196108	-3.829583***
12	*LNIHSG*(-1)	-0.161062	-3.879101***
13	*ECT*	0.154961	4.315017***
14	*D*(*SBI*)	-0.000285	-0.260321
15	*SBI*(-1)	-0.000911	-0.809120
16	*CONSTANT*	-0.323990	-0.856022
R^2			0.576130
Adjusted R^2			0.545997
S.E. of regression			0.039867
Akaike info criterion			-3.538638
Schwarz criterion			-3.297232
F-statistic			19.11959***
Durbin-Watson stat			2.417209
N			227

Notes: ***, **, and * represent significant at 1%, 5%, and 10%, respectively.
Source: Data estimation.

Empirical Model Selection

Economy theories have widely investigated balance relation and covered economy variables within a theoretical economy model. In the theory, however, the relation form amongst economy variables is not discussed specifically and various variables in empirical economy model are not suggested. Thus, selecting empirical model has become important for obtaining a good model (Insukindro and Aliman, 1999).

The model selection in this research makes use of non-nested test due to independent specification of the models – a model is separated from other models. Put in another way, both models have same dependent (*Y*) and different independent variables. This model is called non-nested model as model 1 is not a part of model 2 and conversely model 2 is not a part of model 1. The selection of non-tested model in this research uses some criterion, as follow: (a) goodness of fit criterion – the coefficient of determination R^2 and adjusted coefficient of determination $\overline{R^2}$, (b) Akaike's Information Criterion (AIC), and (c) Schwarz's Information Criterion (SIC).

The econometrics experts have developed a statistical test for selecting a good model - in which two models have same dependent variables by either coefficient of determination criterion (R^2) or adjusted coefficient of determination $\overline{R^2}$. The estimation model selected is the one which has R^2 or $\overline{R^2}$ value higher than other models. Based on goodness of fit criterion, the computation for coefficient of determination R^2 and adjusted coefficient of determination $\overline{R^2}$ (view Table 4 and 5), known that the estimation model of real currency money demand by monetarist model, has R^2= 0.576 and $\overline{R^2}$ = 0.546. It is better than Keynesian model, which has R^2= 0.501 and $\overline{R^2}$ = 0.466. Thus, *CTRL* estimation model by monetarist has performed better than Keynesian.

The Estimation Model of Monetarist Currency Money Demand

By the analysis of the two criterions of selecting model by goodness of fit, AIC and SIC, it can be concluded that real currency money demand by monetarist model has performed better than Keneysian. The estimation model of monetarist currency money demand (Table 6) has been ameliorated with output Newey-West HAC Standard Errors & Covariance that the the recovery of heteroscedasticity has been examined. From the table, it can be explained that I-ECM model constructed as expected – the coefficient value of *ECT* is positive and significant. This means the estimation model of money demand is valid, if the coefficient value of error correction term is not equivalent to zero ($\delta \neq 0$) and significant. So, in other words, I-ECM model works and can be used for estimating the factors that influence money demand in Indonesia during the research period. The result also indicates that the model specification is valid and accordance with the result obtained in cointegration regression as in previous discussion. The estimation result has coefficient of adjustment value $\beta_{14.15}$ = 0.152364. It means that approximately 15.23% the discrepancy between the actual and expected $LNCTRL_t$ will be eliminated or omitted within a month.

The estimation model has yielded coefficient of determination (R^2) 0.57. This value doesn't show a spectacular unit, although time series data are used. It should be noted that the coefficient of determination in Table 6 simply estimates the relation between *D*(*LNCTRL*) and the free variables used in I-ECM estimation and doesn't estimate the relation between *LNCTRL* and explanatory variables in observed models. The usage of first difference data will certainly minimize the data variation towards their average and will by itself minimize the coefficient of determination produced.

Table 6: Estimation Result of the Monetarist Currency Money Demand Model

No.	Variable	CTRL Model		
		Short-term Coefficient	Long-term Coefficient	*t*-statistic
1	*D*(*LNTW*)	1.257965		6.413316***
2	*D*(*RD*1)	0.000305		0.274604
3	*D*(*RLN*)	0.010639		1.047176
4	*D*(*LNIHK*)	-0.449793		-2.051148**
5	*D*(*LNIHSG*)	-0.014006		-0.412261
6	*DUMHB*1	0.028900		2.854632***
7	*DUMK*	0.038816		1.665410*
8	*LNTW*(-1)		0.850089	-0.389546
9	*RD*1(-1)		-0.006255	-4.822958***
10	*RLN*(-1)		0.001017	-4.816518***
11	*LNIHK*(-1)		-0.340835	-3.256174***
12	*LNIHSG*(-1)		-0.035422	-4.300397***
13	*ECT102*	0.152364		4.778645***
14	*D*(*SBI*)	-0.000230		-0.138648
15	*SBI*(-1)		0.994539	-0.800365
16	*CONSTANT*	-0.376204	-1.469113	-0.800637
R^2				0.577260
Adjusted R^2				0.547207
S.E. of regression				0.039814
F-statistic				19.208300***
Durbin-Watson stat				2.409197
N				227

Notes: ***, **, and * represent significant at 1%, 5%, and 10%, respectively. I-ECM Model of long-term coefficient is formulated as $(\beta_i + \beta_{12.13})/\beta_{12.13}$.
Source: Data estimation.

Short-Term Analysis on Monetarist Currency Money Demand

The result of short-term currency money demand analysis constitutes four significant variables which have influence; total wealth variable (*TWV*), consumer price index (*CPI*), holiday dummy (*HD*1), monetary crisis dummy (*MCD*). Wealth variable and holiday dummy statistically are significant with α = 1 %, consumer price index variable is significant on α = 5 %, crisis dummy variable (*MCD*) is significant on α = 10 %. Wealth variable has the coefficient 1.25797, which means if total wealth increases 1%, real currency money demand increases 1.25797%. This finding is in line with Daquila and Fatt (1993), and Martin and Winder (1998) that shows the influence of wealth towards money demand is positive and significant. For consumer price index variable (*CPI*), it has significant influence with 0.44079 coefficient. This means total wealth increases 1%, real currency money demand declines 0.44079%. This is in line with studies conducted by Boediono (1985), Daquila and Fatt (1993), Sugiyanto (1995), Neil and Sharma (1998), Hayo (2000).

Then, for holiday dummy variable (*HD*), in the short term, it is significant with α = 1 % towards real currency money demand. It means there is a behavioural difference of currency money demand between holiday and non holiday month with 0.02890 coefficient, which means it is higher in holiday month than that in non holiday month. Furthermore, for crisis dummy variable, in the short term, it is significant with α = 10 % towards real currency money demand. It means there is a behavioural difference of currency money demand between pre and post or in crisis

period with 0.0388 coefficient, which means it is higher in and post crisis period than that pre crisis period.

For other variables *RD*1, *RLN*, *IHK*, *IHSG*, they do not influence significantly real currency money demand in the short term. For policy variable, in the short term, it does not either. This condition indicates variables established in the short term give less influence over the change of real currency money demand in Indonesia. By this analysis, it can be explained also that short-term currency money demand is not elastic to interest rates, both domestic and foreign interest rates. This is empirically in line with the economic theory indicating that money demand in the short term is allocated for transactions and uncertainties. This is accordance with Insukindro's finding (1998), that short-term money demand is more allocated for transactions and uncertainties, not for speculations.

Long Term Analysis of Monetarist Currency Money Demand

Long-term analysis on factors that influence real currency money demand suggests that domestic interest rates variable has significant influence on α = 1 % towards real currency money demand. Its long-term coefficient is -0.006255, which means if interest rates rise to 1%, the demand for currency money will fall 0.006255%. For foreign interest rates variable, it has significant influence on α = 1 % towards real currency money demand with long-term coefficient 0.001017. It means if foreign interest rates rise to 1%, the demand for currency money will rise to 0.001017%. Then, for price level variable or consumer price index (*CPI*), it has significant influence on α = 1 % towards real currency money demand with long-term coefficient -0.340835. This means if consumer price index rises to 1%, the demand for currency money will fall to 0.340835%. The influence of composite stock price index as a proxy from return of the stock turns out to affect significantly real currency money demand with α = 1 % and the long-term coefficient -0.03542. This means if composite stock price index rises to 1%, it will decrease the demand for currency money 0.03542%.

The findings above on the influence of domestic interest rates variable, consumer price index, composite stock price index towards money demand are in line with the theories. Domestic interest rates with negative influence is in accordance with the studies conducted by Boediono (1985), Fair (1987), Insukindro (1993), Daquila and Fatt (1993), Honohan (1994), Ericson and Sharma (1998), Obben (1998), Eitrheim (1998), Xu (1998), Skrabic and Tomic (2009), Nautz and Ulrike (2010), Abdullah et al. (2010), Odularu and Okunrinbuye (2009), Valadkhani (2008), Singh and Manoj (2009), Achsani (2010), Hamori (2008). Consumer price index (CPI) with negative influence is in accordance with studies by Boediono (1985), Widjanarko (1989), Daquila and Fatt (1993), Sugiyanto (1995), Neil and Sharma, (1998), Bernd (2000). Composite stock price index with negative influence over money demand in Indonesia is in line with Sugiyanto's study (1995).

Nevertheless, it turns out to give positive and significant influence for foreign interest rates variable. This is also as investigated by Boediono (1985), Sugiyanto (1995), Hueng (1999), Elyas and Zadeh (2006), Fair (1987), Daquila and Fatt (1993), Eitrheim (1998), and Abdullah et al. (2010). For policy analysis variable – the influence of monetary policy intervention, however, it influences less effectively real currency money in Indonesia. It is proven either in the long term or short term.

CONCLUSION

Based on the examination and estimation result, it could be concluded that Monetarist real currency money demand performed better than Keynesian real currency money demand. The demand for real currency

money (Monetarist) in the short-run was positively influenced by total wealth, negatively influenced by consumer index price variable, positively influenced by holiday dummy and positively influenced by crisis dummy. Thus, the demand for currency money was not elastic to interest rates, but to wealth. Consumer price index indicated the demand for currency money in the short run was allocated for transactions and uncertainties.

Real currency money demand in the long-run was negatively influenced by domestic interest rates, positively influenced by foreign interest rates variable, negatively influenced by consumer price index, and negatively influenced by composite stock price index. This finding indicated that the demand for real currency money in the long run was allocated for transactions as well as speculations.

In the long-run analysis, the effect of foreign interest rates, either towards real currency money demand, had positive influence, which did not suit the theory. It could be concluded that in the long run, if foreign interest rates rose, the demand for money would rise as well. It was because people shift money abroad. This condition reasserted that it was not only domestic interest rates which affect money demand for speculation purpose, but also foreign interest rates. It suited Mundell-Fleming theory stating that Indonesia operated an an open economy.

It could be concluded as well that there was a behavioural difference of currency money demand between holiday and non-holiday month, such as Lebaran and Christmas. Then, for monetary crisis dummy variable, there was apparently a behavioural difference of currency money demand pre and during or post monetary crisis.

From the effect of monetary operation conducted by Bank Indonesia, especially in relation to Bank Indonesia Certificate interest rates, it could be concluded that it had ineffective influence in the short and long-run. This finding indicated that the policy, especially Bank Indonesia Certificate was less able to influence the amount of money supply (currency money), with the economy assumption of equilibrium in money market.

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