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THE FLOW OF MONEY DEMAND IN INDONESIA: WHAT DRIVES IT?

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ABSTRACT

Indonesia's economy is experiencing a contemporary phase marked by decades of financial turmoil. Fluctuations in money demand are inseparable from the responsibilities of Bank Indonesia, which is the holder of rules and regulations and has full control of tracking the effects of financial flows. In reality, the imbalance between the demand for money and the supply of money with limited stock and capacity has an impact on macroeconomic turmoil. 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. Time series data from 2006–2020 was obtained from the Central Statistics Agency of Indonesia and Bank Indonesia. The data was analyzed using the error correction model (ECM) through EViews 9.0. The indications are that in the short and long terms, GDP and the rupiah exchange rate have a positive effect and increase the demand for money. An increase in deposit rates has a negative effect on the demand for money. Holistic recommendations concentrate on parallel and collaborative monetary instruments between executive parties, including banking. Also, it is necessary to control and visualize policies that are more comprehensive and consider holistic issues related to the aggressiveness of money circulation, which has the potential to disrupt the macroeconomy.

Contribution/Originality: This study provides broad insights into the urgency of managing the more fundamental monetary aspects in Indonesia. At this moment, in the context of monetary science and the novelty corridor, the research output is relevant to the analytical instruments used, thus giving rise to ideas and explicit foundations of originality.

1. INTRODUCTION

Money plays a vital role in the economy of a country and in the lives of people of all ages (Tella & Abdulmumin, 2015). Money functions as a medium of exchange, as a unit of measurement for the value of goods and services, and as a store of value for wealth. The presence of money means that small- and large-scale transactions can be carried out quickly and safely. To support transactions in economic activities, people in Indonesia need rupiah 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.

Money is the engine that drives the economy, and the role of money in economies cannot be doubted. If money is blocked from flowing in an economy, it can disrupt people's economic activities, which has implications for

economic weakness. In today's modern economy, money is not only used in transactions, but it is also 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 between the community and the monetary authority regarding the need for money; this is called "money demand".

The intensity of the public's demand for money is very much needed by Bank Indonesia as a reference when making monetary policy decisions, especially policies regarding control of the money supply to suit the needs of the community. The central bank must be adjusted and balanced with the amount of money needed by the community (Farajnejad & Lau, 2017). If the money supply is too high, it will stimulate an increase in inflation, but if the money supply is too low, it will lead to deflation and slow economic growth. In addition, it is necessary for Bank Indonesia to implement a monetary policy, especially to control 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.

To achieve and maintain the stability of the value of the rupiah and avoid a negative impact on the economy, it is essential to provide a horizon regarding the identification of open macroeconomics, such as the demand for money, so that the money circulated by the central bank is done according to customer needs. Several factors that can affect the public's demand for money 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, Rochaida, Suharto, & Rizkiawan, 2021).

National income can affect the level of demand for money. This is explained by the monetary economic theory, i.e., 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 (Ahmad, Arifuzzaman, Al Mamun, & Oalid, 2021; Hronova & Hindls, 2022; Nwaobia, Ogundajo, & Abe, 2022; Sasono et al., 2021). The demand for money as a precautionary measure to deal with future occurrences is also influenced by national income. National income in this study is proxied by gross domestic product (GDP). In monetary economics, 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 use financial institutions for their savings 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 six-month time deposits for commercial banks.

Another factor that affects the public's demand for money 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 Indonesian people are free to store, own and trade foreign exchange freely. Also, Indonesia adheres to an open economic system so that the Indonesian people can engage in international trade transactions. Under these conditions, fluctuations in the rupiah exchange rate will also affect the public's demand for money.

The dynamics of the rupiah exchange rate also affects the demand for money for use in international trade transactions, especially import transactions. When the rupiah exchange rate depreciates, it has an impact on the 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. When the rupiah exchange rate against the US dollar (US$) depreciates, people who store their wealth in US$ will exchange it for rupiah because the US$ is expensive and can provide the most profit for the owner and will thus have an impact on demand. As the value of the Indonesian rupiah is increasing, 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 the real conditions mentioned above, an in-depth investigation is needed into the factors that influence the demand for money in Indonesia, including GDP, deposit rates, and the rupiah exchange rate. The paper is organized into five sections. Section 1 contains the introduction and explains the background and objectives; Section 2 explains the methodology, data, and design econometrics; Section 3 comprises the results and the empirical findings; Section 4 contains the discussion and compares this research with relevant publications; and Section 5 comprises the conclusion, implications, suggestions, and directions for future research.

2. METHODOLOGY

2.1. Data and Specification

The study uses a quantitative approach in which associative causality is the most important dimension Kurniawan, Awaluddin, Fitriadi, Busari, and Darma (2021); Jiuhardi and 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 Central Statistics Agency of Indonesia (2022) and the official website of 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 carried out using the error correction model (ECM). Engle and Granger (1987) and Muqorrobin (2015) highlighted that this analysis technique is also called a two-stage 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 using the error correction method is applied if the data are not stationary but cointegration exists between the two variables.

ECM analysis also has the advantage of overcoming problems in time series data with trends that cause data not to be stationary, leading to spurious regression. Absent regression occurs when there is no relationship between the independent variable and the dependent variable (Khan, Marimuthu, & Lai, 2020).

2.2. Econometrics

The implementation of the ECM was supported by EViews 9.0 software. The ECM equation used to analyze the effect of GDP, deposit interest rates, and the rupiah exchange rate on the demand for money in Indonesia is as follows:

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

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

$$LogMD_t = \alpha + \beta_1 LogGDP_t + \beta_2 DIR_t + \beta_3 LogRER_t + \epsilon_t$$

where Log = logarithm, MD = money demand, GDP = gross domestic product, DIR = deposit interest rate, RER = rupiah exchange rate, α = constant, β_1, β_2, β_3 = long-term coefficients, 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 the ECM to identify short-term relationships and the residual value of error correction term (ECT) is entered into the equation model. Thus, the short-run equation is composed of the following:

$$D\_LogMD_t = \alpha + \beta_1 D\_LogGDP_t + \beta_2 D\_DIR_t + \beta_3 D\_LogRER_t + \beta_4 ECT_{t-1} + \epsilon_t$$

where D_LogMD = first differentiation of LogMD ($LogMD_t - LogMD_{t-1}$), DLogGDP = first differentiation of LogGDP ($LogGDP_t - LogGDP_{t-1}$), D_DIR = first differentiation of DIR ($DIR_t - DIR_{t-1}$), D_LogRER = first differentiation of LogRER ($LogRER_t - LogRER_{t-1}$), α = constant, β_1, β_2, β_3, β_4 = short-term coefficients, 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, Wu, & Sun, 2016). The ECT value or residual coefficient (-1) must be significant. Then, ECM is workable in practice (Pakpahan, 2012; Seong, 2009). The ECT is formed explicitly and focuses on:

$$ECT_{t-1} = LogMD_{t-1} + LogGDP_{t-1} + DIR_{t-1} + LogRER_{t-1}.$$

3. RESULTS

3.1. Unit Root Test

In stationary data, the mean, variance and autocovariance remain the same over time, so the time series data is classified as stable (Syaharuddin, Purwadi, & Sampeliling, 2021). The unit root test, represented by the augmented Dickey–Fuller (ADF) test, is summarized in Table 1.

Table 1. Unit root test (ADF).

Variable	T-Statistic	MacKinnon	Prob.	Remark
LogMD	-4.237	-3.175	0.009	Stationary
LogGDP	-1.230	-3.099	0.630	Not stationary
DIR	-2.551	-3.120	0.127	Not stationary
LogRER	-0.748	-3.099	0.802	Not stationary

To find any problems in the unit root test, we compare the T-statistic score with the MacKinnon critical value. If the T-statistic score > critical value, then the data is classified as stationary. Based on the results in Table 1, MD is the only stationary variable, with a T-statistic value of -4.237, which is greater than -3.175, and the p-value is below 5% (0.009 < 0.05). The other three variables (GDP, DIR, and RER) had T-statistic scores less than 0.05 and the probability was below 5% (p = 0.630; 0.127; 0.802, respectively), so it was necessary to carry out 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 the basis for making decisions.

Table 2. Degree of integration (first difference).

Variable	T-Statistic	MacKinnon	Prob.	Remark
LogMD	-5.019	-3.144	0.002	Stationary
LogGDP	-3.650	-3.120	0.020	Stationary
DIR	-5.474	-3.120	0.001	Stationary
LogRER	-3.912	-3.120	0.019	Stationary

The results in Table 2 show that the data of all variables are stationary at the integration level of the first differentiation as the T-statistics are greater than the critical values, and the p-values are less than 0.05. Thus, it is concluded that the study model is stationary and valid and is synchronized into the ECM.

3.3. Cointegration Test

Stationary variable data in the first differentiation degree of integration is very likely to lead to 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 is greater than the 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 *	0.978	98.401	47.857	0.000
At most 1 *	0.909	50.404	29.798	0.000
At most 2 *	0.653	19.378	15.494	0.012
At most 3 *	0.350	5.584	3.841	0.018

Note: * denotes rejection of the hypothesis at the 0.05 level; ** denotes the MacKinnon, Haug, and Michelis (1999) p-values.

Based on the information in Table 3, the T-statistic value is greater than the critical value at the 5% confidence level (98.401 > 47.856). This confirms that there is long-term cointegration between the variables.

3.4. Result of the 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 carried out with reference to long-term estimates (see Table 4). The long-term analysis equation is rewritten in the following equation:

$$D\_LogMD_t = -1.254 + 0.311\, Log\_GDP_t - 0.046\, DIR_t + 1.334\, Log\_RER_t + \epsilon_t$$

In the long-term regression equation where the C coefficient is -1.254 and GDP, DIR, and RER are assumed to be zero or constant, then MD decreases to 1.254%. Meanwhile, GDP and RER increased by 1%, reaching 0.311 and 1.334, respectively, and MD increased by 0.311% and 1.334% for the long term assuming other variables were held constant. However, the DIR coefficient shows a value of -0.047, so when the DIR increases by 1%, the MD actually decreases by 0.046% in the long term.

Table 4. Long-term analysis.

Variable	Coefficient	Std. Error	T-Statistic	Prob.
D_LogGDP	0.311	0.083	3.724	0.003
D_DIR	-0.047	0.014	-3.311	0.007
D_LogRER	1.334	0.252	5.295	0.000
C	-1.254	0.739	-1.699	0.117
R-squared	0.962			
Adjusted R-squared	0.952			
F-statistic	95.229			
Prob. (F-statistic)	0.000			

Table 5. Short-term analysis.

Variable	Coefficient	Std. Error	T-Statistic	Prob.
D_LogGDP	0.137	0.044	3.076	0.013
D_DIR	-0.029	0.006	-5.674	0.000
D_LogRER	0.411	0.167	2.473	0.035
ECT(-1)	-0.761	0.166	-4.594	0.001
C	0.032	0.007	4.912	0.001
R-squared	0.823			
Adjusted R-squared	0.744			
F-statistic	10.479			
Prob. (F-statistic)	0.001			

The variables are stationary in the degree of integration of the first differentiation and are cointegrated with each other. Therefore, there is also a short-term relationship between the variables. Table 5 summarizes the short-term estimates. The long-term analysis is calculated by the equation below:

$$D\_LogMD_t = 0.032 + 0.136\, D\_LogGDP_t - 0.029\, D\_DIR_t + 0.411\, D\_LogRER_t - 0.760\, ECT_{t-1} + \epsilon_t$$

Based on the short-term regression equation, the coefficient for C is 0.032, which means that if GDP, DIR, and RER are assumed to be zero or constant, then MD increases by 0.032%. Meanwhile, GDP and RER increased by 1%, reaching 0.136 and 0.411, respectively, and MD increased by 0.136% and 0.411% for the short term assuming the other variables were held constant. The DIR coefficient is -0.029, and when DIR increases by 1%, MD actually decreases by 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 proves 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, adjustment to the flow of money demand takes about 7–8 months.

3.5. Classical Assumption Test

The classical assumption test is represented by normality, which is useful in examining residual scores that are normally distributed, or vice versa. The 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 free from autocorrelation symptoms. In Table 6, the p-value = 0.717, which is greater than 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**	**Score**
Mean	-8.27e-18
Median	-0.002
Maximum	0.023
Minimum	-0.203
Std. Dev.	0.013
Skewness	0.236
Kurtosis	2.040
Jarque–Bera	0.667
Probability	0.717

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. In Table 7, the R^2 score in the short-term regression is 0.823, which is above 0.75. The variation of change in the value of the MD variable, which is determined by the variations in 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, which is also above 0.75. The variation of change in the MD variable is determined by variations in changes in GDP, DIR, and RER in the long term up to 96.2%. Other variables outside the model can explain up to 3.8% of the variation.

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

Component	**Short-term**	**Long-term**
R-squared	0.823	0.962
Adjusted R-squared	0.744	0.952
F-statistic	10.479	95.229
Prob. (F-statistic)	0.002	0.000

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 actualized for estimation.

The parameter based on the F-table in the short-term equation is 3.59. Referring to Table 7, the F-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 long-term equation shows that the F-statistic is greater than the T-table (95.228 > 3.59), where the probability is 0.000. For that reason, GDP, DIR, and RER have a simultaneous impact on MD for long-term estimates.

4. DISCUSSION

The findings verify that in the ECM, or short term, GDP has a positive effect on money demand. This is also confirmed 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 (2018).

The more GDP increases, the more money demand increases in line with monetary theory regarding the demand for money related to transactions (Drake & Fleissig, 2006; Stiglitz & Greenwald, 2003). It indicates that the higher the national income, the greater the volume of public transactions and the greater the amount of money used in transactions.

In the short and long terms, this study found that the deposit rate has a negative effect on the demand for money, which verifies the speculative motives in monetary 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 a view to earning profits (Ascarya, 2012). Meanwhile, if deposit interest rates are low, customers tend to respond with speculative behavior; they are more likely to hold money and have no intention of depositing it in banks (Riani, 2021). The speculative motive generally becomes routine among the upper-middle class customers and the wealthy class of society. Yet, we found that deposit rates have a negative effect on money demand, and this is supported by Simorangkir (2003) and Liñares-Zegarra and Willesson (2021).

In developing markets, such as Indonesia, it was found that the rupiah exchange rate had a positive effect on the demand for money in the long and short terms. However, this study contradicts this and is not relevant to previous publications, such as Bahmani-Oskooee, Bahmani, Kutan, and Xi (2019); Mahmood and Alkhateeb (2018); McGibany and Nourzad (1995) and Zehra, Kashif, and Chhapra (2021), which state that 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 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, and the advantages of holding money provide great benefits. Lusardi (2019) and Pawasutipaisit and Townsend (2011) also confirm that wealth owners (individuals) always accurately select the types of assets that achieve the greatest rewards.

5. CONCLUSIONS

The purpose of this study is to examine the effect of GDP, deposit interest rates, and the rupiah exchange rate on the demand for money in Indonesia. In the long and short terms, the statistics confirm that GDP and the rupiah exchange rate have a positive impact on money demand, and the deposit interest rate has a negative effect on money demand. Interestingly, the increase in GDP and the rupiah exchange rate from 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.

It is recommended that monetary systems, such as Bank Indonesia, should provide the amount of money demanded by customers. 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, and an increase in the BI rate 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 can stimulate the 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 its capacity to supply the volume of money needed but without having a negative effect on the national economy.

Finally, considering the weaknesses and limitations of this study, future research should consider 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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