



Analysis The Use of Electronic Money in Indonesia

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Abstract

E-money is an innovation of payment methods. A transaction using electronic money has more advantages than using cash. These advantages make electronic money transactions keep increasing. Currently, the increment of electronic money transactions didn't follow by a reduction in the amount of money in circulation. This study aims to analyze the effect of macro instruments such as Gross Domestic Product, money supply (M1), inflation, and BI Rate on e-money transactions. This study focuses more on server-based electronic money and cash-substitution capabilities. This research uses quantitative methods using time-series data from January 2009 to December 2019, and the Error Correction Model Engle-Granger was employed. The results of the study show that the GDP variable in a short-run has an insignificant negative effect, while in a long-run has a positive effect, it is also significant on e-money transaction in Indonesia. The M1 variable in the short-run has an insignificant negative effect, while in the long-run, it has a significant negative effect on e-money in Indonesia. Inflation variables in both the short and long-run have an insignificant positive effect on e-money in Indonesia. The variable BI rate in the short and long-run have an insignificant negative effect on e-money in Indonesia.

INTRODUCTION

The infiltration of advanced technology era in communication and information, especially the internet, has a broad impact in various fields, including economics. The result published by Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) states that 64.8% of people in Indonesia in 2018 have been aware of the internet, it is used as an online transaction with an average of 3.19 million rupiahs per person and predicted to keep developing (APJII, 2019).

Layanan Keuangan Digital (LKD) regulated in *Peraturan Bank Indonesia Nomor 20/6 / PBI / 2018* concerning electronic money. The existence of LKD is presented to provide flexibility for the public in terms of transactions without carrying a wallet and cash. The policy of cashless intended to subtract the negative consequences related to the increment of cash in economics, including filing fees for cash, the high risk in using cash, inefficiency, and corruption (Adu, 2016). The basic concept of electronic money is deposited in an application, and it can be used in any places that have been working with the publisher of electronic money (Usman, 2017). According to Bank Indonesia, electronic money is a non-physical payment method for traders or merchants, not digital money publishers which the money value saved in servers and chips (Bank Indonesia, 2020). Electronic money can be published based on the value of money that has been deposited from consumers to the publisher, and the value of money that has been saved is not like savings in the bank. Aside from the flexibility in transactions, indirectly, people participate in promoting Bank Indonesia's program on cashless society. Electronic money, in general, is commonly used as a tool to conduct a small transaction without physical money (cashless money), people just have to stick the electric money card on the reader machine (Usman, 2017). Nowadays, people in Indonesia fond of using e-money, ATM cards, debit cards, credit cards, so every year there is increment transaction volume (Ritonga, 2018). The regulation regarding electronic money in

Indonesia was initially attached to the APMK regulation, but due to the development of technology, electronic money is no longer considered the same as APMK. That is why, in 2009, Bank Indonesia issued *Peraturan Bank Indonesia Nomor: 11/12 / PBI / 2009*, it contained regulations about electronic money.

The validity of this regulation stimulates the increment of e-money transaction growth to 17 million transactions with transaction value reaching 500 billion in 2009. Figure 1 shows the development of e-money and GDP. Throughout 2016 till 2019, GDP growth has a stable condition on level 5%. This growth showed the improvement of the condition of Indonesian economics. The stability level of GDP encourages people to intensify their consumption. Based on BPS reports, the level of household consumption in 2019 amounted to 5,936,399 billion Rupiah. The growth of people's consumption has led to an increment in the value of digital money transactions used by people in the amount of 145,165,468 million Rupiah in 2019.

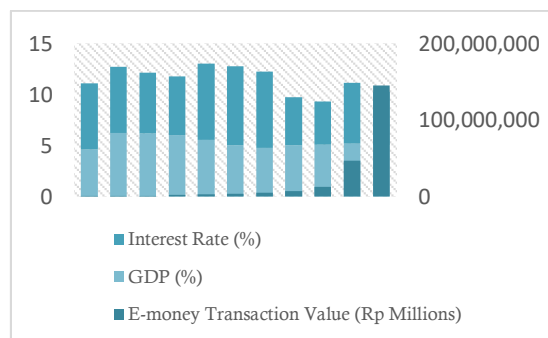


Figure 1. Developments in E-money (Million Rupiah), GDP (%) and Interest Rates (%)

Source: Statistik Indonesia various editions, BPS and SEKI various editions, BI

Keynes acknowledged that people want the amount of money demand exceeds the needs in the transaction; it has happened because there is an urge to hoard wealth (Mishkin, 2009). The demand for money to hoard wealth or the purpose of this speculation depends on the high and low-interest rates. When the interest rate is high, people tend to save their money in the bank rather than carrying around their cash and vice versa. Figure 1 shows that changes in interest

rates do not seem to be followed by the demand for electronic money, which increased over the years. The interest rate in 2017 is around 4.25%, followed by e-money demand for 12 billion Rupiah. The following year the interest rate has increased by 6% and e-money demand for 47 billion Rupiah. Referring to Keynes's theory that states there are negative relations between the interest rate with the demand for money that has been seen yet in the track record, it is confirmed in 2019 that the interest rate has decreased by 5.25% and demand for electronic money increased by 145 billion Rupiah.

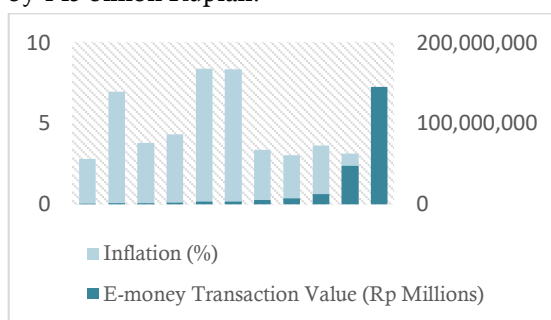


Figure 2. Development of E-money (Million Rupiah) and Inflation (%)

Source: *Laporan Perekonomian Indonesia* and SEKI in various editions, BI

According to Bank Indonesia, the inflation rate is stable at the level of 3% throughout 2016 till 2018. Moreover, in 2019 Indonesia's Inflation recorded a decline by 2.7%. Inflation shows the development of a commodity price in a country. The frequency of demand for money in a society influenced by the price. A stable inflation rate can lead to the demanding for goods and services in society, also experiencing stability and ultimately will also have an impact on the amount of money requested. Based on Figure 2, it can be conclude that a low rate of Inflation not followed by a decrease in demand for money by people, which is represented by the e-money variable.

Hong (2009) argues the presence of digital money as a payment instrument for virtual transactions will slowly shift the existence of currency, in tune with Figure 3.

Based on Figure 3, over the years the growth of digital money as payment method keep on increase up to 209.8%. At the end of 2018 it become 47.2 million Rupiah and the increment

of electronic money keep on escalating in 2019, according to a report published by Bank Indonesia, digital money transactions grew by 188.31% on an annual basis in December 2019. In fact, the increment of the value of e-money transactions also followed by growth in the currency, which from year to year, it escalated even though the nominal was lower than the digital money. Based on the publication of Bank Indonesia, currency circulation in Indonesia has been increased every year. Recorded in December 2019, currency circulated in the amount of 654.7 trillion Rupiah (Bank Indonesia, 2019). On Figure 3, the use of non-cash payment methods, especially e-money products, has improved in the last three years. However, this improvement has not offset by people's dependency on cash

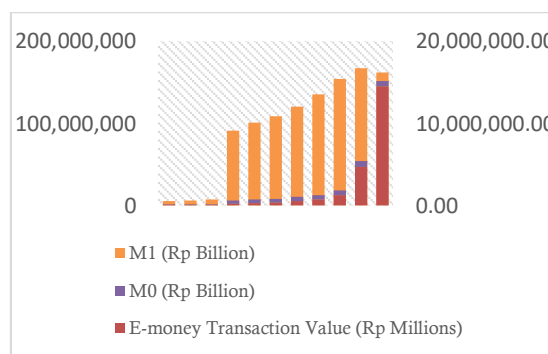


Figure 3. Development of Electronic Money Transactions (Million Rupiahs), Currency (Billion Rupiahs) and M1 (Billion Rupiahs)

Source: SEKI various editions, BI

Based on the results of the study, economic growth can have an impact on the demand for electronic money in a country. Besides, when viewed from how high the level of non-cash payment penetration, it cannot be separated from the development of telecommunications and transportations infrastructure that currently has released digital money products. The advantage of this digital payment can be seen from the amount of monetary nominal traded and free of additional costs when transacting. Moreover, there are security feature on electronic money that make people feel save when using e-money (Tee & Ong, 2016). The digital money user increased when Bank Indonesia started to

launched the Indonesian Standard Quick Response Code (QRIS), a system for all electronic money payment by only scanning QR codes. QRIS is available only at merchants who collaborated with non-cash payment system service providers. The implementation of the QRIS Payment System based on *Peraturan Anggota Dewan Gubernur Nomor 21/18 / PADG / 2019* concerning the Implementation of the National Quick Response Code Standard for Payment. QRIS is almost the same with an ATM Bersama, the potential benefits of electronic money expected to be able to create a more effective and efficient payment system also the achievement of a cashless society scheme in Indonesian society (Abidin, 2015).

The growth of non-cash payments has encouraged individuals to create several choices of transaction methods for shopping (Chatterjee & Rose, 2012). In this condition, people's behavior will be changed, if they were previously tended to transacting using cash then now they will use daring transaction method (Igamo & Falianty, 2018). These advantages encourage people to start gradually lessen their dependence on currency to start using e-money. This habit considered able to change the pattern of the society in transactions, so it does not rule out the possibility that the presence of non-cash payments in the future will be able to change or shift the culture of the society in transacting using cash to non-cash. This concept is in line with the research of Oyelami & Yinusa (2013), Igamo & Falianty (2018) that states non-cash transactions can substitute cash.

From the number of advantages that are obtained from using electronic money, people advised they should be more careful when using electronic money, such as the risk of loss or reduced balance in the account due to being hacked by irresponsible people. The case of hacking digital wallets in Indonesia in general according to IT observer Rudi Adiarto is more inclined in how hackers can access mobile phone numbers to find out the OTP code (One Time Password). This code is disposable security that is commonly used as a form of confirmation when conducting online transactions and other

digital banking activities (CNBCIndonesia.com, 2020).

Hidayati et al. (2006), in a BI study, stated that currently, there had been found yet the indicators of using in measuring the development of official non-cash payment instruments in Indonesia. However, it commonly found in several research studies analysing the development of non-cash payment methods through parameters of digital transaction volume, private consumption against M1, and the ratio of cash to M1. E-money has liquidity equal to cash, however Bank Indonesia didn't clarified yet the e-money fund group into whether M1 or M2 to this day (Putri & Prasetyo, 2019). Incorrect classification can cause formulation and implementation of monetary policy errors (S, L.I & Fauzie, 2014).

A comparison of ratio of digital money transactions value with the total population shown in Figure 4 as a form of non-cash transactions growth in Indonesia. There are proportion of the increment in the value of electronic money transactions along with the pace of Indonesia's population. Although there is still a great use of real money by people in Indonesia, but the use of digital payment methods has shown a significant increment in recent years. Those increment can be interpreted that currently, the public has received e-money as part of a transaction tool in Indonesia.

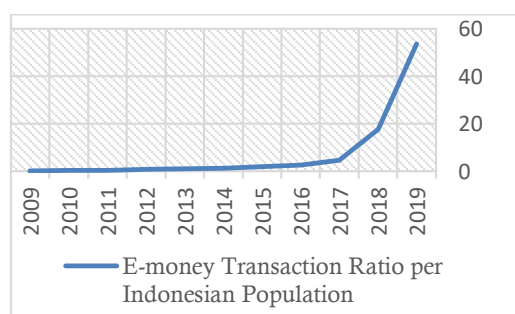


Figure 4. The Comparison of the Value of E-money Transactions with the Number of Population in Indonesia

Source: SEKI various editions, BI and Indonesia Urban Population 1960-2020, Macrotrends

The rising trend on economy growth along with the rapid technology advance inflict new

improvement in payment method in Indonesia, it is digital payment tool. The rapid growth of non-cash payment system due to development of technology make a huge impact for payment system sustainability in Indonesia, it also encourage people to shopping (Ramadhani & Oktor, 2019). The convenience in shopping using e-money will cause a decrease of requested money (Slozko & Pelo, 2014). The progress of non-cash payment methods in Indonesia shows an increasing trend but the growth has not been accompanied by a decrement in the demand for currency in the society, this is due to the high number of people in Indonesia who depend on cash transactions. All this time, Bank Indonesia has been striving to increase the use of non-cash payments to “the less cash society” in Indonesia so that an efficient payment system can materialized. This research is important because, with the increasing use of digital money, it is necessary to analyze determinants that influence the use of digital money.

RESEARCH METHODS

This research is using quantitative approach, the data are presented in the form of numbers and statistics. Hypothesis is a concept of research aims to identified, explained, and obtained empirical results or findings regarding the impact between variables object that have been hypothesized in this study. The secondary data used in this study consists of the digital transaction values, GDP, Inflation, BI Rate, and money supply. This research using data in the form of monthly time series from January 2009 to December 2019. Researcher was collecting the data through publications issued by the government, official pages of institutions (Bank Indonesia and BPS), and several journal articles.

The dependent variable in this study is the digital transaction values that stated in million rupiahs. Variable GDP, Inflation, BI Rate, and money supply as the independent variables. GDP (X1) and Money supply (X2) stated in billion rupiahs. Inflation (X3) used Month to Month (MtM) data, and BI Rate (X4) stated in terms of percentage. The study employed Error Correction Model (ECM) methodology to study the effect of

macro variables on digital transaction in the long and short, as well as analyzing the substitution of e-money to a currency based on regression elasticity result.

The regression used logarithmic form that aims to convert data that were initially non-stationer into normally distributed data. The Error Correction Model equation can be arranged when independent and dependent variables cointegrated in the same degree. The long-run equation model used in this study:

$$L_Em = \alpha_0 + \alpha_1 LPDB_t + \alpha_2 LM1_t + \alpha_3 Inf_t + \alpha_4 SB_t + \varepsilon_t \dots \dots \dots (1)$$

The short-run model formulation in this study:

$$D(L_Em) = \beta_0 + \beta_1 D(LPDB)_t + \beta_2 D(LM1)_t + \beta_3 D(Inf)_t + \beta_4 D(SB)_t + ECT(-1) + \varepsilon_t \dots \dots \dots (2)$$

Where α_0 & β_0 are Constanta; L (log) is logarithmic form of the equation for Y and X variables; EM represents the dependent variable (Y), while the independent variable (X) is represented by GDP, M1, Inf, and SB; D is a first form of difference in the short-run model; ε_t representing the residuals on the model; and ECT stands for error correction term.

The used of Error Correction Model *EG* considered appropriate to analyze data in the form of time series and spurious regression (Astuti & Saputro, 2018). Non-stationary data, in general, in the short-run, shows an imbalanced relations, but in the long-run, there is a tendency of a balanced relations (Widarjono, 2014). According to Widarjono (2014), the first step to find out if the data containing the unit roots is by using the Augmented-Dickey Fuller test. The ADF value compared with the critical value; if the ADF value is smaller than the critical value, so the data is not stationary and vice versa. The second step is followed by the Cointegration test aim to identify whether or not there is a long-run equilibrium correlation in the model that has been prepared. Gujarati & Porter (2010) argued that the classical assumption tests must be applied in a regression model.

The next step is testing the model by F test, Widarjono (2010) explained this test is intended to measure the correlation formed by the independent variable simultaneously on the dependent variable. Statistical T-Test by comparing T-statistics with T-tables is necessary in order to analyze the significance of all regression coefficients for the variable (Y) (Nachrowi & Usman, 2006). R square test is

needed to analyze whether the model could be explained the variation of the dependent variable (Y).

RESULTS AND DISCUSSION

Once the ECM-EG model was estimated, the short-run regression results can be seen in Table 1:

Table 1. Short-run Regression Results

Variable	Coefficient	T-statistics	Prob	Adjusted R square
D (LPDB)	-105.7775	-0.362487	0.7176	
D (LM1)	-8.501165	-1.427044	0.1561	
D (INF)	0.185892	0.641664	0.5223	
D (SB)	-0.823143	-1.009669	0.3146	
C	0.571707	0.439353	0.6612	0.389405
ECT (-1)	-0.747438	-8.688077	0.0000	
T-Table		1.65694		
F-Statistic		15.94365		

Sources: Processed Data

*Significant level (α) = 5%

The ECM model concluded valid when error correction sign (ECT) is negative and statistically significant (Widarjono, 2010). From Table 1, the ECT value is significant $\alpha = 5\%$ with a coefficient value of -0.747438, which means that the ECM model could correct imbalances of the short-run into the long-run balance of 74.7%. Furthermore, the long-run regression results can be seen in Table 2 below:

Based on the results, the GDP variable in the short-run has an insignificant negative response to the electronic money transactions in Indonesia; meanwhile, in the long-run, it has a significant positive response to the electronic money transactions in Indonesia. An increment in economic growth is one of the indications of the success and prosperity in a country. According to Todaro & Smith (2009), an increment in economic growth is possible or based on technological, institutional, and ideological advances towards various kinds of demands.

The shift in consumption patterns of today modern society requires the presence of supporting technology in facilitating the goods and services exchange. E-money is the result of innovative payment technology in order to support today's society's lifestyles. Currently, the form of electronic money consists of chip-based and server-based, in which server-based e-money products prevalent between people in Indonesia. With people applying Electronic money, it means there are advances in technology and information disclosure. Thus, it can be said that the more people use e-money in a country, it indicating that people in those country have enough income and they are very open to technology.

Suseco (2016) stated that electronic money will be used more when the economic growing. When it happened, then the society's transaction using electronic money will also growing as well. Beside, Suseco also stated that in the developed countries like Indonesia, e-money has positive and strong relation with

economies of scale. It means that e-money can grow bigger and bigger along with economic growth due to the increment of society's prosperity level and they are considered as people who have a good understanding in technology, therefore they can easily accept new payment method like electronic money also used them in

the daily life. There are potential broad market share in the developing countries that have low income to increase the number of electronic money users and boost non cash payment transaction. Consequently, electronic money have a good accretion in the developing countries.

Table 2. Long-run Regression Results

Variable	Coefficient	T-statistics	Prob	Adjusted R square
LPDB	41.26106	4,012,119	0,0001	
LM1	-13.81871	-2.94754	0.0038	
INF	0.132339	0.388004	0.6987	
SB	-0.212158	-1.15279	0.2512	0.534304
C	-3,529,343	-4.71128	0	
T-Table		1.65694		
F-Statistic		36.42751		

Sources: Processed Data
 *Significant level (α) = 5%

Sumolang, R. M (2015) stated that the demand for electronic money influenced by people's income; when their income increasing, people tends to increase their consumption patterns. Thus, it does not close the possibility that people will increase their electronic money accounts balance. According to Anugrah & Arianti (2017), per capita income, which shows a positive trend usually used as indicator in representing people's purchasing power and competitiveness, with their income increasing it encourages public to use electronic money. From these results, it can be conclude that in a row with the increment of economic growth accordingly it can stimulate enhancement on digital money transactions.

Money Supply variable in a short-run, the amount of the circulated money with the transaction using electronic money generate insignificant negative effect. The amount of circulated money has an insignificant effect on e-money in Indonesia. It may cause by the fact that payment transaction using e-money have not been widely practiced by people in Indonesia when they transact on their daily life and even though many people have started using electronic

money, cash is still a necessity that cannot be thrown away. Currently, E-money usage only limited to urban society where the supporting facilities for electronic money transactions are more adequate than in rural areas so that e-money usage was not quite maximum compared to cash usage. In an urban areas almost all of the merchants have been adopting non-cash payment method, however electronic money usage more widely used in transportation, as well as in e-commerce shopping. This habit pattern indicates that people in urban areas are far more advanced and have open minded in applying non-cash payment technology rather than people who lived in rural areas. Generally, people who lived in rural areas depend more on physical money in every transaction made because physical money tends to be more convincing than virtual money, in which people who lived in rural areas can receive physical or direct payment. Electronic money usage is also limited to certain groups, which in urban areas it is more dominated by the productive age group where the dominance of technology in their daily activities are strong, in contrast, in rural areas the dominance of technology is not that strong. People in there

generally have not been open-minded about technology advanced like digital payment especially the elderly.

In this time the system of economic focuses on a more efficient and effective economy, namely through the use of technology. To achieve those goals, the Less Cash Society (LCS) emerged, it is a movement to reduce the usage of cash so they will switch to use non-cash in transaction. The amount of circulated money basically is the amount of money that circulating in society in the form of currency, demands of deposits, and savings. However, in 2009, electronic money was first released in Indonesia marked by the issuance of Peraturan Bank Indonesia Nomor: 11/12 / PBI / 2009, concerning Electronic Money by Bank Indonesia. The appearance of electronic money indirectly resulted in the increment of the amount of electronic money transaction reaching 17 million transactions with transaction value up to 500 billion in 2009.

The data showed from 2007, both electronic money and circulating money increase continuously. They both not decreasing in each year till 2014. However, when we examined carefully, it can be seen that the increase in changes in the value of electronic money requests each year is greater than M1, except in 2013. In 2012, there was a decrease in changes in the quantity of money in circulation, though previously it increase continuously. Yet, this cannot directly state that the decrease in changes in the money supply that year is a factor that affects the increment in changes in demand for electronic money due to other factors aside from electronic money. Thus, it can be seen that the trend of the two variables is negative trend.

On long-run result, the amount of circulating money have a significant effect on electronic money, it indicates that the increment of digital money usage by people in Indonesia is due to the decrement in the amount of circulating money (M1). Considering that e-money is convenient, fast, and practical it facilitate people to transacting. The other factors affecting people strong interest in using electronic money is promotional appeal as well as various kind of

advantages they will get when using electronic money, aside from more fast and efficient, it is due to discounts and cashback. Those concept make people understand that encouraging electronic money usage can be done by reduce the circulating money in the society. Like Bank Indonesia Pekanbaru branch said, they have initiation to reduce the amount of circulating money in order to increasing electronic money usage. Theoretically, it is quite clear on how people will demand a number of electronic money and use it to transact when the amount of supply money decreased, so people can use their savings to transact with move their savings to their electronic money account.

Putri & Prasetyo (2019) stated that the increment in supply money showed the economic growth in a country. As the economy advances, the proportion of currency usage in circulation will decreased, then replaced by demands deposits. Technological developments in the payment sector have shifted the role of cash into a more efficient and economical non-cash payment. The decrement in paper and metal money usage shifted by digital money will give big encouragement in transaction (Suseco, 2016).

Inflation variable in the short and long term did not have a significant effect on electronic money transactions in Indonesia, and each coefficient is positive. Inflation is a situation where prices in market has increased continuously for a long time and occurs in all goods and services in general. Inflation can happened by various factors, such as the increment of society's consumption rate, excess liquidity in the market which triggers consumption or even speculation, including the outcome of goods' distribution obstructed. It also can be happened due to the amount of money in circulation have a bigger number than needed. Inflation is an economic symptoms that is difficult to be handled perfectly for usually they just can handle the inflation to the extent of reducing and restrain it. Therefore, inflation indicator become the hint of fruitfulness of macro policy in a country (Rukmana, 2016).

Inflation can have an impact on people's purchasing power. Changes in the inflation rate

in Indonesia are generally caused by changes in domestic prices in that period. Based on Bank Indonesia publication, inflation rate in 2014 recorded in the amount of 4.93% price increment in 2014, it can be seen in the increment of import commodity prices like automotive and electronic, it causes by the reduction of rupiah exchange rate in those year. In the end of 2014, inflation rate is so stable in the mid of the increment of subsidized BBM prices and fluctuation of volatile food. On the demand-side inflationary pressure is experiencing deceleration due to lower economic growth from 5.6% in 2013 to 5.0% in 2014. The impact of cost push pressure in 2015 considered relatively minimum compared to in 2013 and 2014. Inflation in 2015 is within the inflation target, which is 3.35% (yoy). Slowing inflation in 2015 in a row with the increment of relatively minimum input cost stemming from BBM prices and volatile food. The number of inflation in August 2019 recorded 0.12%. Year to date inflation rate in January up to August 2019 is 2.48% and yoy inflation rate in August 2019 is 3.94%. The increment in inflation was triggered by the rising in some of expenditure component index, it included consumption, water, electricity and fuel, health, education, also clothing needs which increased by an average of 0.2% to 1% as well as transportation, communication, and financial services. In the same year, the increment of society's consumption rate due to the domination of digital money use up to 188.31% annually in December 2019 resulted by dozens of promos and discounts provided by digital money organizers. Based on the long and short-run coefficients, although inflation is occurring, people still transacting using e-money. The number of consumption activities carried out by public are not disrupted because inflation is still considered low, and there is urge to fulfill their daily needs although more monetary nominal is required.

Yuwono (2017) said that the increment of e-money can stimulate inflation if the payment value exceeds or reduces the value of payment of the goods and services at a different places. Syarifuddin et al., (2017) also explained non-cash

payment usage will have a substitution effect. It causing the demand of currency decreased while M1 and M2 increased, then it will affected on rising prices. Moreover, because of the conveniences and practicality in transaction, indirectly people will increase their consumption on purchasing goods and services. Additionally, in e-money transaction, people didn't need to mind about the change money if they paid in the big amount of money. Bank Indonesia in monetary policy is intended to manage price pressure from the demand of relative aggregate on goods and services offers. Where the rate of the circulation money and labor greatly affects the rate of inflation and in e-money it affects the circulation of money.

Based on the study by Ramadhani & Oktora (2019) showed positive relation between inflation with non-cash transaction. The increment of inflation is possible when people tried to switch to cheaper goods and services in order to meet their daily needs with their income. Ramadhani also added, the increment of non-cash transaction in society could stimulate the increment of consumption rate, then it will causing an increment in demand on goods and services so it triggered inflation. The changes in non-cash payment method that are more concise and efficient have made people transact more using electronic money as the inflation rate increases.

Based on the results of the BI Rate variable identified that it has insignificant effect on the electronic money transactions in Indonesia in the short and long-run. Interest rate is an economic indicator that has direct impact on every economic activity related to saving, investment and consumption so that economists always able to monitor the movement on this variable. The movement of interest rates, both up and down, has an impact on the amount of money in circulation in society, which includes non-cash payments, demand deposits and currency (Lintangsari et al, 2018). This interest rates affects the individuals in determining the decision in bringing physical money or allocated them in securities assets. Keynes's theory stated that the demand for money have a negative

relation with the interest rates. The relationship between non-cash payment with the interest rates can be seen from the amount of money people's holding.

Referring to Hidayati et al (2006) which states that the balances in electronic money should have been classified as part of the money supply in a narrow sense (M1). Those statement pictured the similarity between electronic money and money so that Keynes's theory concept about the relation between interest rates and demand for money can be adopted. The increment in interest rates does not close the possibility for somebody to tried to decreased the amount of transaction balance or deposit the fund in their electronic money account, so that they tend to spend their funds on valuable assets, in contrary, if the interest rates decrease, those individuals would reduce their demands on securities by selling it and they would increase the amount of the transaction balance that is deposited in their account. The fact based on the result of the data analysis showed that the changes in the e-money variable didn't affected on the changes of interest rates. It is due to the concept of electronic money is only limited as direct payment media and not for investment, so that it have no relation with interest rates (Lintangsari et al, 2018). The absence of a relationship between interest rates and digital money keeps people at the level of consumption in the goods market and if there are an increment in interest rates, people will still tend to allocate their fund in the money market without reducing their consumption rate in the goods market using electronic money. From the data throughout 2009-2019, e-money increasing while interest rates fluctuating up and down every years. So, it can be conclude that e-money not affecting interest rates. Oyelami & Yinusa (2013) dan Ramadhani & Oktara (2019) on their research found that interest rates have a negative relation with electronic money.

Based on data processing's result, both in short and long-run, money supply variable has a negative relation with the amount of electronic money transactions. Considering that e-money is convenient, fast, and practical it facilitate people

to transacting. Moreover, the amount of money circulating in the community also increasing. The increment in the value of electronic money transactions has proven to be able to reduce the currency in circulation. This assumption is in line with the research of Hidayati et al. (2006) and Pramono et al. (2006) that states electronic money has a similar degree of nature with the currency, so it belongs to the M1 group.

The significant effect manifests the ability of electronic money to substitute cash using the indicator of the money supply (M1) with the amount of electronic money transactions can be seen from significant effect. The results show that e-money couldn't replace or reduce cash transactions in Indonesia in a short-run. Substitution effect can be seen in the result of long-run model that get a significant result on electronic money transactions (Em). The impact of the e-money substitution in a short-run cannot be seen yet because transactions that can be done by electronic money tend to be still small scale and the application of payment method that carried out by certain circles. The results of this study are in line with Sitorus (2006) and Snellman, Vesala, & Humphrey (2001). They suggest that the ability of electronic money to substitute cash in European countries still considered low because the development of electronic money is not as extensive as credit and debit cards. The same result was also stated by Hong (2009), who stated that in the short-run, electronic money has not been able to substitute cash. This substitution concept only limited in transactions method, overall e-money will not shift the existence of currency (Priyatama & Apriansah, 2010). Research that also analyzes the power of electronic money substitution conducted by Oyelami & Yinusa (2013), electronic money can substitute cash, while credit and debit cards considered as a complement of payment method.

Based on the results of the F test, the long and short-run models get a Prob (F-statistic) of 0.000000, where the value is less than 0.05. It means that GDP, Money Supply (M1), Inflation, and BI Rate simultaneously has a positive and significant effect on electronic money

transactions in Indonesia, especially in the period January 2009 - December 2019. The results of the coefficient of determination test on the short-run model seen from the Adjusted R-Squared value obtained 0.389405 which means the variable GDP, Money Supply (M1), Inflation and the BI Rate can explain the variable electronic money transactions by 38 percent, while the rest 61 percent is explained by other variables outside the model. While the long-run model, the Adjusted R-Squared value produces 0.471331, means that the GDP, JUB, Inflation, and BI Rate Interest Rates can affect the electronic money in Indonesia by 47.13 percent and the remaining 52.87 percent is influenced by other variables outside the model.

CONCLUSION

Based on the results of research conducted on the analysis of the influence of Gross Domestic Product, money supply (M1), Inflation, and BI Rate on electronic money transactions in Indonesia. The conclusion of the analysis can be described as follows: Gross Domestic Product (GDP) in the short-run model has insignificant negative effect. In contrast, the long-run model shows a significant positive effect on electronic money transactions in Indonesia. The results showed that the increment of income also accompanied by an increment in the electronic money transactions conducted by the public. The level of income of a certain person becomes a reference on how much this person level of consumption spending through electronic money transactions. Increasing consumption patterns can result a surge in demand for goods and services so that inflation can occur.

Inflation has an insignificant positive effect on electronic money transactions both in the short and long-run. It is due to the demands from people to keep supplying the necessities of life even though prices have increased, in this condition people still considers that the increment in the price of goods or services still affordable by their income. The result of short and long-run on interest rates have an insignificant negative effect on electronic money. Interest rates affect cash-handling, but due to the

limited application of electronic money payment methods, people still tend to allocate their funds to the money market without reducing consumption in the goods market.

The amount of money supply on the results of both the long and short-run models has a negative effect on electronic money transactions. These indicate that electronic money transactions contributing in reducing the amount of cash in circulation. Various kind of benefits obtained from using electronic money and instigation from surrounding environment have shifted the payment method from cash to non-cash by the public. Electronic payments have a positive impact, especially in developing countries like Indonesia, which means that electronic money transactions have the potential to grow in line with the macro variables. GDP, money supply, inflation, and interest rates simultaneously have a positive and significant impact on electronic money transactions in Indonesia, and these variables able to explain 38.94 percent in the short-run and 47.13 percent in the long-run.

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