MACROECONOMICS AS DETERMINANTS OF THE MONEY SUPPLY IN INDONESIA: ERROR CORRECTION MODELS ANALYSIS

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Abstract

This study analyzes macroeconomic factors that affect the money supply in Indonesia during the period 1993-2022, using the Error Correction Model (ECM). The main objective of this study is to identify macroeconomic variables that are significant in determining the money supply, as well as to understand the short-term and long-term dynamics of these variables. The results of the analysis show that the variables of exchange rate, GDP, government expenditure, and interest rates have a negative effect on the money supply, as is the case with FDI and inflation. Both long-term and short-term actually have a negative impact on the money supply in Indonesia. ECM managed to capture the short-term and long-term relationships between these macroeconomic variables and the money supply. These findings provide important insights for policymakers in formulating effective monetary strategies to manage the money supply and maintain economic stability.

Keywords: *ecm model, Indonesia, macroeconomic variables, money supply*

INTRODUCTION

Economic activities are inseparable from the interaction in the market, which meets demand and supply. To accommodate these activities, a transaction instrument is needed that has a value that can measure the price of a good or service. The presence of money has been institutionalized in society, so that all community activities are influenced, measured, and largely determined by money (Amaliyah & Aryanto, 2022). So important is money in the economy that the amount of money circulating in the community must be balanced, where the amount of money provided by Bank Indonesia must be equal to the amount of money needed by the community. By knowing the number of money requests in the community, it can help Bank Indonesia as a monetary authority in terms of printing and circulating money to the public (Widayati, Zulfikar & Mahardika, 2023).

The money supply is an issue that attracts the attention of not only central bankers and policymakers, but also academics. So important is money in the economy that the amount of money circulating in the community must be balanced, where the amount of money provided by Bank Indonesia must be equal to the amount of money needed by the community. By knowing the number of money requests in the community, it can help Bank Indonesia as a monetary authority in terms of printing and circulating money to the public. By looking at this, it can be said that the demand for money has an important role, especially related to the selection of monetary policy carried out by the central bank (Al Hafizh, 2022). If you look at the conditions that occur in Indonesia, the amount of money in circulation from year to year continues to increase, both the money supply in a narrow sense (M1) and the money supply in a broad sense (M2).

Economic liquidity, or money supply in a broad sense (M2), in January 2024 will grow higher. The M2 position in January 2024 was recorded at IDR 8,721.9 trillion, or 5.4% (yoy), higher than the previous month's growth of 3.5% (yoy). This development was driven by the growth of a narrow money supply (M1) of 4.9% (yoy) and quasi-money of 6.1% (yoy) (Bank Indonesia, 2024). Extreme monetarists argue that money itself is very important and that all other assets, both real and financial, can almost replace money. On the other hand, the extreme Neo-Keynesian view is based on the premise that money is not important and that changes in interest rates on a number of financial assets alone are crucial factors (Chona, 1976). The money supply is one of the important factors that affect changes in macroeconomic variables in the economy and has a fundamental role in the discipline of economics (Lone & Yadav, 2016).

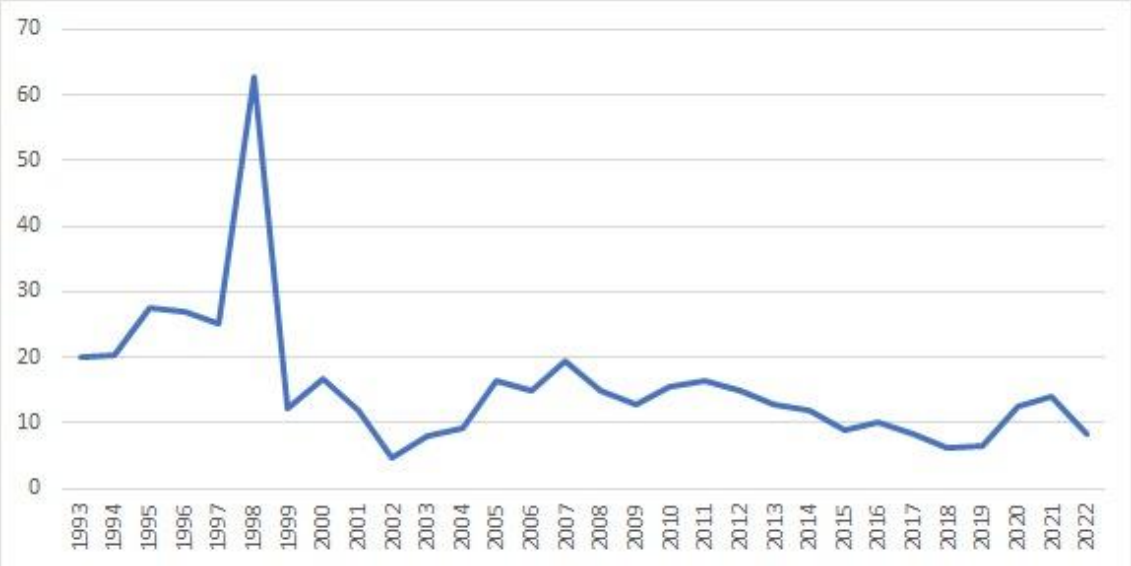

Figure 1. Money Supply Development Trends in Indonesia 1993-2022
Source: World Bank (data processed)

Based on the image in Figure 1, it can be seen that Indonesia is experiencing a trend of developing a fluctuating money supply. In 1998, it was the one that had the highest trend during the observed period. Money has always been a controversial topic in the field of economics. Policymakers devise their tools to manage the money supply and control its impact on other economic variables (Hassan & Teleb, 2022).

Many factors affect the rise and fall of the money supply in Indonesia, both in a broad sense (M2) and a narrow sense (M1) (Maesaroh & Triani, 2013). One of the determining factors for the amount of money in circulation is the exchange rate. In Indonesia, the government usually plays a role in determining the exchange rate so that it reaches a level that is conducive to the business world. The exchange rate, especially the rupiah per dollar exchange rate, is closely related and affects the flow of goods and services as well as capital from within and out of Indonesia (Maesaroh & Triani, 2013). The movement of the exchange rate will change the movement of the amount of money in circulation. In the condition of an appreciative exchange rate, the amount of money in circulation will decrease, and in the condition of depreciation, the amount of money supply will increase (Krugman, 2009).

Foreign Direct Investment (FDI) plays an increasingly important role in Indonesia's economy. As one of the main pillars of economic growth, FDI not only increases

production capacity and creates jobs, but also has significant implications for the money supply in the economy. In this context, understanding how FDI affects the money supply is crucial to formulating effective economic policies (Radifan & Saputra, 2022).

Basically, FDI brings in foreign capital into the country, which is then converted into local currency. This process directly increases the money supply, due to increased liquidity in the domestic financial system (Yang & Shafiq, 2020). In addition, foreign investment activity is also often accompanied by increased demand for local goods and services, which in turn drives an increase in economic transactions and money turnover (Hina & Anayat, 2019). However, the effect of FDI on the money supply is not always linear and can be influenced by various other factors, such as monetary policy, political stability, and global economic conditions. For example, large FDI inflows without being offset by appropriate monetary policy can lead to inflationary pressures due to an uncontrolled increase in liquidity. On the other hand, conducive political stability and regulation can attract more FDI, which positively affects the money supply (Thi & Chi, 2023).

The link between the money supply and output has been getting more attention lately because of its role in economic growth. Some Keynesians argue that money is not important, so it is irrelevant to economic growth. Similarly, some monetarists believe that money is important, thus encouraging the use of monetary policy to influence economic growth. Classical economic theory based on money neutrality states that changes in the amount of money in the aggregate money supply affect nominal variables, not real variables. As a result, an increase in the money supply will increase all prices and wages proportionally, but will not have an impact on real economic output (GDP) (Hussain & Mahfuzul, 2017).

Many economists find that the study of money affects the process of economic growth (King, 1873). The importance of the banking system in raising money and pumping it to finance large projects (Schumpeter & Keynes, 1936). The balance of the monetary sector leads to the equilibrium of the market economy since the absence of financial institutions and instruments will hinder the transformation of savings into investments, which will have a negative impact on growth, since changes in the money supply affect real variables such as GDP and employment levels due to price stability and incomplete information flowing in the market. The effect of the money supply on economic growth emphasizes the strong influence of the money supply on money income and growth (Friedman & Schwartz, 1963). In contrast to economic theories that state that the money supply affects economic growth, some researchers disagree with statements made by people such as Gatawa, Abdulgafar, and Olarinde, (2017). As found in his research, there is no influence of the money supply on economic growth without adequate levels of money, such as supply, credit, and appropriate current financial conditions (Razia & Omarya, 2022).

Government spending is one of the fiscal policies used in the Keynesian model, which has not resulted in a significant increase in aggregate demand. The nominal government expenditure has continued to increase in significant amounts since the crisis hit Indonesia in 1997. However, the amount of government spending has decreased significantly due to very high inflation. Theoretically, only using expansionary fiscal policy, namely increasing government spending to stimulate the economy, will create a crowding-out effect (Adrison, 2002).

Government spending has a complex relationship with the money supply. It does not directly inject new money into the economy in the same way that central banks do.

However, this can indirectly affect the amount of money in circulation through various mechanisms (Bairam, 1991). When the government spends more than it collects in taxes, it usually finances the gap by borrowing. These loans can involve selling bonds to banks, which increases banks' reserves and allows them to lend more money into circulation (Makwandi & Raphael, 2017). Government spending on programs or social benefits can provide an injection of funds into the economy if the recipient spends the funds. This increases demand for goods and services, which can provide incentives for businesses to borrow and invest, potentially leading to a higher money supply (Li, 2022).

One of the factors that causes the money supply to decline is inflation. If the money supply in the community is high, it will cause inflation to tend to be high and can paralyze the economy, so the money supply must always be stable. The increase in the price of goods and services in the country encourages inflation, which it has an impact on the declining value of money. Thus, Bank Indonesia is required to control the level of the money supply because it has a wide impact on other macro variables (Prasasti & Slamet, 2020). Bank Indonesia, as the policy setter of the monetary authority, has the duty as a central bank to regulate, maintain, and maintain the stability of the rupiah currency and encourage smooth production and development in order to improve the people's standard of living in implementing its policies.

According to the theory of money quantity, inflation is always and everywhere a monetary phenomenon, which is basically caused by the growth of the quantity of money too fast. Milton Friedman's assertion states that the increase in the growth rate of the money supply is not the only cause of inflation in the long term, but it is the most important factor (Friedman, & Schwartz, 1963).

Another variable that is affected by the money supply is the interest rate. The interest rate represents future payments for past transfers. Interest rates involve comparing the amount of money at different time periods. Interest rate variables are considered important because they are able to influence people in making decisions about allocating their money. Interest rates are a consideration for the public in determining the allocation of their funds, whether for consumption, savings, or investment (Mankiw, 2012).

Interest rates are important in determining how monetary policy is transmitted to the economy because interest rates have a strong relationship with household spending (Miskhin, 2017). The increase in interest rates directly affects two sides, namely: increasing the cost of capital, thereby reducing interest in investing (assuming monetary policy accompanied by an increase in interest rates and the condition of the paribus ceteris). Reduced investment lowered aggregate supply. Then the increase in interest rates increases the interest income of savers, on the one hand, it has an impact on increasing purchasing power (income effect), and on the other hand, it reduces consumption interest (substitution effect) (Al Hafizh, 2022).

We can see from several previous studies that the author tries to fill the research gap, namely, rather than testing to the inconsistency of variable variables that affect money supply, researchers include a new variable that is rarely researched, namely the variable of government expenditure in affecting money supply. This study relies on annual *time series* data spanning from 1993 to 2022. The data start from 1993, because around that year Indonesia implemented significant economic and financial liberalization and reforms to improve financial stability and encourage private sector growth. The significantly more liberalized trade and domestic financial markets and reduced barriers to foreign investment markedly affected money supply dynamics due to changing demand for credit and financial intermediation (Akimov & Dollery, 2009). So monetary policy

must be really appropriate in order to be able to overcome problems that arise in the economy and stabilize the economic condition of a country.

This study aims to explore the key factors influencing the money supply in Indonesia, focusing on macroeconomic variables that provide a comprehensive and significant impact on the nation's economic conditions. By examining these factors, the research seeks to contribute to the development of new methodologies and insights related to the dynamics of the money supply. Furthermore, the findings are expected to serve as a valuable reference for policymakers, enabling the formulation of effective monetary policies to address economic challenges and promote stability in the country's economic framework.

LITERATURE REVIEW

The Theory of the Amount of Money in Supply

The amount of money in circulation is determined by the amount of money supplied by the Central Bank and the demand for money from the public. The amount of money in circulation basically has two meanings, namely, money supply in a narrow sense. In a narrow sense, money has the meaning of all currency and bills available for use by the public, so that it is purchasing power that can be directly used for payment. The amount of money in circulation at a given time is the sum of currency and currency (Boediono, 1998).

Exchange rate

The quantity theory of money explains the relationship between the amount of money in circulation and the level of prices in the economy. If central banks increase the money supply in response to currency depreciation to stabilize the exchange rate, then the money supply will increase. In the event of exchange rate depreciation, the central bank may sell foreign exchange reserves to buy local currency, increasing the money supply (Cottrell, 1997). According to the Purchasing Power Parity (PPP) theory, if the money supply increases and causes domestic inflation, the price of domestic goods will increase. In order to maintain the equality of goods prices between countries, the domestic currency exchange rate must depreciate (Ito, Sasaki, & Sato, 2005). This is in line with research by Setyorani (2018). and Anggraini and Rahayu (2022) which found that the exchange rate has a positive effect on the money supply.

H_1: The exchange rate has a positive effect on the money supply.

Foreign Direct Investment

According to Keynesian theory, the demand for money consists of transactions, speculation, and just-in-case. The increase in FDI increases economic activity and investment, which increases the demand for money. Central banks can respond by increasing the money supply to support higher economic activity. When FDI enters a country, capital in the form of foreign currency is converted into local currency. This process increases the money supply as central banks or commercial banks issue local currency in exchange (Jahan, Mahmud, & Papageorgiou, 2014).

FDI is often directed at projects that increase production capacity and infrastructure. This increase increases economic activity and the demand for money to support day-to-day business transactions. To meet this demand, central banks may intervene in the foreign exchange market by buying foreign currency and printing more local currency,

which increases the money supply. This is in line with research by Sarno *et al* (2020) and Omran & Bolbol (2022), which states that foreign direct investment has an effect on the money supply.
H_2: FDI has a positive effect on the money supply.

Gross Domestic Product

According to the Keynesian view, the demand for money is primarily determined by the level of economic activity. As GDP increases, the demand for money for transactions increases, which then prompts central banks to increase the money supply to meet this demand. This shows that the economy is growing and that there is an increase in the production of goods and services. Economic growth usually requires an increase in the money supply to support more transactions. In a growing economy, central banks may increase the money supply to prevent deflation and support aggregate demand (Urbanovský, 2017).

The effect of gross domestic product on the money supply is that if the gross domestic product increases, the money supply also increases, and vice versa, if the gross domestic product decreases, the money supply will decrease. This results in the gross domestic product having a positive effect on the money supply (Mentari & Pangidoan, 2020). This is in line with research (Anggraini & Rahayu, 2022; Hassan & Teleb, 2022; Razia & Omarya, 2022) showing that there is a positive relationship between GDP and the money supply.
H_3: GDP has a positive effect on the money supply.

Government Expenditure

According to Keynesians, government spending is a powerful tool for managing aggregate demand. Increased government spending can stimulate the economy by increasing aggregate demand. This increase boosts economic growth and increases the demand for money, which increases the money supply. When the government increases its spending, it increases aggregate demand in the economy. Higher aggregate demand can drive increased production and income, which in turn increases the demand for money for transactions, and consequently increases the money supply (Jahan et al., 2014). This is supported by research by Adrison (2002) and Apryansyah and Amaliah, (2023), who found that there was a positive relationship between government spending and the money supply.
H_4: Government spending has a positive effect on the money supply.

Inflation

Cash balance theory from Alfred Marshall. Alfred Marshall was the first person from Cambridge University to explain the theory of money quantity and research the relationship between the money supply and inflation. According to Marshall, the amount of money circulating in the community actually does not include the money owned by the community as a whole, because there are still some that are held in cash (Mitchell, 1896).

Inflation will become a serious economic problem when it lasts for a long period of time and inflation is high. The increase in the price of goods can cause the public's need for larger denominations of money to increase. Classical quantity theory says that a continuous trend of rising prices in general can occur when inflation and the increase in the money supply exceed actual needs (Ghalib, Damayanti, & Nur Shava, 2023).

If the amount of money in circulation exceeds what the community wants, people tend to spend their money by increasing their consumption of goods and services. However, if production capacity is saturated, the increase in demand for goods and services will in turn increase inflation. People want to hold money for the purpose of goods and service transactions (Parulian & Utami, 2024). If the price of goods and services rises, the trend that occurs is that people will be more happy to hold money. When inflation occurs, it means that the amount of money circulating in society is abundant, resulting in the value of the currency falling. If inflation falls, the money supply in circulation in society also drops (Fatmawati & Yuliana, 2019). This is supported by research (Ghalib et al., 2023; Prasasti & Slamet, 2020; Al Hafizh, 2022) showing that inflation has a positive effect on the money supply. Findings differ in the study by Koti & Bixho, (2016), which found that inflation has a negative influence on the money supply.
H_5: Inflation has a positive effect on the money supply.

Interest Rate

Interest rates affect an individual's decision on whether to spend more money. Keynes developed the Theory of Liquidity Preference, which links interest rates with income. He asserts that exogenous variations in money tend to constantly stimulate changes in V and Y. Therefore, he argues that increases in money tend to lower interest rates by stimulating investment growth (Rivera-Batiz, & Rivera-Batiz, 1985). The speed will also decrease. He rejected the idea that speed is constant. An increase in the money supply usually leads to a decrease in interest rates, which makes investing in domestic currencies less attractive compared to foreign currencies, leading to depreciation (Koti & Bixho, 2016).

Interest rates and the money supply are closely related in the context of monetary policy. Central banks use interest rates as the main tool to control the money supply and thus, influence various aspects of the economy. According to the quantity theory of money, an increase in the money supply will occur if interest rates are lowered, as lower borrowing costs encourage increased credit and spending by consumers and firms, thus increasing the money supply in the economy (Urbanovský, 2017).

High interest rates make individuals save more money at banks. This causes how much money flows in the public arena to decrease. Alternately, assuming interest rates are low, individuals will be less likely to need to save in the bank, but rather place them in various other types of investment speculation. This can obviously enlarge or increase the amount of money circulating in the community. It is very reasonable that changes in interest rates can affect the amount of money in circulation in the community (Parulian & Utami, 2024). This is supported by research by Al Hafizh (2022) and Mentari and Pangidoan (2020) showing that interest rates have a positive effect on the money supply. Different findings were obtained in the study by Parulian and Utami (2024) and Anggraini and Rahayu (2022) that interest rates have a negative influence on the money supply.
H_6: Interest rates have a positive effect on the money supply.

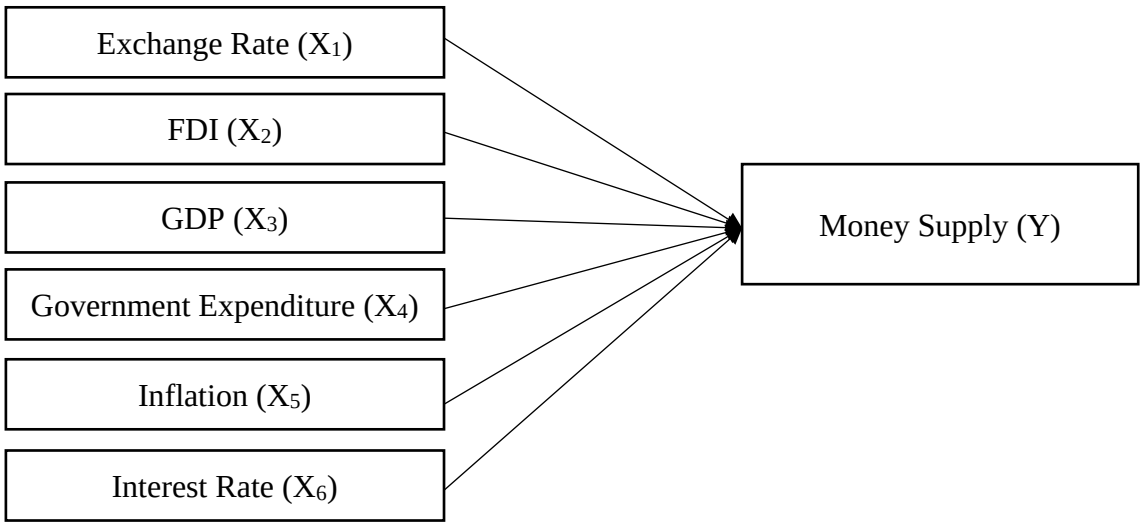

Figure 2. Research Framework

RESEARCH METHODS

Types of Research and Data Sources

In this study, the researcher used a quantitative method using time series data with a time frame of 30 years from 1993 to 2022. This study uses secondary data obtained reliable sources, namely from reports issued by the World Bank. Variable operational definition table can be seen in Table 1 below.

Table 1. Definition Operational Variables

Variabel	Type of Variabel	Proxied by	Source
Money Supply	Dependent	Broad money growth(annual%)	World Bank
Exchange Rate	Independent	LCU per US$	World Bank
Foreign Direct Investment	Independent	Foreign direct investment, net inflows (% of GDP)	World Bank
GDP	Independent	GDP growth (annual %)	World Bank
Government Expenditure	Independent	General government final consumption expenditure (% of GDP)	World Bank
Inflation	Independent	Inflation, consumer prices (annual %)	World Bank
Interest Rate	Independent	Real interest rate (%)	World Bank

Analysis Methods

In this study, the researcher conducted a regression analysis using the *Error Correction Model* (ECM) method. The ECM model is used to see the long-term and short-term effects of existing variables (Lubis, 2020). The stages that must be carried out before conducting the ECM test are stationary tests, cointegration tests, and long-term estimation. Below is a long-term estimation model (Formula 1)

$$MS_t = \beta_0 + \beta_1 ER_t + \beta_2 FDI_t + \beta_3 GDP_t + \beta_4 GE_t + \beta_5 INF_t + \beta_6 IR_t + e_t \qquad (1)$$

Explanation:

MS	: Money Supply; ER	: Exchange rate;	FDI : Foreign Direct Invesment
GDP	: Gross Domestic Product;		GE : Government Expenditure
INF	: Inflation; IR	: Interest rate	
e	: Disturbance/residual variable		
t	: Research Period (in years)		

In order to overcome the problem of data dislocation, the researcher uses the ECM method, which will reduce the long-term model to inaction. So, the short-term ECM model produced is as follows:

$$\Delta MS_t = b_0 + b_1\Delta ER_t + b_2\Delta FDI_t + b_3\Delta GDP_t + b_4\Delta GE_t + b_5\Delta INF_t + b_6\Delta IR_t + b_7 EC_{t-1} \quad (2)$$

Derived from:

$$EC_t = (MS_{t-1} - \beta_0 + \beta_1 ER_{t-1} + \beta_2 FDI_{t-1} + \beta_3 GDP_{t-1} + \beta_4 GE_{t-1} + \beta_5 INF_{t-1} + \beta_6 IR_{t-1}) \quad (3)$$

Stationary Test and Cointegration Test

The data stationary test in this study uses the Augmented Dickey-Fuller (ADF) approach. The description carried out in this study pays attention to the statistical value of ADF and the statistical value of T, or the critical value obtained in the test. In this study, the researcher used the Johansen method.

Classical Assumption Test

In this study, four types of classical assumption tests are applied in the testing process, including the residual normality test, which is used to determine whether the regression equation and the variable are normally distributed. Multicollinearity tests are also used to evaluate how independent and dependent variables in the model correlate with each other. The heteroscedasticity test is used to determine whether the variation in each observation has the same value. Finally, autocorrelation tests are used to ascertain whether or not there is a correlation between residuals in the research model (Ramadhan & Sitorus, 2023).

Hypothesis and Model Significance Test

In this study, the hypothesis and research model will be tested using the t-statistical test, the F-statistical test, and the determination test (R2). The t-statistical test was carried out with the aim of testing the research hypothesis by looking at the magnitude of the influence of each independent variable on the dependent variable. Meanwhile, the F-statistical test was used to see the magnitude of the influence of all independent variables together on the dependent variables of the study. And for the determination coefficient (R2) test, it was carried out to see how well the estimation results of the research model were in explaining the changes in the dependent variables of the research.

RESULTS AND DISCUSSION

Stationary Test

In this study, to detect the stationarity of the data, the *Augmented Dickey-Fuller* (ADF) approach was used at the level and the 1st *difference level*. The results of the stationary test are as follows.

Table 2. Stationary Test

Variable	Method	Level	1 st diff
MS	ADF	0.4995	0.0009
ER	ADF	0.2527	0.0003
FDI	ADF	0.0042	0.0000
GDP	ADF	0.5108	0.0011
GE	ADF	0.2204	0.0002
INF	ADF	0.0000	0.0000
IR	ADF	0.0111	0.0000

*significant at α= 0.05

Based on the results of the *Augmented Dickey-Fuller* (ADF) unit root test in Table 2, based on the stationary belief, which is α = 0.05, it can be seen that the variables that are stationary at the level are only the FDI, INF, and IR variables, while the other variables are not stationary at the level. Therefore, a stationary test was carried out at the 1st *difference* level and obtained the results of all stationary variables at the 1st difference level.

Cointegration Test

The cointegration test was carried out using the Johansen method, which consisted of two trade *statistical* values and *a max-eigen statistic* that had a statistical value greater than its critical value with the provision of α = 0.05. This test was carried out to determine whether there was a balance in the same movement and a stable relationship between variables in the long term. Based on the test, several variables with a probability of < of 0.05 can be concluded to have a cointegration between them.

Table 3. ADF Test

		t-Statistic	Probabilitas
Augmented Dickey-Fuller test statistic		-5.428099	0.0001
Test critical	1% level	-3.679322	
	5% level	-2.967767	
	10% level	-2.622989	

Referring to the results of the ADF estimate in Table 3, which shows that the ECT value is 0.0001 < 0.05. then it can be concluded that the ECT is stationary at the level level. Among them are the variables MS, ER, FDI, GDP, GE, INF, and IR, which are mutually integrated, so that all variables have a long-term balance. So it can be continued with the error *correction model test.*

Estimation E*rror Correction Model*

The results of the long-term error correction model *regression test* are as follows.

Table 4. Long-Term Estimation

Dependent variable: MS			
Variable	Coefficient	t-Statistic	Probabilitas
C	42.01469	4.304461	0.0003
ER	-0.001607	-6.103292	0.0000
FDI	1.977782	3.032233	0.0059
GDP	-1.556494	-3.799007	0.0009
GE	-0.502535	-0.466146	0.6455
INF	0.035290	0.199468	0.8436
IR	-0.612800	-4.250811	0.0003

Referring to the results of long-term regression in Table 4, the regression coefficient obtained can be written as a regression as follows:

$$MS_t = 42.01469 + -0.00ER_t + 1.97FDI_t + -1.55GDP_t + -0.50GE_t + 0.03INF_t + -061IR_t$$

The next step is to incorporate the residual value into the short-term regression model, so here is the ECM regression estimate.

Table 5. Short Term Estimation -ECM

Variabel dependen: MS			
Variabel	Coefficient	t-Statistic	Probabilitas
C	-0.035167	-0.048221	0.9620
D(ER)	-0.001176	-1.368812	0.1855
D(FDI)	1.113972	1.608365	0.1227
D(GDP)	-1.570852	-4.861160	0.0001
D(GE)	-1.693207	-1.242803	0.2276
D(INF)	-0.031865	-0.222379	0.8262
D(IR)	-0.638361	-6.401132	0.0000
ECT(-1)	-0.974551	-4.839760	0.0001

Referring to the results *of the short-term Error Correction Model* test in Table 5, the regression coefficient obtained can be written as a regression as follows:

$$D(MS)_t = -0.035167 + -0.00D(ER)_T + 1.11D(FDI)_t + -1.57D(GDP)_t + -1.69D(GE)_t + -0.03D(INF)_t + -0.63D(IR)_t + -097ECT_{t-1}$$

Classical Assumption Test

The classical assumption test results become a basis or requirement to continue a test using the Error Correction Model (ECM) method. Based on the test results using Eviews 12, the normality test value is 0.531769 > 0.05, so it can be said that the data is normally distributed. The value of the multicollinearity-VIF test each obtained a value of ER (4.913377), FDI (1.439960), GDP (6.184093), GE (1.853263), INF (8.981512), and IR (2.920990) < 10, so it can be said that this study does not have multicollinearity problems. The heteroscedasticity test value obtained a chi-square value of 0.9387 > 0.05,

so it can be said that there is no heteroscedasticity problem or the error variance is homogeneous. In addition, the autocorrelation test results also obtained a value of 0.9341 > 0.5, which indicates that there is no serial correlation in the residuals. Therefore, this model is valid and feasible to be used in ECM analysis, with the aim of evaluating both short-term and long-term relationships.

Hypothesis Test and Model Significance

In this study, based on the assumption that t-count has an effect if t-count is greater than t-table and has no effect if t-count is lower than t-table, with t table of 2.068658. Referring to the t-statistical test of long-term regression results, it is known that several independent variables have a significant effect on money supply. There are also several variables that do not have a significant effect on money supply (Table 6).

Table 6. t-Test-Statistics- Long-Term

Variable	Coefficient	Probabilitas	Ket
ER	-0.001607	0.0000	Significant negative effects
FDI	1.977782	0.0059	Significant positive effect
GDP	-1.556494	0.0009	Significant negative effects
GE	-0.502535	0.6455	No significant effect
INF	0.035290	0.8436	No significant effect
IR	-0.612800	0.0003	Significant negative effects

Similar to the long-term, in short-term estimates there are several variables that have a significant effect and also do not have a significant effect on the money supply, but we can see that initially, in the long term, it has a significant effect on the short-term estimate to change position (Table 7).

Table 7. T-statistical test – Short-term

Variable	Coefficient	Probabilitas	Ket
D(ER)	-0.001176	0.1855	No significant effect
D(FDI)	1.113972	0.1227	No significant effect
D(GDP)	-1.570852	0.0001	Significant negative effects
D(GE)	-1.693207	0.2276	No significant effect
D(INF)	-0.031865	0.8262	No significant effect
D(IR)	-0.638361	0.0000	Significant negative effects

The Effect of Exchange Rates on Money Supply

Referring to the long-term estimation results, which obtained a probability value of 0.0000 < 0.05 with a coefficient value of -0.001607, it can be concluded that the exchange rate has a significant negative effect on money supply in Indonesia. While in the short-term estimation results obtained a probability value of 0.1855 > 0.05 with a coefficient value of -0.001176, it can be concluded that in the short-term the exchange rate has a negative but insignificant effect on money supply in Indonesia. Therefore, the results of this study reject the hypothesis that was built. This means that in the long term and short term when the rupiah-US$ exchange rate grows by 1%, it will have a negative effect on reducing the money supply by -0.001607%. This is in line with research conducted by Maitra (2019) and Akinbobola (2020) which states that there is a long-term relationship between the rupiah-US$ exchange rate and the money supply.

Hendayanti, Nurhidayati, and Nugrahini, (2019) states that when the exchange rate increases, people will take the initiative to exchange the dollars they have because it will provide more benefits, so this can cause the money supply to increase. In the long run, this research is not in line with research conducted by Obstfeld and Rogoff (1995) and Obstfeld, Shambaugh, and Taylor (2005) which state that the exchange rate has a negative effect on the amount of money in circulation in a country. This phenomenon occurs due to the volatility of exchange rates, monetary policy, and economic dynamics caused by the pandemic shock (Azwar, 2023). Azwar (2023) said, the appreciation of the rupiah against major currencies, especially the US dollar, has been a major issue during the pandemic. Due to the global uncertainty caused by the pandemic, foreign investors left the Indonesian financial market in search of safer assets. This put significant pressure on the rupiah exchange rate, which forced Bank Indonesia to take action by selling foreign exchange reserves to maintain exchange rate stability. As the sale of foreign exchange took liquidity away from the domestic market, this intervention had a direct impact on decreasing the money supply.

The Effect of Foreign Direct Investment on Money Supply

Referring to the results of the long-term estimate that obtained a probability value of 0. Referring to the long-term estimation results, which obtained a probability value of 0.0059 < 0.05 with a coefficient value of 1.977782, it can be concluded that foreign direct investment has a significant positive effect on the money supply in Indonesia. While in the short-term estimation results obtained a probability value of 0.1227 > 0.05 with a coefficient value of 1.113972, it can be concluded that in the short-term foreign direct investment has a positive and insignificant effect on the money supply in Indonesia. This means that in the long-run, when foreign direct investment grows by 1%, it will have a positive effect on increasing the money supply by 1.977782%. So the results of this study are in line with the hypothesis that was built. This is in line with research conducted by Sarno *et al* (2020) and Omran & Bolbol (2022) which states that foreign direct investment has a positive effect on money supply. This happens because the inflow of FDI contributes to the financial balance of payments surplus. A surplus can lead to an increase in the central bank's foreign exchange reserves, which has a potential impact on the money supply. During the COVID-19 period, which created a snowball effect, and the health crisis became a huge economic crisis, it turned out that FDI remained one of the main pillars that encouraged domestic liquidity through the influx of investment in sector strategies in maintaining economic stability, which could accelerate recovery and again expand the circulation of money through economic activity (Hafizh, 2022).

The Effect of GDP on Money Supply

Referring to the long-term estimation results, which obtained a probability value of 0.0009 < 0.05 with a coefficient value of -1.556494, it can be concluded that GDP has a significant negative effect on the money supply in Indonesia. While in the short-term estimation results obtained a probability value of 0.0001 < 0.05 with a coefficient value of -1.5708525, it can be concluded that in the short-term GDP has a significant negative effect on the money supply in Indonesia. This means that in the long term and short term, when GDP grows by 1%, it will have a negative effect on the decline in the amount of money in circulation in Indonesia of -1.556494% in the long term and 1.5708525% in the short term. Therefore, this study refutes the established hypothesis. The results in this study are in line with research conducted by Shekhani (2022) and Paul et al (2023), which

suggests that GDP negatively affects the money supply. Indonesia experienced a significant economic decline during the COVID-19 pandemic, which was characterized by a significant decline in GDP in 2020. This decline in GDP led to a decrease in aggregate demand and economic activity, which impacted the money supply. Data from 1993 to 2022 shows a negative relationship between GDP and money supply. The economic downturn led to decreased market activity, decreased consumption, and tightened credit. Although Bank Indonesia eased its monetary policy to increase liquidity during the pandemic, the effect was limited as it affected the economy and deterred investment and consumption (Rastagno, et.al. 2019). This shows that a decline in GDP can reduce inflationary pressures during periods of large economic contractions, such as the pandemic, but at the same time can also reduce inflation.

The Effect of Government Expenditure on Money Supply

Referring to the long-term estimation results, which obtained a probability value of 0.6455 > 0.05 with a coefficient value of -0.502535, it can be concluded that government spending has a negative and insignificant effect on the money supply in Indonesia. While the short-term estimation results obtained a probability value of 0.2276 > 0.05 with a coefficient value of -1.693207, it can be concluded that in the short term, government spending has a negative and insignificant effect on the money supply in Indonesia. This means that in the long term or short term, when government spending grows by 1%, it does not have a negative effect on the money supply in Indonesia. So the results of this study reject the hypothesis that was built. The results of this study are in line with research conducted by Osakwe (2019) and Chang, Liu, Spiegel, and Zhang (2019).

Anjande, Asom, Ayila, Mile, and Ijirshar (2022) and García Matres and Viet Le (2021), which states that there is a negative influence between government spending and money supply. Indonesia's government spending between 1993 and 2022, especially during the COVID-19 pandemic, had a negative impact on the money supply, although nominal spending increased sharply. Government spending increased for the health sector and social assistance during the pandemic. However, it led to significant fiscal deficits and increased reliance on debt financing. The data shows that, although the money supply increased, economic uncertainty and the level of public absorption of the stimulus lowered inflation and the rupiah exchange rate. The increase in government spending that was supposed to boost the economy was exacerbated by a decline in public consumption and weak productive sectors. As a result, despite more money in circulation, its effect on economic growth was hampered, resulting in imbalances in the Indonesian economy (Onyedibe, Uzonwanne, & Chidinma, 2022).

The Effect of Inflation on Money Supply

Referring to the long-term estimation results, which obtained a probability value of 0.8436 > 0.05 with a coefficient value of 0.035290, it can be concluded that inflation has a positive and insignificant effect on the money supply in Indonesia. While the short-term estimation results obtained a probability value of 0.8262 > 0.05 with a coefficient value of 0.031865, it can be concluded that in the short-term inflation has a positive and insignificant effect on the money supply in Indonesia. This means that in the short term, when inflation grows by 1%, it will have a positive effect on the money supply in Indonesia. So, this study rejects the hypothesis that was built. The results of this study are in line with research conducted by Lakshmanasamy (2021) and Gharehgozli and Lee (2022) which state that there is a positive influence between inflation and money supply.

Over the period 1993-2022, inflation in Indonesia, especially during the COVID-19 pandemic, showed a positive influence on money supply, albeit in a more complex context. During the pandemic, although inflation was controlled at a moderate level, Bank Indonesia conducted accommodative monetary policies, such as lowering interest rates and increasing liquidity to support economic recovery. Data shows that money supply increased in line with these policies, with people keeping more money in savings or consumption spending in response to economic uncertainty. Lower inflation and expansionary fiscal policies, such as social assistance and stimulus, boosted money supply growth in the economy, although the impact on economic recovery was slower than expected. This positive influence is seen in the increased liquidity that supports more stable sectors.

The Effect of Interest Rate on Money Supply

Referring to the long-term estimation results, which obtained a probability value of 0.0003 < 0.05 with a coefficient value of -0.612800, it can be concluded that interest rates have a significant negative effect on the money supply in Indonesia. While in the short-term estimation results obtained a probability value of 0.0000 < 0.05 with a coefficient value of -0.638361, it can be concluded that in the short term, interest rates have a significant negative effect on the money supply in Indonesia. This means that in the long term and short term, when interest rates experience growth of 1%, it will have an effect on decreasing the amount of money in circulation in Indonesia by -0.612800% in the long term and -0.638361% in the short term. The results of this study are in line with research conducted by Hashemzadeh and Taylor (2019), Laurens and Maino (2007), and Yuliadi (2020) which state that there is an effect of interest rates on the money supply. This can happen when high interest rates make borrowing more expensive, thereby reducing the money supply. During the period 1993-2022, especially during the COVID-19 pandemic, interest rates in Indonesia showed a negative influence on money supply. Amidst efforts by the government and Bank Indonesia to stimulate the economy through lower interest rates, the data shows that although low interest rates were meant to encourage credit and consumption, the results were not as expected. During the pandemic, economic uncertainty, declining purchasing power, and limitations in the production sector caused people and companies to save their money rather than spend or invest. A reduction in interest rates should increase liquidity, but in this situation, most of the money in circulation is not used productively but instead flows into safer forms of savings or investment. Therefore, although the money supply increases, its impact on the economy is limited due to the low demand for credit and consumption amidst the uncertainty that prevails during the pandemic.

Error Correction Term (ECT)

Based on the ECM test, it is known that the t-statistic on the ECT variable is 4.839760 > t-table 2.068658 with a probability value of 0.0001. Therefore, it can be concluded that ECT has a significant negative influence on D (MS). In addition, the value of the ECT coefficient = -0.97 was also obtained, which meets the criteria for a negative value with the provision that the absolute value is vulnerable to 0<ECT<1, which means that this model can be applied in analyzing independent variables for MS. With a coefficient value of -0.974551, it also explains the condition of the speed of MS adjustment towards its equilibrium of 97.45% per quarter. This means that when the short-term balance condition moves towards the long-term balance, in the first quarter there

will be a correction of 97.45%, and the remaining 2.55% will be corrected in the next quarter. The adjustment speed takes 1/0.9745 (1.02 quarters) or 3.1 months.

Table 8. F-Statistical Test -Long Term

	F-statistic	Prob(F-statistic
Long-term	36,12834	0,000000
Short-term	54,47561	0,000000

Referring to the estimation results shown in Table 8, the F-statistical values of each long-term and short-term condition, namely, 36.12834 and 54.47561, have probability values of 0.0000000 and 0.000000, respectively. So it can be concluded that all independent variables in this study are simultaneously able to have a significant influence on the realization of the amount of money supply in Indonesia, both in long-term and short-term conditions.

Table 9. Determination Coefisisn Value (R2)

Model	R-square	Adjusted R-square
Long-term	0.904075	0.879051
Short-term	0.947804	0.930405

Based on the test shown in Table 9, with the R-square value and the adjusted R-square value of 0.904075 and 0.879051, respectively, this explains that the long-term model in this study can explain 90.40% of the actual MS value, with the remaining 9.6% explained by other variables that were not analyzed in this study. Meanwhile, according to the adjusted R-square criterion, this study can explain the actual value of MS up to 87.90%, with the rest of 12.1% explained by other variables that are not analyzed in this study.

While in the short-term condition, it has an R-square value and an adjusted R-square value of 0.947804 and 0.930405, respectively. This explains that the short-term model in this study can explain 94.78% of the actual MS value, while the rest of 5.22% is explained by other variables that are not analyzed in this study. Meanwhile, according to the adjusted R-square criterion, this study can explain the actual value of MS up to 93.04%, with the rest of 6.96% explained by other variables that are not analyzed in this study.

CONCLUSIONS AND SUGGESTIONS

Based on the test results with long-term and short-term models, the results show that the exchange rate, GDP, government expenditure, and interest rates have a negative effect on the money supply, as is the case with FDI and inflation. Both long-term and short-term actually have a negative impact on the money supply in Indonesia. The results of this study show that the long-term and short-term prediction abilities of 87.90% and 93.04% are seen from the results of the estimated value of the adjusted R-square, which explains that there are several factors that can be used to research its influence on the money supply. For the next researcher, you can use other variables in the next estimate, such as financial liberalization, currency ratio, domestic investment, exports, and other variables, as independent variables. To find out the weaknesses and advantages of Indonesia's money supply management policy, researchers can expand their research subjects by comparing Asian countries, G20 members, or other countries. Every country

needs the best strategy to be able to reach the best point in the money supply, such as improving monetary policy tools, fiscal policy coordination, exchange rate policy, inflation targeting, exchange rate policy, macroprudential regulation, communication, and transparency. Because the condition of the money supply of a country has a long-term and short-term impact on its economic aspects. Be it inflationary conditions, interest rates, economic growth, employment, or economic stability in detail.

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