

## THE EFFECT OF NON-CASH PAYMENT TRANSACTIONS ON THE VELOCITY OF MONEY IN INDONESIA

Indah Nur Aeni<sup>1\*</sup>, Harya Kuncara Wiralaga<sup>2</sup>, Dicky Iranto<sup>3</sup>

<sup>1</sup>Economics Education Study Program, Faculty of Economics, Universitas Negeri Jakarta

<sup>2,3</sup>Lecturer at the Faculty of Economics, Universitas Negeri Jakarta

E-mail: <sup>1)</sup> [indahaeni998@gmail.com](mailto:indahaeni998@gmail.com)

### *Abstract*

*This study aims to examine the effect of non-cash payment transactions on velocity of money in Indonesia. Specifically, it investigates the impact of electronic money transactions, debit card transactions, credit card transactions, and the COVID-19 pandemic on velocity of money. The research adopts a quantitative approach and utilizes time series data from 2018 to 2021 obtained from the Bank Indonesia website. Multiple linear regression analysis is employed as the analytical technique. The findings reveal that electronic money transactions do not significantly affect velocity of money in Indonesia. Debit card transactions show a negative and significant impact, while credit card transactions do not show a significant effect. Furthermore, the COVID-19 pandemic has a negative and significant influence on the velocity of money in Indonesia. Simultaneously, all the independent variables have a significant effect on the velocity of money in Indonesia. The  $R^2$  testing indicates that the independent variables explain 85.94% of the variability in the velocity of money variable, while the remaining 14.06% is attributed to other factors beyond this study.*

**Keywords:** COVID-19 Pandemic, Credit Card Transactions, Debit Card Transactions, Electronic Money Transactions, Velocity of Money

### 1. INTRODUCTION

The Fourth Industrial Revolution has brought about significant advancements in information technology, particularly in the banking sector (Punagi & Fauzi, 2022). In response, Bank Indonesia has introduced an electronic money payment system to support the transition towards a non-cash or cashless society. With the widespread use of smartphones in both urban and rural areas, many individuals now prefer server-based electronic money as their primary payment method. This technology enables faster, easier, and safer transaction activities. Moreover, chip-based electronic money offers convenience when using public transportation or making purchases, allowing for multiple payments to be made quickly using a single card.

As the ease of making payments increases, transaction volumes rise accordingly. This increased consumptive behavior not only drives economic growth but also affects the velocity of money in Indonesia. In a briefing to provincial governments in Balikpapan, President Joko Widodo urged individuals to spend more to stimulate economic growth and maintain velocity of money in Indonesia (Damarjati, 2023). Notably, bank deposits in the country have reached up to 690 trillion rupiah (Yanwardhana, 2023). However, the outbreak of COVID-19 and the implementation of large-scale social restrictions (PPKM) from 2020 to 2022 have posed challenges to velocity of money in Indonesia. From 2010 to 2019, the velocity of money in the country exhibited a downward trend, contrary to the developments in the payment system. This discrepancy has the potential to disrupt

financial innovation and affect demand and velocity of money, as highlighted in central bank policies (Huljannah & Satria, 2021).

In formulating policies, Bank Indonesia relies on monetary quantities that serve as operational and final targets. Therefore, velocity of money must be stable and predictable. Innovations in the payment system within the financial market are believed to impact the stability of money flows. The condition of velocity of money in Indonesia before the crisis exhibited an increasing trend. However, during the crisis, it experienced a decline. Subsequently, after the crisis, velocity of money increased again in line with the improvement of economic conditions since 2002 (Pramono et al., 2006). According to Irving Fisher, institutions in the economy that affect people's transactional behavior are key factors in determining velocity of money. This can manifest through innovations in the payment system utilized (Mishkin, 2017).

In response to the advent of the Fourth Industrial Revolution, Bank Indonesia announced the National Non-Cash Movement (GNNT) program on August 14, 2014. The objective of this program is to raise public awareness about the safety, convenience, and efficiency of non-cash payments. Its aim is to foster a society that predominantly transacts through non-cash means, ultimately creating a cashless society (Haryati, 2021). In support of the realization of the National Non-Cash Movement, the Governor of Bank Indonesia officially launched the National Payment Gateway (NPG) card on May 3, 2018. The NPG card enables seamless interconnection in the payment system, enhances consumer protection, and increases overall efficiency. Additionally, on August 17, 2019, Bank Indonesia introduced the QR Code Indonesian Standard (QRIS), a standardized quick response code. This QR code is employed as a payment method in transactions involving server-based e-money applications, mobile banking, or electronic wallets. The implementation of QRIS facilitates the use of server-based electronic money (E-Money) (Ulfi, 2020).

Electronic money, both chip-based and server-based, is highly sought after by the public due to its convenience in facilitating non-cash transactions. The government has also mandated the use of electronic money for public transportation services such as Transjakarta, Commuterline, MRT, and LRT as part of the National Non-Cash Movement (GNNT). Cashless payments using electronic money are also required at toll roads, and many minimarkets provide facilities for electronic money payments. The graph below illustrates the growth of electronic money transactions.

According to data from Bank Indonesia, the volume and value of e-money transactions have consistently increased each year from 2011 to 2021. This indicates the successful implementation of the GNNT program, as people increasingly recognize the advantages of conducting payment transactions with e-money. Despite the COVID-19 pandemic in 2020, the use of electronic money/E-Money continued to rise, possibly because people prefer non-cash transactions.

However, electronic money has its drawbacks, particularly the existence of top-up fees imposed by various partners, with a maximum fee of IDR 1.500. If users top up their electronic money through the card issuer's payment channel, there is no fee for top-ups below IDR 200.000. However, a maximum fee of IDR 750 is charged for top-ups exceeding IDR 200.000. The effectiveness of these top-up fees is related to the fundamental function of money. Both electronic money and cash serve as legal and valid

mediums of exchange, and their substitutability should be seamless without any obstacles. The substitutability of the two forms of money requires value equivalence, meaning that the migration from cash to electronic money should not alter the purchasing power and value of the currency itself. However, top-up fees for electronic money represent a reduction in purchasing power because users have to pay more to obtain the same goods. This fee distorts the principle of value equivalence. If the principle of equivalence is not met, Grisham's law will inevitably come into effect, where “bad money drives out good money”. The development of electronic money may be hindered or even avoided, as people will prefer cash payments to some extent unless compelled otherwise (Kuncoro, 2020).

One of the non-cash payment systems available is the Payment Instruments Using Cards (APMK), which encompasses debit/ATM cards and credit cards. Debit/ATM cards are utilized for cash withdrawals at ATM machines or for bill payments through EDC machines. On the other hand, credit cards enable individuals to make payments or cash withdrawals with the bank bearing the payment obligations in advance, which can then be repaid in full or in installments according to agreed-upon terms (Kartikasari, 2017).

Debit cards and credit cards have gained popularity among many individuals for conducting payment transactions. The availability of EDC machines in shopping centers, minimarkets, restaurants, entertainment venues, and even healthcare facilities has facilitated the widespread use of these cards. For instance, the UNJ Primary Clinic, despite its modest size, has implemented non-cash payments in collaboration with Bank BNI and Bank Mandiri. Payments can be made using BNI and Mandiri debit cards, or other bank cards with an administration fee. In the event that a patient does not possess a debit card, payment can be made directly to Bank BNI or Bank Mandiri using the assigned code number provided by the Primary Clinic.

Bank Indonesia data from 2010 to 2022 indicates a consistent annual increase in the total volume and utilization of credit cards and debit cards. This signifies the successful implementation of the GNNT program, and reflects the growing trust in the advantages of conducting payment transactions with credit and debit cards, as well as the convenience provided by the National Payment Gateway (NPG) facility. However, in 2020, there was a decline in debit card and credit card transactions due to the decrease in purchasing power caused by the impact of COVID-19. This was exacerbated by widespread job losses and government policies enforcing Large-Scale Social Restrictions (PSBB) in several regions, resulting in the closure of many businesses, aside from those selling essential goods and medical supplies.

The findings of Permatasari (2020) research indicate that E-Money transactions have a negative effect on velocity of money in Indonesia, which aligns with the research conducted by Rahmaniar & Aryani (2021) on the negative impact of e-money transactions on velocity of money in Indonesia, Malaysia, and Singapore. Conversely, the study conducted by Lintang Sari, Hidayati, Purnamasari, Carolina, & Febranto (2018) reveals that e-money transactions have a negative and insignificant effect on velocity of money in Indonesia, while credit card transactions have a positive and insignificant effect on velocity of money in the country. However, Ginting, Djambak, & Mukhlis (2018) find that debit card transactions have a positive and insignificant effect on velocity of money in Indonesia, while credit cards have a negative and insignificant effect. Additionally,

Fauzukhaq, Prasetya, & Akbar (2019) suggest that the circulation of electronic money has a positive and significant impact on the velocity of money in Indonesia.

Based on the aforementioned background and previous research findings, this present study aims to delve deeper into the influence of non-cash payment transactions on velocity of money in Indonesia. With a specific focus on electronic money transactions, debit card transactions, credit card transactions, and the impact of the COVID-19 pandemic, this research seeks to provide a comprehensive analysis of their effects on velocity of money.

## **2. LITERATURE REVIEW**

### **2.1. Velocity of Money**

Velocity of Money represents the average number of times a unit of currency is used for transactions within a given period. It measures the speed at which money circulates in an economy and is often denoted as  $V$ . The concept of velocity of money is derived from the relationship between the money supply ( $M$ ) and the product of prices ( $P$ ) and real output ( $Y$ ), known as  $P \times Y$ . The product of prices and real output represents the aggregate nominal income or nominal GDP of an economy (Mishkin, 2017).

Bank Indonesia defines velocity of money rate as a measure of the average movement of money from one hand to another. It is calculated by comparing the ratio of income or GDP to the money supply ( $M$ ). This ratio provides insights into the velocity of money in the economy (Solikin & Suseno, 2002). Therefore, velocity of money reflects the average flow of money used for purchasing goods and services produced in the economy. It can be computed by dividing nominal GDP by the money supply.

### **2.2. Payment System**

A payment system encompasses a set of rules, institutions, and procedures that facilitate the transfer of funds to fulfill financial obligations arising from economic activities (Ambarini, 2015). This definition aligns with the concept of a payment system as defined in Bank Indonesia Regulation Number 23/11/PBI/2021 on National Payment System Standards, which refers to a method comprising rules, infrastructure, institutions, and procedures for the transfer of funds used for payment in transactional activities (Bank Indonesia Regulation Number 23/11/PBI/2021 on National Payment System Standards, 2021). The payment system comprises various instruments, banking procedures, and interbank fund transfer systems that ensure the velocity of money (CPSS, 2003). Thus, the payment system encompasses a collection of systems that govern payment methods in transactions.

There are two primary categories of payment instruments: cash payment instruments and non-cash payment instruments. Cash payment instruments include physical currency, such as banknotes and coins denominated in the local currency. On the other hand, non-cash payment instruments are provided by the banking system and include instruments like checks, promissory notes, debit notes, credit notes, and bank drafts for transfers. Non-cash transactions do not involve the use of physical currency but are conducted through interbank transfers or intra-bank transfers via the bank's internal network (Pramono et al., 2006). Notably, some examples of non-cash payment

instruments include electronic money and payment instruments using cards, which encompass debit cards, ATM cards, and credit cards as defined by Bank Indonesia.

### **2.3. Electronic Money**

According to BIS (1996), the definition of electronic money is a payment instrument product with stored value/prepaid, where the value of money is stored in an electronic device owned by the consumer. Consumers purchase the value of money that will be stored in their electronic devices, and the value of electronic money decreases when used for payment. Electronic money differs from debit and credit cards in that it requires online authorization and debits the consumer's bank account when used for payment. Electronic money encompasses prepaid cards, where the money's value is stored in a microprocessor chip on a plastic card, and prepaid electronic money products that utilize computer networks, storing the value of money in a software/application that has been installed. According to the supervisory institution under the World Bank, Lauer & Tarazi (2012), electronic money also holds the same meaning. It refers to an instrument of "stored value" issued upon receiving funds, with the value being electronically recorded and stored on computer devices, cell phones, or prepaid cards or chips. These serve as a means of payment and can be converted into cash.

### **2.4. Debit Card**

According to BIS (1996), a debit card is a card that allows the holder to make purchases directly charged to the account holder's funds. According to OJK (2018), a debit card is a payment instrument that uses a card issued by a bank. The debit card holder is a customer of the bank and possesses a savings/current account that is used for transactions at ATM machines or for shopping at various merchants equipped with Electronic Data Capture (EDC) machines. When the card is used for payment, it reduces the balance in the savings/current account owned by the debit card holder. Bank Indonesia provides a similar definition of debit cards as one of the Payment Instruments Using Cards (APMK) used for making payments related to economic activities, including shopping transactions. The cardholder's obligations are paid immediately by directly deducting the cardholder's deposits at banks/financial institutions authorized to collect funds, following the applicable regulations (DASP Bank Indonesia, n.d.).

### **2.5. Credit Card**

According to BIS (1996), a credit card is a card that indicates the holder has been granted credit. It enables the holder to make purchases and/or withdraw cash up to a predetermined limit. The credit granted can be settled in full at the end of a specified period or partially, with the remaining amount carried forward as extended credit. Interest is charged on the extended credit amount, and sometimes the cardholder incurs an annual fee.

Meanwhile, as per Bank Indonesia, a credit card is a card used for making payments, including shopping or cash withdrawals. The key difference from debit cards is that the obligations of the credit card holder are initially paid by the bank or financial institution. Subsequently, the cardholder repays the bank according to the agreed terms, either in full or in installments, at a predetermined time (DASP Bank Indonesia, n.d.).

## 2.6. COVID 19 Pandemic

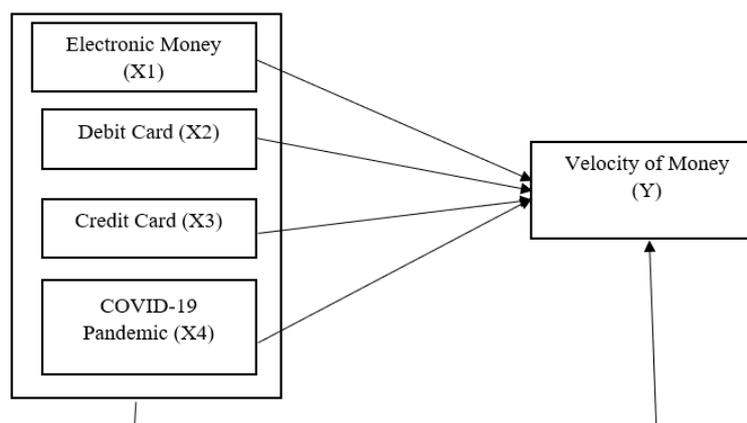
COVID-19, as defined by the World Health Organization (WHO), is a newly identified infectious disease caused by the coronavirus. It was first discovered in the city of Wuhan in December 2019 and subsequently spread to various countries worldwide. The COVID-19 pandemic struck Indonesia in early 2020 and quickly spread across the nation and beyond. The global impact of the pandemic has been significant, causing severe disruptions to economies around the world. Many countries implemented regional restrictions and measures such as the implementation of Large-Scale Social Restrictions (PPKM) in Indonesia, resulting in the disruption of economic activities.

The COVID-19 pandemic has had a profound effect on various sectors of the economy. The closure of many factories and businesses has led to a surge in layoffs, causing a decline in employment rates. Reduced sales turnovers and production levels have resulted in decreased income and salaries for individuals. As a consequence, people's purchasing power has diminished, leading to a reduction in economic transaction activities (Suryati et al., 2021).

## 2.7. Theoretical Framework and Hypothesis Development

Non-cash payment systems, such as electronic money, debit cards, and credit cards, share similarities with cash payments in that they serve as means of payment for goods and services. However, the key difference lies in the fact that electronic money, debit cards, and credit cards eliminate the need for physical cash, making transactions more effective and efficient.

This research aims to investigate the impact of electronic money, debit cards, credit cards, and the COVID-19 pandemic on the velocity of money in Indonesia. Drawing upon relevant theories and prior research, it is recognized that institutional factors play a significant role in shaping transactional behavior within an economy, particularly in relation to the payment systems utilized. Building upon this understanding, the proposed model for this research is as follows:



**Figure 1. Research Model**  
Source: processed by the author

## **2.8. Hypothesis**

Based on theory and relevant research, the following hypotheses can be proposed:

1. Electronic money transactions have a negative impact on the velocity of money.
2. Debit card transactions have a negative impact on the velocity of money.
3. Credit card transactions have a positive impact on the velocity of money.
4. The COVID-19 pandemic has a negative impact on the velocity of money.
5. Electronic money transactions, debit card transactions, credit card transactions, and the COVID-19 pandemic simultaneously affect the velocity of money.

## **3. RESEARCH METHODS**

The present study focuses on examining the influence of non-cash transactions on the velocity of money in Indonesia. The unit of analysis is the effect of these transactions on the velocity of money. The dependent variable is the velocity of money, while the independent variables include electronic money, debit card transactions, credit card transactions, and a dummy variable representing the COVID-19 pandemic.

The data used in this study are secondary data obtained from the Bank Indonesia website. Time series data from January 2018 to December 2021 are collected for the value of electronic money transactions, debit card transactions, credit card transactions, and the COVID-19 pandemic. The velocity of money is calculated by dividing the nominal GDP by the money supply.

To analyze the data, multiple linear regression analysis is utilized using the Eviews software. This method allows for the examination of a dependent variable influenced by multiple independent variables (Basuki, 2017). In this study, the regression model used is as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where:

V = Velocity of money

$\alpha$  = Constant

$\beta$  = Regression Coefficient

X1 = Electronic money transactions

X2 = Debit card transactions

X3 = Credit card transactions

X4 = COVID-19 pandemic (dummy variable)

e = Error term

## 4. RESULTS AND DISCUSSION

### 4.1. Research Result

#### 4.1.1. Data Description

This study examines the relationship between four independent variables - electronic money, debit cards, credit cards, and the COVID-19 pandemic - and one dependent variable, namely the velocity of money in Indonesia. The data used in this analysis includes the value of electronic money transactions, debit card transactions, and credit card transactions from January 2018 to December 2021. Additionally, the data for the velocity of money is obtained from the nominal GDP, which has been interpolated to monthly data, and the money supply over the same period. All data sources are retrieved from the Bank Indonesia website.

To ensure comparability and consistency, data transformation techniques are applied to the variables of electronic money transactions, debit card transactions, and credit card transactions. These variables are logarithmically transformed to equalize units and improve the statistical analysis.

#### 4.1.2. Classic Assumption Test

The multiple linear regression model can be considered a good model if it satisfies the classical assumption tests. These assumptions are essential for ensuring the validity and reliability of the regression analysis results.

##### 1) Multicollinearity

The multicollinearity test is used to determine whether there is a relationship between the independent variables by examining the Variance Inflation Factor (VIF) values. If the VIF value is greater than 10, it indicates symptoms of multicollinearity, while a VIF value less than 10 suggests no significant multicollinearity. Multicollinearity refers to the phenomenon where independent variables are highly correlated with each other in multiple linear regression.

**Table 1. Multicollinearity Test Results**

Variance Inflation Factors

Date: 05/21/23 Time: 10:32

Sample: 2018M01 2021M12

Included observations: 48

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.306216	26643.08	NA
LOGUE	4.77E-05	445.8084	2.553859
LOGKD	0.003186	48698.25	2.764670
LOGKK	0.000769	6836.038	2.135142
C19	8.90E-05	3.388826	1.906215

Source: Results of Eviews data processing

According to the results of the multicollinearity test table, all variables exhibit VIF values below 10 in the Centered VIF column. This suggests the absence of

multicollinearity symptoms, confirming that the assumption of no multicollinearity is met.

## 2) Heteroscedasticity

Heteroscedasticity is a test conducted to determine whether the relationship between residuals and predicted values follows a linear pattern or exhibits a different pattern. In this study, the heteroscedasticity test is performed using the Harvey test. The presence of heteroscedasticity can be identified by examining the probability value on obs R squared. If the probability value is less than 0.05 ( $\alpha = 0.05$ ), it indicates the presence of heteroscedasticity symptoms. Conversely, if the probability value is greater than 0.05 ( $\alpha = 0.05$ ), it suggests the absence of heteroscedasticity symptoms.

**Table 2. Heteroscedasticity Test Results**

Heteroskedasticity Test: Harvey

F-statistic	1.173328	Prob. F(4,43)	0.3360
Obs*R-squared	4.723491	Prob. Chi-Square(4)	0.3169
Scaled explained SS	5.642785	Prob. Chi-Square(4)	0.2275

Source: Results of Eviews data processing

According to the table of heteroscedasticity test results, the probability value on obs R squared is 0.3169, which exceeds the significance level of 0.05. Hence, the estimation model is not affected by heteroscedasticity.

## 3) Autocorrelation

The autocorrelation test is conducted to assess the presence of a relationship between residual observations. The test examines the probability value on obs R squared in the LM Test. If the probability value exceeds 0.05 ( $\alpha = 0.05$ ), there are no symptoms of autocorrelation. Conversely, if the probability value is below 0.05 ( $\alpha = 0.05$ ), it indicates the presence of autocorrelation symptoms.

**Table 3. Autocorrelation Test Results**

Breusch-Godfrey Serial Correlation LM Test:

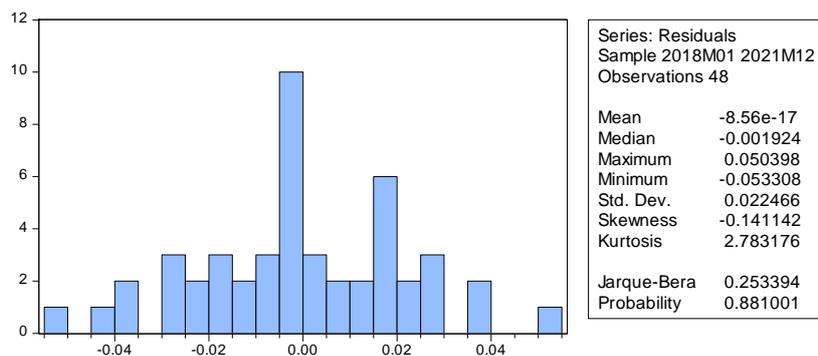
F-statistic	1.298986	Prob. F(2,41)	0.2838
Obs*R-squared	2.860286	Prob. Chi-Square(2)	0.2393

Source: Results of Eviews data processing

Based on the results of the autocorrelation test, the probability value on obs R squared is 0.2393, indicating that it is greater than the significance level of 0.05 ( $\alpha = 0.05$ ). Therefore, there are no symptoms of autocorrelation in the estimation model.

4) Normality

The normality test is used to determine whether the data follows a normal distribution or not. This can be observed through the probability value on the Jarque-Bera test. If the probability value on the Jarque-Bera test is greater than 0.05 ( $\alpha = 0.05$ ), the data is normally distributed. However, if the probability value is less than 0.05 ( $\alpha = 0.05$ ), the data is not normally distributed.



**Figure 2. Normality Test Results**  
Source: Results of Eviews data processing

Based on the normality test results, the probability value obtained from the Jarque-Bera test is 0.881001, which is greater than the significance level of 0.05. This indicates that the data in this study is normally distributed.

4.1.3. Multiple Linear Regression Model

This study uses multiple linear regression analysis. The following is the multiple linear regression equation model:

**Table 4. Multiple Linear Regression Test Results**

Dependent Variable: PU  
Method: Least Squares  
Date: 05/21/23 Time: 13:52  
Sample: 2018M01 2021M12  
Included observations: 48

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.149611	0.553368	3.884599	0.0003
LOGUE	-0.008129	0.006908	-1.176763	0.2458
LOGKD	-0.115078	0.056443	-2.038826	0.0476
LOGKK	0.039898	0.027731	1.438783	0.1575
C19	-0.086755	0.009435	-9.194690	0.0000

R-squared	0.859451	Mean dependent var	0.905625
Adjusted R-squared	0.846376	S.D. dependent var	0.059926
S.E. of regression	0.023488	Akaike info criterion	-4.566340
Sum squared resid	0.023722	Schwarz criterion	-4.371423
Log likelihood	114.5922	Hannan-Quinn criter.	-4.492681
F-statistic	65.73566	Durbin-Watson stat	1.608806
Prob(F-statistic)	0.000000		

Source: Results of Eviews data processing

Based on table 4 above, the results of the multiple linear regression equation are obtained as follows:

$$PU = 2.149611 - 0.008129 UE - 0.115078 KD + 0.039898 KK - 0.086755 C19$$

Based on the results of the multiple linear regression equation provided above, it can be observed that the constant value is 2.149611. This indicates that when the values of all independent variables are set to 0, the velocity of money is estimated to be 2.149611. Moving on to the coefficients of the independent variables, the first variable (X1), representing the value of electronic money transactions, has a coefficient of -0.008129. This suggests that a 1% increase in electronic money transactions is associated with a decrease in the velocity of money by 0.008129, and vice versa. Similarly, the second variable (X2), which represents the value of debit card transactions, has a coefficient of -0.115078. This implies that a 1% increase in debit card transactions is linked to a decrease in the velocity of money by 0.115078, and vice versa. On the other hand, the third variable (X3), representing the value of credit card transactions, has a coefficient of 0.039898. This indicates that a 1% increase in credit card transactions is associated with an increase in the velocity of money by 0.039898, and vice versa. Lastly, the fourth variable (X4), representing the impact of the COVID-19 pandemic, has a coefficient of -0.086755. This implies that during the COVID-19 pandemic, there is a decrease in the velocity of money by 0.086755, and vice versa.

#### **4.1.4. t-Statistics Test**

The t-Statistic test is conducted to assess whether each independent variable has a significant or insignificant impact on the dependent variable. The significance of each independent variable can be determined by examining the corresponding probability value in Table 4 of the multiple linear regression results. If the probability value is less than 0.05 ( $\alpha = 0.05$ ), then the independent variable is considered to have a significant effect on the dependent variable. Conversely, if the probability value is greater than 0.05 ( $\alpha = 0.05$ ), then the independent variable is considered to have no significant effect on the dependent variable. Referring to Table 4 of the multiple linear regression results, we can assess the significance of each independent variable.

a) **The Effect of Electronic Money Transactions on Velocity of Money**

The probability value for electronic money transactions, as seen in Table 4, is 0.2458, which is greater than 0.05. Therefore, the null hypothesis (H0) is accepted, and the alternative hypothesis (H1) is rejected. This suggests that electronic money transactions have no significant effect on the velocity of money.

b) **The Effect of Debit Card Transactions on Velocity of Money**

The probability value for debit card transactions, as observed in Table 4, is 0.0476, which is less than 0.05. Hence, H0 is rejected, and H1 is accepted, indicating that debit card transactions have a significant effect on the velocity of money.

c) **The Effect of Credit Card Transactions on Velocity of Money**

The probability value for credit card transactions, as shown in Table 4, is 0.1575, which is greater than 0.05. Thus, H0 is accepted, and H1 is rejected, suggesting that credit card transactions have no significant effect on the velocity of money.

d) **The Effect of the COVID-19 Pandemic on Velocity of Money**

The probability value for the COVID-19 pandemic, as seen in Table 4, is 0.0000, which is less than 0.05. Therefore, H<sub>0</sub> is rejected, and H<sub>1</sub> is accepted, indicating that the COVID-19 pandemic has a significant effect on the velocity of money.

#### 4.1.5. Statistical F Test

The statistical F test is conducted to determine whether the independent variables have a significant effect on the dependent variable simultaneously. This can be observed from Table 4, specifically the probability value of the F statistic. If the probability value is less than 0.05 ( $\alpha = 0.05$ ), it indicates that the independent variables have a significant effect on the dependent variable simultaneously. Conversely, if the probability value is greater than 0.05 ( $\alpha = 0.05$ ), it suggests that the independent variables do not have a significant effect on the dependent variable simultaneously.

##### a) The Effect of Electronic Money Transactions, Debit Card Transactions, Credit Card Transactions, and the COVID-19 Pandemic on Velocity of Money

Based on Table 4, the probability value of the F statistic is 0.000000. Therefore, the null hypothesis (H<sub>0</sub>) is rejected, and the alternative hypothesis (H<sub>1</sub>) is accepted. This indicates that electronic money transactions, debit card transactions, credit card transactions, and the COVID-19 pandemic have a significant effect on the velocity of money simultaneously.

#### 4.1.6. Coefficient of Determination (R<sup>2</sup>)

The coefficient of determination (R<sup>2</sup>) can be seen through Table 4, where the R squared value is recorded as 0.85945. This means that approximately 85.94% of the variation in the velocity of money can be explained by the independent variables, namely electronic money transactions, debit card transactions, credit card transactions, and the COVID-19 pandemic. The remaining 14.06% is attributed to other variables not included in the analysis.

## 4.2. Discussion

### 4.2.1 The Effect of Electronic Money Transactions on Velocity of Money in Indonesia

The results from the multiple linear regression analysis presented in Table 4 indicate that electronic money transactions do not have a significant effect on the velocity of money in Indonesia. This conclusion is supported by the t-statistic test, where the probability value is found to be 0.2458, which is greater than the predetermined significance level of 0.05.

Similar findings are evident in previous research. Lukmanulhakim, Djambak, & Yusuf (2016) conducted a study covering the period from 2010 to 2014, and their results also showed that electronic money transactions had no significant effect on the velocity of money, with a probability value of 0.1033. Additionally, Huljannah & Satria (2021), in their research spanning from 2016 to 2020, and Lintang Sari et al. (2018), analyzing data from 2009 to 2017, found no significant relationship between e-money and the velocity of money in Indonesia.

Moreover, referring to Table 4, we observe that electronic money transactions contribute only a small proportion to the overall transactions, accounting for less than

10%. This limited contribution could be attributed to the relatively recent emergence of electronic money and the uneven spread of technological advancements across different regions in Indonesia. Furthermore, the usage patterns of individuals in each region differ, resulting in a predominantly urban adoption of electronic money. Additionally, the coefficient value obtained from the analysis is relatively small, with a value of 0.008129. Consequently, changes in electronic money transactions are unlikely to have a significant impact on the velocity of money.

Fisher's view suggests that the influence of technological and institutional factors on the velocity of money evolves gradually over time (Mishkin, 2017). Therefore, the lack of a significant effect of electronic money on the velocity of money in Indonesia can be attributed to the gradual nature of its impact and the current stage of development and adoption of electronic payment systems in the country.

#### **4.2.2 The Effect of Debit Card Transactions on Velocity of Money in Indonesia**

According to the results obtained from the multiple linear regression analysis presented in Table 4, debit card transactions have a significant effect on the velocity of money in Indonesia. The probability value of 0.0476 is less than the predetermined significance level of 0.05, indicating a significant relationship between debit card transactions and the velocity of money. The coefficient value of -0.115078 suggests a negative direction of the relationship, meaning that a 1% increase in debit card transactions leads to a 0.115078 decrease in the velocity of money, and vice versa.

This finding aligns with Irving Fisher's theory, which posits that the use of payment methods such as cash, checks, and debit cards (all forms of money) results in a higher generation of money for a given level of nominal income. Consequently, the velocity of money decreases (Mishkin, 2017). Therefore, the significant and negative effect of debit card transactions on the velocity of money in Indonesia is consistent with Fisher's theory. A similar conclusion was reached by Huljannah & Satria (2021) in their study covering the period from 2016 to 2020, which found a negative and significant relationship between debit card transactions and the velocity of money in Indonesia.

Bank Indonesia data reveals that debit card transactions account for a larger percentage (ranging from 30% to 40%) compared to credit card and electronic money transactions. This dominance of debit card transactions in economic activities indicates a higher frequency of debit card usage by individuals. Furthermore, within the total value of debit card transactions recorded from 2018 to 2021, cash withdrawals by debit card owners represent the highest portion. Debit cards serve two functions: payment and cash withdrawal. With the convenience of low or even zero fees for cash withdrawals at ATMs, debit card owners are incentivized to withdraw cash more frequently. The lower fees charged by banks for these transactions contribute to a decrease in the velocity of money (David et al., 2016).

#### **4.2.3 The Effect of Credit Card Transactions on Velocity of Money in Indonesia**

The results of the test conducted through multiple linear regression indicate that credit card transactions do not have a significant effect on the velocity of money in Indonesia, as evidenced by a probability value of 0.1575 > 0.05. These findings are consistent with previous research conducted by Huljannah & Satria (2021) from 2016-

2020, Lukmanulhakim et al. (2016) from 2010-2014, and Lintang Sari et al. (2018) from 2009-2017, which all concluded that credit card transactions have no significant effect on the velocity of money in Indonesia.

According to Bank Indonesia data, the number of credit card transactions remains relatively small, accounting for less than 10% of total transactions. Furthermore, the growth rate of credit card transactions appears to be stagnating. These figures indicate that the usage of credit cards in public transactions is not widespread. This observation aligns with the test results, which reveal a relatively small coefficient value of 0.039898 for credit card transactions. Consequently, changes in credit card transactions do not have a significant effect on the velocity of money. Moreover, the uneven distribution of technological advancements across Indonesia and the varying habits of individuals in different regions contribute to credit card transactions being primarily concentrated in major cities.

Irving Fisher stated that the impact of technological and institutional aspects on the economy influences the velocity of money gradually over time (Mishkin, 2017). Therefore, the lack of a significant effect of credit card transactions on the velocity of money in Indonesia can be attributed to these factors.

#### **4.2.4 The Effect of the COVID-19 Pandemic on Velocity of Money in Indonesia**

The results of the multiple linear regression analysis indicate that the COVID-19 pandemic has a significant effect on the velocity of money in Indonesia. The probability value of 0.0000 is less than the predetermined significance level of 0.05. The relationship between the COVID-19 variable and the velocity of money is negative, as evidenced by the coefficient value of -0.086755. This implies that during the COVID-19 pandemic, the velocity of money decreases by 0.086755, and vice versa when not in a pandemic condition, the velocity of money increases by 0.086755. The economic disruptions caused by regional restrictions and activities such as the PPKM have contributed to this effect. Factory closures, layoffs, reduced incomes, and decreased purchasing power have led to a decline in economic activities and subsequently a decrease in the velocity of money (Suryati et al., 2021).

#### **4.2.5 The Effect of Electronic Money Transactions, Debit Card Transactions, Credit Card Transactions, and the COVID-19 Pandemic on Velocity of Money in Indonesia**

The results of the multiple linear regression analysis, as shown in Table 4, reveal that electronic money transactions, debit card transactions, credit card transactions, and the COVID-19 pandemic simultaneously have a significant effect on the velocity of money in Indonesia. This is supported by the static F test, where the probability value of the F statistic is 0.000000, which is less than the significance level of 0.05. Hence, all these factors, when considered together, contribute significantly to the changes in the velocity of money in Indonesia.

## 5. CONCLUSION

The research focused on examining the impact of electronic money transactions, debit card transactions, credit card transactions, and the COVID-19 pandemic on the velocity of money in Indonesia. Based on the tests and analyses conducted, several conclusions can be drawn:

1. Partially, electronic money transactions do not have a significant effect on the velocity of money in Indonesia. The coefficient value of electronic money transactions is  $-0.008129$ , with a probability value of  $0.2458 > 0.05$  ( $\alpha = 0.05$ ).
2. Partially, debit card transactions have a negative and significant effect on the velocity of money in Indonesia. The coefficient value of debit card transactions is  $-0.115078$ , with a probability value of  $0.0476 < 0.05$  ( $\alpha = 0.05$ ).
3. Partially, credit card transactions do not have a significant effect on the velocity of money in Indonesia. The coefficient value of credit card transactions is  $0.039898$ , with a probability value of  $0.1575 > 0.05$  ( $\alpha = 0.05$ ).
4. Partially, the COVID-19 pandemic has a negative and significant effect on the velocity of money in Indonesia. The coefficient value of the COVID-19 pandemic is  $-0.086755$ , with a probability value of  $0.00000 < 0.05$  ( $\alpha = 0.05$ ).
5. Simultaneously, when all factors - electronic money transactions, debit card transactions, credit card transactions, and the COVID-19 pandemic - are considered together, they collectively have a significant effect on the velocity of money in Indonesia. This is indicated by the probability value of the F statistic, which is  $0.000000 < 0.05$  ( $\alpha = 0.05$ ).

The study encountered certain limitations and obstacles. Firstly, the data on the velocity of money was not readily available and needed to be calculated. Additionally, nominal GDP data was not available on a monthly basis, requiring interpolation for monthly data. Future researchers interested in studying the velocity of money can consider incorporating other variables using the latest data and phenomena in society. It would also be valuable to conduct research on a provincial or regional level, although currently, money supply data for such granularity is not available. Future researchers could focus their investigations on major cities, where the more advanced technological infrastructure and behavioral habits of the community may lead to higher percentages of non-cash transactions and consequently have a significant impact on the velocity of money in Indonesia.

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