The Effect of Non-cash Transactions on the Money Supply Indonesia (2009:Q1 – 2019:Q2)

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Abstract

This study explores and investigates the impacts of the volume of non-cash transactions through automated teller machine cards (atm), credit cards, and electronic money to money supply in Indonesia from 2009 quarter one to 2019 quarter two. This study uses secondary data obtained from Bank Indonesia. The analysis tool uses multiple linear regression. Secondary data used is quarterly data on money supply and the volume of transactions of atm debit cards, credit cards, and electronic transactions. The results showed that the volume of credit card and electronic money transactions positively and significantly determine the money supply. The money supply is more elastic in response to the change in the volume of the credit card transaction.

Keywords: non-cash transaction, money supply, money multiplier, autocorrelation
JEL : E4, E5, E6, C4

I. INTRODUCTION

Payment systems, economic transaction patterns, and money forms continue to change over time. The evolution of payment instruments began with gold coins and silver coins, then took the form of paper assets containing checks and currency, and now is an electronic or non-cash payment system [1]. According to Untoro and Widodo [2], technological developments in the field of information and communication provide support for innovations in electronic payments. There are two types of non-cash payments known to the public, namely prepaid cards and prepaid cash. Prepaid cards consist of debit cards via ATM, and credit cards. Prepaid cash is a transaction through the Internet communication network using information and communication technologies such as Integrated Circuits, Cryptography, and also communication networks.

Previous researches on the effect of non-cash transactions to money supply are conducted by Pramono et al. [3], Syarifuddin [4], Nirmala and Widodo [5], Venna and Anggoro [6], Lansody and Syarief [7], Nastiti et al. [8], and Ravi and Ritupana (2014)[9]. In previous studies, the variables most frequently used as variables that influenced the money supply were volume and values of non-cash transactions, Gross Domestic Product, interest rate, nominal exchange rates, and Consumer Price Index. While the tool's analysis that is often used in previous studies are panel data [6], regression analysis, cointegration, linear multiple regression [8], Error Correction Model [7], Vector Error Correction Model [3] [5] ; Vector Auto Regression [9][4].

The results of previous studies show there are two variations of conclusions. The first group succeeded in showing that there is a positive and significant influence of non-cash transactions on the money supply [3] [4] [5][6] [7] [8]. On the other hand, there is one study that has shown that there is no effect of non-cash transactions on the money supply [9]

This study will explore the effect of non-cash transactions on the money supply in Indonesia. This study will use the money supply as the dependent variable and the volume of debit, credit, and electronic money transactions as independent variables. The analysis tool will use multiple linear regression. There are two significant contributions of this paper. First, it will be revealed what kind of non-cash transaction variables which is dominantly influencing the money supply in Indonesia. Secondly, it will be uncovered what is the sensitivity of the change in money supply to the change in the kind of non-cash method variables.

Theoretical Background

The model to uncover the relationship between money supply (M) and the non-cash transaction in this study follow the work of Hunter and Kerr [10]. They introduced the non-fiat transaction using this equation.

$$Q=Qf+Qn \tag{1}$$

The equation revealed that total production is sold to society and paid using fiat money (Qf) and using non-fiat transactions (Qn). The link between production and money could be expressed in the equation, called the quantity equation [11] .

$$MV=PQ \tag{2}$$

Combining equation (1) and (2) and taking the rate of change of all the variables, it could be found the relationship between the rate of change in money supply and the variables which determine the change as bellow.

$$mf=-vf+f+Q-QnQf \tag{3}$$

The equation (3) shows the relationship between the growth rate of fiat money supply (mf), the velocity of fiat transaction (vf), fiat currency inflation rate (f), and the growth of fiat transaction which is determined by the real economic growth (Q) and non-fiat transaction growth. (ΔQn) .

II.LITERATURE REVIEW

In Hunter & Kerr's [10] model, the reduction in the change in the amount of money is determined by the change in the amount of fiat money and non-fiat money. Part of non-fiat money payments is payment by the non-cash method. From equation (3), it can be explained that non-cash transactions can affect the money supply from an increase in the transaction and precautionary demand for money, which in turn will affect GDP.

Research by Citradika et.al [12] shows that non-cash transactions among small and medium scale batik traders increase income through long-term customer service. Cichorska & Klimontowicz [13] observed that advances in technology caused transaction costs to be cheaper so that non-cash transactions increased, which in turn increased people's income. Munoz et.al [14] investigated the influence of technological and institutional advances in determining the choice of retail transactions method, especially in the Central and Eastern European Union. The increase in non-cash transactions encourages retail transactions and income.

Syarifuddin [4] observed the impact of increasing non-cash payments on the economy and the implications for monetary control in Indonesia. The results showed that non-cash payments would cause cash holding to decline, even though the demand for M1 and M2

increased. The increase in non-cash payments also resulted in a decrease in Bank Indonesia's interest rates, an increase in real GDP, and a decrease in the price level.

Nirmala and Widodo [5] discussed an increase in non-cash payments which results in a decrease in Bank Indonesia interest rates, an increase in real GDP, and a decrease in the price level, followed by a substitution effect and efficiency. Increased non-cash payments reduce transaction costs and the economy runs more efficiently. This research shows that cash holdings decrease, while M1 and M2 money stocks increase. An increase in non-cash payments also increases GDP growth and decreases prices.

Lansody and Syarief's [7], discussed the analysis of the impact of non-cash payments on the money supply in Indonesia. The dependent variable used in this study is the money supply in the narrow sense and the money supply in the broad sense. While the independent variable is a non-cash payment transaction. The results showed that non-cash transactions had a positive and significant effect on the money supply.

Nastiti et al. [8] claimed that from 2009 to 2016 the use of non-cash payment instruments every year always increased which indicated that non-cash payments had been received by the public. In this study, researchers not only discussed the effects of financial stability but also discussed the effect of non-cash payments on money supply, the velocity of money, interest rates and inflation. The results of the study revealed that debit cards and e-money transactions had a positive and significant effect on the money supply. If e-money influences the money supply, e-money should affect inflation and financial system stability. Credit card transactions have no significant effect on the money supply. Debit cards, credit cards, and e-money transactions did not significantly influence the velocity of money. E-money transactions and debit card transactions did not significantly influence interest rates. While credit card transactions had a positive and significant effect on interest rates.

Ravi and Rituparna [9] examine the dynamics of money circulation, the external sector and electronic transactions in India. In this study, it was concluded that electronic transactions in India did not affect the velocity of money. The volume of electronic transactions taking place in India did not adequately influence changes in the velocity of money. The external sector and interventions in India affect the velocity of money.

III. RESEARCH METHODOLOGY

The data used in this study is the quarterly time-series data, from the first quarter of 2009 to the second quarter of 2019 downloaded from the Bank Indonesia website, www.bi.go.id. The dependent variable in this study is the money supply M1 [15] [16], while the independent variable in this study is the volume of transactions of a debit card (VD) [17] credit card (VK) [18] and electronic money (VEM) [19]

Multiple regression analysis is employed in this study. The model is formulated as it is written in the equation (4).

$$M_t = \alpha_t + \beta_1 VD_t + \beta_2 VK_t + \beta_3 VEM_t + e_t \qquad (4)$$

Variable M represents the money supply which is measured by M_1. VD stands for the volume of the Debit Card transaction. VK denotes the volume of Credit Card transactions. VEM embodies for Volume for Electronic Money transactions. Notation of α, β_1, β_2, β_3 symbolizes constant and coefficient of the regression and e_t is an error term,
The tool of analysis used in this research is the Multiple Linear Regression. Eviews 8 was employed in data processing in this study. The econometrical and statistical tests done in this study are Stationary, Classical Assumptions, t, and F test.

IV. EMPIRICAL RESULT AND DISCUSSION

A stationarity Test is carried out to avoid the results of spurious regression. A data is said to be stationary if it meets the criteria that are if the average value and its variants are systematically not varied throughout the observation. In this study, the Philips-Pheron or PP test will be used [20].

Based on Table 1, it is found out that the variable money supply (M), debit card transaction (VD), credit card transaction (VK), and electronic money transaction (VEM) are stationary at zero degrees of integration level (0). Since all variables involved in the regression analysis are stationary at zero degrees of integration, so cointegration analysis could proceed [21]

Table 1: Phillips Perron Stationarity Test

Variable	T-stat Phillips Perron	Critical Value			Conclusion
		1 %	5 %	10 %	
M	4,788466	4,198503	3,523623	3,192902	Stationary
VD	4,217726	4,198503	3,523623	3,192902	Stationary
VK	3,779025	4,198503	3,523623	3,192902	Stationary
VEM	5,475059	4,198503	3,523623	3,192902	Stationary

Note: The sample period is spanned from 2001:01 to 2019:07

The multiple regression analysis of money supply (M) on debit card transaction (VD), credit card transaction (VK) and e-money transaction (VEM) could be reported in table 2.

Table 2: Multiple Regression Analysis on Money Supply (M)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-32935.98	95736.66	-0.344027	0.7327
VD	0.000484	9.92E-05	4.883909	0.0000
VK	0.007592	0.002889	2.628227	0.0123
VEM	2.93E-05	3.16E-05	0.925737	0.3604
R-squared	0.988481			
F-statistic	1086.979	Durbin-Watson stat		0.916207
Prob(F-statistic)	0.000000			

Note: The sample period is spanned from 2001:01 to 2019:07

After multiple regression on the cointegration model was proceeded, and classical assumption tests were done, it is found out that the cointegration model was heteroscedasticity free. The heteroscedasticity test was executed by the White test method. The autocorrelation test accomplished by the Breusch Godfrey method exposed that the

model suffered from auto-correlation. The autocorrelation problem has been treated, a new problem has come up. The estimation result suffered from a multicollinearity problem. Since there is a high correlation between variable debit card transaction and credit card transaction, and between debit card transaction and e-money transaction, so it was decided that the variable of credit card transaction was deleted from the model. The new model estimation could be presented in table 3.

From the estimation result, it could be concluded that credit card and e-money transactions positively significantly influenced the money supply in Indonesia. The money supply is more elastic in responding to the change in the increase of credit card transactions rather than to the change in e-money transactions.

Table 3: Estimation Coefficient Regression Free of Classical Violation Problems

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-182167.2	37504.88	-4.857159	0.0000
VKT	0.020271	0.001325	15.29613	0.0000
VEMT	0.000135	4.94E-05	2.722850	0.0097
R-squared	0.940354			
F-statistic	299.5465	Durbin-Watson stat		2.067829
Prob(F-statistic)	0.000000			

Note: The sample period is spanned from 2001:01 to 2019:07

The results of this study are following previous studies conducted by Pramono et all. [3], Syarifuddin [4], Nirmala and Widodo [5], Venna and Anggoro [6], Lansody and Syarief [7], which established that non-cash transaction affected money supply. In the long run, the development of credit cards and electronic money will certainly continue to increase the utilization of non-cash transactions due to technological advances in banking and increased demand for credit cards and electronic money to meet transaction needs. Credit cards and electronic money are in demand because they are more convenient. The existence of the use of non-cash transactions will certainly encourage spending and public demand for goods and services, and consecutively encourage the activities of the real sector but also promote inflation.

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V. CONCLUSION

The non-cash transaction which consists of credit card payment and e-money payments has a significant role in determining the money supply in Indonesia. The money supply is more elastic in responding to the change in the increase of credit card transactions rather than to the change in e-money transactions.

Since non-cash payment has a significant role in determining the money supply, so it potentially has the power to boost economic growth but also inflation. Since some of the e-money transaction does not go through the banking system, the government should have a strategy to control the potential destabilizing power of e-money transaction.

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