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Analysis of the Effect of Non-Cash Payments on the Velocity of Money in Indonesia

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Abstract

The purpose of this study is to analyze how the effect of non-cash payments on the Velocity of Money. This study used a quantitative approach and used multiple linear regression as the data analysis method. The population in this study is the territory of Indonesia, the sampling technique uses non-probability sampling with a type of saturated sampling technique. The secondary data used is a time series within a period of 14 years, the period 2009 to 2022 in annual form. The results of this study show that from the results of t Test, ATM/Debit Cards have a significant negative effect on the Velocity of Money. Credit Cards have a significant positive effect on the Velocity of Money. However, E-Money does not affect the Velocity of Money. Meanwhile, based on the F Test result, ATM/Debit Cards, Credit Cards, and E-Money simultaneously have a significant effect on the Velocity of Money at a confidence level of 93%. This research provides benefits for the government, society, and other institutions in the form of steps and attitudes that need to be taken to increase non-cash payment transaction value to increase the Velocity of Money in Indonesia.

Keywords: Velocity of Money, ATM/Debit Cards, Credit Cards, Electronic Money (E-Money), Multiple Linear Regression Analysis.

Introduction

When the payment mechanism is required to always accommodate every need of the community in terms of moving funds quickly, efficiently, and safely, payment technology innovations in Indonesia are increasingly emerging very rapidly and advanced. With the non-cash payment service, Bank Indonesia (BI) as the Monetary Authority has the authority to maintain a smooth payment system (Rahmawati et al., 2018) by always ensuring that every existing payment system must comply with applicable regulations.

Bank Indonesia divides electronic payment instruments into two forms, namely Card-Based Payment Instruments and Electronic Money (Sri Rahayu & Ris Yuwono Yudo Nugroho, 2020). Card-Based Payment Instruments are divided into ATM/Debit Cards and Credit Cards. Based on data from BI, shows a trend in the use of cashless payment systems that are increasingly in demand by the Indonesian people, this is reflected in ATM/Debit Cards, Credit Cards, and E-Money transaction values, which have continued to increase in each year from 2009 to 2019. However, in 2020, there was a decrease in ATM/Debit Card and Credit Card transaction values as a result of the emergence of the Coronavirus Disease of 2019 (COVID-19) Pandemic in Indonesia. which caused a sharp decline in people's economic activity, namely direct buying and selling transaction activities, due to the implementation of Large-Scale Social Restrictions (Bank Indonesia, 2021). The community then switched to digital economic and financial transaction activities using E-Money which makes it easier for people because they do not need to leave the house and use cash to prevent the spread of COVID-19.

During 2021, digital economic and financial transactions grew rapidly in line with increasing public acceptance and preference for online shopping, the expansion and convenience of digital payment systems, and the acceleration of digital banking (Bank Indonesia, 2022) as indicated by the increase in the value of E-Money transactions. The value of payment transactions using ATM/Debit Cards and Credit Cards also recorded an increase in line with the increase in community economic activity due to the decrease in the level of Community Activity Restrictions. In 2022, the value of E-Money transactions continues to grow followed by an increase in ATM/Debit Card and Credit Card transaction values.

The phenomenon of the COVID-19 pandemic, coupled with the development of science and technology on the cashless payment system, has made people accustomed and comfortable to continue using the cashless payment system because it has a high level of effectiveness and efficiency in carrying out the buying and selling transaction process. However, the ease of the non-cash payment system must be accompanied by a wise attitude in buying goods and services with a non-cash payment system against the available money. To measure the purchasing behavior of goods and services against available money, it can be calculated by the Velocity of Money (VoM). Based on data from Bank Indonesia, VoM speed in Indonesia was not stable enough from 2009 to 2022, up and down before and after the COVID-19 Pandemic. In 2020, it experienced a very drastic decrease in turnover by 2 times during the COVID-19 Pandemic.

Statement of the Problem

The BI study states that Card-Based Payment Instrument transactions and increased E-Money issuance will diminish the normal sum of cash circulating within the community, hence the speed of VoM. As evidenced by data from Bank Indonesia, in 2018 and 2022, when the transaction values of the three non-cash payment instruments increases, VoM also increased. Conversely, in 2020 when there was a decrease in ATM/Debit Card and Credit Card transaction values, VoM also decreased. However, in 2019 when there was an increase in transactions of the three non-cash payment instruments, VoM should have increased but instead decreased. And in 2020, when there was an increase in the value of E-Money transactions, VoM decreased. Likewise, when economic activity has begun to recover (in 2021), in fact, the increase in

transaction value of the three non-cash payment instruments does not accompany the increase in VoM. From the explanation above, the purpose of this study is to test how non-cash payments actually affect the Velocity of Money.

Literature Review

1. Money Quantity – Irving Fisher

Fisher introduced the quantity theory of money explaining the relationship between the money supply and changes in the value of money (Bima Savero Dewanto, 2022). According to this theory, if the economy is in equilibrium, then the money supply multiplied by its speed of circulation will be equal to the sum of all the value of goods transacted (Natsir, 2014). By stating the following equation:

$$MV = PY$$

Where

M = Money Supply
V = Velocity of Money
P = Pricing Tier
Y = Output

If Y indicates the amount of output and P indicates the price of one output unit, then the total output value is PY. In this equation, Y is the real GDP; P is the GDP deflator; and PY is the nominal GDP (Mankiw, 2009). The money supply used here is money supply in the narrow sense (M1) because the money in circulation is cash (currency and giral money).

2. Velocity of Money

According to (Glosarium Bank Indonesia, n.d.) Velocity of Money is the magnitude of the speed at which money flows in the economy; It is a way to measure national income compared to purchasing behavior by describing the relationship between money, purchases of goods, and services. Acceleration (V) is expressed most clearly as total expenditure (P x Y) divided by the money supply (M) as follows (Fisher in Gintting et al., 2018) :

$$V = \frac{PY}{M} \ or \ V = \frac{PDB}{M}$$

Where

V = Velocity of Money
P = Price Level (price index)
Y = Aggregate Output (finished goods)
M = Money Supply

According to Fisher (Gintting et al., 2018), acceleration is determined by the institutions in the economy that influence individuals to make transactions, if people use cashless payments to make their shopping transactions, as they do today, so that the use of money becomes less

when making purchases, then less money needed to make transactions is generated by nominal income (M decreases relative to P x Y), and acceleration (P x Y)/M will rise.

3. ATM/Debit Card

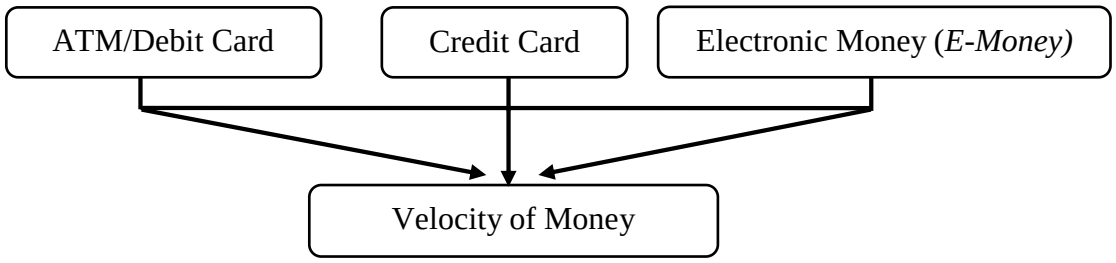
ATM/Debit Card is a payment instrument that can be used to make cash withdrawals and/or fund transfers by directly reducing cardholder deposits at banks or institutions other than banks authorized to collect funds following applicable laws and regulations so that the cardholder's obligations are fulfilled immediately (Sitorus, 2020). ATM/Debit is a combination payment card of ATM Cards and Debit Cards, so it has more functions than ordinary ATM cards, namely in addition to transacting at ATM machines can also be used to shop at shopping places.

4. Credit Card

Based on (Bank Indonesia, 2018), Credit Card is a Card-Based Payment Instruments that can be used to make payments for obligations arising from an economic activity, including shopping transactions and/or to make cash withdrawals, where the cardholder's payment obligations are fulfilled in advance by the acquirer or issuer, and the cardholder is obliged to make payments at the agreed time either by lump sum repayment (charge card) or by payment in installments.

5. Electronic Money (E-Money)

Electronic Money (E-Money) is a non-cash payment instrument where the amount of money value listed is by the amount of money value deposited in advance by the cardholder E-Money to the publisher (Prasetia, 2018). When used, the value of electronic money stored in the electronic media will be decrease by the transaction value and can then be topped up.



Charts 1. Research Model

Research Method

This study uses quantitative methods that emphasizes hypothesis testing, so that it can be used as a parameter of the influence of a variable on other variables and then can be concluded. The population used in this study is the territory of Indonesia. This data is obtained from the official website of Bank Indonesia (BI) namely *www.bi.go.id*, and the official website of the Central Statistics Agency, namely *www.bps.go.id*. The secondary data used is a time series within a period of 14 years (14 samples), the period 2009 to 2022 in annual form. In this study,

the Velocity of Money (Y) with a unit of turnover (times) calculated by dividing Nominal GDP by a narrow money supply (M1), while the three transaction values of ATM/Debit Cards (X_1), Credit Cards (X_2), Electronic Money (E-Money) (X_3) are in units of billion rupiah (Rp billion). The data of the four variables are converted into the form of natural Logarithms (Ln) so that the parameters can be interpreted as elasticity.

Data Analysis Technique

The data analysis method used is multiple linear regression to test the hypothesis, using IBM Statistical Product and Service Solution (SPSS) Statistics 27 for Windows. The formula of multiple linear regression is as follows:

$$\text{LnVoM} = \beta_0 + \text{LnDebit} + \text{LnKredit} + \text{LnEMoney}\beta_1 + \beta_2\beta_3\, e$$

To find out if the coefficients in the equation are linear (unbiased), namely by conducting a Classical Assumption Test consisting of a Normality Test, Heteroscedasticity Test, Autocorrelation Test, and Multicollinearity Test. In testing, regression must be free from classical assumptions so that the taking of F Test and t Test t is not biased. After that, it can be continued with hypothesis testing consisting of the Coefficient of Determination Test (R^2), t Test, and F Test.

Result

A. Classical Assumption Test

1. Normality Test

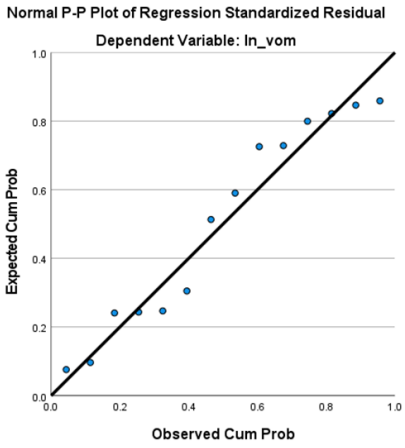


Figure 1. Normality Test
Source: *Output Result SPSS 27 (2023)*

The author uses the Normal Probability Plots (Normal P-P Plot) graph test. By *Figure 1.* above, it can be seen that the data points are already around or following the direction of their diagonal lines, then it can be concluded that the data is normally distributed.

2. Heteroscedasticity Test

			Unstandardized Residual
Spearman's rho	LN_Debit	Sig. (*2-tailed*)	.782
	LN_Credit	Sig. (*2-tailed*)	.935
	LN_EMoney	Sig. (*2-tailed*)	.714

Table 1. Heteroskedasticity Test
Source: *Output Result SPSS 27 (2023)*

By *Table 1*. above is the Spearman Rank Test results. It is known that the Sig. (2-tailed) value of each variable X, namely Ln ATM/Debit Card of 0,782, Ln Credit Card of 0,936, and Ln E-Money of 0,714. It is known that all Sig. (2-tailed) values in the three X variables are greater than 0,05, therefore, there is no sign of heteroscedasticity in the regression model and it can be concluded that the regression model is viable in this study.

3. Autocorrelation Test

Durbin-Watson
1.524

Table 2. Autocorrelation Test
Source: *Output Result SPSS 27 (2023)*

By *Table 2*. above, it can be seen that Durbin Watson (DW) has a value of 1,524. It is known that the value of DW Test 1,524 lies between the values of d_L i.e. 0,767, and a value of d_U amounted to 1,779. so it can be concluded that the regression model does not show any signs of autocorrelation.

4. Multicollinearity Test

	Collinearity Statistics	
	Tolerance	VIF
(*Constanta*)		
LN_Debit	.112	8.938
LN_Credit	.190	5.267
LN_EMoney	.347	2.884

Table 3. Multicollinearity Test
Source: *Output Result SPSS 27 (2023)*

In *Table 3*. above, it can be seen that the results of the Multicollinearity Test for tolerance values on Ln ATM/Debit Card is 0,112, Ln Credit Card is 0,190, and Ln E-Money is 0,347. Meanwhile, the VIF value of Ln ATM/Debit Card is 8,938, Ln Credit Card is 5,267, and Ln E-Money is 2,884. According to the results, every variable's tolerance value has reached > 0,1, and the VIF value of each variable < 10, it can be concluded that in this regression model, there are no symptoms of multicollinearity.

B. Test the hypothesis

1. Coefficient of Determination (R^2)

R	R *Square*	*Adjusted* R *Square*	Std. *Error of the Estimate*
.962a	.926	.904	.368

Table 4. Coefficient of Determination (R2)
Source: *Output Result SPSS 27 (2023)*

In *Table 4*. Above, known result for R Square value is 0,926 or 92,6% ≈ 93%. This means that the independent variable in this study was able to influence the dependent variable by 93%, while 7% was explained by other variables outside this study.

2. F Test

	Sum of Squares	Df	*Mean Square*	F	Sig
Regression	16.964	3	5.655	41.652	.000[b]
Residuals	1.358	10	.136		
Total	18.322	13			

Table 5. F Test
Source: *Output Result SPSS 27 (2023)*

By *Table 5*. above, known value of F_{count} = 41,652 > F_{table} = 3,71. Because the Sig. value of 0,000 < 0,05 is obtained, this means that there is a significant effect between the independent variables, namely ATM/Debit Card, Credit Card, and E-Money to the dependent variable i.e. the Velocity of Money simultaneously or together.

3. t Test

Type	t	Sig.
(Constant)	19.881	.000
LN_Debit	-5.606	.000
LN_Credit	4.973	.001
LN_EMoney	-1.509	.162

Table 6. t Test
Source: *Output Result SPSS 27 (2023)*

By *Table 6*. above, in decision making, namely by making a comparison between t_{table} and t_{count}. With the formula df = n – k = 14 – 4 = 10 with a significant alpha level of 0.05, the t_{table} value is 1,81246. t-Test results are as follows:

1. Ln ATM/Debit Card : t_{count} = -5,606 < t_{table} = 1,812 and significance value is 0,000 < 0,05. Therefore, ATM/Debit Cards have a significant negative effect on the Velocity of Money.
2. Ln Credit Card : t_{count} = 4,973 < t_{table} = 1,812 and significant value of 0,001 < 0,05. Then Credit Cards have a significant effect on the Velocity of Money.

3. Ln E-Money: t_{count} = -1,509 < t_{table} = 1,812 and significance value is 0,162 < 0,05. Then E-Money does not affect the Velocity of Money.

Discussion

Based on t Test result, ATM/Debit Cards have a significant negative effect on the Velocity of Money. As ATM/Debit Card's transaction value increase, the Velocity of Money decreases. This is according to Bank Indonesia's data, that the distribution of ATM/Debit Card transaction value consists of 4 types, namely Cash Transaction Value, Shopping Transaction Value, Intrabank Transfer Transaction Value, and Interbank Transfer Transaction Value. Data from BI shows that in the period 2009-2022, the smallest transaction value each year is the Shopping Transaction Value, while the largest is Cash Transaction Value, this means that people only use a little money in their ATM/Debit Cards for shopping transactions, but withdraw their money into cash through ATMs (M increases), so that GDP (P x Y) falls relative to M, then the acceleration (P x Y)/M will fall. This is in line with Irving Fisher's theory that if people use ATM/Debit Cards for shopping transactions, so that the use of money becomes less when making purchases, and then less money needed to make transactions is generated by nominal income (M decreases relative to P x Y), and acceleration (P x Y) / M will rise. The result of this study is in line with the result of the research from (Sanni et al., 2019), that ATM/Debit Cards have a negative and significant effect on money circulation in the long and short term.

According to the result of t Test, Credit Cards have a significant positive effect on the Velocity of Money. As Credit Card's transaction value increase, the Velocity of Money also shows an increase. This is according to Bank Indonesia's data, that the distribution of Credit Card transaction value consists of 2 types, namely Shopping Transaction Value and Cash Transaction Value. Data from BI shows that in the period 2009-2022, the largest transaction value each year is the Shopping Transaction Value, while the smallest is Cash Transaction Value, this means that people use their Credit Cards to transact shopping so that the use of money is reduced when making purchases (M decreases relative to P x Y), and acceleration (P x Y) / M will increase. The use of this Credit Card is identical to that used by the upper middle class who are usually compulsive and uncontrollable in making transactions, with a glamorous and excessive lifestyle will have a serious impact on changes in the increase in money circulation which means people's transaction activities in consuming also increase (Roy et al., 2021). This is in line with Irving Fisher's theory above. The result of this research is in line with the result of the research from (Anggraini & Agustin, 2022), that Credit Cards have a significant positive effect on the Velocity of Money, so increased use of Credit Cards can provide an increase in the Velocity of Money. According to them, with the modernization of society and coupled with the COVID-19 pandemic, the use of Credit Cards by the public has increased.

According to the result of t Test, E-Money does not significantly affect the Velocity of Money. Any increase in the value of Electronic Money transactions will not affect the Velocity of Money. This is based on Bank Indonesia's data, that the division of Electronic Money

transaction value consists of 6 types, namely Shopping Transaction Value, Electronic Money Transfer Transaction Value, Initial Transaction Value (first-time fill), Transaction Value Reload/Top Up, Electronic Money Cash Withdrawal Transaction Value, and Transaction Value Redeem. Data from BI shows that in the 2009-2022 period, the largest average transaction value each year is the Transaction Value Reload/Top Up, then the Value of Shopping Transactions, and the Value of Electronic Money Cash Withdrawal Transactions, this means that the community does top up not always make shopping transactions using the balance, but withdraw the balance into cash. The use of E-Money in Indonesia is experiencing a positive trend, but it is also possible that there are still many people who have not utilized this electronic money-based cashless payment instrument, and the use of electronic money is also still on a small transaction scale (Anggraini & Agustin, 2022). Moreover, the use of E-Money remains uneven among all people, and the lack of ability to understand technology, as well as the lack of ability to own these payment instruments. The result of this study is in line with the result of the research from (Gintting et al., 2018) that the nominal E-Money transaction does not have a significant influence on the velocity of money in Indonesia.

Conclusion

Along with the development of technology in the payment system, the use of ATM/Debit Cards, Credit Cards, and E-Money in Indonesia has a positive trend because it always increases every year, except during the COVID-19 pandemic where only E-Money has increased. Based on the test results and discussions described above, the ATM/Debit Card transaction values has a significant negative effect on the Velocity of Money. Furthermore, the value of Credit Card transactions has a significant positive effect on the Velocity of Money. However, the E-Money transaction values does not influence the Velocity of Money. Meanwhile, ATM/Debit Cards, Credit Cards, and E-Money simultaneously or together have a significant effect on the Velocity of Money.

Recommendations

The main objective of this study is to examine the analysis of the transaction value of ATM/Debit Cards, Credit Cards, and Electronic Money on the Velocity of Money in Indonesia. In the study's results, it turned out that only 92,6% of the Velocity of Money was caused by the individualistic variables in this study. It obviously shows that other factors influence the Velocity of Money and to explore a more in-depth analysis to gain a comprehensive understanding of the Velocity of Money, further research is needed. Therefore, this study recommends exploring the other 7,4% of factors that influence Velocity of Money. In addition, the extension of this research to stakeholders, government, and others will provide a clear indication of what complementary implementation of program activities and will increase the value of non-cash payment transactions to the velocity of Money circulation.

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