

Research article

Revealing the Impact of Electronic Money and Economic Factors on the Velocity of Money in Indonesia

Viony Margaretha*, Setyo Tri Wahyudi

Department of Economics, Faculty of Economics and Business, Brawijaya University, Indonesia

* Corresponding author email: vionymargaretha1409@gmail.com

ABSTRACT

The velocity of money is an important indicator that shows the efficient use of money in economic transactions. This study analyzes the effect of electronic money and economic factors such as GDP, interest rate, exchange rate, and composite stock price index on the velocity of money in Indonesia. The Error Correction Model (ECM) analysis method was used to estimate the equilibrium relationship in the short and long run using quarterly data for the period from 2016-2023. The findings indicate that in the long run, GDP, interest rate, and the composite stock price index have a positive and significant effect. Meanwhile, electronic money and exchange rate have a negative and significant effect on the velocity of money. On the other hand, the findings indicate that in the short run, GDP has a positive and significant effect on velocity of money. Whereas, electronic money, interest rate, exchange rate, and composite stock price index have no significant effect in the short run. These results imply that the government should support the expansion of electronic money systems to increase payment accessibility and efficiency, as well as maintain economic stability as fluctuations in economic factors significantly affect the velocity of money.

ARTICLE INFO

Article history:

Received: October 19th, 2025

Revised: February 11th, 2025

Accepted: June 15th, 2025

Published: June 30th, 2025

Keywords:

Velocity of money; Electronic money; Macroeconomics

JEL classification:

E1

E40

E41

Citation:

Margaretha, V., & Wahyudi, S. T. (2025). Revealing the Impact of Electronic Money and Economic Factors on the Velocity of Money in Indonesia. *Jurnal Ekonomi Pembangunan*, 23(1), 123-134. DOI: 10.29259/jep.v23i1.23217

Copyright © 2025 The Authors. Published by JEP is licensed under a CC BY-SA 4.0 International License

1. INTRODUCTION

The velocity of money is an important indicator in monetary theory, as it has received attention mainly due to its role in establishing solid monetary programs (Selvasundaram et al., 2022). It is an economic concept that measures the frequency with which a unit of currency is used to purchase goods and services over a period of time (Iliyasu & Sanusi, 2024). In practice, the velocity of money indicates the level of economic activity from the circulation of money for transactions. However, monetarists tend to focus on money supply and to ignore the velocity of money (Peneder, 2022). Central money authorities that strive to regulate the flow of spending in the economy should not only depend on money supply but also on its turnover – that is, the velocity of money (Altayee & Adam, 2013). The velocity of money can help policymakers to obtain insights about inflationary and deflationary risks; furthermore, it also gives complementary perspectives on money demand, enabling policymakers to cross-verify the information obtained from money demand models (Jung, 2017). However, changes in the velocity can affect the relationship between the money supply and the price level. Therefore, stability of the velocity of money is an important factor in ensuring the effectiveness of monetary policy, using monetary velocity as an operational and final target (Anwar et al., 2024).

Within the original quantity theory of money, some researchers have stated that the velocity of money is constant (Atanasijević et al., 2022). However, variability in the velocity has proven that this theory is incorrect. Generally, the velocity of money is not constant, but is expected to be stable or predictable. Monetarists argue that the velocity of money tends to be more stable in the long-

run, but may fluctuate temporarily in short-run conditions due to changes in the economy (Sud, 2024). In the case of Indonesia, the velocity of money is not stable but has a declining tendency. Oyadeyi (2024) assert that one of the main problems in developing countries is that issues such as financial innovation, monetization policy, financial sector deepening, GDP growth, and others have contributed to fluctuations in the velocity of money. Fluctuating and unstable money flows will make it difficult for monetary authorities to determine the money supply in the economy. Hence, it is important for a central bank to understand how the velocity changes.

According to economist Irving Fisher, the velocity of money is impacted by institutions and technical advancements (Bordo & Rockoff, 2013). The development of the banking and financial sector has shifted payment patterns and systems in economic transactions and continues to evolve towards a digital economy through ATMs, cards, and most recently, digital payments with e-money (Putri et al., 2021). In response to this, Bank Indonesia announced the National Non-Cash Movement in 2014 to encourage non-cash economic activities and create a cashless society (Haryati, 2021). The use of e-money in Indonesia then continued to increase, particularly in recent years. Government programs have contributed to this trend, such as the National Payment Gateway card, e-toll payments, electronic payment systems in transportation and retail sectors, and the creation of QRIS. InsightAsia's 2023 E-Wallet Industry Outlook survey found that 74% of respondents prefer digital wallets. This shift toward electronic payments has been supported by increased smartphone use as well as Internet access and accelerated by the COVID-19 pandemic, which improved digital transactions. As stated by the Coordinating Ministry for Economic Affairs of the Republic of Indonesia, the growth of marketplaces, widespread acceptance of online shopping, and acceleration of digital banking have increased this phenomenon over time.

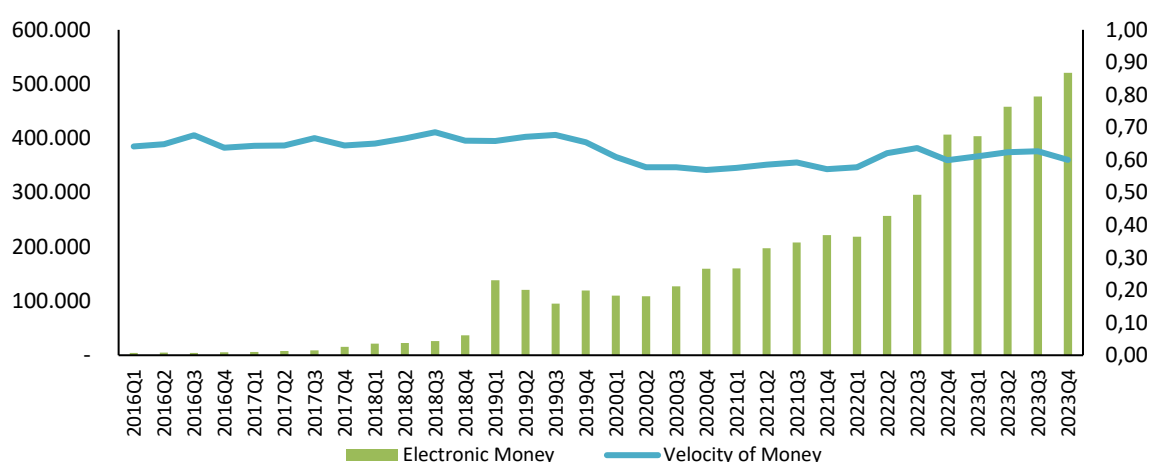


Figure 1. Indonesia's Velocity of Money and E-money in 2016-2023

Source: Bank Indonesia (2024) and Indonesian Statistics (2024)

Figure 1 shows a slow reduction in the velocity of money over time; the condition is not in line with the rising trend of e-money payment systems in Indonesia. This condition does not align with Fisher's theory (Bordo & Rockoff, 2013), which states that cash usage replaced by e-money will increase the velocity of money, because less money is needed to make transactions generated by nominal income. Analyses of the effect of e-money have been widely conducted on the velocity of money, both domestically and internationally. Study by Antoni (2013) revealed that an increase in e-money can reduce money turnover in Indonesia, Singapore, and Malaysia because the use of cash is minimized. Additionally, study in Kenya led to the finding that an increase in financial innovation by one unit proxied by the ratio of mobile money transactions to GDP causes the velocity of money turnover to decrease. In contrast, Hwang & Wen (2024) stated that digital payments increase the velocity of money in China. Meanwhile, several studies in Indonesia also showed various results. Pambudi & Mubin (2020) stated that e-money has a significant positive effect on the velocity of money, which agrees with the study by Sharma & Syarifuddin (2019). Conversely, Wasiaturrahma et al. (2019) argued that e-money negatively affects the velocity of money; this was then confirmed by the study of Anwar et al. (2024), who found that an increase in the use of e-money reduces the

velocity of money. The velocity of money also fluctuates in response to changes in monetary policy that controls the economy at a macro level. According to economics, the velocity of money is determined not only by the rate of transactions by the people but also by variable factors representing opportunity costs. In the econometric model according to Humphrey as stated in Mohamed (2020), the velocity of money is generally a function of interest rates, inflation expectations, wealth, real income, equity returns, tastes, and technological variables. Thus, this study uses economic factors that are also expected to affect the velocity of money, such as real GDP, interest rate, exchange rate, and the composite stock price index.

The factor of income measured by the real GDP can affect the velocity of money because it represents the value of goods and services produced from a country in a given period (Novitasari et al., 2023). According to Keynes' theory, the relationship of GDP and the velocity of money could be positive or negative, depending on the economic development of a country; this means that higher incomes lead to greater desires to use money. A study conducted by Humairoh et al. (2025) shows support of the theory, where an increase in GDP indicates an increase in public income due to an increase in public spending, thereby increasing the turnover of money. Yet, these results are contradictory to Nampewo & Opolot (2016); and Khanom (2019), who said that the effect is negative. According to liquidity preference theory, an increase in money supply reduces interest rates and higher income levels increase the demand for real money balances, thereby increasing interest rates. This theory also explains that the velocity of money fluctuates with the movement of interest rates; when interest rates increase, the velocity of money also increases (Mubin & Pambudi, 2020). This means that interest rates are the price of investment funds, which is one of the indicators in determining individual decisions to spend money or save money (Prasetyo, 2018). Empirical findings such as those of Ardakani (2023); and Al-Masaeid (2022) led to positive results, while these are in opposition to the study by Oyadeyi (2024), who discovered that interest rates have a negative effect on the velocity of money.

Friedman (1988) stated that there is an inverse relationship between stock prices and the velocity of money due to the wealth effect or substitution effect (Pinno & Serletis, 2016). An increase in stock prices indicates an increase in nominal wealth. This means that individuals are more likely to hold wealth in cash because the money-to-income ratio is high, and thus the velocity of money is low. However, high stock prices make stocks an attractive component of portfolios and create a substitution effect that reduces the money supply and increases the velocity of money. Another study by Selvasundaram et al. (2022) stated that stock market capitalization reduces the velocity of money. On the other hand, international economic activities are also thought to affect the velocity of money. In an open economy view, the exchange rate reflects the relative return of foreign currency to the domestic market and influences price levels and interest rates. According to Lucas (1988) as cited in Nampewo & Opolot (2016), the opportunistic cost of keeping wealth as domestic money includes domestic interest rates, foreign interest rates on bonds, and returns from exchange rate movements. Therefore, people can hold both domestic and foreign financial assets. If the domestic currency depreciates, there will be a decrease in the demand for money, because economic agents can substitute money with more profitable financial assets and increase money turnover. This statement is supported by Nampewo & Opolot (2016); and Atanasijević et al. (2022), where the exchange rate has a positive impact on the velocity of money; Sharma & Syarifuddin (2019), meanwhile, reported a negative effect.

Therefore, based on existing theories and phenomena, the objective of this study is to examine how e-money and economic factors affect the velocity of money in Indonesia. This study contributes to fill gaps and inconsistencies on the literature of the velocity of money through e-money payments and economic conditions by making an empirical analysis using the latest and comprehensive data. In addition, it combines economic variables from previous authors, such as GDP, interest rate, and exchange rate; it also adds the composite stock price index variable, which has never been studied in Indonesia. This paper has the following organization: the next two sections provide the research methodology, followed by the empirical results and discussion of the findings; finally, the last section presents the conclusions with policy implications and suggestions for future research.

2. RESEARCH METHODS

2.1. Data

This study employed a quantitative approach using quarterly secondary time series data for the period from Quarter I of 2016 to Quarter IV of 2023. The data used in the study were obtained from official publications by Bank Indonesia (BI), the Indonesian Statistics (BPS), and the Indonesia Stock Exchange (IDX). The analyzed variables were the velocity of money as the dependent variable, while the independent variables consisted of e-money, GDP, interest rate, exchange rate, and the composite stock price index. The variables of nominal GDP, money supply M2, real GDP, and composite stock price index used quarterly data based on publications, while the value of electronic money transactions is summed per three months. Meanwhile, monthly data for the interest rate and exchange rate variables were averaged per quarter. The variables and data sources are described in Table 1.

Table 1. The Description of Variables

Variable	Description	Unit	Source
VOM	Ratio of nominal GDP to broad money supply (M2)	Times	BI
EM	Total transaction value using e-money	Billions IDR	BI
GDP	Real GDP at constant price	Billions IDR	BPS
IR	Central bank interest rate	Percent	BI
ER	Exchange rate of IDR to 1 USD	Thousands IDR	BI
CSPI	IDX composite price	Thousands IDR	IDX

2.2. Model Specification

This study used a dynamic model with Error Correction Model (ECM). ECM is defined by its ability to explain both short-run and long-run impacts, and can solve problems with non-stationary time series data with the assistance of OLS estimation (Reviane et al., 2024). The long-run equation model was analyzed using multiple linear regression with an Error Correction Model (ECM) analysis approach to estimate the effect of e-money and economic factors on the velocity of money. The long-run model equation can be described as the function in Equation (1) as follows.

$$VOM_t = \alpha_0 + \alpha_1 EM_t + \alpha_2 GDP_t + \alpha_3 IR_t + \alpha_4 ER_t + \alpha_5 CSPI_t + \varepsilon_t \quad (1)$$

Here, VOM_t is the velocity of money; EM_t is e-money; GDP is real GDP; IR_t is interest rate; ER_t is exchange rate; $CSPI_t$ is composite stock price index; α_0 is the intercept; $\alpha_1 - \alpha_5$ are the coefficients; and ε_t is the error term.

Often, in the short-run, there is an imbalance caused by factors outside the study. The ECM method is a tool that short-run tests relationships by adjusting corrections through error correction terms (ECT) to create a balance in the long-run. The short-run equation is shown in Equation 2.

$$\Delta VOM_t = \alpha_0 + \alpha_1 \Delta EM_t + \alpha_2 \Delta GDP_t + \alpha_3 \Delta IR_t + \alpha_4 \Delta ER_t + \alpha_5 \Delta CSPI_t + ECT_t + \varepsilon_t \quad (2)$$

ECT_t is the error correction term. ECT can be interpreted as the speed of adjustment between the actual value and the expected value in one period. The probability value of the ECT coefficient value should be negative and significant, by which the ECM specification model is then valid.

3. RESULTS AND DISCUSSION

3.1. Results

Descriptive statistical analysis describes the study variable data from the average value (mean), median, maximum, minimum, and standard deviation. The results of the descriptive statistical test are presented in Table 2. All the series are normally distributed because the mean value is larger than the standard deviation value, except for e-money. Furthermore, the mean-to-median ratio of

each variable is within the unit proximity, and the standard deviation of the data set shows a high variability during the sample period, except for the velocity of money and interest rate.

Table 2. The Result of Descriptive Statistics

Variables	Obs.	Mean	Median	Max.	Min.	Std. Dev.
VOM	32	0.627	0.637	0.685	0.569	0.035
EM	32	155,181	119,838	520,692	4,071	155,584
GDP	32	2,705,539	2,706,374	3,139,085	2,264,721	229,563
IR	32	0.048	0.047	0.067	0.035	0.009
ER	32	14,247	14,256	15,605	13,138	6,92.378
CSPI	32	6,072	6,179	7,272	4,538	7,26.673

Stationarity is an initial requirement that should be fulfilled in the analysis of time series data. Non-stationary data can cause spurious regression, where the R^2 value of the model is high but does not show a significant relationship. Data stationarity was tested using the unit root test with the Augmented Dicky Fuller (ADF) method as presented in Table 3. No variables were stationary at level; however, they became stationary at the first difference at critical value 5%.

Table 3. The Result of Unit Root test

Variables	Level		1 st Differences		Integration Order
	t-Statistic	Prob.	t-Statistic	Prob.	
VOM	-1.593	0.474	-4.907***	0.000	I(1)
EM	1.933	0.999	-5.434***	0.000	I(1)
GDP	-0.849	0.790	-6.816***	0.000	I(1)
IR	-2.593	0.105	-3.259**	0.026	I(1)
ER	-0.707	0.830	-5.332***	0.000	I(1)
CSPI	-1.807	0.370	-6.020***	0.000	I(1)

Note: ***, **, and * represent significance levels at 1%, 5%, and 10% respectively

The cointegration test using the Engle-Granger method was conducted by regressing all variables and testing the stationarity of their residual values. As shown in Table 4, the residual, as the error correction term (ECT) variable, had a probability value below 5% significance at level. This implies that the equation is cointegrated or has a long-run equilibrium. This enabled ECM estimation to proceed.

Table 4. The Result of Cointegration test

Variable	t-Statistic	Prob.	Conclusion
ECT	-4.497	(0.001)	I(0)

Table 5 presents the results of ECM estimation for both long-run and short-run effects. In the long-run, all independent variables used in this study affect the dependent variable. It was found that GDP, exchange rate, and composite stock price index positively affect the velocity of money. Meanwhile, e-money and interest rate had a negative effect on velocity of money. The p-value of F-Statistic was $0.000 < \alpha$ value, meaning that the independent variables jointly affect the velocity of money in the long-run. In addition, the value of Adj. R^2 is 0.825, which means that the independent variable's relationship can explain the dependent variable's variation by 82.5%, while the remaining 17.5% is explained by variables outside the model.

Table 5 also shows that the ECM model was used to estimate a short-run model with first difference variables and has the characteristic of including residuals or ECT from the long-run model. In the short-run, only the GDP variable has a significant effect, while e-money, interest rate, exchange rate, and composite stock price index have no significant effect on the velocity of money in Indonesia. However, all independent variables together still have a significant effect because the p-value of F-Statistic less than of critical value of 5%. The Adj. R^2 value of 0.639 means that the independent variable's relationship can explain the dependent variable's variation by 63.9%, while the remaining 36.1% is explained by variables outside the model.

Table 5. The Result of Long and Short-run ECM Model

Dependent variable = VOM			
Variables	Coefficient	t-Stat	Prob.
Long-run			
Constant	0.409	3.820	0.000
EM	-2.888	-6.252	0.000
GDP	1.785	4.452	0.000
IR	2.824	9.581	0.000
ER	-3.118	-3.638	0.001
CSPI	1.443	2.471	0.020
R ²	0.853		
Adj. R ²	0.825		
Short-run			
Constant	-0.004	-1.449	0.160
Δ EM	-1.431	-1.542	0.136
Δ GDP	2.145	5.856	0.000
Δ IR	1.266	1.777	0.088
Δ ER	-7.458	-0.821	0.419
Δ CSPI	8.810	1.642	0.113
ECT _{t-1}	-0.748	-3.678	0.001
R ²	0.711		
Adj. R ²	0.639		
Diagnostics test		F-stat	Prob.
Normality (Jarque-Bera)		0.579	0.748
Linearity (Ramsey Reset)		1.810	0.190
Heteroscedasticity (Breusch-Pagan-Godfrey)		0.193	0.963
Autocorrelation (Breusch-Godfrey)		0.645	0.423
Variance Inflation Factor		Stat.	
Δ EM		1.426	
Δ GDP		1.035	
Δ IR		2.259	
Δ ER		1.489	
Δ CSPI		1.034	

In the model equation, the ECT value is negative with a significant probability value of 0.001 less than 5%. As such, the ECM model used in this study is valid. The ECT coefficient value of -0.748 indicates a fast adjustment speed of 74.85% to restore equilibrium from the short-run to the long-run. This means that if there is a deviation in the short-run equilibrium, the variables will adjust back to stability in the long-run equilibrium. For robustness and reliability of the estimation results, it was necessary to conduct some tests on the obtained estimates. These were diagnostic tests for normality, linearity, heteroscedasticity, autocorrelation, and multicollinearity. As shown in Table 5, the Prob. value > α 5% and Variance Inflation Factor (VIF) < 10, ensuring that the model is linear, normally distributed, and no indication of multicollinearity, heteroscedasticity, and autocorrelation.

3.2. Discussion

An analysis on the velocity of money is essential in developing credible monetary policy in Indonesia. Understanding the velocity of money is important because it may provide valuable information for policymakers to measure the effectiveness of monetary policy in the country (Sharma & Syarifuddin, 2019). With the development of payment systems, the use of e-money has become an effective choice to carry out transactions; it is thus also related to the level of turnover in the velocity of money. Furthermore, changes in macroeconomic conditions will determine how people behave towards their money, which leads to variations in the velocity of money.

Based on analysis of time series data with the ECM technique, it was found that e-money has a negative and significant effect on the velocity of money in the long-run. This contradicts Fisher's theory, which states that the increasing use of e-money should speed up money circulation by

reducing cash transactions. It may occur because e-money is still seen as an alternative payment method. People still tend to use cash or card payments, which slows down money circulation. According to the 2023 Visa Consumer Payment Attitudes Study, 80% of Indonesian people still use cash, especially baby boomers, and 67% of the population does not adopt a cashless lifestyle (Alam, 2024). In the 2016-2023 period, the largest average e-money transaction values each year were top-up transactions, followed by shopping transactions, e-money transfer transactions, and e-money cash withdrawals. This means that people who top up e-money do not always use it for transactions, and may only deposit in digital wallets. In addition, it cannot be denied that the increased use of e-money can increase cybercrime and fraud. A study by the Ministry of Communication and Information Technology with the Katadata Insight Center in 2021 found that the financial product most vulnerable to data leakage is digital wallets, with a percentage of 36.6%. This result is in line with the study of Anwar et al. (2024) in that the increasing value of e-money transactions will reduce the velocity of money in the long-run.

This is also contradictory to the application of e-money in developed countries such as China, as found in a study by Hwang & Wen (2024). Digital payments facilitate transactions made by individuals, which makes the velocity of money faster. The massive circulation of e-money leads to a positive relationship with household consumption, resulting in changes in consumer behavior. Luo et al. (2021) also stated that the increase in money turnover due to the use of e-money is characterized by consumer enthusiasm for loans, interest rates, and savings, while in the short-run e-money insignificantly affects the velocity of money. In the Indonesian economic environment, cash is still being used for most transactions (Hermawan et al., 2024). Roy et al. (2021) found similar results, in that people still do not have optimal trust for a cashless society. Anggraini & Agustin (2022) also explained that the adoption of e-money has not quickly changed consumer behavior towards new payment systems; accordingly, its use has not been evenly distributed throughout society and is still on a limited scale for transactions.

The GDP has a positive and significant effect on the velocity of money in Indonesia, in both the long-run and short-run. According to Fry (1998), the relationship between real per capita income and the velocity of money can be positive or negative, depending on a country's stage of economic development (Oyadeyi, 2024). Study by Altayee & Adam (2013) emphasized that velocity will decrease along with income growth in the early stage, but will eventually have a positive correlation later on. A positive relationship between the velocity of money and the GDP indicates that Indonesia is an advanced economy at a later stage of growth. Despite global economic uncertainty and inflation, Indonesia's economy still grew strong by 5.05% in 2023, exceeding the government's projection of 5%. The main contributors to this growth were household consumption and investment. This result is consistent with Keynes' theory of average consumption, which is influenced by income. Higher income increases the demand for money and transaction levels, which makes the velocity of money faster. Similar conclusions were also drawn by Pambudi & Mubin (2020); and Sharma & Syarifuddin (2019), who found a positive relationship between GDP and the velocity of money. Meanwhile, studies on developing countries as conducted by Nampewo & Opolot (2016); and Khanom (2019) showed a downward trend in the velocity of money, while GDP growth is gradually increasing.

Interest rate, proxied by the BI rate, has a positive and significant effect on the velocity of money in Indonesia in the long-run. Keynes' theory explains that interest rate and the demand for money for speculative purposes are positively correlated. Higher interest rates reduce the people's desire to hold cash as the opportunity cost increases. This will encourage people to place savings in banks because it increases the expectation of higher returns, which in turn boosts the velocity of money. During an interest recession, the opportunity cost of holding money falls and its velocity decreases; the opposite is also true outside of a recession (Ardakani, 2023). However, in the short-run, interest rate has no effect on the velocity of money. This may be due to the adjustment period between policy changes and its impact on the economy. Additionally, interest rates are often based on future expectations; people do not immediately respond to interest rate changes, especially in stable economic conditions. Al-Masaeid (2022) implied that interest rates are sticky in the short-run, making the relationship between prices and the velocity of money weak. That is, interest rates

do not adjust quickly to changes in economic conditions in the immediate timeframe and remain stable even though other economic factors are shifting rapidly. This result is in line with the studies by Wasiaturrahma et al. (2019); and Novitasari et al. (2022), who found that interest rates only affect the velocity of money in the long-run with a positive coefficient.

Exchange rate also negatively and significantly affects the velocity of money in Indonesia over the long-run. Currency depreciation raises import costs, leading to higher domestic prices (inflation). People also become reluctant to spend their money, slowing down the velocity of money. Furthermore, a decline in the velocity of money can occur when domestic investors shift their portfolios to foreign assets (Oyadeyi, 2024). Rather than holding on to an expensive domestic currency, investors may choose to diversify their portfolios into foreign assets to hedge against domestic risks, resulting in lower domestic money flows. The rupiah's performance against the USD has weakened along with the global economic slowdown. In 2018, the US-China trade war triggered central banks to raise interest rates. As a result, capital flows to developing countries were more selective and led to pressure on the rupiah. The COVID-19 pandemic in 2020 lowered the economic outlook, as well as Indonesia's exchange rate. Meanwhile, the exchange rate depreciation in 2023 was caused by weakening economic growth and rising inflation in developed countries due to the Russia-Ukraine geopolitical war. The volatility of the exchange rate affects the behavior of consumers and investors, thus reducing the turnover of money. This is reinforced by study conducted by Fabregas & Yokossi (2022); Nampewo & Opolot (2016); and Atanasijević et al. (2022). However, in the short-run, exchange rate volatility has no significant effect, since the effects of depreciation are anticipated to be seen over time. Most industry players transact using hedging instruments to reduce the risk of exchange rate fluctuations. In addition, forex transactions often utilize pre-agreed futures contracts. This could explain why exchange rate does not immediately affect the velocity of money in the short-run.

Composite stock price index, which is proxied by the IDX composite, has a positive and significant long-run effect on the velocity of money. According to Friedman, this positive relationship suggests a substitution effect between money and stocks, where holding money becomes an opportunity cost. This positive relationship is consistent with the results of a study by Pinno & Serletis (2016) in a developed country, which had the finding that stock market volatility affects the velocity of money significantly and positively. As stock prices rise, people prefer to invest in financial assets rather than to hold cash to spend or invest in the real economy. A rising composite stock price index indicates high stock market activity and signals economic stability, which in turn increases the velocity of money. Meanwhile, a decline causes many investors to withdraw funds from the stock market, as the flow of funds switches to safer instruments such as deposits or bonds. This in turn will reduce the velocity of money in the economy. This result contradicts the theory and literature for developing countries, as seen in Oyadeyi (2024); and Selvasundaram et al. (2022), which showed a negative impact towards the velocity of money. Another study by Salama (2021) supports this result by finding different reciprocal relationships between the velocity of money and the value of traded stocks. For developed economies, the value of traded stocks has a strong and positive response to the velocity of money, but the response is relatively low in developing economies. The estimation results also show that the composite stock price index has no significant effect in the short-run, as the stock market is viewed as a long-run investment, and thus short-run fluctuations do not have a major impact on daily economic decisions.

4. CONCLUSIONS

The conclusion of this study gives insights on the response of the velocity of money to electronic money payment systems and macroeconomic factors. The results reveal that in the long-run, the velocity of money decreases amid technological advances that increase the use of e-money. This happens because people still trust cash as the medium of exchange in transactions. For economic factors, exchange rate shows a negative impact as the rupiah's performance against the USD has weakened in recent years because of the global economic crisis. Meanwhile, GDP, interest rate, and composite stock price index have a positive and significant effect to the velocity of money, which proves that Indonesia is a developed country with a quite solid economic condition. Additionally, in

the short-run, e-money, exchange rate, interest rate, and composite stock price index have no significant effect, while GDP has a positive effect. This can be attributed to these factors adjusting slowly to economic fluctuations and having no impact on the velocity of money.

Given the importance of e-money in facilitating transactions, the study suggests that governments should actively promote and support the expansion of e-money payment systems, especially in rural areas. This can be achieved by advancing technological infrastructure and diversifying digital financial products to make electronic payments more accessible and efficient. Encouraging greater adoption of e-money could improve transaction speed and enhance financial inclusion. Furthermore, the study emphasizes the government's crucial role in maintaining economic stability, as fluctuations in economic factors significantly affect the velocity of money. Stable macroeconomic conditions foster confidence in the economy, leading to healthier financial activity and more robust money circulation. A suggestion for future study is to provide broader insights into global trends by incorporating cross-country data. In addition, developing models with greater complexity may improve upon existing study.

Acknowledgment: The authors would like to thank the Department of Economics, Brawijaya University, for providing resources and input during the completion of this research, as well as related institutions that have supported the data for this article.

Authors Contribution: V. M., S. T. W. contributed equally to conceptualization, original draft writing, review, and editorial inputs. V. M. Prepared the final draft and S. T. W. have read and agreed to the published version of the manuscript.

Conflict of interest: The authors declare no conflict of interest.

REFERENCES

- Alam, M. M., Awawdeh, A. E., & Muhamad, A. I. B. (2021). Using e-wallet for business process development: challenges and prospects in Malaysia. *Business Process Management Journal*, 27(4), 1142-1162. <https://doi.org/10.1108/BPMJ-11-2020-0528>
- Al-Masaeid, M. (2022). The Role of Financial Development in Determining the Velocity of Money in Circulation: The Case of Jordan. *Economics*, 11(2), 76-87. <https://doi.org/10.11648/j.econ.20221102.12>
- Altayee, H. H. A., & Adam, M. H. M. (2013). Financial Development and the Velocity of Money Under Interest-Free Financing System: An Empirical Analysis. *American Based Research Journal*, 2(8), 53-65. <https://doi.org/10.5281/zenodo.3408234>
- Anggraini, A., & Agustin, G. (2022). Effect Cashless Payment on Inflation with Velocity of Money as Intervening Variable. *BALANCE: Jurnal Ekonomi*, 18(2), 199-207. <https://doi.org/10.26618/jeb.v18i2.9606>
- Antoni, A. (2013). Dynamic Relation of Money Velocity, Money Volatility and Inflation Threshold. *Economic Journal of Emerging Markets*, 3(3), 245-259. <https://doi.org/10.20885/ejem.v3i3.2977>
- Anwar, C. J., Ayunda, V. T., Suhendra, I., Ginanjar, R. A. F., & Kholishoh, L. N. (2024). Estimating The Effects of Electronic Money on The Income Velocity of Money in Indonesia. *International Journal of Innovative Research and Scientific Studies*, 7(2), 390-397. <https://doi.org/10.53894/ijirss.v7i2.2632>
- Ardakani, O. M. (2023). The Dynamics of Money Velocity. *Applied Economics Letters*, 30(13), 1814-1822. <https://doi.org/10.1080/13504851.2022.2083062>
- Atanasijević, J., Danon, M., Lužanin, Z., & Kovačević, D. (2022). Shadow economy estimation using cash demand approach: the case of Serbia. *Sustainability*, 14(20), 13179. <https://doi.org/10.3390/su142013179>
- Bordo, M. D., & Rockoff, H. (2013). The influence of Irving Fisher on Milton Friedman's monetary economics. *Journal of the History of Economic Thought*, 35(2), 153-177. <https://doi.org/10.1017/S1053837213000047>
- Fabregas, R., & Yokossi, T. (2022). Mobile money and economic activity: evidence from Kenya. *The*

- World Bank Economic Review*, 36(3), 734-756. <http://dx.doi.org/10.1093/wber/lhac007>
- Haryati, D. (2021). Fenomena Cashless Society pada Generasi Milenial dalam Menghadapi Covid-19. *Business Innovation & Entrepreneurship Journal*, 3(1), 33–39. <https://doi.org/10.35899/biej.v3i1.202>
- Hermawan, D., Lie, D., Sasongko, A., & Yusan, R. I. (2024). Money Velocity, Digital Currency and Inflation Dynamics in Indonesia. *Bulletin of Indonesian Economic Studies*, 60(3), 305–345. <https://doi.org/10.1080/00074918.2024.2398347>
- Humairoh, H., Annas, M., Wiwaha, A., Duha, T., & Endri, E. (2025). Digitalization of the payment systems: Evidence from Indonesia. *Calitatea*, 26(205), 121-135. <http://dx.doi.org/10.47750/QAS/26.205.25>
- Hwang, J. T., & Wen, M. (2024). Electronic payments and money demand in China. *Economic Analysis and Policy*, 82, 47-64. <https://doi.org/10.1016/j.eap.2024.02.025>
- Iliyasu, J., & Sanusi, A. R. (2024). Relative price shocks and core inflation in Nigeria: implication of second-round effects for monetary policy. *Global Business and Economics Review*, 30(4), 383-403. <http://dx.doi.org/10.1504/GBER.2024.138791>
- Jung, A. (2017). Forecasting Broad Money Velocity. *The North American Journal of Economics and Finance*, 42, 421–432. <https://doi.org/10.1016/j.najef.2017.08.005>
- Khanom, S. (2019). Economic Transformation in Bangladesh and the Income Velocity of Broad Money: An Econometric Analysis. *The Journal of Social Sciences Research, Academic Research Publishing Group*, 5(2), 408–417. <https://doi.org/10.32861/jssr.52.408.417>
- Luo, S., Zhou, G., & Zhou, J. (2021). The Impact of Electronic Money on Monetary Policy: Based on DSGE Model Simulations. *Mathematics*, 9(20), 2614. <https://doi.org/10.3390/math9202614>
- Mohamed, E. S. E. (2020). Velocity of Money Income and Economic Growth in Sudan: Cointegration and Error Correction Analysis. *International Journal of Economics and Financial Issues*, 10(2), 87–98. <https://doi.org/10.32479/ijefi.8944>
- Mubin, S. A. P. M. K., & Pambudi, S. A. (2020). Analysis the effect of electronic money use on velocity of money: Evidence from Indonesia. *Jurnal Ilmu Ekonomi Terapan*, 5(1), 42. <https://doi.org/10.20473/jiet.v5i1.19626>
- Nampewo, D., & Opolot, J. (2016). Financial Innovations and Money Velocity in Uganda. *African Development Review*, 28(4), 371–382. <https://doi.org/10.1111/1467-8268.12218>
- Novitasari, D., Astuti, R. F., & Sutrisno. (2023). Analysis Determinants the Velocity of Money in Indonesia. *Educational Studies: Conference Series*, 3(1), 107–116. <https://doi.org/10.30872/escs.v3i1.2599>
- Oyadeyi, O. O. (2024). The velocity of money and lessons for monetary policy in Nigeria: An application of the quantile ARDL Approach. *Journal of the Knowledge Economy*, 16, 8249–8285. <https://doi.org/10.1007/s13132-024-02201-7>
- Pambudi, S. A., & Mubin, M. K. (2020). Analysis The Effect of Electronic Money Use on Velocity of Money: Evidence from Indonesia. *Jurnal Ilmu Ekonomi Terapan*, 5(1), 42. <https://doi.org/10.20473/jiet.v5i1.19626>
- Peneder, M. (2022). Digitization and the evolution of money as a social technology of account. *Journal of Evolutionary Economics*, 32(1), 175-203. <https://doi.org/10.1007/s00191-021-00729-4>
- Pinno, K., & Serletis, A. (2016). Money, Velocity, and the Stock Market. *Open Economies Review*, 27(4), 671–695. <https://doi.org/10.1007/s11079-016-9400-5>
- Prasetyo, A. S. (2018). Determinants of Demand For Money and The Velocity of Money in Indonesia. *Journal of Developing Economies*, 3(2), 65–79. <https://doi.org/10.20473/jde.v3i2.10464>
- Putri, A., Safuridar, S., Amilia, S., & Asnidar, A. (2022). Analysis of The Effect of Non-Cash Payments, Interest Rate, and The Amount of The Money Circulation on Inflation in Indonesia. *International Journal on Social Science, Economics and Art*, 11(4), 172-179. <http://dx.doi.org/10.35335/ijosea.v11i4.59>
- Reviane, I. T. A., Paddu, A. H., & Sari Saudi, N. D. (2024). Assessing the implications of imported electricity equipment in Indonesia: A comprehensive ECM approach for short-term and long-

- term analysis. *Journal of Infrastructure, Policy and Development*, 8(8), 5926. <http://dx.doi.org/10.24294/jipd.v8i8.5926>
- Roy, J., Rochaida, E., Suharto, R. B., & Rizkiawan, R. (2021). Digital and Electronic Transaction against Velocity of Money. *Corporate Governance and Organizational Behavior Review*, 5(2), 145–155. <https://doi.org/10.22495/cgobrv5i2sip3>
- Salama, A. H. (2021). The Velocity of Money and the Stock Market. A Comparative Forward and Backward Analysis. *EKB Journal Management System*, 12(2), 1–37. <https://doi.org/10.21608/jces.2021.188336>
- Selvasundaram, K., Sagathevan, S., & Abdu, M. (2022). Financial development and economic growth in BRICS revisited: An application of cross-sectional augmented ARDL. *International Social Science Journal*, 72(245), 799-812. <http://dx.doi.org/10.1111/issj.12364>
- Sharma, S. S., & Syarifuddin, F. (2019). Determinants of Indonesia's Income Velocity of Money. *Bulletin of Monetary Economics and Banking*, 21(3), 323–342. <https://doi.org/10.21098/bemp.v21i3.1006>
- Sud, N. (2024). Is Money Velocity Pro-Cyclical? The Case of India. *Journal of Economic Structures*, 13(12). <https://doi.org/10.1186/s40008-024-00333-2>
- Wasiaturrahma, D., Wahyuningtyas, Y. T., & Ajija, S. R. (2019). Non cash payment and demand for real money in Indonesia. *Journal of Economics, Business, and Accountancy, Ventura (JEBAV)*, 22(1), 1-8. <http://dx.doi.org/10.14414/jebav.v22i1.1575>

THIS PAGE INTENTIONALLY LEFT BLANK