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The Impact of Non-Cash Payment Systems on Inflation in Indonesia

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ABSTRACT

This study investigates the impact of non-cash payment systems on inflation in Indonesia, focusing on three major instruments: ATM cards, credit cards, and electronic money (e-money). The rapid development of digital payment technologies has transformed consumer behavior and the circulation of money, potentially influencing the country's inflation dynamics. Using a quantitative research approach and multiple linear regression analysis, this study examines monthly data from 2022 to 2024 to assess how different non-cash transactions affect inflation. The empirical findings reveal that ATM card transactions have a positive and statistically significant effect on inflation, indicating that higher ATM transaction volumes are associated with increased consumer spending. Conversely, credit card transactions demonstrate a negative but significant effect, suggesting that deferred payments may moderate inflationary pressures. Meanwhile, e-money transactions have a negative yet insignificant effect, implying limited influence given their lower transaction volume compared to other instruments. Overall, the results highlight that the impact of non-cash payment systems on inflation varies across payment types and their intensity of use, providing valuable insights for policymakers in managing monetary stability amid the growing digitalization of financial systems.

Keywords: Non-cash payment system; ATM card; credit card; e-money; inflation

Introduction

Technological advancement has significantly influenced various aspects of human life, including the financial and banking sectors. One of the most noticeable transformations is the shift from cash-based payment systems to non-cash payment mechanisms. Over time, the use of non-cash payment systems has grown rapidly in Indonesia. The increasing demand for fast, secure, and efficient fund transfer services has driven continuous innovation in payment technologies. In this context, Bank Indonesia plays a crucial role in supervising and ensuring that all developments in non-cash payment systems comply with existing regulations. The reliability and security of these systems are essential for minimizing risks in financial transactions [1].

The adoption of non-cash payment systems in Indonesia dates back to the Japanese and Dutch colonial periods and the early years of independence, when both cash and non-cash transactions were already practiced. During the cash-based period, people primarily used paper money and coins, whereas non-cash payments were conducted through clearing systems. Modern forms of non-cash payments now include electronic fund transfers, ATM cards, debit cards, credit cards, prepaid cards, and digital instruments such as electronic money (e-money) [2].

The widespread use of ATM cards may increase the volume of money in circulation, which, if not properly managed, could trigger inflation through higher demand for goods and services. Similarly, the growing popularity of credit cards, driven by convenience and promotional incentives, can indirectly raise prices through merchant service fees, thereby contributing to inflationary pressures. On the other hand, e-money promotes financial inclusion and transaction efficiency through innovations introduced by national banks to support the digital economy. Monetary stability focuses on maintaining controlled inflation, balanced exchange rates, and interest rates that support sustainable economic growth. The expansion of non-cash payment systems influences money circulation and, consequently, inflation, alongside broader monetary conditions. Therefore, understanding the relationship between non-cash payment systems and inflation is essential, particularly in the Indonesian context [3].

Previous studies have demonstrated that non-cash payment systems have a relevant impact on inflation in several countries. In Indonesia, however, the effects have been mixed. Some studies indicate a significant negative influence of non-cash payments on inflation, primarily because higher transaction volumes via ATMs and credit cards accelerate money velocity and, in turn, stimulate inflationary pressures. Moreover, the ease and efficiency of e-money

transactions encourage higher consumer spending, potentially intensifying inflationary trends [4]. As cash transactions continue to decline, technological innovations have further accelerated the adoption of non-cash payment methods such as ATM/debit cards, credit cards, and e-money, which are increasingly preferred by consumers. In the digital era, a deeper understanding of their impact on inflation is essential to inform effective monetary and economic policy formulation [5].

Despite the growing literature on non-cash payment systems and inflation, empirical findings for Indonesia remain inconclusive, particularly regarding the direction and magnitude of the effects across different instruments. Several studies document either positive or negative impacts of non-cash transactions on inflation, while others report mixed or insignificant results. At the same time, there is still limited evidence that simultaneously distinguishes the roles of ATM cards, credit cards, and e-money using recent post-pandemic data. This study addresses this gap by examining how these three major non-cash payment instruments jointly and differentially affect inflation in Indonesia during 2022–2024.

Payment Systems

The evolution of payment systems has been driven by increasing transaction value, growing risk, the complexity of financial processes, and rapid technological advancements. Cash payment systems have undergone a substantial transformation from commodity-based money to fiat money. Meanwhile, non-cash payment systems have evolved from paper-based instruments such as checks and demand deposits to electronic-based instruments, including payment cards and electronic money (e-money). Each phase of this evolution has played a crucial role in supporting the smooth functioning of payment mechanisms in economic activities [6].

Technological progress has led to the emergence of two major types of payment systems: cash and non-cash. Cash payments refer to transactions using money in physical form - banknotes or coins - which are legally recognized as valid means of payment. In Indonesia, banknotes are available in denominations of IDR 1,000, 2,000, 5,000, 10,000, 20,000, 50,000, and 100,000, while coins are issued in denominations of 100, 200, 500, and 1,000 rupiah.

In contrast, non-cash payment systems are sets of rules, procedures, and instruments designed to facilitate value exchange in transactions among individuals, financial institutions, and private entities and the banking sector [7]. In practice, these systems rely on interbank transfers and use various instruments, such as ATM cards, debit cards, credit cards, and e-money, as payment media [8].

ATM Cards

An Automated Teller Machine (ATM) card is a payment instrument that allows customers to perform self-service banking transactions through automated electronic terminals. The primary function of ATMs is to enable customers to conduct basic financial transactions such as cash withdrawals, balance inquiries, and fund transfers quickly and efficiently without direct interaction with bank staff. The increasing adoption of ATM cards enhances transaction efficiency and liquidity within the financial system [9].

Credit Cards

A credit card is a payment instrument issued by a financial institution that provides a predetermined credit limit to the cardholder. It enables consumers to make purchases or payments up to the assigned limit, with the obligation to repay either in full or in instalments according to the agreed terms. The convenience, deferred payment feature, and promotional incentives associated with credit cards have contributed to their widespread use, influencing consumer spending patterns and, indirectly, inflationary dynamics in the economy [9].

Electronic Money (E-Money)

Electronic money, or e-money, refers to digital payment instruments stored on a server or on a chip-based card and regulated by Bank Indonesia. E-money facilitates smooth transactions across various sectors, including transportation (such as railways and public transit), toll road payments, and retail transactions in supermarkets, food courts, and parking facilities. Popular e-money providers in Indonesia include ShopeePay, LinkAja, Paytren, iSaku, OVO, GoPay, Uangku, T-Cash, Brizzi, Mandiri e-money, and Flazz. The growing use of e-money supports financial inclusion, promotes convenience, and enhances digital economic participation among Indonesian consumers [10].

Inflation

Inflation is a persistent, general increase in the prices of goods and services over a specific period. Temporary or short-term price increases are not classified as inflation, as inflation is typically measured over at least one month, or approximately 30 days. Furthermore, price increases in only one or a few commodities do not constitute inflation

unless they trigger broader price increases in other goods and services [11]. Inflation remains a critical indicator of macroeconomic stability, influencing purchasing power, investment decisions, and monetary policy formulation [12].

The novelty of this study lies in its comparative analysis of three major non-cash payment instruments using recent monthly data (2022–2024) to capture post-pandemic inflation dynamics in Indonesia.

Research Method

This study employs a quantitative research approach to collect and analyze numerical data related to non-cash payment transactions and inflation in Indonesia. The purpose of this approach is to statistically examine the relationship between the two variables and determine the extent to which non-cash payment systems influence inflation. The chosen methodology provides a systematic explanation of how various forms of non-cash transactions, such as ATM cards, credit cards, and e-money transactions, affect inflationary dynamics in the Indonesian economy [13].

A multiple linear regression was used as the primary analytical tool to assess the relationship between several independent variables and a single dependent variable, specifically the influence of non-cash payment transactions on inflation. The study uses time-series data from the observation period and analyzes it using SPSS (Statistical Package for the Social Sciences) version 23 [14].

The general multiple linear regression model used in this study is formulated as follows:

$$Yt = \alpha + \beta_1 LogX_1t + \beta_2 LogX_2t + \beta_3 Log3t + et$$

Where:
Y = Inflation
α = Constant
X_1 = ATM card transactions
X_2 = Credit card transactions
X_3 = E-money transactions
t = Time series (year)
$\beta_{1,2,3}$ = Regression coefficients of independent variables
et = Error term

The observation period from 2022 to 2024 was deliberately chosen to represent the normalization phase of Indonesia's economy after the COVID-19 pandemic, when digital payment adoption accelerated, and Bank Indonesia's monetary policy gradually shifted from crisis response to stabilization. This period, therefore, provides relevant context for assessing how non-cash payment instruments interact with inflation in a post-pandemic environment.

Since the data used in this study are time series, the regression results may be potentially affected by issues such as non-stationarity and spurious correlation. Although the model satisfies the tested classical assumptions, future research is encouraged to incorporate formal stationarity tests and more advanced time-series techniques to strengthen the robustness of the findings [15].

Results and Discussion

Descriptive Analysis

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
X1	36	13.1740353200	13.4247822000	13.326549963889	.0616569781718
X2	36	10.0929071500	10.6855776900	10.402093275000	.1376287210368
X3	36	13.5329390700	14.6693719500	14.187034276667	.3026278960135
Y	36	1.550	5.950	3.39833	1.325882
Valid N (listwise)	36				

Table 1 presents the descriptive statistics for the four variables used in this study: ATM Card Transactions (X_1),

Credit Card Transactions (X_2), Electronic Money Transactions (X_3), and Inflation (Y).

For ATM card transactions (X_1), the results indicate a minimum value of IDR 526,515.115 and a maximum value of IDR 676,563.913. The mean value is IDR 614,387.334, with a standard deviation of IDR 37,372.311, indicating relatively high variation in transaction volumes over the observation period.

For credit card transactions (X_2), the minimum value is IDR 24,170.959, and the maximum is IDR 43,720.732. The average transaction value is IDR 33,232.512, with a standard deviation of IDR 4,572.456, indicating moderate dispersion in transaction activity over time.

Electronic money transactions (X_3) also exhibit considerable variation, ranging from IDR 753,842.753 to IDR 2,348,698.614. The mean value is IDR 1,511,345.733 and the standard deviation amounts to IDR 414,470.078, indicating substantial fluctuation in e-money usage among consumers during the study period.

In contrast, the inflation rate (Y) shows relatively limited variability, with a minimum of 1.55% and a maximum of 5.95%. The mean inflation rate is 3.3983% and the standard deviation is 1.3259, implying stable price levels during the sample period.

Finally, the Valid N (listwise) value indicates that all variables consist of 36 valid observations, meaning the dataset is complete with no missing or incomplete values. This ensures the reliability of subsequent regression analysis.

Classical Assumption Tests

Normality Test

Table 2. *Normality Test*

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		36
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	.95694214
Most Extreme Differences	Absolute	.095
	Positive	.094
	Negative	-.095
Test Statistic		.095
Asymp. Sig. (2-tailed)		.200[c,d]

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

d. This is a lower bound of the true significance.

The results presented in the table indicate that the Kolmogorov–Smirnov normality test shows no significant deviation from a normal distribution. This is evidenced by the obtained Asymp. Sig. (p-value) of 0.200, which is greater than the conventional significance threshold of 0.05. Therefore, the residuals in this study are normally distributed, indicating that the regression model satisfies the normality assumption and is appropriate for further statistical analysis.

Multicollinearity Test

Table 3. *Multicollinearity Test*

Coefficients[a]

Model		Collinearity Statistics	
		Tolerance	VIF
1	X1	.801	1.248
	X2	.242	4.130
	X3	.270	3.707

a. Dependent Variable: Y

Based on the results presented in the table, the Variance Inflation Factor (VIF) values are 1.248 for ATM Card Transactions, 4.130 for Credit Card Transactions, and 3.707 for Electronic Money Transactions. Since all VIF values are below the threshold of 10, this indicates that no multicollinearity exists among the independent variables in the regression model [16]. Therefore, it can be concluded that each independent variable has a sufficiently low correlation with the others, allowing them to be used reliably in explain variations in the dependent variable (inflation).

Heteroskedasticity Test

The heteroskedasticity test assesses whether the variance of the residuals from one observation to another is constant. A good regression model assumes homoskedasticity, meaning the residual variance remains constant across observations.

In this study, heteroskedasticity was examined using a scatter plot of standardized residuals (SRESID) versus predicted values (ZPRED). As illustrated in Figure 1, the residuals are randomly dispersed above and below the zero line without forming any systematic pattern. This randomness indicates the absence of heteroskedasticity in the regression model.

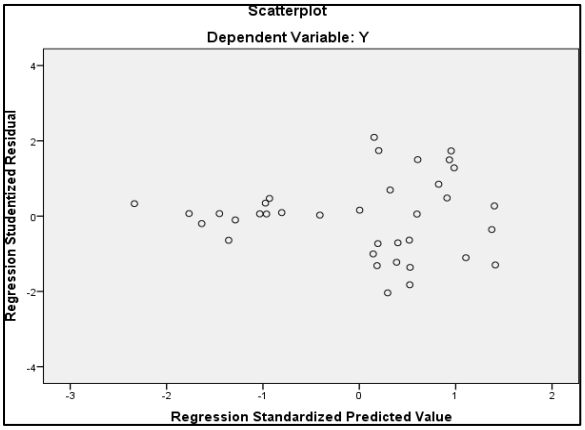

Figure 1. Heteroskedasticity Test

Based on the figure above, the scatterplot shows that the residual points are evenly distributed above and below the zero line on the Y-axis (Inflation) without forming any discernible pattern. This uniform dispersion indicates that the residual variance remains constant across observations and that no systematic pattern is present. Therefore, the regression model is free of heteroskedasticity. This finding confirms that the data satisfy the homoscedasticity assumption, ensuring the model's validity for further analysis and interpretation of the relationships among the examined variables.

Hypothesis Testing Results

Coefficient of Determination (R and R^2 Test)

The correlation coefficient (R) and the coefficient of determination (R^2) are employed to measure the strength of association and the explanatory power of independent variables in relation to the dependent variable. The correlation coefficient (R) indicates the direction and strength of the relationship between variables, while the coefficient of determination (R^2) explains the proportion of variance in the dependent variable that is accounted for by the independent variables in the regression model.

The results of the Model Summary are presented as follows:

Table 4. Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.692[a]	.479	.430	1.00794

a. Predictors: (Constant), X3, X1, X2

b. Dependent Variable: Y

Based on the results presented above, the correlation coefficient (R) value of 0.692 indicates a moderately strong positive relationship between the independent variables - ATM Card, Credit Card, and E-Money transactions - and the dependent variable, Inflation, in Indonesia.

Furthermore, the coefficient of determination (R^2) of 0.479 indicates that 47.9% of the variation in inflation is explained by the three independent variables in the regression model. The remaining 52.1% is influenced by other factors not included in this model, such as macroeconomic variables such as interest rates, economic growth, and exchange rate fluctuations.

Thus, these findings imply that the use of non-cash payment instruments significantly contributes to explaining inflation fluctuations in Indonesia, although it is not the sole factor driving changes in inflation.

F-Test (Test of Overall Significance)

The F-test is used to determine whether all independent variables in the regression model, when considered simultaneously, have a statistically significant influence on the dependent variable. In this study, an F-test was conducted to evaluate the overall significance of the regression model and to assess whether the model effectively predicts the dependent variable (inflation).

Table 5. F-Test

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	29.478	3	9.826	2.901	.000[b]
	Residual	32.051	32	1.002		
	Total	61.529	35			

a. Dependent Variable: Y

b. Predictors: (Constant), X3, X1, X2

The results presented in the table above indicate that the regression model is statistically significant in explaining the influence of non-cash payment transactions on inflation levels in Indonesia. The computed F-statistic value **(**F = 9.810**)** is greater than the critical F-table value (F = 2.901), and the significance probability (p-value = 0.000) is smaller than the 0.05 threshold.

Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. This implies that all independent variables ATM Card (X_1), Credit Card (X_2), and E-Money (X_3) jointly exert a significant effect on the dependent variable, Inflation (Y).

This finding confirms that variations in inflation in Indonesia can be significantly explained by the collective influence of non-cash payment instruments, reinforcing the macroeconomic relevance of digital financial transactions in shaping price stability.

Partial Significance Test (t-Test)

The t-test is conducted to determine the individual significance of each independent variable in explaining variations in the dependent variable, while assuming that all other variables remain constant. A variable is considered statistically significant if the calculated t-value exceeds the critical t-table value at a 5% significance level ($\alpha = 0.05$), or equivalently, if the significance probability (p-value) is less than 0.05.

Table 6. t-Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-58.774	49.355		-1.191	.242
	X1	8.219	3.065	.382	2.681	.011
	X2	-6.087	2.498	-.632	-2.437	.021
	X3	1.126	1.076	.257	1.046	.303

a. Dependent Variable: Y

The t-test results presented above show the partial effects of each independent variable on inflation in Indonesia. Based on the statistical output, the regression equation derived from this study can be formulated as follows:

$$\boldsymbol{Y = -58,774 + 8,219X1 - 6.087X2 + 1.126X3}$$

The interpretation of the regression coefficients is as follows:

1. Constant (α = -58.774)
   The constant term indicates that, if ATM card, credit card, and e-money usage is assumed to be zero, the baseline inflation rate in Indonesia would be -58.774 (hypothetically negative, representing the intercept).
2. ATM Card Transactions (X_1)
   The regression coefficient for X_1 is 8.219 with a p-value of 0.011 < 0.05, indicating a positive and statistically significant effect on inflation. This suggests that an increase of one billion rupiah in ATM card transactions tends to raise inflation by 8.219 units, assuming other variables remain constant. The result implies that higher ATM card activity increases money circulation and aggregate demand, thereby exerting upward pressure on prices.
3. Credit Card Transactions (X_2)

The regression coefficient for X_2 is -6.087 ($p < 0.05$), indicating a negative and significant relationship with inflation. This indicates that an increase of one billion rupiah in credit card transactions tends to reduce inflation by 6.087 units, ceteris paribus. The result implies that deferred payments associated with credit cards may help to smooth consumption and mitigate short-term inflationary pressures.

4. E-Money Transactions (X_3)
   The regression coefficient for X_3 is 1.126, with a p-value of 0.303 (> 0.05), indicating that e-money transactions have no statistically significant effect on inflation. Although e-money use is growing rapidly, its influence on inflation remains limited, possibly because transaction values are relatively small compared with traditional banking instruments.

Overall, the results indicate that ATM Card and Credit Card transactions significantly affect inflation, while E-Money transactions do not. These findings highlight that the macroeconomic impact of digital payment systems in Indonesia still varies depending on the type and scale of non-cash instrument use.

Discussion

The Effect of ATM Card Transactions on the Inflation Rate

Based on the results of the multiple linear regression analysis, the ATM card transaction variable has a regression coefficient of 8.219, a significance level of 0.011, and a t-statistic of 2.681, which exceeds the critical t-table value of 2.03693. This finding indicates that ATM card transactions have a positive and statistically significant effect on the inflation rate in Indonesia.

The coefficient value of 8.219 implies that for every one-unit increase in ATM card transactions, the inflation rate increases by 8.219 units, assuming other variables remain constant. The p-value of 0.011 < 0.05 indicates that this relationship is statistically significant at the 95% confidence level.

This result reinforces the notion that the ease of conducting transactions through ATM cards stimulates higher household consumption. When individuals can easily withdraw cash or make direct purchases via debit cards, aggregate demand tends to rise. In the short term, an increase in demand without a corresponding increase in supply may create demand-pull inflationary pressure. Therefore, the proliferation of ATM card usage can contribute to inflation through its role in facilitating liquidity and accelerating the velocity of money in the economy [17].

The positive and significant coefficient for ATM card transactions suggests that greater ATM card use is associated with higher inflation, reflecting ATM-based payments' role in accelerating the velocity of money and stimulating aggregate demand.

The Effect of Credit Card Transactions on the Inflation Rate

The regression analysis reveals a negative and significant relationship between credit card transactions and inflation, as evidenced by a regression coefficient of -6.087, a significance value of 0.021, and a t-statistic of -2.437, which exceeds the critical value of ±2.03693. Since the significance value is below 0.05, it can be concluded that credit card transactions significantly and negatively affect inflation in Indonesia.

The negative coefficient implies that every one-unit increase in credit card transactions reduces the inflation rate by approximately 6.087 units, holding other factors constant. Although credit cards facilitate consumption, this finding suggests that credit card use in Indonesia has not yet emerged as a major driver of inflationary consumption.

Unlike debit or cash payments, credit cards involve short-term borrowing, interest charges, and credit limits that restrain excessive consumption. Moreover, in Indonesia, credit card ownership is predominantly among the upper-middle class, who typically demonstrate higher financial literacy and more disciplined consumption habits. Consequently, increases in credit card transactions may not directly correspond to higher aggregate consumption and may even exert a moderating effect on inflationary pressures [18].

The negative and significant coefficient for credit card transactions indicates that greater reliance on credit cards is associated with lower inflation, consistent with the notion that deferred payments, credit limits, and repayment obligations may smooth consumption over time and prevent excessive short-term demand pressures.

The Effect of E-Money Transactions on the Inflation Rate

The findings indicate that e-money transactions have a positive but statistically insignificant effect on inflation in Indonesia. The regression results show a coefficient of 1.126, a significance level of 0.303 > 0.05, and a t-statistic of 1.046, which is below the critical t-value of 2.03693. Although the direction of the relationship suggests that higher e-money usage is associated with a slight increase in inflation, the effect is not statistically significant.

E-money transactions in Indonesia generally involve small-scale, day-to-day payments, such as transportation fares and food or beverage purchases, which contribute only marginally to aggregate demand. Moreover, e-money represents a change in payment method rather than a substantial increase in overall consumption volume. From the

perspective of the Quantity Theory of Money, e-money contributes minimally to the expansion of the money supply and thus exerts limited inflationary pressure.

In addition, e-money operates primarily as a prepaid instrument, with funds deposited into the system before use. This mechanism prevents an immediate increase in money circulation compared to credit-based instruments. Therefore, it can be concluded that, during the study period, e-money transactions did not have a statistically significant impact on inflation in Indonesia [19].

The positive but insignificant coefficient for e-money implies that, although e-money use is expanding, its contribution to inflation remains limited at the aggregate level. In the Indonesian context, e-money transactions are predominantly used for low-value, high-frequency payments such as transport, tolls, and small retail purchases, and are mostly prepaid. As a result, e-money functions more as a payment substitution mechanism than as a credit-creating instrument, which helps explain why its aggregate impact on inflation is statistically insignificant de spite rapid growth in usage.

Conclusion

This study investigates the impact of non-cash payment systems on inflation in Indonesia, focusing on three primary instruments: ATM cards, credit cards, and electronic money (e-money). Using a multiple linear regression approach and monthly time-series data from 2022 to 2024, the findings reveal differentiated effects among these instruments.

The results indicate that ATM card transactions have a positive and significant effect on inflation, implying that greater access to funds through ATM cards enhances liquidity and stimulates consumer spending. This increase in aggregate demand tends to elevate inflationary pressure.

Conversely, credit card transactions have a significant negative influence on inflation. Although credit cards facilitate consumption through credit mechanisms, repayment obligations, credit limits, and interest rates lead to more cautious consumer behavior. As a result, the use of credit cards may actually restrain excessive consumption and contribute to inflation moderation [20].

Meanwhile, e-money transactions demonstrate a positive but statistically insignificant relationship with inflation. This outcome suggests that, while e-money promotes convenience and efficiency in small-scale transactions, its overall macroeconomic impact remains limited. The scale of usage and transaction values is still relatively small compared to traditional payment instruments.

In summary, these findings confirm that not all non-cash payment instruments exert uniform or direct impacts on inflation. The influence depends largely on transaction characteristics, the scale of use, and consumers' behavioral aspects. This highlights the importance of differentiating between digital payment instruments when assessing their macroeconomic implications.

The large negative intercept should be interpreted with caution, as it mainly reflects the statistical intercept of the regression line rather than a meaningful economic value when all transaction variables are hypothetically zero; therefore, the discussion focuses on the estimated slopes of the non-cash payment variables.

Policy Implications

Based on the empirical results, several policy recommendations can be derived to support monetary stability amid the ongoing digital transformation of Indonesia's payment ecosystem:

1. Integrating digital payments into monetary policy. Bank Indonesia and related authorities should closely monitor ATM, credit card, and e-money transactions and integrate these data into monetary policy and inflation forecasting models to better manage inflation dynamics.
2. Promoting responsible and inclusive digital payment use. Policies to expand digital payments must be accompanied by financial literacy programs on debt management, credit use, and digital security, while encouraging broader adoption of e-money among SMEs and rural communities to enhance financial inclusion without adding inflationary pressure.
3. Balancing innovation with monetary stability. As Indonesia moves toward a cashless economy, regulators need to ensure that financial innovation does not compromise monetary stability, maintain public confidence, and support resilient, sustainable economic growth.

Limitations

This study has several limitations. First, it does not incorporate other macroeconomic variables such as interest rates, broad money supply, and exchange rates, which may also influence inflation dynamics. Second, the observation

period is relatively short (2022–2024) and captures only the early post-pandemic phase. Third, the analysis relies on a linear regression framework that does not fully capture potential long-run and dynamic relationships between digital payments and inflation. Future research could address these limitations by extending the sample period, adding key macroeconomic controls, and applying more advanced time-series models such as VECM or ARDL.

Future Research Directions

Although this study contributes valuable insights into the relationship between non-cash payment systems and inflation, several avenues remain open for further exploration.

Future research could:

1. Incorporate a longer observation period and additional macroeconomic variables such as interest rates, money supply, and GDP growth to capture a more comprehensive view of monetary dynamics.
2. Employ advanced econometric techniques, such as Vector Error Correction Models (VECM) or Autoregressive Distributed Lag (ARDL) approaches, to analyze long-term causality and short-term adjustments between digital payments and inflation.
3. Investigate behavioral aspects of consumers' digital payment adoption, exploring how trust, convenience, and financial literacy mediate the impact of payment systems on spending behavior and price levels.
4. Compare cross-country evidence among ASEAN economies to evaluate whether similar digital payment trends produce comparable inflationary outcomes across different monetary frameworks.
5. Explore policy simulations using digital transaction data and machine learning models to predict inflation responses under various digitalization scenarios

By following these directions, future research can provide a deeper, more nuanced understanding of how the evolving digital payment landscape interacts with monetary policy, consumption behavior, and price stability in emerging economies such as Indonesia.

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