

# THE INFLUENCE OF THE PROPORTION OF ELECTRONIC MONEY, MONEY SUPPLY, EXCHANGE RATE AND BI RATE ON ECONOMIC GROWTH IN INDONESIA IN 2010-2020

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## ABSTRACT

The purpose of the study is to determine and analyze the effect of the variable Nominal Proportion of Electronic Money Transactions, Money Supply, Exchange Rates, and BI Rate on economic growth in Indonesia in 2010-2020. The study utilized data in monthly time series from January 2010 to December 2020 where the sample amounted to 120 months. The research model is the Vector Error Correction Model (VECM) and is assisted by EViews 12 software. The results showed that in the long run a relationship was found between the variables of the Nominal Proportion of Electronic Money Transactions, Money Supply, and exchange rates on economic growth. Nominal Proportion of Electronic Money Transactions, and Money Supply have a positive and significant effect on economic growth. While the exchange rate variable in the long term and short term has a significant negative effect on economic growth.

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## 1. INTRODUCTION

Economic growth is an issue in the country's economic sector that takes place over a long period of time, with the aim of achieving conditions that continue to improve. A growing economy in Indonesia is related to the welfare of its population. If the population in the country does not experience an increase in welfare, it can be concluded that the economic conditions in the country have not improved or are even experiencing a decline. In order to determine the level of economic growth of the country, it can be done through efforts to determine the level of gross domestic product (GDP).

From data from the Badan Pusat Statistik (BPS), in 2010 Indonesia's economic growth increased by 6.40%, then in 2011 from 6.50%, while in 2012 it decreased to 6.30%, then in 2011 it increased by 6.30%. For the following years, the economy in Indonesia did not grow but continued to decline until it reached -2.07% in 2020. Kuznets states that economic growth is a long-term increase in a country in order to meet its economic needs, these needs increase along with technological advances and mandatory compliance between ideologies and institutions (Jinghan, 2010). GDP levels that increase or decrease are influenced by a number of factors such as money supply, exchange rates, interest rates, and others.

Bank Indonesia is currently actively promoting the use of electronic money to achieve easier and simpler transactions. In addition, the step of using electronic money also has the aim of minimizing the use of cash. A drastic increase in the use of non-cash transactions using electronic money. Based on data from the Bank Indonesia (BI) website, the nominal proportion of electronic money transactions in 2010 was 3%, then the nominal proportion of electronic money transactions continued to increase until in 2020 it reached 262%. According to Tee & Ong (2016) non-cash transactions can increase the level of public consumption as well as economic development where in the long run, these types of transactions can have an impact on economic growth. Thus, the enactment of policies related to non-cash transactions can be a promotional event for non-cash transactions which in the future can affect the country's economic level.

With the existence of electronic money that facilitates this transaction, it can increase the money supply in the community. Money supply also has an impact on economic growth. According to data obtained from BPS, money supply continues to increase every year, in 2010 the increase in money supply was 15.40% until in 2020 the increase in JUB reached 179.22%. According to Keynes' hypothesis, money supply has a positive effect on output and economic growth. If there is a phenomenon of excessive money

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supply, Bank Indonesia sets a policy (lowering) the interest rate. This situation triggers an investment trend, which can lead to an increase in output and economic growth.

The exchange rate is also an important variable that affects the country's economic growth. Based on exchange rate data from 2010 to 2020, it is known to have depreciated, where in 2010 the exchange rate was Rp.9,068 until in 2020 it touched Rp.14,340. According to (Nugroho, 2016) Exchange rate depreciation has a negative effect on international trade, for example, increased production costs on production inputs. Not only that, exchange rate depreciation also affects the decline in foreign exchange reserves so that it has an impact on hampering economic growth and development. If the exchange rate depreciates continuously, then this situation affects the growth of the Indonesian economy.

Then the BI Rate or interest rate is a factor that has an impact on economic growth. Based on BI rate data from 2010-2020, it fluctuated, namely when in 2010 it was 6.5%, then the largest in 2014 was 7.7% and the smallest in 2020 was 3.75%. If there is an increase in the Bank Indonesia interest rate, there will also be an increase in lending and deposit rates. If there is an increase in deposit interest rates, it causes the tendency of economic actors to save their money in banks, which in turn can reduce economic activity. This is in line with research (Ginting, 2016) which states that an increase in BI interest rates can dampen economic activity and result in reduced inflation. Interest rates that have increased or decreased are influenced by the demand and supply of money. An increase in interest rates tends to occur when debtor demand is greater than JUB or creditor supply funds. This applies vice versa, a decrease in interest rates occurs when debtor demand is lower than the amount of money supply from creditors.

Based on the explanation above, where electronic money and money supply continue to increase, this should increase economic growth, but based on data, Indonesia's economic growth continued to decline from 2010 to 2020. Meanwhile, the exchange rate is increasingly depreciating and then the bi rate fluctuates. So this study has the aim of seeing the effect of the Nominal Proportion of Electronic Money Transactions, Total Money in Circulation, Exchange Rates, and BI Rate in Indonesia in 2010-2020 on Economic Growth that occurred in Indonesia.

## **Literature Review**

### **Economic Growth**

Economic growth can be defined as the development of economic activity in a society that results in increased production of goods and services and the welfare of society (Sadono Sukirno, 2000). The level of economic growth is generally indicated through changes in the value of Gross Domestic Product (GDP). Sukirno (2004) defines Gross Domestic Product (GDP) as National Income which reflects the level of production achieved by a particular country in one year and how it changes from year to year. According to Meier (1989), economic growth is a fundamental indicator in the analysis of economic development in a country. Economic growth is considered a necessary requirement of the development process. However, it should be noted that economic growth is measured based on national income. Meanwhile, economic development has indicators of success involving per capita income, human Development Index, And Quality Of Life Index Which Are Quantitative In Nature.

### **Proportion Of Electronic Money**

Proportion / Debt ratio is used to estimate the existing electronic money from the money supply. In the study, the proportion of electronic money was calculated using the money supply. Bank Indonesia Regulation number 16/8/PBI/2014 electronic money is a payment instrument which uses electronic media and has a value stored on a server or chip. Bank Indonesia recognizes several key elements in the concept of electronic money, including the process of depositing a sum of money with the issuer prior to the use of electronic payment instruments, storing the value of money on a server or chip, using electronic money to conduct transactions with economic actors, and the importance of noting that money stored in electronic media is not included in the banking regulatory framework in accordance with banking laws (Bank Indonesia 2019). According to the form, electronic money (e-money) is grouped into two types:

1. Card-based E-money (Chip), where the value of money is stored on a form of card by embedding a chip. Transactions using card-based e-money can take place offline. Often, this form of e-money is also known as prepaid cards.
2. Application-Based E-money (Server), where electronic money in the form of a server can be accessed via the internet. The e-money application utilizes certain software as a store of value.

### Exchange Rate

An exchange rate is a representation of the price of a particular currency when measured in terms of another country's currency that is used in trade between countries. These exchange rates tend to fluctuate and can change, which is known as appreciation and depreciation. Appreciation refers to an increase in the value of a currency, which can be measured through the larger amount of foreign currency that can be purchased using domestic currency, thus possibly leading to an increase in the price of local goods compared to imported goods. Conversely, depreciation describes a fall in the value of the currency, which may result in local goods becoming cheaper than imported goods (Mankiw, 2015:671).

### Money Supply

According to Bank Indonesia, money in circulation can be grouped into two categories, namely in the narrower sense (M1) and the broader sense (M2). M1 includes cash used by the public as well as money held in Rupiah-denominated current accounts. M2, on the other hand, includes M1, as well as quasi-money (such as savings, time deposits in Rupiah or foreign currencies, and current accounts in foreign currencies) and also includes financial instruments such as securities issued by the domestic private sector with maturities of up to one year. As a result, money in circulation in the broader sense (M2) includes all forms of money in circulation in the economy, such as money held by the public in various forms (transaction money/chiral/quarter money), as well as additional quasi-money (such as savings, foreign currency accounts, time deposits, etc.) held by the public at banking institutions.

### Bi Rate

The BI Rate is the interest rate for one month which is periodically stated by Bank Indonesia in a certain period and has a role as a guide in monetary policy (Siamat, 2005). In other words, the BI Rate is a benchmark interest rate that is used to develop monetary policy strategies aimed at controlling the inflation rate in Indonesia. Changes in the BI Rate can have an impact on both deposit rates and bank lending rates. Therefore, it is very important to regulate the BI Rate in order to maintain economic stability and the amount of money in circulation so that the economy can be controlled (Alvyonita & Hidayat, 2017).

## 2. METHOD

In the study, secondary data in the form of monthly time series from January 2010 to December 2020 were used. The variables analyzed include economic growth as the dependent variable, while the independent variables consist of nominal electronic money transactions, money supply, inflation rate, currency exchange rate, and BI Rate. The data sources used come from Bank Indonesia and the Central Bureau of Statistics (BPS).

The data analysis method used in the study is the Vector Error Correction Model (VECM) using EViews 12 software. VECM is an analytical model with the aim of identifying the short-term response of certain variables to changes in the long term that occur due to the presence of a permanent shock (Kostov and Lingard in Ajija, 2011). Not only that, the VECM model is useful in dealing with time series data problems where it is not stationary and explains the direct relationship, namely correlation in econometric analysis (Ajija, 2011). In this analysis, the cointegration approach is utilized in conducting long-term correlation analysis, while VECM is used in conducting short-term (dynamic) correlation analysis. Data stationarity testing on all variables in the research model refers to the Augmented Dickey-Fuller Test (ADF) method.

## 3. RESULT AND DISCUSSION

### Unit Root Test (Stationarity Check)

Variable	Rate	Level		1 <sup>st</sup> Difference	
	Critical ( $\alpha$ )	Dickey Fuller Test	P value	Dickey Fuller Test	P value
PDB	5%	-2.7197	0.0734	-13.3046	0.0000
TUE	5%	0.21488	0.9726	-11.8337	0.0000
JUB	5%	-1.4757	0.5429	-15.6795	0.0000
KURS	5%	-10.6784	0.0000	-11.1359	0.0000
BI RATE	5%	-0.5266	0.8812	-7.79207	0.0000

Before analyzing time series data, the first step that needs to be taken is testing in order to determine whether the data is stationary or not. This test uses the unit root test with the Augmented Dickey-Fuller Test (ADF) method.

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Dickey Fuller (ADF) method with a significance level of 5%. The results of the ADF stationarity test, using the critical value at the 5% significance level, show that only one variable is stationary at the level. Therefore, stationarity testing is carried out further for the first difference level. At the first difference level, all variables are stationary. The test results for the First Difference level show that all variables are stationary, so further tests can be conducted.

#### Optimum Lag Test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	768.4960	NA	4.54e-12	-11.92962	-11.81822*	-11.88436
1	809.5417	78.24343	3.53e-12	-12.18034	-11.51189	-11.90875*
2	832.9876	42.86207	3.62e-12	-12.15606	-10.93057	-11.65814
3	871.2864	67.02281*	2.96e-12*	-12.36385*	-10.58133	-11.63960

VECM estimation is influenced by the lag length of the data used. The lag length of this data is utilized in determining how long the impact of each variable on past variables can occur. In the study, in determining the optimal lag length, we can note the asterisk (\*) in each column. Based on the table, it can be concluded that the 3rd lag is the most which means that the optimum lag used in the study is lag 3.

#### Var Stability Test

Root	Modulus
-0.357558 - 0.606947i	0.704438
-0.357558 + 0.606947i	0.704438
-0.698939	0.698939
0.133785 - 0.635703i	0.649628
0.133785 + 0.635703i	0.649628
0.648192 - 0.022267i	0.648574
0.648192 + 0.022267i	0.648574
-0.284284 - 0.475973i	0.554408
-0.284284 + 0.475973i	0.554408
-0.499597	0.499597
-0.001154 - 0.436152i	0.436153
-0.001154 + 0.436152i	0.436153
-0.106010 - 0.295842i	0.314262
-0.106010 + 0.295842i	0.314262
0.144238	0.144238

Before conducting further analysis, it is necessary to conduct a stability test on the VAR model to ensure its stability. The test results show that the data has a modulus value <1, which indicates that the data in the study has been stable for the optimum lag.

#### Cointegration Test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.410466	189.8747	69.81889	0.0000
At most 1 *	0.301395	122.7650	47.85613	0.0000
At most 2 *	0.283642	77.21404	29.79707	0.0000
At most 3 *	0.157169	34.84997	15.49471	0.0000
At most 4 *	0.098252	13.13441	3.841465	0.0003

Note: marked (\*) is an indication of cointegration.

In the table above, there are 5 ranks of cointegration with a significance level of 5%. This result indicates that there is a cointegration relationship between variables, which means that the Vector Error Correction Model (VECM) can be utilized in the research.

#### Vecm Test

The VECM test is used to determine the long-term and short-term relationship between the dependent variable (Economic Growth) and the independent variables (Electronic Money, Nominal Proportion of Electronic Money Transactions, Money Supply, Exchange Rate, and BI Rate). In the research conducted, the level of significance between variables was measured at the 1%, 5%, and 10% levels through the calculation of comparing the t-statistic value to the t-table value calculated based on the degree of freedom (df) obtained by the formula  $df = n - k$ , where k is the number of research variables while n is the number of observations. In this context, the degree of freedom is  $120 - 5 = 115$ . The result of

t-table with df 115 at 1% significance level is t-table = 2.619258, at 5% level t-table 1.980808 and at 10% level t-table 1.658212.

### Long-Term Relationship

Long Term		
Variable	Coefficient	T Statistics
TUE	<b>12.19659</b>	<b>5.49941*</b>
JUB	<b>55.15095</b>	<b>2.01861**</b>
KURS	<b>-11.85994</b>	<b>-9.57378*</b>
BI RATE	0.997605	0.10638

Notes: \*) significant at 1% alpha, \*\*) significant at 5% alpha, \*\*\*) significant at 10% alpha.

The results of the VECM estimation in the long run reveal that the variables of the proportion of electronic money, money supply, inflation, and BI Rate have an influence on GDP with the following relationships:

1. The proportion of electronic money variable has a positive and significant impact on GDP in the long run at the 1% significance level, with a coefficient of 12.1965 This means that if the electronic money variable increases by 1%, GDP will increase by about 15.1%.
2. The money supply variable has a significant positive impact on long-term GDP at the 1% significance level, with a coefficient of 55.1509 This means that if the JUB variable increases by 1%, GDP will increase by around 55.1%.
3. The exchange rate and GDP variable shows a negative and significant relationship in the long run which has a significance level of 5%, then the coefficient is -11.8599, this means that if the exchange rate increases by 1%, GDP decreases by about 11.8%.

### Short-Term Relationship

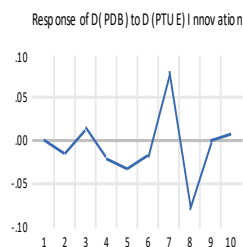
SHORT TERM		
Variable	Coefficient	T Statistics
TUE	0.386257	1.45616
JUB	2.856754	1.12849
KURS	<b>-0.492015</b>	<b>-1.96478***</b>
BI RATE	0.994319	0.49401

Notes: \*) significant at 1% alpha, \*\*) significant at 5% alpha, \*\*\*) significant at 10% alpha.

The VECM estimation results for the short term show that the exchange rate variable has a negative and significant effect on economic growth where the significance level is 10% with a coefficient value of 0.492, which means that if the exchange rate increases by 1%, there will be a decrease in economic growth around 0.492%. While the variable proportion of electronic money, money supply, and BI Rate does not have a significant effect on economic growth in the short term. In other words, if these variables increase by 1%, in the short term there is no significant impact on the GDP variable.

### Impulse Response Function (Irf) Results

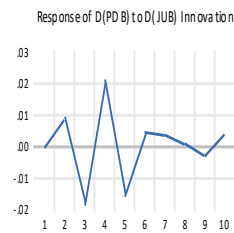
IRF analysis is used to analyze how certain variables respond to shocks caused by other variables. This analysis provides an overview of how the estimated impact of the shock on other variables, in order to know how long the shock is felt by other variables either positive or negative response. This research utilizes IRF analysis in 10 periods.



**Figure 1.** IRF Results of GDP to TUE

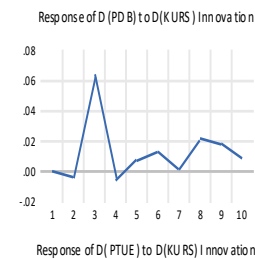
Figure 1 illustrates how the economic growth or GDP variable responds to a shock from the Electronic Money Proportion variable. The response of economic growth fluctuates, starting with a negative response to the electronic money variable at first. However, for the third period economic growth began to respond positively. Then, for the 7th period, economic growth again responded

positively with an increase in electronic money. However, in the next period, economic growth again responded negatively.



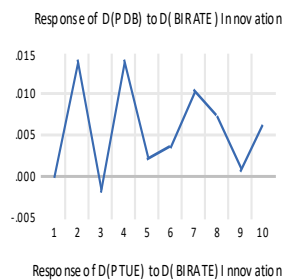
**Figure 2.** IRF Results of GDP to JUB

Figure 2 illustrates the response of the economic growth or GDP variable to a shock from the money supply variable. The response of economic growth fluctuates in response to an increase in money supply. In the initial period, economic growth responded positively, then in the second period it experienced a significant decline, then in the next period it fluctuated, until in the final period economic growth again responded positively to the money supply variable.



**Figure 3.** IRF results of GDP to KURS

Figure 3 illustrates how the economic growth variable (GDP) responds to a shock to the exchange rate variable. At first, economic growth shows a negative response to changes in the exchange rate. However, in the third period, economic growth begins to respond positively to an increase in the exchange rate. Furthermore, in the next few periods, the response of economic growth fluctuates with a positive response to the exchange rate variable.



**Figure 4.** IRF Results of GDP to BI RATE

Figure 4 illustrates how the economic growth variable (GDP) responds to a shock to the BI Rate variable. The response given by economic growth to the bi rate at the beginning of the period showed a positive response then in the 3rd period there was a negative response but in the next period economic growth responded positively to the bi rate variable.

#### Variance Decomposition (Vd) Analysis

The variance decomposition test results aim to determine the extent of the contribution of certain variables to other variables. In the study, the variance decomposition test results are shown in the table below illustrating the contribution of electronic money variables, money supply (JUB), currency exchange rates, inflation, and BI Rate to GDP.

Variance Decomposition of D(PDB):						
Period	S.E.	D(PDB)	D(PTUE)	D(JUB)	D(KURS)	D(BIRATE)
1	0.316419	100.0000	0.000000	0.000000	0.000000	0.000000
2	0.319070	99.49679	0.203202	0.077539	0.025760	0.196713
3	0.341690	95.72344	0.346909	0.353449	3.401414	0.174787
4	0.374751	95.61433	0.648697	0.587694	2.860124	0.289156
5	0.386144	94.92281	1.367719	0.714010	2.719905	0.275556
6	0.395930	94.80781	1.553564	0.692193	2.675933	0.270497
7	0.420981	91.81638	4.897715	0.617839	2.367028	0.301042
8	0.438745	88.91581	7.795816	0.568825	2.415360	0.304191
9	0.450240	89.31248	7.402868	0.545716	2.449954	0.288980
10	0.463823	89.84577	7.001414	0.523072	2.338011	0.291732

Based on the VD test results table above, it can be seen that the largest contribution to the GDP variable is the GDP variable itself, which reaches 100% in the first period. However, the contribution of the GDP variance slowly decreased to 89.84% in the 10th period. Initially, the electronic money proposal has not made a significant contribution to GDP. However, its contribution increased from 0% in the first period to 0.20% in the second period, then continued to increase until it touched 7% in the 10th period. The money supply variable also did not make a significant contribution to GDP at the beginning of the period, for the next period the money supply response fluctuated. The exchange rate variable at the beginning of the period did not contribute significantly to GDP. However, its contribution tends to be stable until period 10, which is 2.33%. Meanwhile, the BI Rate variable shows the smallest contribution compared to other variables, with 0% for the first period and 0.29% in the 10th period.

#### **The Effect Of Electronic Money Proposals On Economic Growth**

The results showed that the nominal proportion variable of electronic money transactions has a positive and significant effect in the long term on economic growth. When electronic money transactions are higher, it encourages economic growth. The advantages of using electronic money, which include convenience and reduced transaction costs, trigger an increase in consumption by electronic money users, which in turn will result in higher economic growth. This finding is in line with Mashabi & Wasiaturrahma's (2021) research which shows that electronic money transactions have a positive impact on economic growth in the long run. However, in the short term, the electronic money variable does not have a significant impact on economic growth because there are several obstacles to the use of electronic money in developing countries that have not been fully overcome.

#### **The Effect Of Money Supply On Economic Growth**

The results of this study indicate that JUB has a positive and significant long-term effect on economic growth. This result is in line with Keynes' theory, where individuals save money to facilitate their transactions, and the public's demand for money in making transactions is influenced by the level of national income and the interest rate. When national income is higher, it can increase the volume of transactions, and ultimately the need for money also expands in order to facilitate these transactions. This finding is also in line with the results of research by Mutia, Indrawati, & Sarfiah (2018), which states that there is a positive and significant effect of JUB on Indonesia's GDP.

#### **The Effect Of Exchange Rates On Economic Growth**

The results indicate that the exchange rate variable has a significant negative effect on economic growth, which means that when the exchange rate increases, economic growth decreases. The existence of a negative influence occurs because if the exchange rate (exchange rate) increases, it means that the rupiah exchange rate has depreciated or weakened, which causes the high price of domestic products rather than the price of foreign products. When the exchange rate weakens, it can cause the price of imported commodities to rise where the increased exchange rate also affects production costs so that it finally has an impact on the price of increased output. This research is in line with Wiriani (2020) which shows that there is an effect of exchange rates on economic growth. The existence of a negative impact occurs because the exchange rate weakens so that the price of raw materials increases and has an impact on economic growth.

#### **The Effect Of Bi Rate On Economic Growth**

The results of this study indicate that the BI Rate has a positive and insignificant effect on economic growth. The results are in line with the theory which states that if interest rates are high, it will reduce the amount of investment which has an impact on reducing economic growth. However, if interest rates are low, it will spur high investment and then stimulate economic growth. These findings are in line with

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Kurniasari's research (2011) which examines the effect of investment, inflation, exchange rates and interest rates on economic growth in Indonesia. The results of his research state that partially the interest rate has no effect on economic growth. Then another study conducted by Annisa Dewi Ambarwati (2018) states that interest rates have a positive effect on the country's economic growth.

#### 4. CONCLUSION

According to the results of this study, it can be concluded that the variables of the proportion of electronic money, money supply, and exchange rates affect economic growth in Indonesia during the 2010-2020 period. In the long term, the variable proportion of electronic money and money supply has a positive and significant effect on economic growth. Meanwhile, the exchange rate variable both in the long and short term has a significant negative effect on economic growth. However, the BI Rate variable has no effect either in the long term or short term on economic growth.

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