



DOMESTIC MACROECONOMIC FUNDAMENTALS, GLOBAL COMMODITY PRICE SHOCKS, AND RUPIAH EXCHANGE RATE FLUCTUATIONS

Putri Dwi Nurwulandari^{*1}, Aminudin Ma'ruf²

^{1,2}State University of Surabaya

Correspondence*: putri.22114@mhs.unesa.ac.id

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Abstrack

This study investigates the determinants of the rupiah exchange rate against the US dollar over the 2010–2024 period, focusing on inflation, money supply, foreign exchange reserves, trade balance, global oil prices, global gold prices, and a COVID-19 dummy variable. The analysis employs a Vector Error Correction Model (VECM), complemented by the Impulse Response Function (IRF) and Forecast Error Variance Decomposition (FEVD). The short-run results indicate that domestic macroeconomic variables, global commodity prices, and the COVID-19 dummy do not have a statistically significant effect on the exchange rate, suggesting that short-term movements are driven primarily by market adjustment and policy stabilization mechanisms. However, the error correction term is negative and statistically significant, and the lagged exchange rate is also significant, indicating that deviations from long-run equilibrium are gradually corrected over time. In the long run, inflation and money supply exert a negative effect on the exchange rate, whereas the trade balance and global oil prices have a positive effect. By contrast, foreign exchange reserves and global gold prices are not statistically significant, implying that these variables play a stabilizing rather than a determining role in exchange rate movements. The IRF results show that the exchange rate responds gradually and converges following macroeconomic shocks, while the FEVD results indicate that long-run exchange rate fluctuations are influenced mainly by trade balance and oil price shocks, although their relative contributions remain limited.

Keywords: Exchange Rate; Rupiah; Domestic Macroeconomic Fundamentals; Global

A. INTRODUCTION

Current global economic developments are increasingly characterized by strong interdependence among nations, such that changes in one country can generate far-reaching implications across the global economy. In this increasingly integrated environment, exchange rates have become a key indicator of macroeconomic stability because of their central role in international trade and foreign investment. According to Musyaffa' and Sulasmiyati (2017), exchange rates constitute one of the main parameters reflecting a country's economic condition relative to that of other nations. In line with these developments, Indonesia, as a developing country with an open economy, faces increasingly complex challenges in maintaining exchange rate stability. This condition has encouraged the government to implement various measures aimed at preserving exchange rate stability (Setiawati et al., 2023). In practice, however, such stabilization efforts are often constrained by external pressures that are difficult to manage.

In Indonesia, since the adoption of a free-floating exchange rate system in August 1997 (Juhro & Azwar, 2021), the rupiah exchange rate has been largely determined by market mechanisms. Although Bank Indonesia has attempted to stabilize the exchange rate through monetary policy and market intervention, exchange rate movements have remained highly volatile, particularly during periods of external shocks. This suggests that exchange rate stability cannot be fully controlled through domestic policy alone. To illustrate these developments, Figure 1 presents the movement of the rupiah exchange rate against the US dollar as reported by the World Bank.

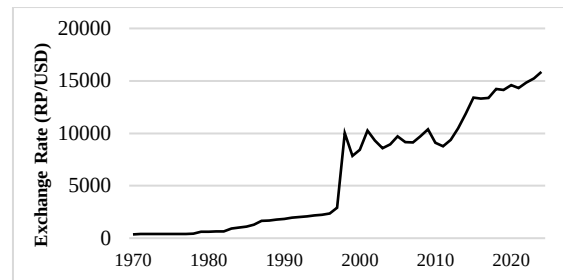


Figure 1. Exchange Rate of the Rupiah Against the USD
Source: World Bank (2026)

Figure 1 shows that the rupiah exchange rate against the US dollar has depreciated substantially, from around Rp360/USD in the 1970s to approximately Rp15,000/USD in 2024. Sharp fluctuations were observed during major crisis episodes, including the 1997–1998 Asian financial crisis, the 2008 global financial crisis, and the COVID-19 pandemic. These patterns indicate that the rupiah is highly sensitive to global shocks while also reflecting domestic fundamental conditions. Such recurring volatility poses serious risks to economic stability, including rising inflation, uncertainty in production costs, and disruptions to international trade.

Exchange rate fluctuations reflect the combined influence of both domestic and global factors. A stable exchange rate indicates monetary stability and supports the smooth functioning of economic activity (Setiawati et al., 2023). By contrast, exchange rate instability may weaken the effectiveness of monetary policy and increase the economy's vulnerability to external shocks. From a domestic perspective, inflation and the money supply (MS) are critical variables, particularly when the domestic currency depreciates. Higher prices of imported goods directly intensify inflationary pressures (Erviati, 2025). Nevertheless, the relationship between these variables and the exchange rate is not always consistent. Ali et al. (2015) show that controlling the money supply can help maintain exchange rate stability, whereas Abdurehman and Hacilar (2016) find that the relationship between inflation and the exchange rate is not statistically significant. These mixed findings indicate uncertainty in the monetary transmission mechanism affecting the exchange rate.

Amid this complexity, the trade balance and foreign exchange reserves represent key variables that connect domestic and external factors. A trade surplus or deficit influences exchange rate stability (Fedihartono et al., 2023), while foreign exchange reserves function as an important stabilization instrument through market intervention (Yusuf & Ichsan, 2019). However, the intensive use of foreign exchange reserves may weaken market confidence in economic fundamentals, thereby reducing their effectiveness. This condition reflects a policy dilemma in efforts to maintain exchange rate stability.

Beyond domestic factors, exchange rates are also significantly affected by fluctuations in global commodity prices, particularly crude oil and gold. Changes in these commodity prices directly affect the trade balance and international capital flows. Gold prices are widely regarded as a safe haven during periods of uncertainty (Shakeel et al., 2023), whereas oil prices influence foreign exchange earnings and import costs (Arfaoui & Ben Rejeb, 2017). In recent years, fluctuations in both commodities have become more pronounced, especially during the COVID-19 pandemic, thereby increasing pressure on the rupiah exchange rate. Rastogi et al. (2023) further show that shocks in gold and oil prices affect exchange rates in different ways, underscoring the complexity and nonlinearity of these relationships.

Although previous studies have made important empirical contributions, most have examined these factors in isolation. Research that simultaneously integrates domestic variables (money supply and inflation), external sector variables (foreign exchange reserves and the trade balance), and global variables (oil and gold prices) remains limited. Moreover, prior studies

have generally not incorporated structural changes associated with the COVID-19 pandemic, nor have they clearly distinguished between the short-run and long-run effects on the exchange rate. These limitations suggest that our understanding of the determinants of the rupiah exchange rate remains incomplete, particularly in explaining exchange rate dynamics under conditions of structural economic change. Such limitations may, in turn, reduce the effectiveness of exchange rate stabilization policies.

Therefore, this study not only examines the simultaneous effects of money supply, inflation, foreign exchange reserves, the trade balance, and oil and gold prices on the rupiah exchange rate, but also addresses several limitations in previous research. Unlike most earlier studies, this research employs monthly data covering the 2010–2024 period in order to better capture high-frequency exchange rate dynamics, and it explicitly incorporates a COVID-19 dummy variable as a structural break, which remains relatively underexplored in the Indonesian context. Furthermore, this study distinguishes between short-run and long-run relationships, thereby allowing for a more precise identification of the transmission mechanisms linking domestic and global factors. Through this approach, the study is expected to provide a more comprehensive empirical understanding of exchange rate dynamics and to contribute to the formulation of more effective monetary policy.

B. LITERATURE REVIEW

1. Inflation

Inflation is a primary determinant of exchange rates within the Purchasing Power Parity (PPP) framework, which posits that differences in inflation across countries are reflected in exchange rate movements, with higher inflation tending to lead to currency depreciation (Dornbusch, 1985). An increase in domestic inflation reduces purchasing power and thereby triggers exchange rate adjustment. In practice, depreciation may also intensify inflation through rising import prices (Ervianti, 2025). However, the effect of inflation is not always consistent and may depend on policy responses and the broader economic structure (Abdurehman & Hacilar, 2016). Therefore, inflation is theoretically expected to have a negative effect on the exchange rate.

2. Money Supply

Money supply is a key variable in the Monetary Approach to Exchange Rates (MAER), which argues that exchange rates are determined by the equilibrium between money demand and money supply (Krugman et al., 2018). Within this framework, an increase in the money supply that is not accompanied by output growth will intensify inflationary pressures and depreciate the domestic currency. Empirically, an expansion in the money supply may reduce real interest rates and encourage capital outflows, thereby weakening the exchange rate (Syamad & Handoyo, 2023). Accordingly, money supply is theoretically expected to have a negative effect on the exchange rate, as liquidity expansion tends to result in depreciation.

3. Foreign Exchange Reserves

Foreign exchange reserves reflect the monetary authority's capacity to maintain exchange rate stability through intervention in the foreign exchange market within the framework of the Monetary Approach to Exchange Rates (Frenkel & Johnson, 1977). An increase in foreign exchange reserves strengthens the central bank's ability to supply foreign currency in response to depreciation pressures (Yusuf & Ichsan, 2019). However, the relationship between foreign exchange reserves and the exchange rate is not always linear. Under certain conditions, an increase in reserves may reflect external pressures that are themselves associated with exchange rate depreciation (Hayat & Jabbar, 2022). This suggests

that foreign exchange reserves function as a stabilizing buffer, although their effectiveness depends on underlying economic conditions.

4. Trade Balance

The trade balance affects exchange rates through the mechanism of foreign exchange supply and demand. A trade surplus increases the supply of foreign exchange and encourages appreciation, whereas a trade deficit increases the demand for foreign exchange and leads to depreciation. Within the Marshall–Lerner framework, exchange rate depreciation will improve the trade balance only if the price elasticity of demand for exports and imports is sufficiently high (Lerner, 1944). However, in the Indonesian case, depreciation does not always improve trade performance because of the country's substantial dependence on imports (Permana et al., 2023). Therefore, although the trade balance is theoretically expected to have a positive effect on the exchange rate, the direction and magnitude of this effect depend heavily on the structure of trade.

5. Oil Prices

Oil prices influence exchange rates through trade channels and foreign exchange earnings within the commodity price transmission framework. An increase in oil prices may raise export earnings in oil-exporting countries and thereby contribute to exchange rate appreciation (Cashin et al., 2003). By contrast, for oil-importing countries such as Indonesia, higher oil prices increase import costs and the demand for foreign currency, thereby placing depreciation pressure on the exchange rate. Ji et al. (2020) show that the effect of oil prices on the exchange rate is asymmetric and depends on a country's position in the energy trade structure.

6. Gold Prices

Gold prices can also be understood within the commodity price channel framework and are widely regarded as representing a safe-haven asset in the global financial system (Cashin et al., 2003). Increases in gold prices reflect rising global uncertainty and shifts in investor portfolios toward safer assets, which may affect international capital flows and exchange rates. The effect of gold prices on exchange rates tends to be stronger in the long run and during periods of crisis, whereas in the short run the effect is not always statistically significant (Wang et al., 2021). This indicates that the role of gold is more pronounced through global financial channels than through direct trade mechanisms.

7. Interrelationships Among Variables in the Exchange Rate System

Although each variable has a distinct theoretical mechanism, all of them interact in determining equilibrium in the foreign exchange market. Inflation and money supply reflect domestic monetary pressures, whereas foreign exchange reserves and the trade balance represent the strength of the external sector. Meanwhile, oil and gold prices capture the transmission of global shocks through trade channels and international capital flows. These simultaneous interactions indicate that exchange rate movements are not determined by a single variable in isolation, but rather by the interrelated dynamics between domestic and global factors. Therefore, exchange rate analysis requires an approach capable of capturing both short-run and long-run relationships simultaneously.

8. Research Hypotheses

Despite the extensive literature, most previous studies examine these variables separately, even though exchange rate dynamics are inherently interconnected. For this reason, this study adopts a system-based approach. Specifically, it employs the Vector Error Correction

Model (VECM), which enables the simultaneous analysis of dynamic relationships among variables in both the short run and the long run. Accordingly, the primary focus of this study is on system dynamics rather than on testing the partial effects of individual variables.

H₁: Domestic macroeconomic variables and global commodity prices interact simultaneously in influencing the dynamics of the rupiah exchange rate.

H₂: There are differences in the short-run and long-run transmission mechanisms among the variables in the system with respect to the rupiah exchange rate.

H₃: The rupiah exchange rate exhibits a significant response to shocks originating from variables within the system.

C. METHODS

This study employs a quantitative time-series econometric approach using the Vector Error Correction Model (VECM) to examine the dynamic relationship between the rupiah exchange rate (IDR/USD), domestic macroeconomic variables, and global commodity prices. The VECM framework is selected because it is capable of capturing both short-run dynamics and long-run equilibrium relationships among cointegrated variables (Stock & Watson, 2015).

The data used in this study consist of monthly time-series observations from January 2010 to December 2024, resulting in a total of 180 observations. All variables are obtained from official and reliable sources. The exchange rate (IDR/USD middle rate) and inflation (CPI-based) are sourced from Bank Indonesia. Data on money supply (M2), foreign exchange reserves (in million USD), and trade balance (exports minus imports, in million USD) are obtained from Statistics Indonesia (BPS). Meanwhile, the global commodity variables include world crude oil prices sourced from the U.S. Energy Information Administration (EIA) and gold prices (USD per troy ounce) obtained from the International Monetary Fund (IMF). In addition, this study incorporates a dummy variable to capture the impact of the COVID-19 pandemic. The dummy variable (D_t) is defined as $D_t = 1$ for the period from March 2020 to December 2021, representing the peak period of global economic disruption caused by the pandemic, and $D_t = 0$ otherwise.

The empirical analysis follows standard VECM procedures and is conducted using EViews 12 software. First, the stationarity of each variable is tested using the Augmented Dickey-Fuller (ADF) test to ensure that all series are integrated of order one, $I(1)$. Second, the optimal lag length is determined on the basis of information criteria, including the Akaike Information Criterion (AIC), Schwarz Criterion (SC), and Hannan-Quinn (HQ). Third, a stability test is performed to verify the validity of the VAR system. Fourth, the Johansen cointegration test, based on both the trace statistic and the maximum eigenvalue statistic, is applied to identify the existence of long-run relationships among the variables. If cointegration is confirmed, the VECM model is estimated to analyze both short-run dynamics and long-run adjustments. The speed of adjustment toward equilibrium is captured by the Error Correction Term (ECT), whereas short-run interactions are represented by the differenced variables.

The baseline VECM specification in this study is expressed as follows:

$$\Delta ER_t = \alpha_1 e_{t-1} + \sum_{i=1}^{p-1} \delta_i \Delta x_{t-i} + \gamma D_t + e_t$$

Where ΔER_t represents the change in the exchange rate, ECT_{t-1} is the error correction term indicating the speed of adjustment toward long-run equilibrium, Δx_{t-1} denotes the vector of first-differenced explanatory variables (inflation, money supply, foreign exchange reserves, trade balance, oil prices, and gold prices), D_t is the COVID-19 dummy variable, and e_t is the error term.

D. RESULTS AND DISCUSSION

1. Stationarity Test

Data stationarity testing was conducted using the ADF test, and the test results are presented in Table 1.

Table 1 . Unit Root Test

ADF (Augmented Dickey-Fuller)				
Variabel	Level	Description	First Difference	
	Prob*		Prob*	Description
Exchange Rate	0.7190	Non-stationary	0.0000*	Stationary
Inflation	0.1548	Non-stationary	0.0000*	Stationary
Money Supply	0.2113	Non-stationary	0.0000*	Stationary
Foreign Exchange Reserves	0.0495*	Stasionery	0.0000*	Stationary
Trade Balance	0.1256	Non-stationary	0.0000*	Stationary
Crude Oil	0.2434	Non-stationary	0.0000*	Stationary
Gold	0.8942	Non-stationary	0.0000*	Stationary

Source: Data Processed Eviews 12 (2026)

Based on the results of the stationarity test (ADF) above, all variables are stationary at the first difference level because the ADF probability value of each variable is less than 5%.

2. Optimum Lag Test

The following are the results of the optimum lag test :

Table 2. Optimum Lag Test

lag	LogL	LR	FPE	AIC	SC	HQ
0	38.73961		1.63e-09	-0.371223	-0.242617*	-0.319041
1	124.1308	162.7926	1.06e-09*	--0.796852*	0.231997	-0.379389*
2	163.3714	71.59682*	1.20e-09	-0.682706	1.246385	0.100037
3	186.4782	40.26803	1.63e-09	-0.379862	2.449472	0.768162
4	216.3107	49.54645	2.07e-09	-0.155681	3.573896	1.357622
5	251.1392	54.99223	2.49e-09	0.010068	4.639888	1.888652
6	279.6184	42.63561	3.27e-09	0.250077	5.780140	2.493941
7	315.3387	50.55148	4.00e-09	0.405396	6.835701	3.014540
8	357.8767	56.71734	4.59e-09	0.480974	7.811523	3.455399

Source: Data Processed Eviews 12 (2026)

Based on Table 2, which shows the results of the information criterion estimation, lag 2 is identified as the optimum lag. This is based on the minimum values obtained for the Final Prediction Error (FPE) and Akaike Information Criterion (AIC) parameters.

3. Stability Test

The results of the stability test can be seen in the following table:

Table 3. Stability Test Results

Root			Modulus
-0.481740			0.481740
0.283373	-	0.088652i	0.296916
0.283372	+	0.088652i	0.296916
-0.225016			0.225016
-0.102972	-	0.149153i	0.181245
-0.102972	+	0.149153i	0.181245
0.084028			0.084028

Source: Data Processed Eviews 12 (2026)

Based on the results of the VECM estimation stability test presented in Table 3. all characteristic root modulus values are below one (<1). This indicates that the estimated VECM model is stable, so that further analysis in the form of Impulse Response Function (IRF) and Variance Decomposition (VD) can be interpreted validly and reliably.

4. Cointegration Test

The cointegration test was conducted to determine the appropriate model specification, namely between Vector Autoregression (VAR) or Vector Error Correction Model (VECM). This test aims to confirm the existence of equilibrium relationships and stability of movements between variables in the long term. The estimation results are shown in the following table:

Table 4. Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None*	0.601345	705.029	125.6154	162.78	46.23142	0.000
At most 1	0.499933	542.249	95.75366	122.664	40.07757	0.000
At most 2	0.461087	419.586	69.81889	109.422	33.87687	0.000
At most 3	0.400276	310.164	47.85613	90.4975	27.58434	0.000
At most 4	0.382197	219.667	29.79707	85.2406	21.13162	0.000
At most 5	0.34585	134.426	15.49471	75.1222	14.2646	0.000
At most 6	0.284698	59.3039	3.841465	59.3039	3.841465	0.000

Source: Data Processed Eviews 12 (2026)

The cointegration test results in Table 4 show that the variables are cointegrated in the long run, as indicated by a trace statistic $>$ critical value of 5%. Thus, in the long run, the variables will influence each other.

5. Short-Term Model Estimation

The following are the model estimates produced in this study:

Table 5. Short-Term Estimate

Variable	Coefficient	T-statistic	T-table
CointEq1	-0.161332	-2.79077	1,974
Exchange Rate (-1),2)	-0.357815	-4.52362	1,974
Inflation (-1),2)	0.001819	0.81472	1,974
Money Supply(-1),2)	-0.093355	-1.27626	1,974
Foreign Exchange Reserves(-1),2)	0.094905	1.27198	1,974
Trade Balance (-1),2)	-2.28E-06	-1.23910	1,974
CrudeOil (-1),2)	0.028936	1.44171	1,974
Gold (-1),2)	-0.035179	-0.61620	1,974
Dummy_Covid (-1),2)	-0.021273	-1.27689	1,974

Source: Data Processed Eviews 12 (2026)

The following VECM equation represents short-term adjustment dynamics and is formulated as follows:

$$\begin{aligned}\Delta ER_t = & -0.161332 ECT_{t-1} - 0.357815 \Delta ER_{t-1} + 0.001819 \Delta INF_{t-1} \\ & - 0.093355 \Delta MS_{t-1} + 0.094905 \Delta FER_{t-1} - 2.28 \times 10^{-6} \Delta TB_{t-1} \\ & + 0.028936 \Delta OIL_{t-1} - 0.035179 \Delta GOLD_{t-1} - 0.021273 D_t + \varepsilon_t\end{aligned}$$

Based on Table 5, the short-term estimation results indicate that not all variables are insignificant. The error correction term (CointEq1) is statistically significant, as its t-statistic (-2.79077) exceeds the critical value (1.974) in absolute terms. This confirms the existence of a long-run equilibrium relationship and indicates that deviations from equilibrium are corrected in the short run. In addition, the lagged exchange rate variable is also significant, with a t-statistic of -4.52362 , suggesting that past exchange rate movements significantly influence current exchange rate dynamics.

Meanwhile, other variables including inflation, money supply, foreign exchange reserves, trade balance, crude oil prices, gold prices, and the Covid-19 dummy are not statistically significant in the short run, as their t-statistics are smaller than the critical value. These findings indicate that short-term exchange rate movements are primarily driven by adjustment toward long-run equilibrium and past exchange rate behavior rather than contemporaneous macroeconomic fundamentals.

6. Long-Term Model Estimation

Table 6. Long-Term Estimates

Variabel	Coefficient	T-statistic	T-table
Exchange Rate(-1)	1.000000		1,974
Inflation(-1)	-0.032407	-4.36239	1,974
Money Supply(-1)	-0.500664	-9.98365	1,974
Foreign Exchange Reserves (-1)	-0.228041	-1.64859	1,974
Trade Balance(-1)	0.0000314	4.43499	1,974
CrudeOil(-1)	0.162094	3.98436	1,974
Gold(-1)	-0.009595	-0.11025	1,974

Source: Data Processed Eviews 12 (2026)

The following VECM equation represents long-term adjustment dynamics and is formulated as follows:

$$\begin{aligned}
 ER_t = & -0.032407 INF_t - 0.500664 MS_t - 0.228041 FER_t \\
 & + 0.0000314 TB_t + 0.162094 OIL_t \\
 & - 0.009595 GOLD_t + \epsilon_t
 \end{aligned}$$

Based on the results of the long-term VECM estimation, inflation has a negative and statistically significant effect on the exchange rate, as indicated by a coefficient of -0.032407 and a t-statistic of -4.36239 . Given that the exchange rate is defined as IDR/USD, a negative coefficient implies a decrease in the exchange rate, which corresponds to an appreciation of the rupiah. Therefore, an increase in inflation is associated with an appreciation of the rupiah, ceteris paribus. The money supply also exhibits a negative and significant effect, with a coefficient of -0.500664 and a t-statistic of -9.98365 . This indicates that an increase in liquidity leads to a decline in the exchange rate, implying an appreciation of the rupiah.

Conversely, the trade balance has a positive and significant effect on the exchange rate, as shown by a coefficient of 0.0000314 and a t-statistic of 4.43499 . A positive coefficient indicates an increase in the exchange rate, which corresponds to a depreciation of the rupiah. This suggests that improvements in the trade balance are associated with rupiah depreciation. In addition, world crude oil prices have a positive and significant effect, with a coefficient of 0.162094 and a t-statistic of 3.98436 , indicating that an increase in oil prices leads to an increase in the exchange rate, or rupiah depreciation.

Meanwhile, foreign exchange reserves and gold prices do not show statistically significant effects in the long term, indicating that these variables do not play a significant role in

explaining exchange rate movements. The existence of a long-term relationship among the variables is further supported by the Johansen cointegration test results and the significance of the Error Correction Term.

7. Impulse Response Function (IRF)

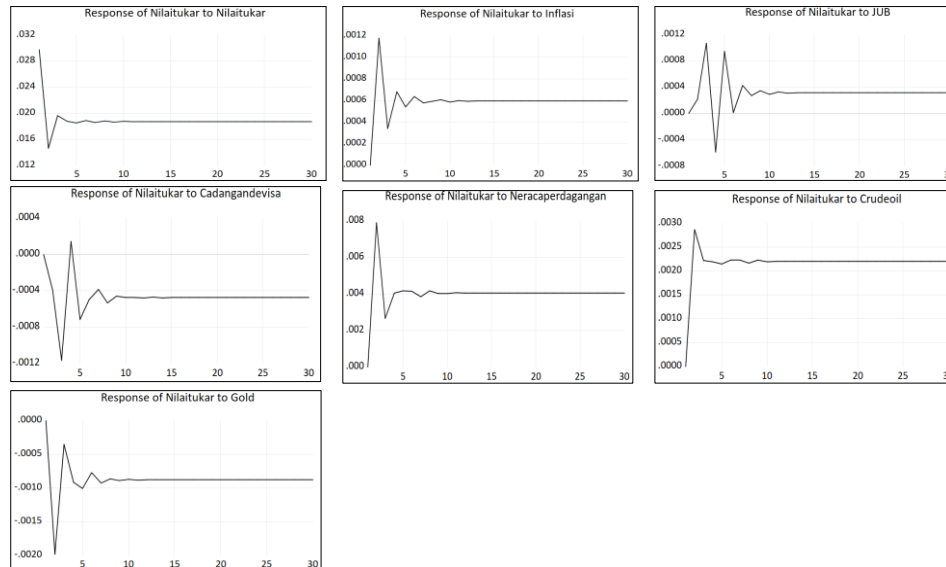


Figure 2 . Impulse Response Function to Exchange Rate Shocks
Source: Data Processed Eviews 12 (2026)

The Impulse Response Function (IRF) results show that the exchange rate responds dynamically to macroeconomic shocks and gradually converges toward equilibrium. In the short run, shocks to inflation and money supply tend to generate a positive response in the exchange rate, indicating depreciation pressure. However, this short-term response differs from the long-run VECM estimation results, where inflation and money supply exhibit a negative relationship with the exchange rate, implying appreciation.

This difference indicates that the transmission mechanism is time-dependent. In the short term, shocks trigger market reactions and expectations that lead to depreciation, while in the long term, policy adjustments and macroeconomic stabilization mechanisms may reverse the direction of the effect. Therefore, the relationship between macroeconomic variables and the exchange rate should be interpreted dynamically rather than as a fixed relationship.

8. Analysis Forecast Error Variance Decomposition (FEVD)

Table 7. Forecast Error Variance Decomposition (FEVD)

Period	Exchange Rate	Inflation	Money Supply	Foreign reserves	Exchange	Trade Balance	Crude Oil	Gold
1	100.0000	0.000000	0.000000	0.000000		0.000000	0.000000	0.000000
10	93.99897	0.096445	0.068759	0.076112		4.409077	1.119207	0.231430
30	93.96038	0.095104	0.041744	0.066573		4.385520	1.234070	0.216611

Source: Data Processed Eviews 12 (2026)

The results of the Forecast Error Variance Decomposition (FEVD) analysis reveal that in the very short term, exchange rate fluctuations are determined absolutely (100%) by the shock of the variable itself, reflecting the strong influence of market expectations and historical internal factors. However, entering the long-term horizon (30th period), this dominance

declines to 93.96%, leaving room for the transmission of other fundamental variables. Among these determinants, the trade balance appears as the largest contributor with a share of 4.39%, followed by the transmission of global crude oil price shocks (1.23%) and gold (0.22%). Conversely, the propagation of domestic monetary variables such as inflation (0.095%), foreign exchange reserves (0.067%), and JUB (0.042%) is recorded as very marginal. This configuration confirms that although the volatility of the Rupiah was driven by its own inertia at the beginning of the period, the posture of the external sector (trade and energy commodity performance) had a much more substantial leverage than domestic monetary instruments in dictating long-term exchange rate variations.

The empirical findings suggest that exchange rate dynamics are shaped by both internal adjustment mechanisms and external shocks. In the short run, exchange rate movements are driven primarily by inertia and the adjustment process toward long-run equilibrium, as reflected in the significance of the error correction term. This indicates that short-term fluctuations are influenced more by market expectations than by contemporaneous macroeconomic fundamentals. By contrast, the long-run results highlight the importance of structural relationships among variables, although the direction of these relationships does not always conform to conventional theoretical expectations.

9. Domestic and Global Determinants of Rupiah Exchange Rate Fluctuations

The Johansen cointegration test indicates that all variables are connected through a long-run equilibrium relationship. This finding confirms that the rupiah exchange rate does not move independently; rather, it is shaped by structural linkages between domestic macroeconomic variables and external factors, particularly global commodity prices. Conceptually, the presence of cointegration implies that, despite short-term fluctuations, the economic system tends to return to its long-run equilibrium path. This strengthens the view that the exchange rate should be understood as an endogenous variable within a broader system characterized by the simultaneous interaction of multiple economic forces. Similar findings show that exchange rates in developing countries are highly sensitive to a combination of domestic and external factors in the long run (Utami & Islami, 2021; Kusnadi & Saragih, 2020). However, while cointegration confirms the existence of a long-run relationship, it does not by itself explain the direction of the interactions among variables. For that reason, further analysis through short-run and long-run estimations is necessary to understand the underlying transmission dynamics more clearly.

10. Short-Run and Long-Run Dynamics of Rupiah Exchange Rate Movements

The estimation results show that the effects of macroeconomic variables and global commodities on the exchange rate differ across time horizons. In the short run, not all variables exert a significant effect, indicating that exchange rate movements are influenced more strongly by market dynamics, such as expectations, capital flows, and temporary shocks. Comparable evidence suggests that short-term exchange rate fluctuations are driven more by market factors than by macroeconomic fundamentals (Handayani, 2022). Nevertheless, the significant error correction term indicates the presence of an adjustment mechanism toward long-run equilibrium. In other words, any short-run deviation from equilibrium tends to be corrected over time. In addition, the significance of the lagged exchange rate suggests that current exchange rate movements are also influenced by their behavior in previous periods, reflecting the presence of inertia in exchange rate dynamics.

In the long run, the estimation results reveal a pattern that is not fully consistent with conventional theory. Inflation and money supply are found to have a negative and significant effect on the exchange rate, implying that increases in these variables are followed by an appreciation of the rupiah, given that the exchange rate is defined as IDR/USD. This result

does not fully support Purchasing Power Parity (PPP) theory or the Monetary Approach to Exchange Rates (MAER), both of which generally predict depreciation in response to rising inflation and monetary expansion. Even so, these findings are not entirely inconsistent with the empirical literature. A negative relationship between inflation and the exchange rate has also been reported, which is explained by policy responses and market conditions that mitigate inflationary pressure on the domestic currency (Marlissa & Mamengko, 2024). Likewise, under certain conditions, an increase in money supply may reflect healthy economic expansion, which in turn can strengthen market confidence in the domestic currency (Ramadhani et al., 2025).

By contrast, the trade balance and global crude oil prices have a positive and significant effect on the exchange rate, indicating that increases in these variables are associated with rupiah depreciation. These results suggest that external factors play a more prominent role in shaping exchange rate movements than domestic monetary variables. The relationship between the exchange rate and the trade balance can be bidirectional and does not necessarily result in appreciation when the trade balance improves (Winarno, 2014). In addition, rising global oil prices can increase the demand for foreign currency through the import channel, thereby generating depreciation pressure on the domestic currency (Rastogi et al., 2023). Meanwhile, foreign exchange reserves and gold prices do not appear to have a significant effect, suggesting that they are not the primary determinants of exchange rate movements in the estimated model. Gold tends to function more as an investment instrument and a safe-haven asset, meaning that its effect on the exchange rate is indirect rather than immediate (Parengkuan, 2018). Overall, these findings indicate that the relationship between macroeconomic variables and the exchange rate is highly contextual and does not always follow classical theoretical predictions, especially in an open economy exposed to global dynamics and international capital flows.

11. Rupiah Exchange Rate Responses to Macroeconomic and Commodity Price Shocks

The Impulse Response Function (IRF) results indicate that the exchange rate responds dynamically to shocks and does not return to equilibrium immediately. In the initial periods, the response tends to fluctuate and is dominated by internal shocks, reflecting the presence of short-run rigidities and the strong role of market sentiment. Over time, however, the response gradually weakens and displays a pattern of convergence toward long-run equilibrium. This suggests that shock transmission within the exchange rate system is gradual rather than instantaneous.

The FEVD results reinforce this interpretation. In the early periods, exchange rate variation is dominated by shocks to the exchange rate itself. However, over the medium and long term, the contribution of other variables becomes more substantial. In the final period, external variables, particularly the trade balance and global crude oil prices, emerge as the largest contributors after the exchange rate itself. These findings indicate a gradual shift in the determinants of exchange rate fluctuations, from predominantly internal factors in the short run to more external influences over a longer horizon. Similar evidence shows that external shocks exert a stronger influence than domestic factors in shaping exchange rate dynamics in the long run (Febrian & Wahed, 2025).

E. CONCLUSION AND RECOMMENDATIONS

This study concludes that the rupiah exchange rate is influenced by both domestic macroeconomic variables and global commodity prices, with distinct dynamics emerging in the short run and the long run. The results confirm the existence of a long-run equilibrium relationship, indicating that exchange rate movements are shaped by the interaction between domestic and external factors. In the short run, exchange rate fluctuations are driven primarily by market dynamics and the exchange rate's own past behavior, as most explanatory variables

do not exhibit a statistically significant effect. Nevertheless, the significance of the error correction term indicates that short-run deviations are gradually adjusted toward long-run equilibrium.

In the long run, inflation and money supply are found to have a negative and significant effect on the exchange rate. Given that the exchange rate is defined as IDR/USD, this implies that increases in both variables are associated with a decline in the exchange rate, reflecting an appreciation of the rupiah. By contrast, the trade balance and global crude oil prices have a positive and significant effect, indicating that increases in these variables are associated with rupiah depreciation. Meanwhile, foreign exchange reserves and gold prices do not show a significant long-run effect. In addition, the IRF and FEVD results indicate that, in the short term, exchange rate fluctuations are dominated by internal shocks. Over the medium and long term, however, external variables, particularly the trade balance and global crude oil prices, become increasingly important in explaining exchange rate variation.

This study has several limitations. First, the quality and frequency of the data may affect the precision of the estimation results. Second, the model specification is limited to selected variables and may therefore not fully capture the complexity of exchange rate dynamics. Third, the use of the IDR/USD exchange rate requires caution in interpreting coefficient signs, as different exchange rate definitions may lead to different conclusions regarding appreciation and depreciation. Fourth, the COVID-19 dummy variable may not fully capture the broader and nonlinear economic effects generated by the pandemic.

Accordingly, future research is recommended to incorporate a broader set of explanatory variables, employ alternative model specifications, and adopt a more comprehensive approach to capturing structural shocks. From a policy perspective, the findings suggest that exchange rate stabilization should not rely solely on domestic monetary management, but should also take into account external-sector conditions, particularly trade performance and movements in global energy prices. Overall, these results highlight the importance of distinguishing between short-run adjustment processes and long-run structural relationships in exchange rate analysis.

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