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# The Impact of Electronic Money, Inflation, Interest Rates, Foreign Exchange Reserves, and the Amount of Money Supplied in Foreign Currencies in Indonesia

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**Abstract**

*Money serves as a means of trade and a unit of account for the purchase and exchange of goods and services, as well as a form of wealth storage. Talking about money is inextricably linked to the amount of money in circulation, which includes the amount of money in society, banks, institutions, and even the government. The amount of money in circulation is affected by a number of variables that cause it to fluctuate every year. This study tries to identify a number of variables that affect the money supply, such as the short- and long-term effects of e-money, inflation, interest rates, and foreign exchange reserves and exchange rates.*

*This study makes use of secondary data that was collected over a 15-year period, from 2008 to 2022, from the Central Bank and the Central Statistics Agency. Multiple Linear Regression Analysis is the method of analysis that is employed, and it uses the Stata program's computer tool to display the interaction between independent and dependent variables.*

*The findings of this study demonstrate that factors such as interest rates, foreign exchange reserves, short- and long-term e-money variables, and exchange rates all significantly affect the amount of money in circulation in Indonesia. The amount of money in circulation in Indonesia is mostly unaffected by the inflation variable.*

***Keywords:*** *Money Supply, E-money, Inflation, Interest Rates, Foreign Exchange Reserves, Foreign Exchange Rates.*

## INTRODUCTION

The means of payment is money, apart from that, money is a means of transaction when purchasing or paying for goods or services, so that money can be said to be an object that can be exchanged for other objects, as a unit of account, as well as a means of storing wealth in the presence of money, transactions carried out becomes easier, practical and efficient.

Money is defined in two senses, namely M1, money in the narrow sense, in the form of

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currency and demand deposits, and M2, money in the broad sense, in the form of currency, demand deposits and quasi money. In the development of the M2 money supply, it shows an increase in the amount every year, and also has developments that fluctuate every year. It can be seen from the last 5 years from 2015–2019 as seen from Bank Indonesia statistical data:

Table 1. Table of Money Supply for 2015 - 2019

| Year | Money Supplay (M2) (Billion Rupiah) | Development (%) |
|---|---|---|
| 2015 | 4.546.743,03 | - |
| 2016 | 5.004.976,79 | 10.07 |
| 2017 | 5.419.165,05 | 8.27 |
| 2018 | 5.760.046,20 | 6.29 |
| 2019 | 6.136.552,00 | 6,54 |

Source: Bank Indonesia

The money supply in 2015 reached IDR 4,546,743.03 billion, whereas in 2016 it increased to IDR 5,004,976.79 billion, resulting in an increase of 10.07%. In 2019 it reached Rp. 6,136,552.00 billion, which shows the lowest development in the last 5 years caused by a decrease in net foreign assets driven by a slowdown in claims to non-residents amidst an increase in liabilities to non-residents along with an increase in capital inflows in securities.

The amount of money in circulation has a significant influence on the economy, because it affects people's purchasing power. When the money supply increases sharply, it can trigger inflation, thus having a negative impact on the economy. Therefore, it is necessary to determine the optimal level of money supply in the economy to create equilibrium conditions in the real money market, which can be formulated as follows:

$$M/P = m\ d\ (y)$$

Meanwhile, M is the stock or money supply level, P is the price level, while m d is the real money demand, the size of which is determined by real income (y). In order for equilibrium conditions to occur in the real money market to be realized, the role of the central bank is needed to monitor the money supply through the establishment of policies, so that it can ensure the availability of sufficient money to realize steady economic growth, with a money supply that is not too excessive, so that it can avoid the problem of inflation which is detrimental to society and has a negative effect on economic growth.

Controlling or regulating the amount of money in circulation is one of the duties of Bank Indonesia as the country's central bank. The Law Number 23 of 1999 Concerning Bank Indonesia, which was revised by Law Number 3 of 2004, governs the monetary policy practiced by the institution. As part of its responsibilities to oversee and manage the payment system, Bank Indonesia has a unique responsibility, namely issuing money as a legitimate form of payment in Indonesia, which includes controlling the printing and circulation of money as well as its overall supply. The government, in this case Bank Indonesia, must pay close attention to the significance of the money supply in the economy in order to identify factors that can affect the money supply and generate

## LITERATURE REVIEW

Three exogenous variables make up the Money Supply Model with Banking Fractional

Reserves, namely:

1. The amount of money held by the general population in cash and by banks as reserves is known as the monetary basis. The central bank has direct authority over the balance's monetary base.

2. The percentage of deposits that the bank reserves is known as the reserve deposit ratio. The bank's operational procedures and applicable banking regulations influence the reserve deposit ratio.

3. The quantity of money or money that people hold in the form of a checking account is known as the currency deposit ratio. The household choice for the type of currency they will hold is reflected in the currency deposit ratio.

By altering the monetary base and the reserve deposit ratio, the central bank can indirectly influence the amount of money in circulation. The central bank therefore has three tools for implementing monetary policy: open market operations (OMO), discount rate policy (DRP), and margin reserve requirement (MRR). Since it is the only institution with the capacity to make monetary policy, the Central Bank is free to do so. As a result, the decisions it makes must not only benefit the real sector, which is the primary engine of economic activity, but also the economy as a whole.

Factors that influence the Money Supply

The Relationship of E-Money to the Money Supply

E-Money has an impact on the money supply, namely that its effectiveness will not change the broad money supply (M2), but causes a shift from quasi money, time deposits or savings deposits to M1, in float form (Nizam, 2022). Owners of electronic money refill, top up with cash deposits, then there is a shift from currency to float so that there is no change in the money supply (M2). Electronic money owners top up their current account expenses at commercial banks so there is no change in M2 but there is a shift in M1 from demand deposit to float.

If the owner of electronic money refills or tops up savings account expenses, savings deposits and time deposits, customer time deposits at commercial banks, there will be an increase in M1 which comes from Float and M2 will not experience changes, because there is only a shift in money. quasi, savings or term savings become M1 in float form.

The Relationship of Inflation to the Money Supply

In the short term, it is impossible to observe the close connection between inflation and the money supply. The long term, not the short term, is where this inflation theory performs best. The amount of money demanded increases as the price level rises. In the context of macroeconomics, one of the indicators used to assess or gauge a nation's level of economic stability is inflation, the rise and fall of which frequently cause economic unrest. The value of money, which is governed by the supply and demand for money (Nguyen, 2015; Taghiyev, 2016; Viuela, 2020), is related to inflation and the money supply. The money supply will rise or shift higher when inflation is high and vice versa (Hussain, 2018; Buthelezi, 2023).

The Relationship of Interest Rates to the Money Supply

The fee for the loan that the borrower must pay is called the interest rate, and it is how much the lender is compensated for his investment. Individual choices on whether to increase spending or save money as savings are influenced by interest rates. In macroeconomics, the monetary authority, in this case the central bank, can control interest rates and the money supply through monetary policy to influence conditions in the money market. For example, a rise in interest rates at the central bank may make people prefer to save their money first rather than use it for consumption activities (Vasani, 2019).

Relationship of Foreign Exchange Reserves to Money Supply

The foreign sector has a large impact on the money supply in a nation that adheres to an open economic system, like Indonesia. Changes in the foreign sector, as indicated in changes in foreign exchange reserves, have an impact on the money supply since many developing nations utilize controlled floating exchange rates. The government's acquisition of foreign exchange reserves in the form of foreign money that is later converted to rupiah will have an impact on the money supply. Because the quantity of foreign exchange reserves transferred raises the money supply by the same amount, there is a strong link between foreign exchange reserves and the money supply (Vasani, 2019; Foday, 2021).

The Relationship of Foreign Exchange Rates to the Money Supply

The foreign exchange rate, also referred to as the foreign exchange rate, shows the cost or value of a country's currency expressed in terms of the value of another country's currency or the amount of local currency necessary. As a result, if the exchange rate increases, you must acquire the new rate. The value of the local currency decreases when more rupiah is spent, increasing the amount of money in use within the neighborhood. Consumer demand for goods and services may increase as a result of the home currency depreciating against other currencies.

Because more people will spend their money on products and services, the demand for money will rise as a result. As a result, there will be more money in circulation. In the meantime, if domestic currency depreciates in value relative to foreign currency, this can lead to people continuing to look for foreign cash. This situation results from people saving some of their income in foreign currency, which reduces the amount of money in circulation (Vasani, 2019).

## METHODS

The Central Statistics Agency and the Indonesian Stock Exchange websites, both accessible at www.bi.go.id, provided secondary data for this study. The study was conducted between 2008 and 2022. Ex post facto research means that the data collection for this study was done after all the events had taken place. With the help of this method, it should be possible to ascertain how Indonesia's money supply is affected by e-money, inflation, interest rates, foreign exchange reserves, and foreign exchange rates.

## RESEARCH VARIABLE

The following are the research variables used as follows:

1. The natural logarithm variable for the money supply is all currency, demand deposits plus quasi money available for use by the public. The amount of money in circulation in a broad sense (M2) is expressed in billions of rupiah

2. Variable Electronic money or e-money and e-Money2 is a type of money in electronic and digital form in the number of shopping transactions used by the public using electronic money as seen from the nominal value of e-money which is in millions of Rupiah.

3. The inflation rate variable is Inflation is a continuous increase in the prices of goods and services within a certain time, so that inflation can be seen from the consumer price index inflation based on annual inflation calculations which are in percent units

4. The monetary policy used by the government to control the economy and the pace of the nation's economic expansion is the variable interest rate set by Bank Indonesia. The Bank Indonesia interest rate is the source of the data.

5. Natural logarithm variable. Foreign exchange reserves are foreign assets owned by a country, so it can be seen from the foreign exchange reserves in the form of foreign currency in millions of dollars.

6. The price of US dollars in Rupiah units or the price of US dollars when converted to Rupiah is the variable natural logarithm of foreign exchange rates. The research period's annual average of the Central Bank's purchase rate data versus the US dollar is the source of the data.

Data analysis technique

Multiple linear regression analysis is the method used in this study's data analysis. Multiple linear analysis is performed after the classical assumptions have been verified. The classical assumption test is a procedure used to determine whether there are any issues with classical assumptions in a linear regression model that could make it doubtful that the regression equation derived is accurate in estimation, unbiased, and consistent.

Some of the conventional assumption tests used in this work include the heteroscedasticity test, the multicollinearity test, and the autocorrelation test. Multiple linear regression analysis is used in this study to forecast the value of the dependent variable whether the independent variable's value rises or falls as well as to determine whether there is a positive or negative relationship between each independent variable and the dependent variable.

## RESULTS AND DISCUSSION

The regression model's coefficient of determination calculation yielded a value of 0.9119. This demonstrates that all independent variables can account for 91.19% of the fluctuation in the money supply, while additional variables other than the research variables can account for the remaining 8.81%. The F test findings indicate that all independent variables have a combined effect on the money supply; Fcount is 11.26 and 0.001 is the significance level, respectively. As a result, it can be said that all independent variables significantly affect the money supply.

Heteroskedasticity Test

```
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnAMS

         chi2(1)      =     1.20
         Prob > chi2  =   0.2742
```

The results of the heteroskedasticity test, namely a value of 0.2742 > 0.05, the data is not affected by symptoms of heteroskedasticity.

Multicollinearity Test

```
. vif
```

| Variable | VIF | 1/VIF |
|---|---|---|
| eM2 | 18.33 | 0.054542 |
| eM | 18.14 | 0.055128 |
| Infl | 5.75 | 0.174062 |
| lnFER | 3.54 | 0.282783 |
| IR | 3.17 | 0.315685 |
| lnFERat | 1.96 | 0.510745 |
| Mean VIF | 8.48 | |

Multicollinearity test results, namely the data is not affected by symptoms of multicollinearity, where the value is 8.48 < 10.

Autocorrelation Test

```
. estat dwatson

Durbin-Watson d-statistic(  7,    15) =   1.65132
```

Table DW test is DL = 0.4471; DU= 2,4715

DW Test – 1,65132;

4-DU => 4 - 2,4715 = 1,5285

The results of the autocorrelation test, namely the Durbin-Watson value of 1.65132, the data are relatively not affected by autocorrelation symptoms

Next, regression calculations are carried out for all variables.

| Source | SS | df | MS | Number of obs | = | 15 |
|---|---|---|---|---|---|---|
| | | | | F(6, 8) | = | 13.80 |
| Model | 11.390466 | 6 | 1.89841101 | Prob > F | = | 0.0008 |
| Residual | 1.10068258 | 8 | .137585322 | R-squared | = | 0.9119 |
| | | | | Adj R-squared | = | 0.8458 |
| Total | 12.4911486 | 14 | .892224902 | Root MSE | = | .37092 |

| lnAMS | Coef. | Std. Err. | t | P>\|t\| | [95% Conf. | Interval] |
|---|---|---|---|---|---|---|
| eM | -3.93e-09 | 1.44e-09 | -2.72 | 0.026 | -7.25e-09 | -5.99e-10 |
| eM2 | 4.25e-18 | 1.69e-18 | 2.52 | 0.036 | 3.54e-19 | 8.15e-18 |
| Infl | -.0696379 | .1081203 | -0.64 | 0.538 | -.3189638 | .179688 |
| IR | .5329743 | .118527 | 4.50 | 0.002 | .2596505 | .8062981 |
| lnFER | 2.412274 | .6680838 | 3.61 | 0.007 | .8716698 | 3.952878 |
| lnFERat | 1.982061 | .6936345 | 2.86 | 0.021 | .3825373 | 3.581585 |
| _cons | -33.99699 | 8.694116 | -3.91 | 0.004 | -54.04566 | -13.94832 |

Based on the regression results processed with Stata software, the influence of each independent variable on the Money Supply can be described as follows:

e-Money has a significant negative effect on the Money Supply

The e-Money test's findings on the quantity of money in circulation revealed that the t-count was -2.72 with a significance value of 0.026, where the probability value of t is smaller than 5% (0.026 0.05), indicating that the e-Money variable has a short-term negative impact on the quantity of money in circulation. E-Money has a large positive impact on the money supply over the long term. Therefore, the amount of money in circulation in Indonesia from 2008 to 2022 will be significantly influenced by e-Money as a method of electronic payment.

This is because e-Money only shifts M1 or money in the narrow sense, currency and demand deposits which ultimately causes a shift from quasi money, time deposits or savings deposits to M1 in float form. Owners of electronic money refill, top up with cash deposits, then there will be a shift from currency to float, so there is no change in the money supply (M2). Electronic money owners top up their current account expenses at commercial banks, so there is no change in M2 but there is a shift in M1 from demand deposit to float. Owners of electronic money top up their savings accounts and time deposits at commercial banks, time deposits and savings deposits, so M2 does not experience changes because there is only a shift from quasi money, savings or time deposits to M1, in the form of float.

Inflation does not have a negative effect on the Money Supply

According to the results of the t test on inflation, the t-count was -0.64 and the significance level was 0.538, indicating that the likelihood of t was higher than 5% (0.64 > 0.05). Therefore, from 2008 to 2022, Indonesia's money supply is not significantly impacted by the inflation variable. As a result, Indonesia's money supply did not fall throughout the years 2008 to 2022 while inflation rose.

Interest Rates have a positive effect on the Money Supply

Based on the results of the interest rate test on the money supply, it was found that the t-count was 4.50 with a significant value of 0.002, where the probability t value was smaller than 5% (0.002 < 0.05) which means that the interest rate variable had a significant effect on the amount Money Circulation in Indonesia in 2008-2022.

This is because interest rate instruments are more widely used in investments such as mutual funds, shares and bonds, where the transaction mechanism uses non-cash payments. Interest rate policy has an impact on withdrawals made by state banks at the Central Bank, but is more likely to have an impact on investment products such as deposits and bonds. Almost the same condition also occurs in private banks, where changes in interest rates affect the demand for currency, but have more of an impact on assets that are currently taken over by the Treasury department in private banks. So interest rates have an influence on the money supply in Indonesia in 2008-2022, because when there is an increase in interest rates as a result of central bank policy, people do not immediately save their money in banks or people do not directly switch investments into deposits or shares, because People have their own plans beforehand, so that only a small percentage of people save money in banks when interest rates increase.

Foreign Exchange Reserves have a positive effect on the Money Supply

The results of the natural logarithm test for foreign exchange reserves yielded a t-count of 3.61 and a significant value of 0.007, where the probability of t is less than 5% (0.007 0.05). This indicates that, from 2008 to 2022, foreign exchange reserves in Indonesia will have a significant impact on the total money supply. Foreign exchange reserves are deposits made in foreign currencies by central banks and other monetary authorities that act as a kind of debt insurance. Foreign exchange reserves have a substantial positive impact on the money supply; specifically, the foreign commerce sector has a sizable impact on the money supply. Considering that many developing countries use controlled floating exchange rates, changes in the foreign trade sector as reflected in changes in foreign exchange reserves have an influence on the money supply.

The revenue received by the government is in the form of foreign currency which is then exchanged for rupiah, so in the exchange process it will increase Bank Indonesia's asset reserves, and the money supply will increase by the same amount of money. The amount of foreign exchange reserves exchanged increases the money supply by the same amount. The increase in the position of foreign exchange reserves was also influenced, among other things, by tax and service revenues, as well as the withdrawal of government loans.

Foreign Exchange Rates have a positive effect on the Money Supply

The analysis of the natural logarithm of foreign exchange rates yielded a t-count of 2.86 and a significant value of 0.021, both indicating that the probability of t was less than 5% (0.021 0.05). Therefore, from 2008 to 2022, the Indonesian money supply will be positively and significantly influenced by the foreign exchange reserve variable. This is due to the fact that changes in the exchange rate will result in changes in the societal demand for money. Fluctuations in the exchange rate affect the prices of domestic and imported goods, income from domestic companies, and the wealth of all domestic investors. As a result, the central bank has a number of responsibilities to maintain the stability of the rupiah exchange rate.

Foreign currency exchange rates can affect the money supply due to the influx of deposits and investments in foreign currency as a component of quasi money, because fluctuations in the exchange rate will influence people's behavior in holding quasi money. This is because there is an element of speculation and uncertainty in the future which is one of the considerations for someone to convert their wealth into more profitable assets.

## CONCLUSION

Based on the statistical analysis of the data obtained from testing the aforementioned research hypothesis, it can be said that the variables short- and long-term e-money, interest rates, foreign exchange reserves, and foreign exchange rates all significantly affect the amount of money in circulation, whereas the variable inflation has no significant impact on it. As a result of the fact that this study is only focused on a small number of variables that affect the money supply, it is advised that future studies broaden their focus by including more pertinent variables, such as the gross domestic product (GDP), exports, and investment, as well as Indonesia. The research period should be extended and foreigners.

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