

(Research) Article

Effectiveness of Monetary Policy and the Utilization of Digital Economy in Maintaining Financial System Stability in Indonesia

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Abstract: The digital economy has significantly transformed economic growth by introducing innovations in payment systems and financial services. The modernization of payment instruments through monetary policy has enhanced the ability to control inflation and ensure financial system stability. This study aims to analyze the effectiveness of monetary policy and the utilization of the digital economy in maintaining financial stability in Indonesia. Using time series data from 2010 to 2024 obtained from the World Bank, this research applies the Vector Autoregression (VAR) method to examine both short-term and long-term relationships among variables, including e-money, money supply, inflation, exchange rate, interest rate, and credit card usage. The results show that e-money has a significant reciprocal influence on the money supply, while inflation is also affected by e-money and interest rates. The impulse response function demonstrates that the interactions among these variables tend to converge towards equilibrium over time. Variance decomposition analysis indicates that in the short term, e-money primarily drives financial stability, whereas in the medium and long term, the money supply plays a dominant role. Overall, the findings suggest that monetary policy, supported by digital economic systems, effectively enhances financial system stability in Indonesia. This research contributes to understanding the dual effect of digital payment innovations and provides recommendations for policymakers to strengthen financial inclusion, economic resilience, and macro-financial stability in the digital era.

Keywords: E-money, Money Supply, Credit Card, Inflation, Exchange Rate, Monetary Policy, Digital Economy

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1. Introduction

The financial system plays a crucial role in the economy by allocating funds from surplus to deficit parties. The European Central Bank defines financial stability as a condition where the financial system efficiently allocates resources from savers to investors while being resilient to financial risks (European Central Bank, 2022). An unstable financial system disrupts capital allocation, hampers economic cycles, and ultimately reduces economic performance (Warjiyo, 2024).

Indonesia's 1998 financial crisis required considerable costs and time to restore public confidence (Azka, 2017). Therefore, policies promoting financial inclusion and comprehensive economic growth are necessary to ensure stability (Halim, 2018). Financial inclusion seeks to remove barriers—both price and non-price—in utilizing non-formal financial institutions, aiming for income distribution and poverty reduction (Bank Indonesia, 2024).

The economy is also influenced by rapid technological developments, particularly in payment systems. However, limited digital literacy hampers the marketing of digital financial products (Rangkuty et al., 2022). Digital platforms have enabled the financial system to innovate through electronic money (e-money), which is gradually replacing cash as a more efficient and economical payment method (Abidin, 2025).

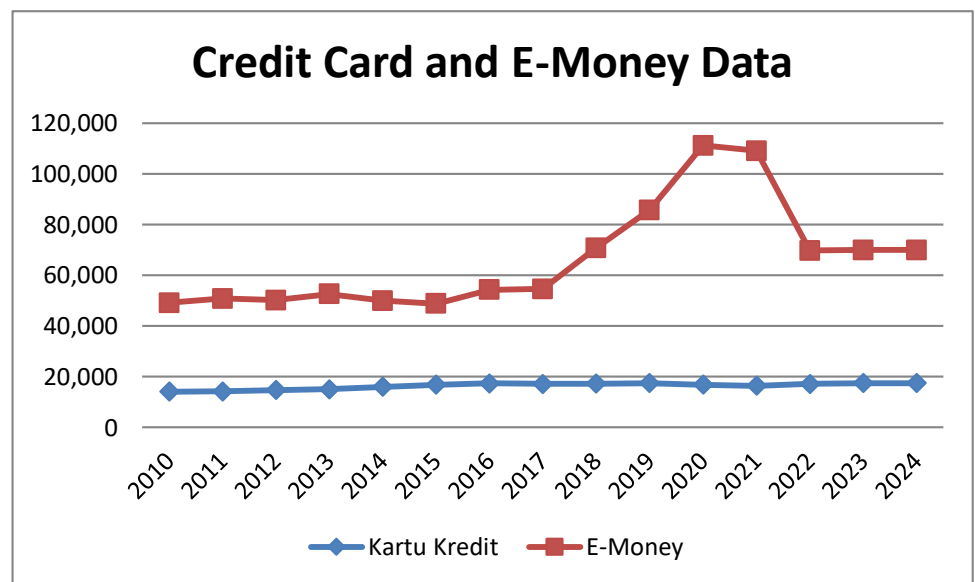


Figure 1. Credit Card and E-Money Data for the Period 2010 to 2024

E-money has shown continuous growth, with a notable difference during the COVID-19 pandemic. According to Lintang & Sari (2020), the use of credit cards declined while e-money usage increased during the pandemic, as individuals reduced their spending due to lower incomes. To manage their finances under reduced economic conditions, they opted for more efficient means to meet their needs.

The central bank's excessive focus on monetary policies aimed solely at maintaining price stability has resulted in less attention to risks arising from macroeconomic linkages with the financial system. Past financial crises have demonstrated that macro-financial linkages are strong, and instability within these linkages often triggers crises (Warjiyo, 2010). Consequently, to mitigate risks from macro-financial vulnerabilities, macroprudential policies were formulated to complement monetary policy, which alone cannot maintain financial system stability, as financial instability is not always related to liquidity issues that monetary policy can resolve (International Monetary Fund, 2017).

One of the objectives of financial strategy, as part of the broader economic development agenda, is to reduce poverty, ensure equitable income distribution, and maintain financial system stability (Budiyanto & Wibowo, 2021). Previous studies have also analyzed monetary and macroprudential policies as key factors within the financial system (Hidayati, 2019). The issue of monetary policy and digital economy utilization in Indonesia is an interesting topic to explore, supported by empirical literature suggesting that monetary policy and digitalization significantly influence financial stability. Indonesia's monetary policy manages the financial sector to enhance access to financial services. Therefore, further research is needed on "The Effectiveness of Monetary Policy and the Utilization of Digital Economy in Maintaining Financial System Stability in Indonesia."

2. Literature Review

2.1. Financial System Stability

Financial stability lacks a standardized international definition. The BIS and Financial Stability Forum define financial instability as a situation where economic performance deteriorates due to fluctuations in financial asset prices or the inability of financial institutions to meet obligations (Pujoalwanto, 2014). A stable financial system is robust and resistant to economic shocks, capable of performing intermediation functions and supporting economic growth (Prihatin et al., 2019). Instability may arise from structural or behavioral failures, either internal or external (Sri, 2020).

2.2 Monetary Policy

Monetary policy is the process through which the central bank influences economic and financial activities to achieve ultimate objectives. Its primary goal is to maintain the stability of the rupiah, achieved through interest rate channels, asset prices, and credit flows (Warjiyo, 2016). Central bank policies are closely related to the relationship between interest rates and money supply, aiming to control inflation and maintain exchange rates (Rangkuty & Yusuf, 2020).

2.3. Digital Economy

The digital economy has significantly transformed the global economic landscape by enhancing efficiency, productivity, innovation, and market expansion. Digital technologies automate business processes, facilitate faster decision-making, and enable businesses to reach broader markets beyond geographical boundaries, fostering economic growth.

3. Proposed Method

This study examines the effectiveness of monetary policy and digital economy utilization in maintaining financial system stability using time-series data (2010–2024) sourced from the World Bank. A quantitative descriptive approach is employed through Vector Autoregression (VAR) analysis (Rydland, 2018). The VAR model assesses relationships among variables using unit root tests, optimal lag selection, cointegration tests, causality tests, estimation, impulse response functions, and variance decomposition.

The mathematical equations for VAR are:

$$SB_t = \beta_{10} + \beta_{11}JUB_{t-p} + \beta_{12}E-money_{t-p} + \beta_{13}Kartu\ Kredit_{t-p} + \beta_{14}KURS_{t-p} + \beta_{15}INF_{t-p} + et_1$$

$$JUB_t = \beta_{20} + \beta_{21}E-money_{t-p} + \beta_{22}Kartu\ Kredit_{t-p} + \beta_{23}KURS_{t-p} + \beta_{24}INF_{t-p} + \beta_{25}SB_{t-p} + et_2$$

$$E-money_t = \beta_{30} + \beta_{31}Kartu\ Kredit_{t-p} + \beta_{32}KURS_{t-p} + \beta_{33}INF_{t-p} + \beta_{34}SB_{t-p} + \beta_{35}JUB_{t-p} + et_3$$

$$Kartu\ kredit_t = \beta_{40} + \beta_{41}KURS_{t-p} + \beta_{42}INF_{t-p} + \beta_{43}SB_{t-p} + \beta_{44}JUB_{t-p} + \beta_{45}E-money_{t-p} + et_4$$

$$KURS_t = \beta_{50} + \beta_{51}INF_{t-p} + \beta_{52}SB_{t-p} + \beta_{53}JUB_{t-p} + \beta_{54}E-money_{t-p} + \beta_{55}Kartu\ Kredit_{t-p} + et_5$$

$$INF_t = \beta_{60} + \beta_{61}SB_{t-p} + \beta_{62}JUB_{t-p} + \beta_{63}E-money_{t-p} + \beta_{64}Kartu\ Kredit_{t-p} + \beta_{65}KURS_{t-p} + et_6$$

Descriptions :

JUB = Money Supply

E-Money = Electronic Money

Kartu Kredit = Credit Card

KURS = Exchange Rate

SB = Interest Rate

INF = Inflation

β = Regression Coefficient

et = Random Shock

p = Lag Length

5. Results

5.1. Stationarity Test

Table 1: Results of the ADF Unit Root Test

Variable	Unit Root	ADF test statistic	Prob.	Description
<i>E-Money</i>	Level	1.3407	0.5770	Non-stationary
	1 st difference	3.2770	0.0454	stationary
	2 nd difference	-	-	-
Inflation	Level	1.5084	0.4978	Non-stationary
	1 st difference	4.4078	0.0063	stationary
	2 nd difference	-	-	--
Money Supply	Level	0.5504	0.9785	Non-stationary
	1 st difference	5.5418	0.0018	stationary
	2 nd difference	-	-	-
Debit Cards	Level	1.7042	0.4064	Non-stationary
	1 st difference	2.2878	0.1901	Non-stationary
	2 nd difference	3.1149	0.0579	stationary
Exchange Rate	Level	2.7700	0.0915	Non-stationary
	1 st difference	4.1024	0.0116	stationary
	2 nd difference	-	-	-
Interest Rate	Level	1.8359	0.3486	Non-stationary
	1 st difference	3.8764	0.0166	stationary
	2 nd difference	-	-	-

Source: Processed data using EViews, 2025

The ADF unit root test results show that most variables become stationary at the first difference ($p < 0.05$), while credit card variables become stationary at the second difference.

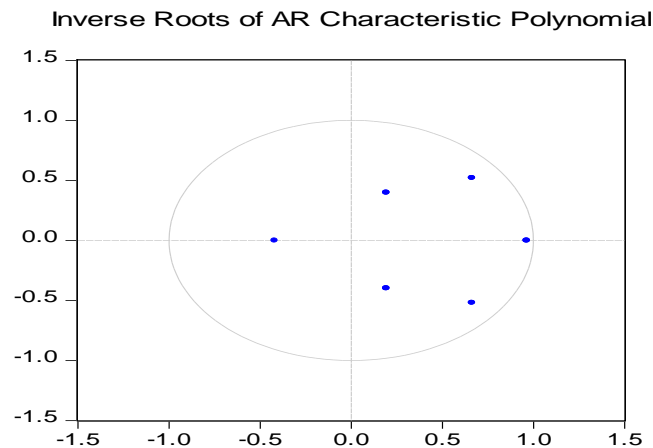
5.2. Optimal Lag Stability

The VAR model is sensitive to lag length; the optimal lag is determined using the Akaike Information Criterion (AIC). The study found that lag 1 is optimal.

Table 2: Lag 1 Determination Test

Determinant resid covariance (dof adj.)	1.59E+21
Determinant resid covariance	1.54E+19
Log likelihood	-397.8572
Akaike information criterion	67.67034
Schwarz criterion	69.49556
Number of coefficients	42

Source: Processed data using EViews, 2025



The table shows that the selected lag, based on the Akaike Information Criterion (AIC) value of 69.49556 at lag 1, is optimal. The plotted points indicate stability within the circle, confirming that lag 1 is used in the estimation.

5.3. Cointegration Test

This test is conducted to determine the existence of long-term equilibrium, indicated by consistent movements and stability among the relationships of the variables.

Table 3: Cointegration Test Results

Trace statistic	>	Critical Value	Prob.
139.0403		69.81889	0.0000
Max-eigin statistic	>	Critical Value	Prob.
57.37942		33.87687	0.0000

Source: Processed data using EViews, 2025

Based on the table, it is evident that the values of the trace statistic and the max-eigen statistic at a 5% confidence level are greater than the critical value. Therefore, the test results indicate that the movements among the research variables—e-money, inflation, money supply, credit card usage, exchange rate, and interest rate—exhibit stability and a long-term equilibrium relationship.

5.4. VAR Estimation

The VAR estimation test was conducted after performing assumption tests, including stationarity, cointegration, causality, and optimal lag tests. The purpose of this test is to identify the interrelationships or contributions of the variables.

Table 4: VAR Estimation Results

Variable	Contribution 1	Contribution 2
E-Money	Money Supply (17.99323)	E-Money (1.111569)
Inflation	Exchange Rate (40.44524)	Debit Card (14.70024)
Money Supply	Interest Rate (8.920007)	Inflation (4.77007)
Debit Card	E-Money	Money Supply

	(29.59113)	(3.31149)
Exchange Rate	E-Money (15.06069)	Exchange Rate (4.48469)
Interest Rate	Exchange Rate (89.41292)	Debit Card (51.94775)

Source: Processed data using EViews, 2025

The largest first and second contributions to the e-money variable are shown by the money supply and e-money itself. The exchange rate and credit cards also contribute to the inflation variable. The money supply is influenced by interest rates and inflation, while debit cards are contributed by e-money and the money supply. The exchange rate is influenced by e-money and the exchange rate itself, whereas interest rates are contributed by the exchange rate and credit cards. Growth in the money supply ensures proper economic growth; however, inflation may occur if the growth of the money supply is inadequate without appropriate macroeconomic policies (Emara & Said, 2021).

6. Impulse Response Function (IRF) of the VAR Model

The estimation of the impulse response is conducted to observe shocks among the research variables. The impulse response graph illustrates how one variable responds to shocks from another variable over a specific period. If the graph shows movements approaching the equilibrium point (convergence), the response will not leave a permanent impact on the variable (Basuki & Prawoto, 2016).

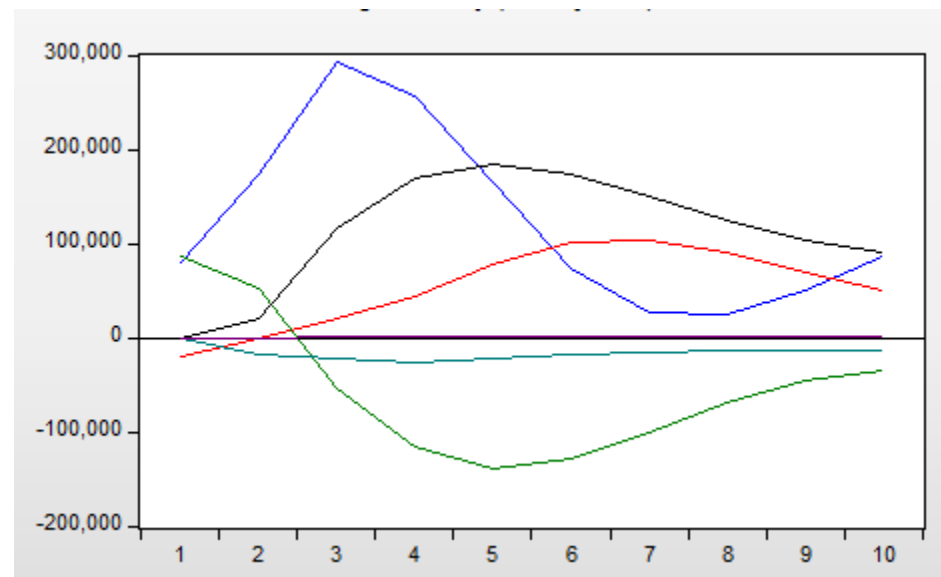


Figure 2: Impulse Response of Research Variables

The figure shows that the interactions among the variables—e-money, inflation, money supply, credit card usage, exchange rate, and interest rate—exhibit similar movements approaching the zero line, indicating convergence toward equilibrium.

7. Variance Decomposition

After the dynamic analysis through the impulse response, the next step is to examine the model characteristics using variance decomposition. The results are presented in the following table:

Table 6: Variance Decomposition Results

Effectiveness of Monetary Policy and Utilization of Digital Economy in Maintaining Financial System Stability	Rekomendasi		
	Short Term	Jangka menengah	Long Term
E-Money	E-Money	E-Money	E-Money
	-	Money Supply	Money Supply
Inflation	E-Money	E-Money	E-Money
	INF	INF	INF
Money Supply	Money Supply	E-Money	E-Money
	E-Money	Debit Card	Debit Card
Debit Card	E-Money	E-Money	E-Money
	Money Supply	INF	INF
Exchange Rate	INF	INF	E-Money
	JUB	E-Money	INF
Interest Rate	INF	INF	INF
	E-Money	E-Money	E-Money

Source: Processed data using EViews, 2025

In the short term, e-money is effectively recommended by e-money itself, while in the medium and long term, it is influenced by the money supply. Increased consumption and economic growth driven by the use of e-money, in turn, encourage greater public demand for non-cash money to facilitate and speed up transactions. This phenomenon is referred to as the dual effect of usage (Mulfachrizza, 2021). Inflation and credit card usage are influenced by e-money and inflation in the short, medium, and long term. The money supply is affected by e-money and credit cards. Fluctuations in the money supply are influenced by the intensity of cash and non-cash transactions through debit cards and e-money (Rasyida & Yuliana, 2019). Both the exchange rate and interest rate are also driven by inflation and e-money. This aligns with the observation that increased debit card usage leads to higher interest rates, which in turn helps control inflation levels (Safitri, 2021).

6. Discussions

The findings of this study reveal that the utilization of e-money and the implementation of monetary policy have a significant and dynamic influence on the stability of Indonesia's financial system. The Vector Autoregression (VAR) analysis confirms that e-money contributes strongly to the money supply, with its effects evident across both short and long-term periods. This supports the argument that the digitalization of financial transactions plays a crucial role in economic growth and stability by enhancing the efficiency and speed of transactions (Mulfachrizza, 2021).

The results also demonstrate that inflation is highly sensitive to the use of e-money and the dynamics of interest rates. This relationship indicates that increased adoption of digital payment methods influences price levels through changes in consumption patterns. During the COVID-19 pandemic, as highlighted by Lintang & Sari (2020), the usage of e-money surged while credit card usage declined, reflecting a behavioral shift toward more flexible and cost-effective payment solutions. This shift accelerated the digital transformation of the financial system, reinforcing the importance of digitalization in monetary policy frameworks.

Furthermore, the variance decomposition analysis shows that while e-money is the primary driver of stability in the short term, the money supply becomes the dominant factor in the medium and long term. This aligns with Emara & Said (2021), who emphasized the

role of money supply in sustaining economic growth when supported by appropriate macroeconomic policies. Fluctuations in the money supply were also found to be influenced by both cash and non-cash transactions, particularly through debit cards and e-money (Rasyida & Yuliana, 2019).

The exchange rate and interest rate were also identified as key determinants in maintaining financial stability. Their interactions with e-money and inflation suggest that digital financial tools can indirectly influence monetary variables, requiring policymakers to integrate digitalization trends into macroprudential strategies. The findings also highlight the necessity of complementing monetary policy with macroprudential measures to mitigate risks arising from macro-financial linkages, as noted by Warjiyo (2010) and the IMF (2017).

In the context of Indonesia, where financial inclusion remains a national priority, the results of this study underscore the dual impact of digital economy utilization: it not only promotes broader access to financial services but also enhances the resilience of the financial system. The evidence supports the notion that monetary policies must evolve alongside technological advancements to address emerging risks and harness opportunities presented by digital finance.

Policy Implications:

Strengthening Digital Financial Infrastructure – To support the growing adoption of e-money and other digital payment systems.

- Integrating Digitalization into Monetary Policy – Ensuring that policy tools account for the influence of digital transactions on inflation and money supply.
- Enhancing Financial Literacy – Reducing digital literacy gaps to maximize the benefits of digital financial services.
- Implementing Macroprudential Measures – To complement monetary policy in safeguarding against systemic risks from macro-financial linkages.

Overall, this study provides strong empirical evidence that the synergy between monetary policy and digital economic tools can create a more stable, inclusive, and resilient financial system in Indonesia.

6. Conclusions

The interactions among the variables are diverse, with shocks continuing to occur, leading to increases followed by decreases, and vice versa. Each variable contributes differently, as demonstrated by the reciprocal influence of e-money on the money supply. Furthermore, inflation is affected by both e-money and interest rates. This study concludes that monetary policy influences financial stability through the use of digital economic systems.

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