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THE FLOW OF MONEY DEMAND IN INDONESIA: WHAT DRIVES IT? (OBSERVATIONS FROM 2006–2020)

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ABSTRACT

Indonesia is experiencing a contemporary phase of the economy in decades marked by financial turmoil. Fluctuations in money demand are inseparable from the responsibility of Bank Indonesia as the holder of regulations, rules and full control to track the effects of financial flows. The orientation of this study follows up on the causality between Gross Domestic Product (GDP), deposit interest rates and the rupiah exchange rate against the demand for money in Indonesia. The quantitative research approach supports the objective, where data is obtained from the Central Statistics Agency of Indonesia and Bank Indonesia and is of the time-series type for the 2006–2020. The model was analyzed using the Error Correction Model (ECM) which was elaborated through Views 9.0. The indications are that in the short and long term, GDP and the rupiah exchange rate have a positive effect and increase the demand for money. On the one hand, an increase in deposit rates has a negative effect on the demand for money. Further studies consider dimensions outside the variables that have been discussed.

Contribution/ Originality: This study provides broad insights about the urgency of managing the more fundamental monetary aspects in Indonesia.

Keywords: GDP, interest rates, exchange rates, money demand, ECM.

JEL Classification: B22, E43, D51, E41, C32.

1. INTRODUCTION

Money plays a vital role in people's lives and the economy of a country. Starting from children, teenagers, adults and the elderly, they definitely need money (Tella & Abdulmumin, 2015). Money has a function, i.e. as a medium of exchange, as a unit of measurement for the value of goods and services, and money can function as a store of value for wealth. The presence of money causes transactions of economic activities implemented by the community, both on a small and large scale, to be carried out quickly and safely. To support transactions in economic activities, people in Indonesia need rupiah. This is because, in every domestic transaction, you must always and must use rupiah currency, and you may not refuse to apply rupiah currency during transactions in the territory of the Republic of Indonesia.

For the economy, the role of money cannot be doubted. Like blood flowing in the human body, money must always flow in the economy. If money is blocked from flowing in the economy, it can

disrupt people's economic activities, so that it has implications for economic weakness. Money is the engine that drives the economy. In today's modern economy, money is not only used to help transactions, but also money is considered a commodity that can be traded and used for speculative purposes for profit. Production, distribution, consumption and investment activities in national and international markets always involve money to facilitate these activities. Thus, as a consequence, there will be an interaction from the community to the monetary authority regarding the need for money which is called "money demand".

The intensity of the demand for money by the public is very much needed by Bank Indonesia as a reference in making monetary policy decisions, especially in making policies to control the money supply to suit the needs of the community. The central bank in circulating money must be adjusted and balanced with the amount of money needed by the community (Farajnejad & Lau, 2017). If the money supply is too much, it will stimulate an increase in inflation, but if the money supply is too little, it will have an impact on deflation and slow economic growth. In addition, it is necessary to implement a monetary policy that must be implemented by Bank Indonesia, especially in controlling the money supply so that it meets the needs of the community with the aim of achieving and maintaining stability in the value of the rupiah. The mandate of Bank Indonesia to achieve and maintain the stability of the value of the rupiah based on the Law of the Republic of Indonesia No. 23 of 1999 concerning "Bank Indonesia" as amended by Law of the Republic of Indonesia No. 3 of 2004 concerning "Amendments to the Law of the Republic of Indonesia No. 23 of 1999".

If you want to achieve and maintain the stability of the value of the rupiah so as not to have a negative impact on the economy, it is so urgency to provide a horizon about the identification of open macroeconomics, such as the demand for money, so that the money circulated by the central bank is according to customer needs. Several factors that can affect the demand for money by the public include the acceleration of money circulation, the inflation rate, GDP growth, the condition of the domestic banking system and seasonal factors such as holidays (Roy et al., 2021).

National income can affect the level of demand for money. This is explained in the monetary economic theory, i.e. the demand for money according to Keynes the demand for money for transaction and precautionary motives is strongly influenced by national income. The higher the national income, the greater the volume of community transactions and the greater the money needed in each transaction (Sasono et al., 2021; Ahmad et al., 2021). Besides, the demand for money as a precautionary measure to deal with things that happen in the future is also influenced by national income. National income in this study is proxies by Gross Domestic Product (GDP). Too to national income, in monetary economic theory of money demand, interest rates can also affect the demand for money, especially for speculative motives. If interest rates increase, the demand for money will decrease, because people will choose to save their wealth in financial institutions or securities. Conversely if interest rates decline, the demand for money will increase, because people prefer to hold money. In this study, the interest rate observed is the interest rate of 6-month time deposits for commercial banks.

Another factor that affect the demand for money by the public is the exchange rate. The exchange rate is the price of a country's currency expressed in the currency of another country (Berlian et al., 2017). Since 1997 until now, Indonesia has adopted a free-floating exchange rate system so that the rupiah exchange rate will be vulnerable to fluctuations and Indonesia has adopted a free foreign exchange system so that Indonesian people are free to store, own and trade foreign exchange freely. And Indonesia adheres to an open economic system so that the Indonesian people have relationships with people abroad of

international trade transactions. Under these conditions, fluctuations in the rupiah exchange rate will also be able to affect the demand for money by the public.

The dynamics of the rupiah exchange rate also affects the demand for money to be used in international trade transactions, especially import transactions. When the rupiah exchange rate depreciates, it has an impact on rising prices of imported goods and rising prices of imported goods will increase the demand for money in import transactions (Hancock & Humphrey, 1997).

The monetary economic theory, i.e. the demand for money, according to Milton Friedman, explains that the factors that influence the demand for money are prices and income from various forms of wealth. One form of wealth that can be owned by the community is money. Benefits or advantages of wealth in the form of money, can provide benefits in the form of money as well. When the rupiah exchange rate against the U.S Dollar (US\$) depreciates, people who store their wealth in US\$ will exchange it into rupiah (IDR) because US\$ is expensive and can provide most profit and satisfaction for the owner, so it will have an impact on demand. IDR is increasing. Thus, it can be concluded that the exchange rate has a positive influence on the demand for money.

Departing from the actualization, basis, phenomena, and contradictions between theory and real conditions above, an in-depth investigation is needed about the factors that influence the demand for money in Indonesia, including: GDP, deposit rates, and the rupiah exchange rate. Paper outputs are organized into five points. Phase 1: the introduction explains the background and objectives. Phase 2: methodology breaks down the data and designs econometrics. Phase 3: the results display the empirical findings. Phase 4: discussion comparing research with relevant publications. Phase 5: confirming conclusions, highlighting implications, providing suggestions, and directions for future research.

2. METHODOLOGY

2.1. Data and Specification

The study approach using a quantitative approach, where associative-causality is the most important dimension in it (Kurniawan et al., 2021; Juhardi & Michael, 2022). The time span or lag focuses on empirical data collected over 15 periods, from 2006 to 2020. The data sets are compiled through published reports from the Indonesian Central Statistics Agency of Indonesia (2022) and the official website Bank Indonesia (2022).

To investigate the relationship between GDP, deposit interest rates, and the rupiah exchange rate on the demand for money in Indonesia, a series of empirical tests were implemented using the Error Correction Model (ECM). Engle and Granger (1987) and Muqorrobin (2015) highlight that the analysis technique is also called two steps because there are two stages, including calculating the residual value from the standard and running a regression analysis by entering the residual value into the regression equation. Data processing by error correction method is applied if the two analyzed data are not stationary, but are cointegrated between the two variables.

ECM analysis also has the advantage of overcoming problems in research data in the form of time series or time series that show the tendency of a trend and cause data not to be stationary, causing spurious regression. Absent regression occurs when there is no relationship between the independent variable and the dependent variable (Khan et al., 2020).

2.2. Econometrics

The most prominent of this study is the implementation of ECM supported by Eviews 9.0 software. The ECM equation model in the study to analyze the effect of GDP, deposit interest rates, and the rupiah exchange rate on the demand for money in Indonesia is explained as follows:

$$DM_t = \alpha + \beta_1 GDP_t + \beta_2 DIR_t + \beta_3 RER_t + \epsilon_t$$

The data is transformed into logarithms (log) by variables DM, GDP and RER. The formulation below is a long-term equation and can be formed if it is confirmed that the variables are cointegrated with each other, so that there is a long-term relationship as follows:

$$\text{Log}DM_t = \alpha + \beta_1 \text{Log}GDP_t + \beta_2 DIR_t + \beta_3 \text{Log}RER_t + \epsilon_t$$

where Log = Logarithm, DM = Money Demand, GDP = Gross Domestic Product, DIR = Deposit Interest Rate, RER = Rupiah Exchange Rate, α = Constant, $\beta_1, \beta_2, \beta_3$ = Long-Term Coefficient, ϵ_t = Error Term, and t = Time Period.

After that, if the data on all variables are not stationary at the level but are stationary at the integration degree of the first differentiation, then the previous equation is differentiated into ECM to identify short-term relationships and enter the residual value (ECT) into the equation model. Thus, the short-run equation is composed of the following:

$$D_LogDM_t = \alpha + \beta_1 D_LogGDP_t + \beta_2 D_DIR_t + \beta_3 D_LogRER_t + \beta_4 ECT_{t-1} + \epsilon_t$$

where D_LogDM = First Differentiation of LogDM ($\text{Log}DM_t - \text{Log}DM_{t-1}$), DLogGDP = First Differentiation of LogGDP ($\text{Log}GDP_t - \text{Log}GDP_{t-1}$), D_DIR = First Differentiation of DIR ($DIR_t - DIR_{t-1}$), D_LogRER = First Differentiation of LogRER ($\text{Log}RER_t - \text{Log}RER_{t-1}$), α = Constant, $\beta_1, \beta_2, \beta_3, \beta_4$ = Coefficient (Short-Term), ECT = Error Correction Term, ϵ_t = Error Term, and t = Time Period.

The ECT concept is defined as an imbalance error and the ECT value represents the length of time required to get the full balance value (Zhang et al., 2016). The ECT value or residual coefficient (-1) must be significant. Then, ECM is workable to be practiced (Seong, 2009; Pakpahan, 2012). The ECT is formed explicitly and focuses on:

$$ECT_{t-1} = \text{Log}DM_{t-1} + \text{Log}GDP_{t-1} + DIR_{t-1} + \text{Log}RER_{t-1}$$

3. RESULTS

3.1. Unit root test

Stationary data as data that shows the mean, variance and autocovariance remain the same over time, so that time series data is classified as stable (Purwadi et al., 2021). The unit root test represented by the Augmented Dickey-Fuller (ADF) test is summarized in Table 1.

Table 1. Unit root tests (ADF).

Variables	T-Statistic	MacKinnon	Prob.	Remarks
LogDM	-4.236672	-3.175352	0.0095	Stationary
LogGDP	-1.229083	-3.098896	0.6301	Not Stationary
DIR	-2.551996	-3.119910	0.1268	Not Stationary
LogRER	-0.747093	-3.098896	0.8028	Not Stationary

Source: compilation by authors.

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To find out the problem of the unit root test, compare the T-statistic score with the critical value in MacKinnon. If the T-statistic score > critical value, then the data is classified as stationary. Based on Table 1 above, there is one stationary variable: DM, where $-4.236 > -3.175$ and p below 5% ($0.009 < 0.05$). The other three variables (GDP, DIR, and RER) had a T-statistical score < 0.05 and the probability was below 5% ($p = 0.630; 0.126; 0.803$), so it was necessary to analyze it through an integration test to identify the degree of integration.

3.2. Integration test

The degree of integration test is an advanced part of the stationary of the unit root. At the degree level or zero (0), there are still variable data that are not stationary. The test pattern still uses the ADF test as well as the basis for making decisions.

Table 2. Degree of integration (first difference).

Variables	T-Statistic	MacKinnon	Prob.	Remarks
LogDM	-5.018705	-3.144920	0.0024	Stationary
LogGDP	-3.650034	-3.119910	0.0202	Stationary
DIR	-5.474721	-3.119910	0.0010	Stationary
LogRER	-3.912481	-3.119910	0.0128	Stationary

Source: compilation by authors.

In Table 2, that the data of all variables are stationary at the integration level of the first differentiation, where T-statistic > critical value ($-5.018; -3.650; -5.474; -3.912$) and $p < 0.05$ ($0.002; 0.020; 0.001; 0.012$), so it is concluded that the study model is stationary and valid which is synchronized into the Error Correction Model (ECM).

3.3. Cointegration test

Stationary variable data in the first differentiation degree of integration is very likely to occur cointegration, when there is a long-term relationship between variables (Johansen, 1995). Here, cointegration is measured using the Johansen test. If the T-Statistic value > critical value at the 5% confidence level, it indicates that the two variables are cointegrated with each other.

Table 3. Johansen cointegration.

Hypothesized No. of CE(s)	Eigen Value	T-Statistic	0.05 Critical Value	Prob. **
None *	0.975079	98.40103	47.85613	0.0000
At most 1 *	0.908068	50.40456	29.79707	0.0001
At most 2 *	0.653897	19.37736	15.49471	0.0123
At most 3 *	0.349197	10.584125	3.841466	0.0181

Source: compilation by authors. Notes: *) denotes rejection of the hypothesis at the 0.05 level and

**) MacKinnon et al. (1999) p-values.

Based on Table 3, that the T-Statistic value is greater than the critical value at the 5% confidence level, i.e. the T-Statistic value > critical value with a 5% confidence level ($98.401 > 47.856$). That way, there is cointegration between variables in a long-term relationship.

3.4. Result of ECM

The variables in this study include money demand, GDP, deposit interest rates, and the rupiah exchange rate which are concluded to be stationary at the first differentiation degree of integration and are cointegrated. Thus, the ECM analysis was continued with reference to long-term estimates (see Table 4). The long-term analysis equation is rewritten in the following equation:

$$D_LogDM_t = -1.254 + 0.311Log_GDP_t - 0.046DIR_t + 1.334Log_RER_t + \epsilon_t$$

Referring to the long-term regression equation, reflecting the coefficient where C is -1.254 which is interpreted that if GDP, DIR, and RER are assumed to be zero or constant, then DM decreases to 1.254% . Meanwhile, GDP and RER reached 0.311 and 1.334 which is GDP and RER increased by 1% , then DM increased by 0.311% and 1.334% for the long term assuming other variables were held constant. But, the DIR coefficient shows -0.046 , where when the DIR increases by 1% , the DM actually decreases to 0.046% in the long term.

Table 4. Long term analysis.

Variables	Coefficient	Std. Error	T-Statistic	Prob.
D_LogGDP	0.311607	0.083657	3.724804	0.0034
D_DIR	-0.046382	0.014007	-3.311431	0.0069
D_LogRER	1.334916	0.252105	5.295079	0.0003
22	-1.254995	0.738910	-1.698442	0.1175
R-squared	0.962924			
Adjusted R-squared	0.952812			
F-statistic	95.22819			
Prob.(F-statistic)	0.000000			

Source: compilation by authors.

Table 5. Short term analysis.

Variables	Coefficient	Std. Error	T-Statistic	Prob.
D_LogGDP	0.136328	0.044320	3.076000	0.0132
D_DIR	-0.029352	0.005173	-5.674073	0.0003
D_LogRER	0.411952	0.166519	2.473912	0.0353
ECT(-1)	-0.760975	0.165639	-4.594181	0.0013
25	0.032831	0.006684	4.911954	0.0008
R-squared	0.823228			
Adjusted R-squared	0.744663			
F-statistic	10.47827			
Prob.(F-statistic)	0.001931			

Source: compilation by authors.

Variables have been categorized as stationary in the degree of integration of the first differentiation and are cointegrated with each other. Therefore, it also has a short-term relationship between variables. Table 5 summarizes the short-term estimates. The long-term analysis formulation is listed in the equation below:

$$D_LogDM_t = 0.032 + 0.136 D_LogGDP_t - 0.029 D_DIR_t + 0.411 D_LogRER_t - 0.760 ECT_{t-1} + \epsilon_t$$

Based on the function of the short-term regression equation, representing the coefficient for C is 0.032 which is interpreted that if GDP, DIR, and RER are assumed to be zero or constant, then DM increases to 0.032%. Meanwhile, GDP and RER reached 0.136 and 0.411 which is GDP and RER increased by 1%, then DM increased by 0.136% and 0.411% for the short term assuming other variables were held constant. The DIR coefficient shows -0.029, where when DIR increases by 1%, DM actually decreases to 0.029% in the short term. The ECTt-1 score is -0.760 which indicates that the coefficient and significance value of ECT is 0.001, which is proven that the ECM model is valid and the speed of change of the imbalance is short-term. Even though the ECT score reaches -0.760, which means that there has been an imbalance of 100% in the past, the change in money demand will adjust for a decrease of up to 76%. To achieve full balance, the flow of money demand adjustment takes about 7 months to 8 months.

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3.5. Classic assumption test

The classical assumption test is represented by normality, which is useful in examining residual scores that are normally distributed or vice versa. Jarque–Bera test is actualized into normality. The essence of decision-making is if the probability is above 5% ($p > 0.5$), it is concluded that the residuals in the ECM model are avoided from autocorrelation symptoms. From Table 6, it is evident that $p = 0.716 > 0.05$. Thus, the residual data is normally distributed, and the ECM is free from autocorrelation problems.

Table 6. Jarque–Bera assumption.

Series: Residuals	
Observations: 14	11
Mean	-8.27e-18
Median	-0.002024
Maximum	0.023351
Minimum	-0.20327
Std. Dev.	0.013670
Skewness	0.235293
Kurtosis	2.040047
Jarque–Bera	0.666727
Probability	0.716510

Source: compilation by authors.

3.6. Model eligibility

The coefficient of determination (R^2) test is useful for reviewing the percentage of variation in the change in the value of the dependent variable, which is determined by the variation in the change in the value of the independent variable. From Table 7, the R^2 score in the short-term regression is 0.823 and this gain is above 0.75 ($0.823 > 0.75$). The variation of changes in the value of the DM variable is determined by the variation of the independent variables (GDP, DIR, and RER) in the short term is very strong, where 17.7% is influenced by other independent variables outside the model. In the long term, the R^2 was 0.962. This achievement was also above 0.75 ($0.962 > 0.75$). Variation of changes in DM variable is determined by variations in changes in GDP, DIR, and RER in the long term up to 96.2%. There are other variables outside the model, reaching 3.8%.

Table 7. Coefficient of determination (R^2) and simultaneous test (F-statistics).

13	Components	Short term	Long term
	R-squared	0.823228	0.962924
	Adjusted R-squared	0.744663	0.952812
	F-statistic	10.47827	95.22819
	Prob. (F-statistic)	0.001931	0.000000

Source: compilation by authors.

Furthermore, the Goodness of fit test or F test is useful for measuring the feasibility of the model. The significance level in the F test uses a tolerance limit of 5%. The basis for decision-making is assumed as follows:

H_0 : The model is not feasible, so it is not actualized for estimation.

H_1 : The model is feasible, so it is very well actualized for estimation.

The parameters based on the F-table in the short-term equation are 3.59. Referring to Table 7, the 8-statistic score is greater than the F-table ($10.478 > 3.59$) and the probability is 0.001. Simultaneously, all independent variables have a significant effect on the dependent variable in the short term. Meanwhile, the F-table score for the term equation obtained is that the F-statistic is greater than the T-table ($95.228 > 3.59$), where the probability is 0.000. For that reason, the variables GDP, DIR, and RER have a simultaneous impact on DM for long-term estimates.

4. DISCUSSION

12 The findings verify that in the ECM or short term, it shows that GDP has a positive effect on money demand. This is also confirmed based on publications highlighted by Aditia and Cahyono (2018), Shafiq and Malik (2018), and Taiwo (2012). However, in the long run, GDP tends to have a positive effect on money demand, which is supported by Arintoko (2011) and Mazher and Dahlan (2020).

The more GDP increases, the more money demand increases in line with "Monetary Economic Theory" which reviews the demand for money related to transaction motives (Drake & Fleissig, 2006; Stiglitz & Greenwald, 2003). The higher the national income, it indicates, the greater the volume of public transactions and the greater the money in the circulation of transactions. 1

In the short and long term, this study finds that the deposit rate has a negative effect on the demand for money. This implication is in the direction of verifying the speculative motives in "Monetary Economic Theory" (Glazyev, 2016). At the same time, high deposit interest rates have an impact on the interest of customers who prefer to save money in banks in the form of deposits with speculation to earn profits (Ascarya, 2012). Meanwhile, if deposit interest rates are low, customers tend to respond with speculative behavior, where they are more dominant in holding money and have no intention of depositing in banks (Riani, 2021). The speculative motive generally becomes routine by the upper-middle class customers and the wealthy class of society. Yet, we find that deposit rates have a negative effect on money demand and this is supported by the publications discussed by Simorangkir (2003) and Liñares-Zegarra and Willeson (2021). 24

In developing markets, such as Indonesia, it was found that the rupiah exchange rate had a positive effect on the demand for money 28 the long and short term. This study contradicts and is not relevant to previous publications such as Bahmani-Oskooee et al. (2019), Mahmood and Alkhateeb (2018), 19 gibany and Nourzad (1995), and Zehra et al. (2021) which articulates if the demand for money is influenced by the exchange rate.

There is a harmony between the results of the investigation with the effect of money demand in "Monetary Economic Theory". The elements that influence the demand for money are wealth (assets) and prices (Bitrus, 2011; Chitre, 1975; Lioui & Poncet, 2010). Dubb (2016) explains that one of the forms of wealth owned by the community is money. The advantages of holding money provide great benefits. Lusardi (2019) and Pawasutipaisit and Townsend (2011) also confirm that wealth owners (individuals) always consider accurately the types of assets chosen to achieve the greatest satisfaction.

5. CONCLUSIONS

The purpose of this study is to examine the effect between GDP, deposit interest rates, and the rupiah exchange rate on the demand for money in Indonesia. In the long and short term, statistics confirm that GDP and the rupiah exchange rate have a positive impact on money demand. In fact, it was also found that the deposit interest rate had a negative effect on the demand for money. Interestingly, the increase in GDP and the rupiah exchange rate during 2006–2020, had a systematic effect on the increase in the demand for money. On the other hand, when the deposit rate increases, it weakens the demand for money in Indonesia.

Recommendations on regulations governing the monetary system, such as Bank Indonesia, can provide the amount of money demanded by customers. In the coordination path and scenarios to maintain stability in money circulation, it must be balanced with an inclusive GDP, thereby reducing the risk of inflationary symptoms. Other insights also point to the regulation of Bank Indonesia through contractionary monetary policy which raises the BI rate, where the increase is followed by an increase in deposit interest rates which has an impact on money demand. But, if the volume of money in circulation is low, Bank Indonesia will stimulate expansionary monetary policy by lowering the BI rate.

Stakeholders, such as the government, pay more attention to the movement of the rupiah exchange rate, which tends to depreciate. The increase in demand for money must be balanced by a monetary system that is stable in the capacity of supplying the volume of money that has the potential to have a negative effect on the national economy.

Finally, considering the weaknesses and limitations of this study, future research directions consider and concentrate on other variables outside the model that also affect the demand for money other than GDP, deposit interest rates, and the rupiah exchange rate.

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