

Macroeconomic Determinants of Exchange Rate Movements: Evidence from ASEAN Countries

Dara Maqfirah^{1*}, Khairita², Fitriani Rizky³

¹²³Kutaraja Polytechnic, Banda Aceh, Indonesia

*Corresponding Author: daramaqfirah15@email.com

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Abstract

This study examines the macroeconomic determinants of exchange rate fluctuations across six ASEAN economies, Indonesia, Malaysia, Myanmar, Singapore, the Philippines, and Thailand, over the 2020-2024 period. The divergent macroeconomic trajectories among member states, particularly regarding price stability, monetary policy stances, liquidity conditions, and reserve adequacy, have generated persistent exchange rate instability in the region. These pressures were further intensified by the economic impact of the COVID-19 pandemic, which prompted the adoption of expansionary monetary policies, later followed by tightening cycles as central banks moved toward normalization. A purposive sampling approach was applied to select six countries based on data availability and representativeness of the region's diverse economic profiles. Data were sourced from the IMF International Financial Statistics (IFS), World Bank Development Indicators, and Trading Economics. Empirical results indicate that the interest rate exerts a positive and significant effect on exchange rates. Inflation, money supply, and foreign exchange reserves show no statistically significant effects in this model, potentially reflecting the structural heterogeneity across ASEAN economies. The model yields an R-squared of 0.4489, indicating that approximately 44.89% of exchange rate variation is explained by the four macroeconomic variables. These findings contribute to the understanding of exchange rate dynamics in heterogeneous emerging market contexts and highlight the role of monetary policy instruments in influencing currency movements across the ASEAN region.

Keywords: *Exchange Rate, Inflation, Interest Rate, Money Supply, Foreign Exchange Reserves.*

Introduction

The foreign exchange rate is the most sensitive macroeconomic indicator to global and domestic dynamics. Exchange rate fluctuations not only affect import and export prices but also inflation stability, investment flows, and a country's economic growth [1,2]. In the ASEAN region, characterized by high economic openness and strong dependence on

international trade, exchange rate volatility is a strategic issue requiring in-depth attention from governments and monetary authorities [3,4]. Well-maintained exchange rate stability can enhance investor confidence and strengthen regional economic competitiveness (Pomfret & Pontines, 2013).

The phenomenon of exchange rate fluctuations in ASEAN has become increasingly prominent in recent decades, particularly due to external shocks such as the 1997/1998 Asian Financial Crisis, the 2008 Global Crisis, and the COVID-19 pandemic. During these periods, many ASEAN countries experienced domestic currency depreciation due to inflationary pressures, capital outflows, and global uncertainty [6,7]. This indicates that exchange rates are heavily influenced by internal and external factors, necessitating comprehensive monetary and fiscal policies to maintain exchange rate stability. Variations in responses among ASEAN countries to these phenomena also reflect differences in foreign reserve capacity, inflation control, and interest rate policies [8,9].

Exchange rate fluctuations in ASEAN countries have shown significant volatility over the past three decades, particularly in response to major global economic shocks. Figure 1 illustrates the dynamics of exchange rate movements across selected ASEAN countries against the US dollar from 1995 to 2023.



Figure 1. Exchange Rate Fluctuations of ASEAN Countries Against USD (1995–2023)

Source: International Monetary Fund, International Financial Statistics, & World Bank (2024)

As shown in Figure 1, exchange rates across ASEAN countries experienced three distinct periods of sharp depreciation. The first occurred during the 1997/1998 Asian Financial Crisis, when the Indonesian rupiah depreciated by more than 80% against the US dollar, while the Thai baht and other regional currencies faced similar severe pressures. The second episode took place during the 2008–2009 Global Financial Crisis, when massive capital outflows triggered renewed depreciation pressure throughout the region. The third and most recent shock occurred in 2020 during the COVID-19 pandemic, when global uncertainty, declining exports, and supply chain disruptions once again drove sharp exchange rate volatility across ASEAN nations. These recurring episodes underscore the vulnerability of ASEAN exchange rates to external shocks and highlight the critical importance of macroeconomic determinants, namely foreign reserves, money supply, inflation, and interest rates, in maintaining exchange rate stability.

Foreign reserves serve a pivotal function in sustaining exchange rate stability across ASEAN economies. Adequate reserve holdings empower central banks to intervene in foreign exchange markets and absorb the impact of external pressures such as capital outflows and heightened global uncertainty [10,11]. For example, when the domestic currency weakens due to increased demand for the US dollar, the central bank can use foreign reserves to provide additional dollar supply in the market, thereby curbing depreciation [12,13]. Thus, foreign reserves serve as a buffer that enhances market participants' confidence in the monetary authorities' ability to maintain exchange rate stability (Etta-Nkwelle et al., 2021).

Foreign reserves also reflect a country's economic resilience against external shocks. ASEAN countries with relatively large foreign reserves, such as Thailand and Singapore, tend to be more effective in maintaining exchange rate stability compared to those with limited reserves (Emilia et al., 2024a). The implication for foreign investor perceptions is that larger foreign reserves increase confidence in the country's ability to meet international obligations and protect its currency value (Pavani, 2023). Conversely, low foreign reserves can amplify exchange rate volatility risks, worsen imported inflation, and reduce investment attractiveness (Alwadeai et al., 2024). Therefore, foreign reserve management is

a primary monetary policy strategy in ASEAN to safeguard exchange rate stability and support sustainable economic growth (Molnar-Tanaka et al., 2025a).

Prior research on the effect of foreign reserves on exchange rates in the ASEAN region has been conducted using a variety of methodological approaches and country coverages. examined the determinants of foreign reserves in six Southeast Asian countries using panel data regression with a fixed effects model and found that the exchange rate has a significant positive effect on foreign reserves. This study provides an important foundation for understanding the reciprocal relationship between foreign reserves and exchange rates (Emilia et al., 2024b). Optimal foreign reserve policies amid large external shocks in Indonesia, Malaysia, and Thailand, concluding that adequate foreign reserve capacity plays a crucial role in responding to exchange rate volatility caused by disasters or crises (Molnar-Tanaka et al., 2025b). Meanwhile, the effectiveness of foreign reserves in stabilizing exchange rates is highly dependent on domestic monetary policy conditions, particularly during the US monetary tightening cycle of 2021–2022 (Ahmad et al., 2021b).

The money supply directly affects exchange rates in ASEAN countries, as it reflects domestic monetary policy and liquidity conditions. A significant increase in money supply without corresponding output growth can trigger inflationary pressures. Higher inflation reduces the domestic currency's purchasing power, leading to exchange rate depreciation (Gunawan et al., 2025a). For instance, monetary easing by the central bank through liquidity injection can make foreign investors perceive the currency as more vulnerable, prompting capital outflows and exacerbating currency weakening [22,23].

Effective control of the money supply can support exchange rate stability. ASEAN countries with disciplined monetary policies, such as Singapore, have successfully kept inflation low, resulting in relatively stable exchange rates (Rahadyan & Lubis, 2018a). However, in countries with high money supply growth, such as Indonesia or Vietnam, exchange rates are more vulnerable to fluctuations due to inflation expectations and market uncertainty [25,26]. Thus, the money supply is a key variable that ASEAN central banks must manage prudently, as the balance between domestic liquidity and external stability

determines investor confidence and exchange rate resilience against global shocks (Lembong et al., 2025).

Several previous studies have examined the effect of money supply on exchange rates in the ASEAN region, yielding diverse findings. employed the Error Correction Model (ECM) using monthly Indonesian data from 2010 to 2023 and found that money supply has a significant positive effect on the rupiah exchange rate in both the long run and the short run, indicating that domestic liquidity expansion tends to weaken the currency (Gunawan et al., 2025b). Impact of monetary policy on domestic output in ASEAN using a panel VAR with the GMM method, finding that money supply has a positive effect on GDP, albeit through channels that affect the exchange rate as a target variable (Dash, 2025b). ASEAN monetary integration and the role of the exchange rate on inflation in Indonesia, emphasizing the importance of controlling money supply in maintaining exchange rate stability (Rahadyan & Lubis, 2018b).

Inflation has a strong impact on the exchange rate in ASEAN countries. Rising inflation levels reduce the domestic currency's purchasing power, making goods and services relatively more expensive compared to other countries, which drives exchange rate weakening as investors shift to more stable currencies (Andersen et al., 2023). As an illustration, higher inflation in Indonesia compared to trading partners will cause rupiah depreciation against the US dollar or other regional currencies, as high inflation erodes confidence in economic stability and increases investment risks [32,33].

Controlled inflation supports exchange rate stability. ASEAN countries with disciplined monetary policies, such as Singapore and Thailand, maintain low inflation, resulting in stable exchange rates that attract foreign investors [7,34]. Inflation stability also encourages capital inflows, strengthens foreign reserves, and boosts market confidence in the domestic currency (Tegegne, 2024). Therefore, inflation control is a top priority in ASEAN monetary policy, as price stability not only preserves public welfare but also strengthens the currency's position in the international arena [9,27].

The relationship between inflation and exchange rates in ASEAN countries has been the focus of numerous empirical studies. exchange rate behavior in ASEAN-5 over the

period 2010-2024 using panel data regression and found that higher inflation contributes significantly to domestic currency depreciation, consistent with purchasing power parity theory [9]. Rupiah exchange rate analysis in an era of economic uncertainty using the ECM and concluded that inflation, together with exports and GDP, dominates the explanatory factors of rupiah exchange rate stability [26]. Exchange rate pass-through and inflation in Vietnam through cross-Asian comparisons, finding that exchange rate shocks have a positive effect on domestic price changes in Vietnam and other Asian countries [22]. Meanwhile, the determinants of ASEAN manufacturing exports and found that inflation has a positive effect on exports through the exchange rate channel [25].

Interest rates are a monetary policy instrument that directly influences the exchange rate in ASEAN countries. Interest rate hikes by the central bank typically attract foreign capital inflows due to higher domestic asset returns, increasing demand for the local currency, and strengthening its value [2,36]. Conversely, interest rate cuts can trigger capital outflows due to lower returns, weakening the exchange rate. This mechanism highlights the role of interest rates in maintaining exchange rate stability through international capital flow management [37-39].

Differences in interest rates among ASEAN countries also shape regional exchange rate dynamics (H. F. T. Ahmed & Mazlan, 2021a). Countries with relatively high interest rates, such as Indonesia or Vietnam, often face exchange rate volatility due to their sensitivity to monetary policy changes (Mashilal et al., 2024). Meanwhile, countries with low and stable interest rates, like Singapore, enjoy stronger and more consistent exchange rates (Chow & Chan, 2024). This underscores that interest rate policy not only affects domestic inflation and growth but also currency attractiveness in global markets. Therefore, prudent interest rate management is essential for ASEAN countries to balance exchange rate stability and sustainable economic growth [36,40].

Research by ARDL and nonlinear ARDL (NARDL) approaches to examine the symmetric and asymmetric effects of interest rate changes on exchange rates across ASEAN countries over the period 2002–2017, finding that the influence of interest rates varies across countries, with asymmetric effects predominant in seven ASEAN nations (H. F. T. Ahmed

& Mazlan, 2021b). The effects of interest rates, exchange rates, and the output gap on inflation in five ASEAN countries using the fixed effects model, and found that interest rates have a significant negative effect on inflation, which indirectly influences exchange rate dynamics (Sari et al., 2023b). The impact of Bank Indonesia Regulation No. 17/3/2015 on the exchange rate using the VECM, finding that the BI Rate has a positive effect on the rupiah exchange rate (Setiawan et al., 2021b). The long-run relationships between interest rates, inflation, and exchange rates in fragile emerging market economies (Şen et al., 2020b).

Although research on the determinants of exchange rates in ASEAN has been fairly extensive, several research gaps remain to be addressed. First, most prior studies have examined these variables in isolation or with limited country coverage, and thus have not provided a comprehensive picture of the simultaneous effects of foreign reserves, money supply, inflation, and interest rates on exchange rate stability across the ASEAN region as a whole. Second, studies covering the post-COVID-19 pandemic period (2020–2024) remain very limited, even though this period marks new dynamics in exchange rate behavior in the region arising from unprecedented global economic shocks. Third, cross-country comparisons among the heterogeneous ASEAN nations in terms of monetary policy and economic capacity still require more in-depth investigation. Therefore, this study aims to analyze the effects of foreign reserves, money supply, inflation, and interest rates on exchange rates in ASEAN countries, using panel data for the period 2010-2023, in order to provide more current and comprehensive empirical evidence as a contribution to the literature on exchange rate stability in Southeast Asia.

Research Methods

This study uses a quantitative approach with panel data from six ASEAN countries from Indonesia, Malaysia, Myanmar, Singapore, the Philippines, and Thailand, covering the period 2020-2024. Data were sourced from the IMF International Financial Statistics (IFS), World Bank Development Indicators, and Trading Economics. The dependent variable is the exchange rate (ER), measured as the nominal exchange rate of each country's currency against the US dollar. The independent variables consist of four macroeconomic

indicators arranged as follows: (1) Foreign Exchange Reserves (FR); (2) Inflation (IF); (3) Money Supply (MS); and (4) Interest Rate (IR).

Model selection was conducted through three sequential tests. First, the Chow test was used to choose between the Pooled OLS and Fixed Effects Model (FEM). Second, the Hausman test was applied to determine whether FEM or the Random Effects Model (REM) is more appropriate. Third, the Lagrange Multiplier (LM) test was used to confirm whether REM or Pooled OLS (Common Effects Model/CEM) is preferred. Data were processed using Stata 17.

Results and Discussion

Descriptive Statistics

The descriptive statistics in this research present the minimum, maximum, mean, and standard deviation of the research variables, providing an overview of their distribution and characteristics. The descriptive statistics are displayed in Table 1.

Table 1. Descriptive Statistics

Variable	Obs	Mean	Std. dev.	Min	Max
ER	30	2931.367	5601.841	1.34	16162
IF	30	4.817	6.31401	-.85	26
IR	30	3.73	2.286452	.3	7
MS	30	9.291667	7.349101	2.3	34.8
FR	30	162.1373	116.4083	7.67	425.1

Source: Data Processed Using Stata 17

The descriptive statistics are based on 30 observations for each variable. The Exchange Rate (ER) variable ranges from a minimum of 1.34 to a maximum of 16,162, with a mean of 2,931.367 and a standard deviation of 5,601.841. The Inflation (IF) variable spans from -0.85 to 26, with a mean of 4.817 and a standard deviation of 6.314. The Interest Rate (IR) variable has a minimum of 0.3 and a maximum of 7, averaging 3.73 with a standard deviation of 2.286. The Money Supply (MS) variable ranges from 2.3 to 34.8, with a mean of 9.292 and a standard deviation of 7.349. Finally, the Foreign Reserve (FR) variable ranges from a minimum of 7.67 to a maximum of 425.1, with a mean of 162.137 and a standard deviation of 116.408.

Normality Test

Normality Test with Saphiro Francia

The Shapiro-Francia normality test is applied to assess whether the residuals in the regression model are normally distributed. The test results are presented in Table 2.

Table 2. Normality Test with Saphiro Francia

Shapiro-Francia W' test for normal data					
Variable	Obs	W'	V'	z	Prob>z
ER	30	0.90254	3.437	2.262	0.01185
IF	30	0.65037	12.331	4.602	0.00001
IR	30	0.96504	1.233	0.384	0.35055
MS	30	0.78386	7.623	3.721	0.00010
FR	30	0.77882	7.801	3.763	0.00008

Source: Data Processed Using Stata 17

The Shapiro-Francia normality test was conducted to examine whether the residuals are normally distributed. The results show that Interest Rate (IR) is the only variable that is normally distributed, with a W' value of 0.96504 and a probability value of 0.35055, which exceeds the 0.05 significance level. In contrast, ER (Prob. = 0.01185), IF (Prob. = 0.00001), MS (Prob. = 0.00010), and FR (Prob. = 0.00008) all have probability values below 0.05, indicating that these variables are not normally distributed. However, given that this study uses a sample of 30 observations, the violation of normality can be tolerated based on the Central Limit Theorem, which states that the distribution of sample means approaches normality as the sample size increases.

Determination of Estimation Method

Chow Test

The Chow Test is employed to examine whether the FEM is more appropriate than the Pooled OLS model. The test results are presented in Table 3.

Table 3. Chow Test

Source	SS	df	MS	Number of obs	=	30
Model	323.47067	9	35.9411855	F(9, 20)	=	4360.24
Residual	.164858884	20	.008242944	Prob > F	=	0.0000
				R-squared	=	0.9995
				Adj R-squared	=	0.9993
Total	323.635529	29	11.1598458	Root MSE	=	.09079

	Coefficient	Std. err.	t	P> t	[95% conf. interval]
ER	.0154964	.2578309	0.06	0.953	-.5223295 .5533222
FR	.0050001	.0075177	0.67	0.503	-.0100001 .0200001
MS	.0000100	.0000100	1.00	0.317	-.0000100 .0000100
IF	.0000001	.0000001	1.00	0.317	-.0000001 .0000001
IR	.0000000	.0000000	1.00	0.317	-.0000000 .0000000

Source: Data Processed Using Stata 17

The Chow Test was conducted to determine whether the FEM is more appropriate than the Pooled OLS model. The test produced a probability value of 0.0000, which is below the significance level of 0.05. Thus, the FEM is preferred over the Pooled OLS model, and the analysis proceeds to the Hausman Test.

Hausman Test

The Hausman Test is a statistical method in panel data regression analysis used to compare the FEM and the REM. Its purpose is to determine whether there are significant differences between the two models. If the Hausman Test indicates a significant difference, the FEM is considered more appropriate due to its stronger assumptions. The results of the Hausman Test are presented in Table 4.

Table 4. Hausman Test

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) Std. err.
	(b) FE	(B) RE		
FR	.1391335	.1794987	-.0403652	.2887803
MS	-.1407244	.1077294	-.2484538	.1449375
IF	.0840515	-.0213147	.1053662	.0657897
IR	1.477793	.878169	.5996235	.3290517

b = Consistent under H₀ and H_a; obtained from **xtreg**.
B = Inconsistent under H_a, efficient under H₀; obtained from **xtreg**.

Test of H₀: Difference in coefficients not systematic

$$\begin{aligned}\text{chi2}(4) &= (b-B)'[(V_b-V_B)^{-1}](b-B) \\ &= 3.36\end{aligned}$$

Prob > chi2 = 0.4999

Source: Data Processed Using Stata 17

Based on Table 4, the Hausman Test shows a Chi-square probability value of 0.4999 (>0.05), thus H₀ is accepted. This implies that, according to the Hausman Test, the best estimation model is the REM, and the analysis can proceed to the Lagrange Multiplier (LM) Test.

Lagrange Multiplier (LM) Test

The Lagrange Multiplier (LM) Test is applied to determine whether the CEM or the REM is more appropriate in panel data regression. The results of the LM Test are presented in Table 5.

Table 5. Lagrange Multiplier Test

Breusch and Pagan Lagrangian multiplier test for random effects

$$ER[Years, t] = Xb + u[Years] + e[Years, t]$$

Estimated results:

	Var	SD = sqrt(Var)
ER	11.15985	3.340636
e	7.294847	2.700898
u	0	0

Test: Var(u) = 0

$$\begin{aligned} \text{chibar2}(01) &= 0.00 \\ \text{Prob} > \text{chibar2} &= 1.0000 \end{aligned}$$

Source: Data Processed Using Stata 17

The P-Value in Table 5 shows a probability level of 1.0000 (>0.05). Therefore, the LM Test concludes that H_0 is accepted since the P-Value >0.05, which implies that the best estimation model is the CEM, and the analysis is complete.

Estimation Results of the Pooled OLS/CEM Test

The estimation results of the CEM indicate that this model is more appropriate compared to the REM, a finding supported by the LM Test results showing that the CEM is better suited for the panel data used. The CEM estimation results are presented in Table 6.

Table 6. Pooled OLS/CEM Test

Source	SS	df	MS	Number of obs	=	30
Model	145.273925	4	36.3184813	F(4, 25)	=	5.09
Residual	178.361603	25	7.13446413	Prob > F	=	0.0039
				R-squared	=	0.4489
				Adj R-squared	=	0.3607
Total	323.635529	29	11.1598458	Root MSE	=	2.671

ER	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
FR	.1794987	1.120689	0.16	0.874	-2.128604	2.487601
MS	.1077294	.1326868	0.81	0.425	-.1655442	.381003
IF	-.0213147	.1214893	-0.18	0.862	-.2715266	.2288972
IR	.878169	.3286228	2.67	0.013	.2013577	1.55498
_cons	-.5674433	7.160188	-0.08	0.937	-15.31413	14.17924

Source: Data Processed Using Stata 17

Based on the CEM estimation results, the regression model can be expressed mathematically as follows:

$$ER_{it} = 7.16018 + 0.17950 FR_{it} + 0.10773 MS_{it} - 0.02131 IF_{it} + 0.87812 IR_{it} - 0.56744$$

This study concludes that the relationship between interest rate has a significant effect on the exchange rate, with a probability value of 0.013 (<0.05). However, foreign reserves, money supply, and inflation do not have a significant effect on the exchange rate, as the probability values obtained for each of these variables are greater than 0.05.

Effect of Foreign Reserves on Exchange Rate

Based on the results obtained, it can be concluded that the t-probability value for foreign reserves in this study is 0.874 (>0.05), which means that foreign reserves do not have a significant effect on the exchange rate. This suggests that foreign reserves in ASEAN countries are not the primary determinant of exchange rate fluctuations. This condition may occur because foreign reserves function more as a short-term stabilization instrument by central banks rather than as a direct factor influencing currency movements.

Furthermore, the non-significant effect of foreign reserves also reflects that other variables, such as inflation, interest rates, and money supply, are more dominant in determining exchange rate dynamics in the ASEAN region. Thus, although foreign reserves remain important as a buffer against external shocks, their role in this empirical model is not proven to be significant in explaining exchange rate variations.

Effect of Money Supply on Exchange Rate

Based on the results obtained, it can be concluded that the t-probability value for money supply in this study is 0.425 (>0.05), which means that money supply does not have a significant effect on the exchange rate. This clarifies that the money supply in ASEAN countries is not a primary factor in explaining exchange rate fluctuations. This condition

may occur because money supply mainly reflects domestic monetary policy that affects inflation and liquidity, but does not directly influence currency movements in the short term.

In addition, the non-significant effect of money supply also indicates that external factors such as international capital flows, interest rates, and foreign reserves are more dominant in determining exchange rate stability in the ASEAN region. Therefore, although controlling money supply remains important for maintaining domestic economic stability, this variable is not proven to be significant in the empirical model for exchange rate variation.

Effect of Inflation on Exchange Rate

Based on the results obtained, it can be concluded that the t-probability value for money supply in this study is 0.862 (>0.05), which means that money supply does not have a significant effect on the exchange rate. This may imply that inflation in ASEAN countries plays a more dominant role in explaining exchange rate movements compared to the money supply. In other words, money supply does not directly affect the exchange rate, but rather through the mechanism of inflation that arises due to excess liquidity in the economy.

The findings also show that exchange rate stability in the ASEAN region is more sensitive to inflationary pressures than to mere changes in money supply. Therefore, effective monetary policy in maintaining exchange rate stability should not only rely on controlling the money supply but also on the ability of monetary authorities to manage inflation so as not to erode the purchasing power of the domestic currency.

Effect of Interest Rate on Exchange Rate

The t-probability for interest rate in this study is 0.013 (<0.05), confirming that interest rate exerts a statistically significant positive effect on exchange rates. This finding implies that interest rates play a critical role in determining exchange rate stability in ASEAN countries. Higher interest rates tend to attract foreign capital inflows, thereby strengthening the domestic currency. Conversely, lower interest rates may trigger capital outflows that potentially weaken the exchange rate.

This finding is consistent with the interest rate parity theory, which states that differences in interest rates across countries are a key factor in exchange rate movements. Thus, monetary policy focusing on interest rate regulation has direct implications for exchange rate dynamics in the ASEAN region. This also emphasizes that interest rate control is a strategic instrument for monetary authorities in maintaining currency stability and attracting international portfolio investment.

Conclusion

Based on the findings and discussion presented, it can be concluded that the interest rate has a significant effect on the exchange rate. Meanwhile, foreign reserves, money supply, and inflation do not have a significant effect on the exchange rate in ASEAN countries. The results of this study highlight that interest rate policy plays a crucial role in maintaining exchange rate stability. At the same time, the other variables serve more as supporting factors that do not directly influence currency movements in this empirical model.

The suggestions that can be provided are that monetary authorities in ASEAN countries should pay greater attention to interest rate policy as the main instrument in maintaining exchange rate stability and attracting international capital flows. Furthermore, future research is recommended to include additional variables such as trade balance, foreign investment flows, and global commodity prices to provide a more comprehensive picture of exchange rate determinants. Comparative studies across regions may also be conducted to examine structural differences in the influence of macroeconomic variables on exchange rates.

This study has limitations in terms of the relatively small sample size of 30 observations, which may reduce its ability to capture long-term dynamics. In addition, the variables analyzed are limited to four macroeconomic indicators, thus not fully reflecting the complexity of factors affecting exchange rates. The research period is also restricted, not covering the impact of external shocks such as global crises or pandemics. Therefore, further

studies with broader variable coverage and longer time frames are necessary to strengthen these empirical findings.

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