PAYMENT SYSTEM REVOLUTION AND MONETARY POLICY IN THE FACE OF GOODS PRICE TRANSFORMATION: THE EFFECT OF NON-CASH TRANSACTIONS, INTEREST RATES, EXCHANGE RATES, ON INDONESIAN INFLATION

Rahmansyah Harum[1]
Universitas Negeri Medan, Medan, Indonesia
rahmansyah12.harum@gmail.com

Indra Maipita[2]
Universitas Negeri Medan, Medan, Indonesia
imaipita@gmail.com

Fitrawaty[3]
Universitas Negeri Medan, Medan, Indonesia
fitra53@gmail.com

Abstract

This study aims to analyze the effect of non-cash transactions, interest rates, and exchange rates on inflation in Indonesia in the period from January 2021 to December 2023. Using the Error Correction Model (ECM) approach, this study examines the short-term and long-term relationships between these variables. The results of the study indicate that non-cash transactions have a negative and significant effect on inflation in both the short and long term, indicating that the development of digital payment systems can increase economic efficiency and suppress inflation. Meanwhile, interest rates do not have a significant effect on inflation in the short or long term, while exchange rates have a positive and significant effect on inflation in the long term. These findings provide important implications for monetary policymakers in an effort to maintain price stability amidst the transformation of the digital payment system.

Keywords: Inflation, Non-Cash Transactions, Interest Rates, Exchange Rates, ECM, Economic Efficiency, Monetary Policy

INTRODUCTION

Inflation reflects an imbalance between aggregate demand and supply in a country's economy. According to Fadilla & Purnamasari (2021), rising inflation can lead to excessive price increases, decreased consumer purchasing power, disruptions in resource allocation, and economic uncertainty.

In Indonesia, inflation increased to 5.59% in 2022, driven by adjustments in subsidized fuel prices that led to higher transportation and staple food costs. This shows that inflation is not only influenced by supply-demand gaps but also by government fiscal policies, including subsidy reductions.

Inflation may stem from supply-side shocks, such as rising global oil prices or natural disasters (Fitrawaty et al., 2020). Increased public consumption, supported by rapid technological advancements in payment systems, has contributed to inflationary pressure. The shift from cash to non-cash payments—such as transfers, debit cards, and e-wallets—has transformed the financial landscape by increasing the velocity of money circulation.

The widespread use of electronic payment systems has facilitated transactions, especially during periods requiring limited physical contact, such as the COVID-19 pandemic. These non-cash payment instruments are often used interchangeably for online shopping and bill payments, contributing to the complexity of tracking monetary flows and potential inflationary trends.

Interest rates, as a central bank instrument, play a pivotal role in managing inflation. Higher interest rates reduce money supply by discouraging borrowing and stimulating savings, while lower rates encourage spending and investment. During July 2022 to January 2023, Bank Indonesia gradually increased its benchmark rate by 25 basis points, reaching 5.75%, to curb inflation triggered by rising fuel prices and demand-side pressures (Burhan, 2023).

Exchange rate fluctuations also influence inflation through the pass-through effect on imported goods and production costs. The depreciation of the rupiah—particularly against the US dollar—intensifies imported inflation. In 2022, the rupiah weakened by 9.31%, driven by capital outflows following increases in the US Federal Reserve's interest rate. In 2023, the rupiah fluctuated, reaching its weakest point at IDR 15,935/USD in October and its strongest at IDR 14,665/USD in April.

While economic theory suggests that exchange rate depreciation leads to higher inflation, empirical evidence in Indonesia shows mixed results. Some studies find no significant long-term impact of exchange rates on inflation, while others suggest bi-directional causality (Faizin, 2020; Putri & Amilia, 2022).

Several studies have examined the impact of non-cash payments, interest rates, and exchange rates on inflation in Indonesia, yielding varied results. For instance, Kalbuadi & Yanthi (2021) found that the money supply has a significant impact, while e-money does not. Similarly, Sriwahyuni et al. (2020) noted that interest rates significantly influence inflation in North Sumatra, but exchange rates and money supply do not.

Given these inconsistencies, this study re-examines the effect of non-cash transactions, interest rates, and exchange rates on inflation in Indonesia using the Error Correction Model (ECM) to capture both short-term dynamics and long-term relationships.

RESEARCH METHOD

This study was conducted in Indonesia with the objective of analyzing the influence of macroeconomic variables, specifically non-cash transactions, interest rates, and exchange rates, on inflation. The research covers the period from January 2021 to December 2023, reflecting recent economic developments during the post-pandemic recovery phase. The approach employed in this research is quantitative, relying on secondary time-series data that are numerical and measurable in nature. The data were obtained from official and reliable sources, namely the websites of Bank Indonesia (BI) and the Central Statistics Agency (BPS).

The variables examined in this study include inflation as the dependent variable and non-cash transactions, interest rates, and exchange rates as the independent variables. The non-cash transaction variable consists of aggregated data from electronic money and card-based payment instruments (Alat Pembayaran Menggunakan Kartu/APMK). Data collection was carried out using the documentation method, which involves collecting data through the study of existing documents that are relevant to the research objectives. According to Sukardi (2003), documentation is a method aimed at obtaining data through recorded information such as reports or archives, and in this study, it involves accessing official time-series data through BI and BPS.

The analysis technique applied in this research is the Error Correction Model (ECM). This model is suitable for use when the time-series data demonstrate cointegration among variables, allowing the model to capture both short-term dynamics and long-term equilibrium relationships. In this model, the dependent variable is influenced not only by changes in the independent variables but also by the correction mechanism for the imbalance from the long-term relationship, which is represented by the Error Correction Term (ECT). To support the analysis, several statistical tests are applied, including the cointegration test to verify the existence of a long-term relationship among variables, the F-statistic test to assess the overall significance of the model, and the coefficient of determination (R^2) to determine how much of the variation in inflation is explained by the independent variables in the model.

RESULTS AND DISCUSSION

Inflation Development

The development of a country's economy is always related to inflation, which is quite an important factor because it is related to the welfare of the people. According to (Miskhin, 2008)inflation is an increase in price levels that occurs continuously and affects individuals, entrepreneurs, and the government. An overview of inflation that shows fluctuating data developments according to the observation period (January 2021 to December 2023), as shown in the following figure.

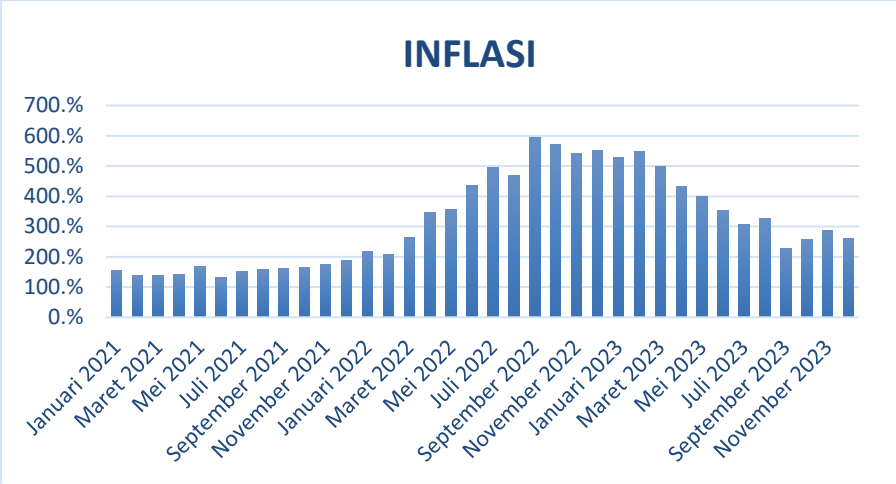
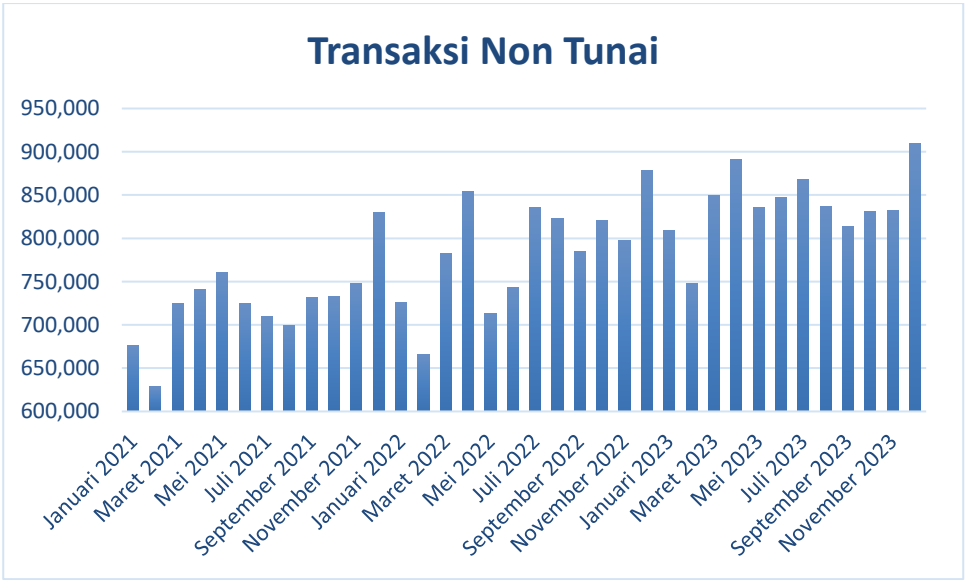


Figure 1
Inflation Development Figure 2021:1 – 2023:12

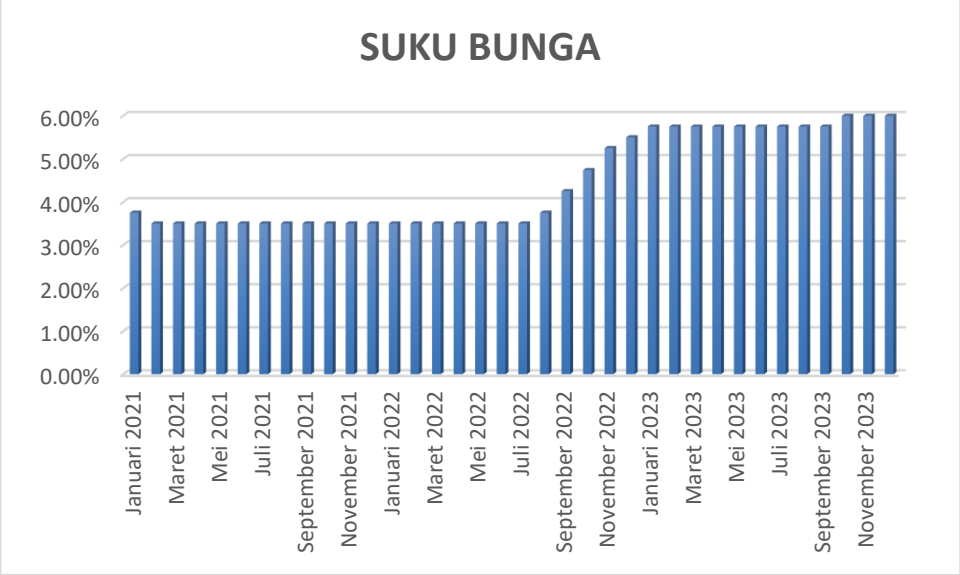
Development of Non-Cash Transactions



Source: Bank Indonesia

Figure 2
Non-Cash Transaction Development Figure 2021:1 – 2023:12

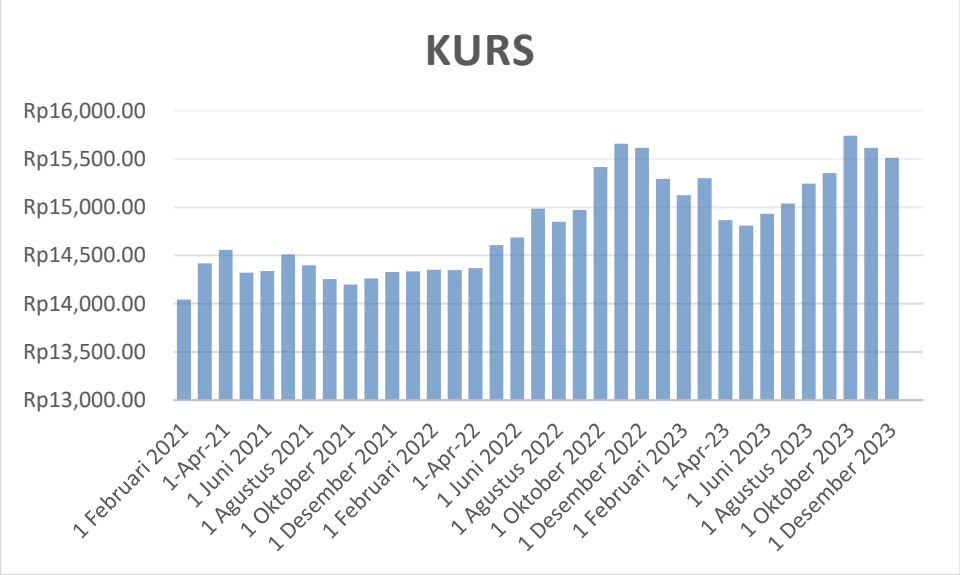
Interest Rate Developments



Source: Central Statistics Agency (BPS)

Figure 3
Interest Rate Development Chart 2021:1 – 2023:12

Exchange Rate Development



Source: Bank Indonesia

Figure 4
Exchange Rate Development Image 2021:1 – 2023:12

Normality Test

The normality test is used to test whether in the regression model, the independent variables and dependent variables are normally distributed or not. A good regression model is if the data distribution is normal or close to normal. Testing is done using the Jarque Bera

Test or JB Test. The assumption of normality can be met, we assess the statistical probability of the value (JB) > 0.05 and the following data is obtained:

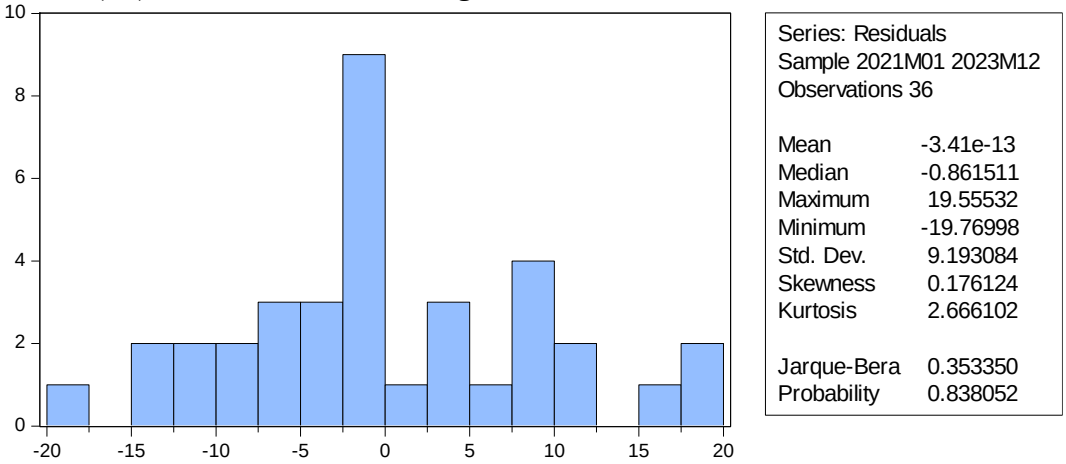


Figure 5
Normality Test Image

Based on the results of the data processing above, it shows the statistical probability value (JB) of 0.838052 > α = 5% (0.05). So, it can be obtained that the data used in the ECM model is normally distributed.

Autocorrelation Test

Autocorrelation is a form of notification that there is a correlation between members of one observation with another observation at different times. To test the existence of autocorrelation, one of them is by conducting the Breusch-Godfrey Test or the Langrange Multiplier (LM) Test. From the results of the LM test, if the calculated F Prob value is greater than alpha 0.05 (5%) it states that the model is free from autocorrelation. And vice versa if the calculated F prob value is smaller than the alpha level of 0.05 (5%) it means that autocorrelation occurs. If the data contains autocorrelation, the data must be repaired immediately so that the model can still be used.

Table 1
Autocorrelation Test Results Table

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	1.561697	Prob. F(2,30)	0.2264
Obs*R-squared	3.394647	Prob. Chi-Square(2)	0.1832

Based on the image above, the autocorrelation test in the table above shows the calculated F probability value of 1.561697 > 0.05 as well as the Prob. F (2,30) value of 0.2264 > α value = 0.05 (5%), so it can be concluded that the ECM model is free from autocorrelation problems.

Multicollinearity Test

One deviation from the classical assumption is if there is multicollinearity or a perfect linear relationship between all independent variables, which makes it difficult to see the effect of explanatory variables on the variables explained. To test for multicollinearity in a study by looking at the Tolerance and Variance Inflation Factor (VIF) values. If the

tolerance is 0.10 or VIF <10.00, it is said that there is no multicollinearity problem between the independent variables.

Table 1
Multicollinearity Test Results Table

Variance Inflation Factors
Date: 05/27/25 Time: 09:53
Sample: 2021M01 2023M12
Included observations: 36

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	264580.7	103043.4	NA
LnTNT	3471.248	46939.45	1.973187
LnSBI	107.9183	9.880953	1.233775
LnCURS	5066.687	181922.8	2.262992

Based on the results of the multicollinearity test in the table above, it shows that all variance values are below 10. Or the VIF value <10, then it can be concluded that there is no multicollinearity value between the independent variables.

Heteroscedasticity Test

Heteroscedasticity aims to test whether in the regression model there is inequality of variance from the residuals of one observation to another. A good regression model is homoscedasticity or no heteroscedasticity. Heteroscedasticity testing is carried out using the White test. If the calculated Prob F value is greater than the alpha level of 0.05 (5%) then there is no heteroscedasticity.

Table 3
Heteroscedasticity Test Results Table

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.494595	Prob. F(3,32)	0.6886
Obs*R-squared	1.595287	Chi-Square Prob.(3)	0.6605
Scaled explained SS	1.050039	Chi-Square Prob.(3)	0.7891

Table 4
Unit Root Test Results with ADF Method

Variables	ADF T-Statistic	Critical Value	Prob	Decision

		1%	5%	10%		
Inflation (INF)	-5.952397	-3.639407	-2.951125	-2.614300	0.0000	Stationary
Non-cash transactions (TNT)	-1.404560	-3.646342	-2.954021	-2.615817	0.5681	Non-stationary
Interest rate (SBI)	-2.859142	-3.639407	-2.951125	-2,614300	0.0608	Non-stationary
Exchange Rate (RATE)	-1.176238	-3,632900	-2.948404	-2.612874	0.6736	Non-stationary

Source: Data processed with eviews 10

Based on the table above, it can be seen that the results of the stationary test at the level level only produce one stationary variable at the level level with a significance level of 0.05 (5%), namely the Inflation variable with a prob value of 0.0000 <0.05, so that not all variables are stationary at the level level or still have unit root problems. With the results of these tests, the data needs to be tested again with the degree of integration test (*integration test*).

Unit Root Test Results

Unit root test or stationary data test is conducted to test whether the data is stationary or not. The method widely used by econometricians to test stationary data problems is to use the unit root test with Augmented Dickey Fuller (ADF) developed by Dickey Fuller. With the condition that the calculated ADF value is smaller than the critical value (Mackinon Critical Value) or the prob is greater than the critical value of 0.05 (5%). If the calculated ADF is greater than the critical value, then the data is not stationary. However, if the prob value is smaller or equal to the critical value of 0.05 (5%) then the data is stationary. The results of the unit root test can be seen in the following table:

Table 5
Unit Root Test Results with ADF Method

Variables	ADF T-Statistic	Critical Value			Prob	Decision
		1%	5%	10%		
Inflation (INF)	-5.952397	-3.639407	-2.951125	-2.614300	0.0000	Stationary
Non-cash transactions (TNT)	-1.404560	-3.646342	-2.954021	-2.615817	0.5681	Non-stationary
Interest rate (SBI)	-2.859142	-3.639407	-2.951125	-2,614300	0.0608	Non-stationary
Exchange Rate (RATE)	-1.176238	-3,632900	-2.948404	-2.612874	0.6736	Non-stationary

Source: Data processed with eviews 10

Based on the table above, it can be seen that the results of the stationary test at the level level only produce one stationary variable at the level level with a significance level of 0.05 (5%), namely the Inflation variable with a prob value of 0.0000 <0.05, so that not all variables are stationary at the level level or still have unit root problems. With the results of these tests, the data needs to be tested again with the degree of integration test (*integration test*).

Degree of Integration Test

The degree of integration test is a test conducted to measure at what level of differentiation a stationary variable is and is only needed if all the data is not yet stationary at the level level. The method used is the Augmented Dickey-Fuller (ADF) method, namely by comparing the calculated ADF value with the absolute critical value α = 0.05 (5%). If the data is still not stationary, it is continued with this method at the next level of differentiation until the data is stationary at the same level. The results of the ADF test are as follows:

Table 6
Unit Root Test Results with the ADF Method on First Difference

Variables	ADF T-Statistic	Critical Value			Prob	Decision
		1%	5%	10%		
Inflation (INF)	-9.554516	-3.646342	-2.954021	-2.615817	0.0000	Stationary
Non-cash transactions (TNT)	-9.607815	-3.646342	-2.954021	-2.615817	0.0000	Stationary
Interest rate (SBI)	-3.993106	-3.639407	-2.951125	-2,614300	0.0041	Stationary
Exchange Rate (RATE)	-5.054289	-3.639407	-2.951125	-2,614300	0.0002	Stationary

Cointegration Test

Cointegration test is a test conducted to determine whether there is long-term equilibrium in the model that has been formed. In this study, the cointegration test uses the residual based test method. This residual based test method uses the Augmented Dickey-Fuller (ADF) statistical test, namely by observing the residual stationary cointegration regression at the level. The results of the cointegration test are as follows:

Table 7
Cointegration Test Results Table

Null Hypothesis: ECT has a unit root

Exogenous: Constant

Lag Length: 1 (Automatic - based on SIC, maxlag=9)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistics	-5.576048	0.0001

Test critical values:	1% level	-3.639407
	5% level	-2.951125
	10% level	-2.614300

As seen in the table, the ADF test value obtained is (-5.576048) >*critical value*(-2.951125) with a probability value of ECT 0.0001 < 0.05 (5%), so that the ECT value is stationary at the level. Therefore, there is a significant relationship (cointegration) in the long term between the independent variables and the dependent variables. By obtaining the test results, namely there is a significant relationship (cointegration), the next test is carried out with the Error Correction Model (ECM) test.

Error Correction Model Regression Results

The ECM test is conducted to determine the short-term and long-term effects of each independent variable on its dependent variable. The results of the processing estimation are obtained using the Eviews 10 program, with the ECM regression model, the following results are obtained:

Table 8
ECM Short-Term Regression Estimation Results Table

Dependent Variable: D(INF)
Method: Least Squares
Date: 05/27/25 Time: 09:50
Sample (adjusted): 2021M02 2023M12
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.052429	1.662000	-0.031546	0.9750
D(LnTNT)	-237.4338	48.52436	-4.893084	0.0000
D(LnSBI)	11.19951	16.23063	0.690023	0.4955
D(LnCURS)	192.5811	128.6163	1.497331	0.1448
ECT(-1)	-1.130550	0.177147	-6.382002	0.0000

R-squared	0.684402	Mean dependent variable	-0.341626
Adjusted R-squared	0.642323	SD dependent var	15.93497
SE of regression	9.530085	Akaike information criterion	7.478348
Sum squared residual	2724.676	Black criterion	7.700540
Log likelihood	-125.8711	Hannan-Quinn critter.	7.555049
F-statistic	16.26444	Durbin-Watson stat	1.991842
Prob(F-statistic)	0.000000		

Based on the table shows the estimation results using the method Error Correction Model (ECM) obtained ECT (Error Correction Term) with a negative and significant sign at

α = 0.05 (5%) for inflation estimation (INF), then the above model is valid for use. The Error Correction Model (ECM) in the short term is as follows:

D INF = -0.052429 - 237.4338 LnTNT + 11.19951 LnSBI + 192.5811 LnKURS - 1.130550 ECT (-1) + Σ1

Based on the estimation results above, it shows that in the short term, the interest rate (SBI) and KURS variables have a positive effect on inflation in Indonesia, while the non-cash transaction (TNT) variable has a negative effect on inflation in Indonesia. However, in terms of significance, non-cash transactions (TNT) have a significant effect on inflation (INF) in the short term. The coefficient value of non-cash transactions is -237.4338 with a probability (p-value) of 0.0000, indicating that non-cash transactions have a negative and significant effect on inflation. This means that every 1 percent increase in non-cash transactions can reduce inflation by 237.4338 percent, assuming other variables remain constant (all things being equal).

Table 9
ECM Long-Term Regression Estimation Results Table

Dependent Variable: INF
Method: Least Squares
Date: 05/27/25 Time: 09:45
Sample: 2021M01 2023M12
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-365.0395	514.3741	-0.709677	0.4830
LnTNT	-176.1451	58.91730	-2.989701	0.0053
LnSBI	13.47820	10.38837	1.297431	0.2038
LnCURS	147.2749	71.18067	2.069029	0.0467

R-squared	0.244053	Mean dependent variable	5.032358
Adjusted R-squared	0.173183	SD dependent var	10.57342
SE of regression	9.614357	Akaike information criterion	7.468831
Sum squared residual	2957.948	Black criterion	7.644778
Log likelihood	-130.4390	Hannan-Quinn critter.	7.530241
F-statistic	3.443674	Durbin-Watson stat	2.233684
Prob(F-statistic)	0.028144		

The long-term Error Correction Model (ECM) is as follows:

INF = -365.0395 - 176.1451 LnTNT + 13.47820 LnSBI + 147.2749 LnKURS + Σ2

The results of the ECM estimation above show that in the long term, changes in the Interest Rate (SBI) and KURS variables have a positive effect on inflation in Indonesia. While non-cash transactions (TNT) have a negative effect on inflation in Indonesia.

However, in terms of significance, it was obtained that the non-cash transaction (TNT) and KURS variables had an effect with a coefficient value of -176.1451 with a probability (p-value) of 0.0053 <α = 0.05 (5%) indicating that non-cash transactions have a negative and significant effect on inflation. This means that every 1 percent increasenon-cash transactions are able to reduce 176.1451 percent inflation assuming other variables remain constant (cateris paribus). The KURS variable with a coefficient value of 147.2749 with a probability (p-value) of 0.0467 < α = 0.05 (5%) shows that the KURS has a positive and significant effect on inflation. This means that every 1 percent increase in the KURS is able to increase 147.2749 percent inflation assuming other variables remain constant (cateris paribus).

t-Statistic Test

The t-statistic test is used to determine the effect of each independent variable on the dependent variable. The test is carried out by comparing the calculated t-value with the t-table α = 0.05 (5%) and (df = 36-4 = 32) which is at a value of 2.037. With the following decision-making criteria:

H0= accepted if the prob value > error level α = 0.05

H1= accepted if the prob value < error level α = 0.05

In the implementation of two-way testing, the minus value (-) in tcount is not seen or ignored. Because the minus value does not indicate the amount but rather shows the direction of the relationship, when making a decision, the minus in tcount is not included.

Table 10
Short Term t-statistic Test Table

Dependent Variable: D(INF)
Method: Least Squares
Date: 05/27/25 Time: 09:50
Sample (adjusted): 2021M02 2023M12
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.052429	1.662000	-0.031546	0.9750
D(LnTNT)	-237.4338	48.52436	-4.893084	0.0000
D(LnSBI)	11.19951	16.23063	0.690023	0.4955
D(LnCURS)	192.5811	128.6163	1.497331	0.1448
ECT(-1)	-1.130550	0.177147	-6.382002	0.0000

Based on Table 4.9, the results of the test of the influence of independent variables on dependent variables in the short term individually can be explained as follows:

1 The Non-cash Transaction (TNT) variable has a t-count value of 4.893084. then compared with the t-table value = 2.037, it can be seen that the t-count value is greater than the t-table (4.893084 > 2.037) meaning that in the short term Non-cash Transactions (TNT) have a significant effect on inflation growth in Indonesia.

2 The Interest Rate (SBI) variable has a t-count value of 0.690023. Then compared with the t-table value = 2.037, it can be seen that the t-count value is smaller than the t-table (0.690023 <2.037) meaning that in the short term the Interest Rate (SBI) does not have a significant effect on Inflation growth in Indonesia.

The KURS variable has a calculated t value of 1.497331. then compared with the t table value = 2.037, it can be seen that the calculated t value is greater than the t table (1.497331 < 2.037) meaning that in the short term the KURS does not have a significant effect on inflation growth in Indonesia.

Table 11
Long-Term t-statistic Test Table

Dependent Variable: INF
Method: Least Squares
Date: 05/27/25 Time: 09:45
Sample: 2021M01 2023M12
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-365.0395	514.3741	-0.709677	0.4830
LnTNT	-176.1451	58.91730	-2.989701	0.0053
LnSBI	13.47820	10.38837	1.297431	0.2038
LnCURS	147.2749	71.18067	2.069029	0.0467

Based on the table, the results of the test of the influence of independent variables on dependent variables in the long term individually can be explained as follows:

1 The Non-cash Transaction (TNT) variable has a calculated t value of 2.989701 then compared with the t table value = 2.037, it can be seen that the calculated t value is greater than the t table (2.989701 > 2.037) meaning that in the long term Non-cash Transactions (TNT) have a significant effect on inflation growth in Indonesia.
2 The Interest Rate (SBI) variable has a t-count value of 1.297431. Then compared with the t-table value = 2.037, it can be seen that the t-count value is smaller than the t-table (1.297431 <2.037) meaning that in the long term the Interest Rate (SBI) does not have a significant effect on Inflation growth in Indonesia.
3 The KURS variable has a t-count value of 2.069029. then compared with the t-table value = 2.037, it can be seen that the t-count value is greater than the t-table (2.069029 > 2.037) meaning that in the long term the KURS has a significant effect on inflation growth in Indonesia.

F-Statistic Test

This test is conducted to see whether all independent variables together or simultaneously affect the dependent variable. Hypothesis testing is conducted by comparing the Fcount value with the Ftable value $\alpha = 0.05$ (5%) and df1 = k-1 (df1 = 4 – 1 = 3), df2 = nk (df2 = 36 – 4 = 32) which is 2.901.

Decision-making criteria:

H0accepted if the prob. value > error level α = 0.05
H1accepted if the prob. value < error level α = 0.05

Table 12
F-statistic Test Table

Variables	F-count value	Probability	Information
Short-term	16.26444	0.000000	Significant
Long-term	3.443674	0.028144	α = 0.05 (5%)

Source: Data processed with EViews 10

Based on the table above, the results of data processing using the Error Correction Model method show short-term and long-term effects. Where the short-term obtained the Fcount value (16.26444> 2.901) Ftable with a probability of 0.0000000 <0.05, meaning that there is an influence of Non-cash Transactions (TNT), Interest Rates (SBI), and EXCHANGE on the Inflation variable (INF) in the short term. While in the long term, the Fcount value (3.443674> 2.901) Ftable with a probability of 0.028144 <0.05 can be concluded that there is an influence of Non-cash Transactions (TNT), Interest Rates (SBI), and EXCHANGE on the Inflation variable (INF) in the long term.

Determination Coefficient Test (R^2)

The coefficient of determination value indicates the percentage of variation in the value of the dependent variable that can be explained by the resulting regression equation. The coefficient of determination, R2 value, is between 0 and 1 (0 < R2 < 1) if R2 approaches 1, it means that the influence of the independent variable is stronger in predicting the variation of the dependent variable. If R2 is equal to 0, then there is no influence of the independent variable in predicting the dependent variable.

Table 13
Short-Term Determination Coefficient (R2) Test Table

R-squared	0.684402	Mean dependent variable	-0.341626
Adjusted R-squared	0.642323	SD dependent var	15.93497
SE of regression	9.530085	Akaike information criterion	7.478348
Sum squared residual	2724.676	Black criterion	7.700540
Log likelihood	-125.8711	Hannan-Quinn critter.	7.555049
F-statistic	16.26444	Durbin-Watson stat	1.991842
Prob(F-statistic)	0.000000		

Based on the results of data processing with the Error Correction Model method in the short term, it is known that R-Squared is 0.684402 or 68.44% with a large contribution of the influence of the Non-cash Transaction (TNT), Interest Rate (SBI), and KURS variables contributing to the Inflation (INF) variable. While the remaining 31.56% is influenced by other variables outside this research model.

Table 14
Long-Term Determination Coefficient (R2) Test Table

R-squared	0.244053	Mean dependent variable	5.032358
Adjusted R-squared	0.173183	SD dependent var	10.57342

SE of regression	9.614357	Akaike information criterion	7.468831
Sum squared residual	2957.948	Black criterion	7.644778
Log likelihood	-130.4390	Hannan-Quinn critter.	7.530241
F-statistic	3.443674	Durbin-Watson stat	2.233684
Prob(F-statistic)	0.028144		

Meanwhile, in the long term, only a contribution of 0.244053 or 24.4% was obtained, while the remaining 75.6% was influenced by other variables outside this research model.

The Impact of Non-Cash Transactions on Inflation in Indonesia.

The results of data estimation with the (Error Correction Model) approach show that the influence of the variables of Non-cash Transactions (TNT) in the short term is negative and significant. It is known based on the acquisition of the short-term partial regression coefficient value of -237.4338 and a probability of 0.0000, so that it is significant at $\alpha = 0.05$ (5%). Therefore, in the short term, the variable of non-cash transactions (TNT) has a negative and significant effect on inflation in Indonesia. And in the long term, the variable of non-cash transactions (TNT) has a negative and significant effect. From the results of data processing, the value of the long-term partial regression coefficient is obtained at -176.1451 and a probability of 0.0053, significant at $\alpha = 0.05$ (5%). So that in the long term, the variable of non-cash transactions (TNT) has a negative and significant effect on inflation in Indonesia.

The results of this study reject the existing hypothesis, where non-cash transactions have a positive and significant effect on inflation in Indonesia. The results show that non-cash transactions have a negative and significant effect in both the short and long term. Of course, this provides an extension of the existing theory. In classical monetarist theory, Milton Friedman states, "inflation is triggered by the growth of money supply that exceeds output growth". Where in the context of digitalization, the growth of non-cash transactions can be high or increase without the growth of the physical money supply (paper). Even non-cash transactions encourage efficiency and reduce distribution costs, which can reduce inflationary pressures. So Friedman's theory can be expanded to include that transactions are not only about the amount of money, but also speed, efficiency, and transparency.

The ability of non-cash transactions that have a negative and significant impact on inflation can increase economic efficiency, where non-cash transactions accelerate money circulation, reduce payment waiting times, and minimize operational and physical transaction costs (such as printing money, distribution, and security) so that the price of goods/services can be more stable or decrease. This price reduction or stabilization helps suppress inflation because consumers have greater purchasing power due to lower costs. By achieving monetary stability with an increasing portion of non-cash transactions, the economic data available is more accurate. This real-time data helps the monetary authority (BI) in making decisions on interest rates, monetary policy, and price interventions so that inflation can be better controlled. Transaction efficiency allows business actors to allocate resources better, such as investment or increasing production capacity. If the supply of goods and services increases, inflationary pressures from the demand side can be suppressed.

In line with research conducted by (Safitri & Ariza, 2021) that non-cash payments have a significant effect on inflation in Indonesia. Then, the coefficient value of non-cash payments is -4.390743. This means that if non-cash payments increase by 1%, inflation in Indonesia will decrease by 4.390743%. So, it can be concluded that non-cash payments have

a negative and significant effect on inflation in Indonesia.(Lucky Soraya & Hasyim Ibnu Abbas, 2022)the results of an empirical study stating that the effect of the volume of emoney transactions (LNEMONEY) on inflation (Y) is negative with a coefficient of -0.354778 and a probability value of 0.0025 in the short term and has a coefficient value of -0.333302 and a probability value of 0.0256 in the long term, it can be said that the variable volume of emoney transactions has a negative coefficient and has a significant effect on inflation both in the short term and in the long term.

The Effect of Interest Rates on Inflation in Indonesia

Based on the results of data estimation using the approach (Error Correction Model) obtained the influence of the Interest Rate (SBI) variable in the short term is positive and insignificant. It is known based on the acquisition of the short-term partial regression coefficient value of -11.19951 and a probability of 0.4955, so that it is not significant at $\alpha = 0.05$ (5%). Therefore, in the short term, the Interest Rate (SBI) variable has a positive and insignificant effect on inflation in Indonesia. And in the long term, the Interest Rate (SBI) variable has a positive and insignificant effect. From the results of data processing, the long-term partial regression coefficient value is 13.4780, and a probability of 0.2038 is not significant at $\alpha = 0.05$ (5%). So in the long term, the Interest Rate variable has a positive and insignificant effect on inflation in Indonesia.

Both in the short and long term, interest rates have a positive and insignificant effect on inflation in Indonesia. This result contradicts Keynes' theory that high interest rates will lower inflation because people immediately save their money in commercial banks and hope to get interest from their savings, so that the amount of money in circulation decreases and inflation also decreases. The findings that can be explained by this study are the possibility of reverse causality, where the central bank raises interest rates in response to rising inflation, not as a direct cause of rising inflation. The insignificant effect of interest rates on inflation also shows that fiscal policy has a greater role in influencing dynamics during the study period. It is known that during the study period, inflation fluctuated and experienced an increase in 2022. The Central Statistics Agency (BPS) noted that inflation throughout 2022 reached 5.59%, which was triggered by the government's policy in adjusting subsidized fuel prices, increasing city transportation fares, intercity transportation, online vehicle fares, and also rice.

The Influence of Exchange Rates on Inflation in Indonesia

Based on the results of data estimation using the approach (*Error Correction Model*) obtained the influence of the KURS variable in the short term is positive and insignificant. It is known based on the acquisition of the short-term partial regression coefficient value of 192.5811 and a probability of 0.1448, so that it is not significant at $\alpha = 0.05$ (5%). Therefore, in the short term, the KURS variable has a positive and insignificant effect on inflation in Indonesia. In contrast to the short term, in the long term, the KURS variable has a positive and significant effect. From the results of data processing, the long-term partial regression coefficient value of 147.2749 and a probability of 0.0467 are significant at $\alpha = 0.05$ (5%) is obtained. So in the long term, the KURS variable has a positive and significant effect on inflation in Indonesia.

The positive effect of the exchange rate on inflation is known to be in imports, that when there is an appreciation in the exchange rate, the rupiah will strengthen, causing producers to flock to make purchases of both raw materials and finished goods abroad. The

presence of these imported goods in the short term can suppress inflationary fluctuations. However, entering the long term, dependence on imports makes producers have to always adjust output and production costs. In theory, Purchasing Power Parity (PPP) states that the exchange rate will reflect differences in price levels between countries. If the exchange rate continues to weaken without intervention, then domestic prices will tend to adjust (rise) to maintain purchasing power parity. The comparison of the value of one currency with another currency is determined by the purchasing power of that currency (for goods and services) in each country(Nopirin, 2019). With the increasing price of raw materials from abroad, production costs automatically increase. The increase in production costs causes the price of goods to increase; if this condition continues to occur, it can cause inflation (cost-push inflation)

The exchange rate variable does not have a significant effect on inflation in the short term. In line with research conducted by (Fadilla & Aravik, 2018) and (Mahendra, 2016). Meanwhile, in the long term, the exchange rate has a positive and significant effect on inflation, supported by research.(Selvina & Nurhayati, 2024)Exchange Rate (NT) has a positive and significant impact on inflation in 10 ASEAN countries, where high inflation causes exchange rate depreciation due to increased demand for foreign currency (Jese et al., 2024). The probability test of the exchange rate significantly affects inflation because its value is 0.0006 < 0.05. A rupiah exchange rate that is too strong can hinder imports and trigger inflation. Maintaining the stability of the rupiah exchange rate is important to prevent inflation and support economic growth.

CONCLUSION

Based on the results of the study using the Error Correction Model analysis of the influence of non-cash transactions, interest rates, exchange rates on Indonesian inflation, monthly data from January 2021 to December 2023, the following conclusions can be obtained: The results of the Stationarity Test show that at the level level only the inflation variable (INF) is stationary. While the variables of non-cash transactions (TNT), interest rates (SBI), and exchange rates are stationary at the 1st difference level. In the short term, non-cash transactions have a negative and significant effect on inflation, while interest rates and exchange rates do not have a significant effect on inflation.

In the long term, non-cash transactions have a negative and significant effect, and exchange rates have a positive and significant effect on inflation, while interest rates do not have a significant effect on inflation. In the short term, it is known that R-Squared 0.684402 or 68.44% of the large contribution of the influence of the variables Non-cash transactions (TNT), Interest rates (SBI), and CURS contribute to the Inflation variable (INF). While the remaining 31.56% is influenced by other variables outside this research model. In the long term, only a contribution of 0.244053 or 24.4% was obtained, while the remaining 75.6% was influenced by other variables outside this research model.

The ability of non-cash transactions that have a negative and significant effect on inflation can increase economic efficiency, where non-cash transactions accelerate money circulation, reduce payment waiting times, and minimize operational and physical transaction costs (such as printing money, distribution, and security) so that the price of goods/services can be more stable or decrease. The positive effect of the exchange rate on inflation is known

to be in imports, that when there is an appreciation in the exchange rate, the rupiah will strengthen, causing producers to flock to make purchases of both raw materials and finished materials abroad. The presence of these imported goods in the short term can suppress inflationary fluctuations. However, entering the long term, dependence on imports makes producers always have to adjust output and production costs.

REFERENCES

Agusmianata, N., Militina, T., & Lestari, D. (2017). Pengaruh jumlah uang beredar dan tingkat suku bunga serta pengeluaran pemerintah terhadap inflasi di indonesia. *FORUM EKONOMI*, *19*(2), 2017.

Aprilianto, F., & Muslikhati. (2022). The Impact of a Cashless Payment System on Inflation. *Jurnal Ekonomi Pembangunan*, *20*(02), 124–136.

Asad, I., Ahmad, N., & Hussain, Z. (2012). IMPACT OF REAL EFFECTIVE EXCHANGE RATE ON INFLATION IN PAKISTAN. *AESS: Asian Economic And Sosial Society*, *2*(8). http://aessweb.com/journal-detail.php?id=5002

Boediono. (1980). *Teori Moneter* (2nd ed.). BPFE.

Boediono. (2014). *Seri Sinopsis Pengantar Ilmu Ekonomi No. 5 Ekonomi Makro* (No 5). BPFE.

Burhan, F. A. (2023, February 16). *Suku Bunga Kredit dan Simpanan Bank terkerek sejak juli 2022, ini besarnya*. Bisnis.Com. https://finansial.bisnis.com/read/20230216/90/1628848/suku-bunga-kredit-dan-simpanan-bank-terkerek-sejak-juli-2022-ini-besarannya

Case, K. E., & Ray C, F. (2001). *Principles of Macroeconomics* (6th ed.). Prentice Hall.

Darmawan, D. (2020). ANALISIS PENGARUH E-MONEY, NILAI TUKAR,DAN SUKU BUNGA TERHADAP INFLASIINDONESIA TAHUN 2014-2019. *Ekonomi Dan Bisnis*.

Dona, E., Hidayati, H., Aswan, K., & Oktavian, R. (2022). Berpengaruhkah Jumlah Uang Beredar, Suku Bunga, Ekspor dan Impor terhadap Inflasi di Indonesia? *Jurnal Ekobistek*, *Vol. 11*(No. 4), 355–360. https://doi.org/10.35134/ekobistek.v11i4.411

Fadilla, salim amir, & Purnamasari, A. (2021). Pengaruh Inflasi Terhadap Pertumbuhan Ekonomi Indonesia Anggun Purnamasari. *Ekonomica Sharia: Jurnal Pemikiran Dan Pengembangan Ekonomi Syariah*, *Vol 7 No 1*. www.bps.go.id,

Fadilla, & Aravik, H. (2018). PANDANGAN ISLAM DAN PENGARUH KURS, BI RATE TERHADAP INFLASI. *Ecoment Global*, *Volume 3*(Nomor 2).

Faizin, M. (2020a). Analisis hubungan kurs terhadap inflasi. *AKUNTABEL*, *17*(2), 314–319. http://journal.feb.unmul.ac.id/index.php/AKUNTABEL

Fitrawaty, Mardiyah, A., & Maipita, I. (2020). Analisis Penentuan Inflasi di Sumatera Utara. *ATLANTIS PRESS*, *Volume 124*.

Iswardono. (1996). *Uang dan Bank: Vol. Ed, 4* (4th ed.). BPFE.

Jese, D., Menurung, R., Lumban gaol, R., & Matondang, K. (2024). Analisis Pengaruh Kurs, Investasi dan BI Rate Terhadap Inflasi Tahun 2001-2020. *Akuntansi Manajemen Pariwisata Dan Pembelajaran Konseling*, *2*(2).

Kalbuadi, K., & Dwinda Merlyana. (2021). ANALISIS PENGARUH PELUNCURAN SISTEM E-MONEYDAN JUMLAH UANG BEREDAR TERHADAP INFLASI DI INDONESIA. *Jurnal Cendekia Akuntansi*, *Vol 2*(No 1), 11–23.

Krugman, P. R., & Maurice, O. (2000). *Ekonomi Internasional: Teori dan Kebijakan*. Terjemahan Indeks Lestari.

Kuncoro, M. (2001). *Manajemen Keuangan Internasional*. BPFE.

Lintangsari, N. N., Hidayati, N., Purnamasari, Y., Carolina, H., & Febranto, W. (2018). ANALISIS PENGARUH INSTRUMEN PEMBAYARAN NON-TUNAI TERHADAP STABILITAS SISTEM KEUANGAN DI INDONESIA. *Jurnal Dinamika Ekonomi Pembangunan*.

Lucky Soraya, J., & Hasyim Ibnu Abbas, M. (2022). Does Non-Cash Payments Affect The Inflation Rate In Indonesia? *Management Studies and Entrepreneurship Journal*, *3*(2), 454–465. http://journal.yrpipku.com/index.php/msej

Mahendra, A. (2016). ANALISIS PENGARUH JUMLAH UANG BEREDAR, SUKU BUNGA SBI DAN NILAI TUKAR TERHADAP INFLASI DI INDONESIA. *JRAK*, *2*(1), 1–12.

Mankiw, N. G. (2007). *Makroekonomi* (Ed 6). Erlangga.

Manurung, R., Harefa, W. N., Siburian, D. J. R., & Hasyim Hasyim. (2023). Analisis Pengaruh Kurs Dan Investasi Terhadap Inflasi Sumatera Utara Tahun 2001-2020. *Profit: Jurnal Manajemen, Bisnis Dan Akuntansi*, *2*(3), 17–24. https://doi.org/10.58192/profit.v2i3.968

Miskhin, F. S. (2008). *Ekonomi Uang, Perbankan, dan Pasar Keuangan* (L. Soelistianingsih & B. Yulianita, Eds.; Edisi 8, Vol. 1). Salemba Empat.

Miskhin, F. S. (2009). *The Economy Of Money, Banking And Financial Market* (8th ed.). Salemba Empat.

Nanga Muana. (2001). *MAKROEKONOMI: Teori, Masalah dan Kebijakan* (1st ed.). PT Raja Grafindo Persada.

Ningsih, S., & Kristiyanti, L. (2018). *ANALISIS PENGARUH JUMLAH UANG BEREDAR, SUKU BUNGA, DAN NILAI TUKAR TERHADAP INFLASI DI INDONESIA PERIODE 2014-2016*.

Nopirin. (1987). *Ekonomi moneter: Vol. Vol 2* (2nd ed.). BPFE.

Nopirin. (2019). *EKONOMI INTERNASIONAL* (Edisi 3). BPFE-YOGYAKARTA.

Nurhalim, A. D. (2021). Does E-Money Affect Inflation In Indonesia. *Jurnal Ekonomi Dan Bisnis*, *Vol 19*(No. 1). https://jurnal.ubd.ac.id/index.php/ds

Nursari, A., Suparta, I. W., & Moelgini, Y. (2019). Pengaruh Pembayaran Non Tunai Terhadap Jumlah Uang yang Diminta Masyarakat. *Jurnal Ekonomi Pembangunan*, *8*(3), 169–182. https://doi.org/10.23960/jep.v8i3.46

Paat, K. E., Kumenaung, A. G., & Mandeij, D. (2024). ANALISIS PENGARUH FLUKTUASI NILAI TUKAR RUPIAH (KURS) PER DOLLAR AMERIKA SERIKAT (USD) TERHADAP TINGKAT INFLASI DI INDONESIA TAHUN 2007-2021. *Jurnal Berkala Ilmiah Efisiensi*, *24*(7).

Pamungkas, C. B. (2018). Pengaruh Nilai Tukar USD dan Bursa Asean Terhadap Indeks Harga Saham Gabungan (IHSG) (Studi pada Bursa Efek Indonesia Periode 2014 –2016). *Jurnal Administrasi Bisnis*, *60*(1), 74–81.

Paul A, S., & Nordhaus, W. D. (2010). *Ilmu Makroekonomi* (M. Hill, Ed.). New York: Mc Graw-Hill ,Media Global Edukasi.

Putri, A., & Amilia, S. (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.

Safitri, A., & Ariza, A. (2021). Pengaruh Pembayaran Non Tunai, Velocity of Money dan Suku Bunga Terhadap Inflasi di Indonesia. *Prosiding Seminar Nasional SATIESP*, 978–602.

Santosa, A. B. (2017). ANALISIS INFLASI DI INDONESIA. *Prosiding Seminar Nasional Multi Disiplin Ilmu*.

Selvina, M., & Nurhayati. (2024). PENGARUH NILAI TUKAR, SUKU BUNGA DAN PERDAGANGAN LUAR NEGARI TERHADAP INFLASI DI NEGARA - NEGARA ASEAN TAHUN 2018 -2022. *Indo-Fintech Intellectuals: Journal of Economics and Business*, *4*(5), 2257–2277. https://doi.org/10.54373/ifijeb.v4i5.2003

Sipayung, P. T. E., & Budhi, M. K. S. (2013). PENGARUH PDB, NILAI TUKAR DAN JUMLAH UANG BEREDAR TERHADAP INFLASI DI INDONESIA PERIODE 1993-2012. *E-Jurnal Ekonomi Pembangunan Universitas Udayana*, *02*.

Sriwahyuni, A., Nainggolan, P., & Sinurat, A. (2020). PENGARUH JUMLAH UANG BEREDAR, SUKU BUNGA DAN NILAI TUKAR TERHADAP INFLASI DI SUMATERA UTARA Oleh. *EKUILNOMI : Jurnal Ekonomi Pembangunan*, *2*(2). https://doi.org/10.36985/ekuilnomi.v2i2.67

Sukardi. (2003). *Metodologi Penelitian Pendidikan; Kompetensi dan Praktiknya.* (Cet. 9). Bumi Aksara.

Sukirno, S. (2012). *Makroekonomi Teori Pengantar* (3rd ed.). PT Raja Grafindo Persada.

Sunariyah. (2013). *Pengantar Pengetahuan Pasar Modal* (Edisi 6). UPP STIM YKPN.

Toha, M. (2019). Derivatif Versus Ekonomi Syariah. *Indonesian Interdisciplinary Journal of Sharia Economics (IIJSE)*, *2*(1), 91-102. https://doi.org/10.31538/iijse.v2i1.328