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Rupiah Exchange Rate Resilience: The Role of Domestic Determinants and Global Monetary Shocks

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Abstract–Financial openness puts the rupiah exchange rate under repeated pressure due to global monetary shocks, while policy evaluations have so far relied on stability indicators that are static and do not explain the currency's recovery capacity. This study aims to analyze the influence of the BI Rate, inflation, Composite Stock Price Index, US Treasury Yield, and CBOE Volatility Index on the rupiah exchange rate in the short and long term, as well as measure exchange rate resilience through the adjustment speed coefficient. The approach used is explanatory quantitative with secondary data for the period January 2013-December 2024 as many as 144 observations, taken through documentation techniques from Bank Indonesia, the Central Statistics Agency, the Indonesia Stock Exchange, and the Federal Reserve Economic Data, and analyzed using Autoregressive Distributed Lag accompanied by dummy Taper Tantrum and COVID-19. The bounds test confirmed cointegration with F-statistic 11.333. In the long term, inflation and US Treasury Yield drive depreciation significantly, global market volatility has a significant effect, while the BI Rate and JCI are insignificant; In the short term, JCI actually triggered appreciation. The Term Error Correction coefficient of -0.368 indicates 36.8% of the imbalance is corrected every month. These findings operationalize resilience as the pace of adjustment and provide an empirical basis for calibrating the duration and intensity of stabilization policies.

Keywords: Rupiah Exchange Rate; Resilience; ARDL; Global Monetary Shocks; Financial Market Volatility

1. INTRODUCTION

The deepening integration of cross-country finance has transformed the exchange rates of developing countries from a mere reflection of domestic fundamentals to a highly sensitive variable for the monetary policies of developed countries. Indonesia occupies a distinctive position in this configuration as an economy with a floating exchange rate regime and a securities market wide open to foreign ownership, the Rupiah bears direct pressure whenever global investors' risk preferences shift. The 2013-2024 range experienced three different pressures but led to similar symptoms, namely depreciation accompanied by a surge in volatility. The Federal Reserve's announcement of quantitative easing reductions in 2013 triggered a surge in U.S. bond yields and a reversal of capital flows from emerging markets (Bernanke, 2020; Muliarta & Widanta, 2023); the COVID-19 pandemic in 2020 presented shocks rooted in the health crisis but transmitted through the drying up of global liquidity; while the United States' monetary tightening cycle in 2022-2024 has again widened the yield differential and prompted international portfolio reallocations (Padha & Chaubal, 2024). The three episodes confirm that the external vulnerability of the Rupiah is repetitive and structural (Obstfeld et al., 2019).

The unresolved issue lies not in whether external shocks pressure the rupiah, but in how quickly the rupiah is able to return to its equilibrium trajectory after the pressure subsides. The evaluation framework commonly used by authorities and academics still relies on static stability indicators, such as the amount of cumulative depreciation, the standard deviation of the exchange rate, or the intensity of foreign exchange intervention. Such measurements illustrate the magnitude of the impact, but do not explain its recovery capacity. In fact, in the dynamic economic literature, stability and resilience are two different constructs, stability refers to low fluctuations, while resilience refers to the ability of the system to absorb disruption and correct itself towards equilibrium (Wang & Liang, 2024). These conceptual differences create a real practical gap, but there is no quantitative measure of how long such pressures will be absorbed by the market mechanism itself, so the calibration of the intensity and duration of policy responses tends to be ad hoc (Ibrahim & Sukmana, 2023). This study proposes a conceptual as well as methodological repositioning to bridge this gap. Exchange rate resilience is formulated not as a condition of low volatility, but as the intrinsic capacity of the domestic foreign exchange market to self-correct short-term deviations towards its long-term equilibrium. This study has a precise econometric equivalent, namely the Error Correction Term (ECT) coefficient or speed of adjustment in the framework of Autoregressive Distributed Lag (ARDL) developed by Pesaran et al. (2001). A negative and significant ECT coefficient confirms the functioning of the recovery mechanism, while the absolute value translates resilience into directly interpretable units, i.e. the proportion of corrected imbalances per period and, implicitly, the estimated duration of the rupiah recovery (Caldera-Sánchez et al., 2017; Wang & Liang, 2024). The selection of ARDL is also based on technical considerations, this approach does not require uniformity of order of integration between variables, is efficient at medium sample sizes, and allows estimation of short-term and long-term dynamics in one integrated equation (Kurniawan et al., 2024).

The selection of variables in this study is not ad hoc, but is derived from the five pillars of international monetary economic theory that complement each other in explaining the transmission path of pressure on the Rupiah. Purchasing Power Parity positions domestic inflation as a fundamental determinant that shifts the point of exchange

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rate equilibrium through the erosion of relative purchasing power (Mishkin, 2022), while the International Fisher Effect and Interest Rate Parity place the BI-Rate as an instrument that affects yield differentials while signaling expectations of depreciation in the future (Krugman et al., 2022). The Portfolio Balance Theory explains why the performance of the Composite Stock Price Index is related to exchange rate movements through portfolio reallocations and capital flows (Syamni et al., 2022), while the International Capital Flow Theory explains how the rise in the US Treasury Yield pulls capital out of emerging markets (Lee, 2024). Finally, Flight to Quality provides a foothold for the CBOE Volatility Index's entry as a proxy for global risk aversion, namely when a surge in uncertainty encourages investors to shift their positions to dollar-denominated assets that are perceived as safe (Gaol, 2023; Padha & Chaubal, 2024). The five theories imply an important methodological consequence that domestic and global determinants work simultaneously and interact with each other, so that their testing separately risks producing biased estimates.

The development of literature clearly shows progress as well as consistent limits. In the realm of domestic determinants, the long-term relationship between monetary variables and the Rupiah exchange rate was confirmed by (Pratiwik & Prajanti, 2023), while short-term and long-term dynamics between interest rates, inflation, JCI, and exchange rates were found by (Utami & Islami, 2021). Support for the Dornbusch overshooting hypothesis in the Indonesian context is provided by (Syamad & Rossanto Dwi Handoyo, 2023), findings that are reinforced by (Maghfiroh & Jayadi, 2024) in the scope of ASEAN-5. In a study published in the UMM Journal of Development Economics, it was shown through the ARDL approach by (Sebayang et al., 2022) that Bank Indonesia's accommodative interest rate policy during the pandemic recession had a positive impact on growth, but in the long-term domestic interest rates must be able to compete with other countries' interest rates to maintain capital inflows, a finding that directly links domestic monetary instruments with external pressures. In the realm of global factors, the influence of the Federal Reserve's quantitative easing policy on the Rupiah exchange rate at both time periods is proven by (Muliarta & Widanta, 2023), the differentiation of the influence of external shocks in different time periods is shown by (Kurniawan et al., 2024), the role of global liquidity in shaping monetary policy outcomes in emerging markets is demonstrated by (Padha & Chaubal, 2024), and the transmission of monetary shocks of the United States to Indonesia's financial market through interest rates and exchange rates simultaneously is shown by (Saputra et al., 2025). Methodologically, the convergence of the literature on the ARDL approach is quite striking; however, all of these studies treat ECM solely as a prerequisite for the validity of cointegration, rather than as an object of substantive interpretation.

From the mapping, three interconnected gaps were identified. First, the context gap, the majority of studies test the influence of determinants in general without specifically evaluating how the rupiah recovery capacity works in two shocking episodes with contrasting characteristics, namely the Taper Tantrum which stems from changes in monetary policy expectations, and the COVID-19 pandemic which stems from real shocks as well as liquidity. Second, methodological gaps, previous research stopped at testing the direction and significance of the relationship between variables, while the question of the speed of adjustment towards equilibrium has not been raised as the focus of the analysis (David et al., 2026). The third, and the most fundamental, is a measurement gap: resilience continues to be interpreted narratively through low exchange-rate volatility, whereas in dynamic systems it is far better represented by the speed of adjustment (Caldera-Sánchez et al., 2017). This study closes the three gaps simultaneously by lifting the ECT coefficient from a complementary statistical status to an operational indicator of resilience, integrating domestic (BI-Rate, inflation, JCI) and external (US Treasury Yield, VIX) determinants in a single estimation framework, and controlling structural shocks through the Taper Tantrum dummy and the COVID-19 dummy so that the parameter estimation is not affected by changes in economic structure (Wooldridge, 2020).

The novelty of this study lies in the shift in the way exchange rate resilience is treated, from narrative adjectives to estimable parameters. Although attention to emerging market resilience to global monetary shocks is now increasing rapidly (International Monetary Fund, 2025), and although a number of studies have shown that the pace of correction towards equilibrium varies between currencies (Marisetty, 2024), no study in the Indonesian context has explicitly elevated the Error Correction Term coefficient from a complementary statistical status to a stand-alone indicator of resilience. This study fills this gap at three levels at once: conceptually, by defining resilience as self-correcting capacity rather than low volatility; methodologically, by making the speed of adjustment as a quantity that is directly interpreted, not just as a condition for the validity of cointegration; and empirically, by measuring this resilience in the 2013-2024 range which contains three shock episodes with contrasting characters. Thus, this study offers a quantitative measure of how long it takes for the rupiah to recover, not just how much it is depressed. This is a question that has not been answered in the exchange rate literature of developing countries.

This study sets four objectives that are intertwined. First, analyze the influence of BI-Rate, inflation, JCI, US Treasury Yield, and VIX on the Rupiah exchange rate in the long term. Second, analyze the influence of the five variables in the short term to map the difference in exchange rate responses across the two-over time. Third, evaluating the impact of the Taper Tantrum period and the COVID-19 pandemic on the dynamics of the Rupiah through the dummy variable representing the two shock episodes. Fourth, and is the ultimate goal that integrates the three previous objectives, to measure the level of resilience of the rupiah exchange rate through the speed of adjustment coefficient in the ARDL model so that a quantitative estimate of the rupiah return to long-term balance after deviation is obtained. Using monthly secondary data for the period January 2013 to December 2024, this study is expected to make a theoretical contribution in the form of operationalization of the concept of exchange rate resilience which has been

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qualitative so far, as well as a practical contribution to Bank Indonesia in the form of an empirical basis to calibrate the intensity and duration of the stabilization policy response when the rupiah is again hit by global monetary shocks.

2. RESEARCH METHODS

2.1 Data Collection Techniques

Data is collected through documentation methods and literature studies on official publications of data publishing institutions. The central exchange rate of the Rupiah against the US dollar (IDR/USD) and the BI Rate is obtained from the Indonesian Economic and Financial Statistics (SEKI), Bank Indonesia; inflation (CPI, year-on-year) from the Central Statistics Agency; Composite Stock Price Index of the Indonesia Stock Exchange with cross-verification through Investing.com; The 10-year US Treasury Yield and the CBOE Volatility Index (VIX) from FRED. Two dummy variables were compiled by the researcher, namely, D_TAPERTANTRUM valued at 1 in May 2013-December 2014 and 0 in other periods, and D_COVID valued at 1 in March 2020-March 2022 and 0 in other periods. The exchange rate variable and JCI are transformed into natural logarithms to stabilize the variance and allow the interpretation of the coefficient as elasticity, while the BI Rate, inflation, UST, and VIX are maintained in their original units because they have been in the form of percentages or indices (Wooldridge, 2020). All data was processed using EViews12.

2.2 Type of Research and Population and Sample

The research design of this study is quantitative and explanatory, aimed at testing the causal dynamics between macroeconomic indicators and financial market variables (Sekaran & Bougie, 2020). The population of this study encompasses all available monthly time-series data concerning domestic monetary conditions and global financial markets that influence the Rupiah exchange rate. Secondary data were retrieved from official publications by Bank Indonesia (BI), the Central Statistics Agency (BPS), the Indonesia Stock Exchange (IDX), and Federal Reserve Economic Data (FRED).

Sample selection was conducted using a purposive sampling method tailored for time-series analysis. The selection criteria required complete, uninterrupted monthly data availability and the necessary inclusion of periods marked by severe global financial volatility. Consequently, the chosen observation window spans from January 2013 to December 2024 (144 monthly observations), intentionally capturing significant structural shocks such as the 2013 Taper Tantrum, the COVID-19 economic crisis, and the aggressive 2022-2024 Fed rate hike cycles. As the study utilizes the entirety of the time-series data meeting these predefined temporal and event-driven parameters, it constitutes a saturated sample.

2.4 Conceptual Framework

The rupiah exchange rate is influenced by domestic and global factors. Domestic factors in this study include the BI Rate, inflation, and JCI, while global factors consist of US Treasury Yield (UST) and CBOE Volatility Index (VIX). These factors affect exchange rates through changes in purchasing power, asset return rates, investment risks, and international capital flows.

Theoretically, the relationship is supported by Purchasing Power Parity (PPP), International Fisher Effect (IFE), Portfolio Balance Theory, International Capital Flow Theory, and Flight to Quality Theory. Changes in inflation and interest rates affect exchange rate expectations, while changes in stock market performance, global asset yields, and market uncertainty can drive changes in capital flows that impact the rupiah exchange rate.

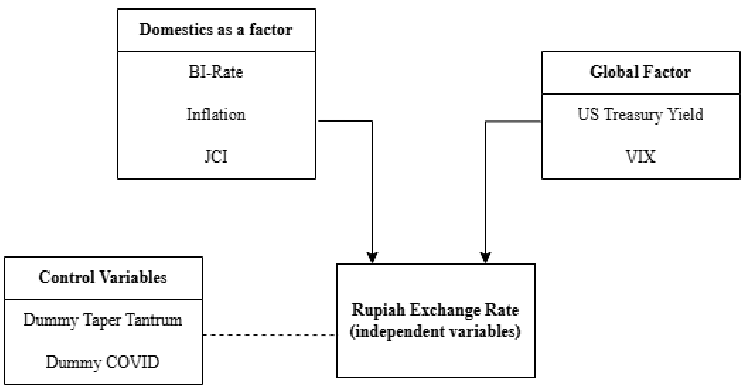

Figure 1. Conceptual Thinking Framework.

Based on this theoretical relationship, the conceptual framework of this study describes the influence of domestic factors consisting of the BI Rate, inflation, and JCI, as well as global factors consisting of the US Treasury Yield and VIX, on the rupiah exchange rate. The study also includes the Taper Tantrum dummy and COVID-19

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dummy as control variables to capture the effects of specific shocks during the study period. The conceptual framework illustrating these relationships is presented in Figure 1.

2.4 Data Analysis Techniques

The conceptual framework of this research positions the rupiah exchange rate (LNEXCRATE) as the dependent variable, shaped by two blocks of independent variables: domestic factors (BI Rate, inflation, Composite Stock Price Index) and global factors (US Treasury Yield, CBOE Volatility Index), together with two shock-period dummy variables (Taper Tantrum and COVID-19). This framework is operationalized econometrically through Equations (1)-(3) below, and exchange rate resilience itself is captured through the Error Correction Term (ECT) coefficient generated from the ARDL/ECM estimation.

As a basis for the preparation of the econometric model, this study first formulates the conceptual relationship between the variables studied. The conceptual model describes the relationship between the rupiah exchange rate as a dependent variable with domestic factors, global factors, and dummy variables that represent periods of economic shock. The conceptual model of the research is formulated as follows.

$$\mathrm{LNEXCRATE_t} = \mathrm{f(BIRATE_t, INFLATION_t, LNJCI_t, UST_t, LNVIX_t, D\_TAPERTANTRUM_t, D\_COVID_t)} \quad (1)$$

The model illustrates that the rupiah exchange rate is influenced by domestic factors including the BI Rate, inflation, and the Composite Stock Price Index (JCI), as well as external factors in the form of US Treasury Yield, CBOE Volatility Index (VIX), and two dummy variables representing the Taper Tantrum period and the COVID-19 pandemic. The operational definition, indicator, data source, and measurement scale of each variable are summarized in Table 1.

Table 1. Operational Definition of Research Variables.

Variable	Operational Definition	Indicator / Measurement	Data Source	Scale
LNEXCRATE	Natural logarithm of the monthly IDR/USD central (middle) exchange rate	ln(IDR/USD spot rate)	Bank Indonesia (SEKI)	Ratio
BI_RATE	Bank Indonesia's benchmark monetary policy interest rate	Monthly policy rate, %	Bank Indonesia (SEKI)	Ratio
INFLATION	Monthly year-on-year change in the Consumer Price Index	CPI inflation rate, %	Central Statistics Agency (BPS)	Ratio
LNJCI	Natural logarithm of the Composite Stock Price Index, reflecting domestic capital market performance	ln(JCI closing index)	Indonesia Stock Exchange / Investing.com	Ratio
UST	Yield on 10-year United States Treasury bonds, reflecting the global risk-free benchmark rate	Monthly yield, %	Federal Reserve Economic Data (FRED)	Ratio
VIX	CBOE Volatility Index, a proxy for global investor risk aversion	Monthly index value	Federal Reserve Economic Data (FRED)	Ratio
D_TAPERTANTRUM / D_COVID	Dummy variables marking the Taper Tantrum (May 2013-Dec 2014) and COVID-19 (Mar 2020-Mar 2022) shock periods	1 = shock period, 0 = otherwise	Constructed by the researcher based on event dating	Nominal

The model is transformed into linear econometrics:

$$LNEXCRATE_t = \alpha + \beta_1 BIRATE_t + \beta_2 INFLATION_t + \beta_3 LNJCI_t + \beta_4 UST_t + \beta_5 VIX_t + \beta_6 D\_TAPERTANTUM_t + \beta_7 D\_COVID_t + \varepsilon_t \quad (2)$$

In this equation, LNEXCRATE is a natural logarithm of the rupiah exchange rate against the United States dollar (IDR/USD) as a dependent variable. Independent variables consist of BIRATE which represents Bank Indonesia's policy interest rate, INFLATION as the monthly inflation rate, LNJCI which is the natural logarithm of the Jakarta Composite Index, UST as the yield on 10-year US Treasury bonds, and VIX which is the CBOE Volatility Index as an indicator of global financial market volatility. In addition, the study included two dummy variables, namely D_TAPERTANTRUM to represent the 2013 Taper Tantrum policy shock period and D_COVID to represent the COVID-19 pandemic period. The symbol α denotes a constant, β is the coefficient of each independent variable, ε_t is an error term, while t represents a monthly observation period from January 2013 to December 2024.

Since this study estimates the simultaneous short-term and long-term dynamics of data with mixed integration orders I(0) and I(1), equation (2) was developed into an Autoregressive Distributed Lag model (Pesaran et al., 2001):

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$$LNEXCRATE_t = \alpha + \sum_{i=1}^{p} \emptyset_i \, LNEXRATE_{t-i} + \sum_{i=0}^{q_1} \beta_{1i} \, BIRATE_{t-i} + \sum_{i=0}^{q_2} \beta_{2i} \, INFLATION_{t-i} + \sum_{i=0}^{q_3} \beta_{3i} \, LNJCI_{t-i} + \sum_{i=0}^{q_4} \beta_{4i} \, UST_{t-i} + \sum_{i=0}^{q_5} \beta_5 \, VIX_{t-i} + \gamma_1 D\_TAPERTANTUM_t + \gamma_2 D\_COVID_t + \varepsilon_t \quad (3)$$

with LNEXCRATE = natural logarithm of the IDR/USD exchange rate; BIRATE = Bank Indonesia's benchmark interest rate; INFLATION = monthly CPI inflation; LNJCI = natural logarithm of the Composite Stock Price Index; UST = yield on 10-year US government bonds; VIX = CBOE volatility index; D_TAPERTANTRUM and D_COVID = dummy variable; p, q = optimal lag length; ε = error term.

The ARDL model allows estimation of the dynamic influence of each variable through the inclusion of lags in both dependent and independent variables. Furthermore, the existence of long-term relationships between variables was tested using the Bounds Test. If there is evidence of cointegration, the model will be transformed into an Error Correction Model (ARDL) to estimate the short-term relationship, long-term relationship, and speed of adjustment towards a long-term equilibrium as reflected in the Error Correction Term (ECT) coefficient (Pesaran et al., 2001).

The estimation procedure was taken sequentially. The analysis began with diagnostic tests of normality (Jarque-Bera), autocorrelation (Breusch-Godfrey LM), and heteroscedasticity. If an indication of heteroscedasticity is detected, the estimate is corrected using White heteroscedasticity-consistent standard errors to keep the interpretation valid. This was followed by the Augmented Dickey-Fuller stationarity test to ensure that no variables were integrated in order I(2). The optimal lag length is determined based on the Akaike Information Criterion (AIC). The existence of cointegration is tested through the Bounds Test by comparing the F-statistical value against the upper and lower bound critical limits. Long-term and short-term estimation was then carried out, followed by diagnostic tests, and the stability of model parameters was verified through the CUSUM and CUSUM of Squares tests (Pesaran et al., 2001).

3. RESULTS AND DISCUSSION

3.1 Research Results

This section reports the processed output of the Autoregressive Distributed Lag (ARDL) estimation on 136 monthly observations of the USD/IDR exchange rate covering January 2013 to December 2024. Presentation follows the sequence of the analytical procedure: diagnostic and robustness testing, stationarity, lag order selection, cointegration, long-run estimation, short-run error correction estimation, goodness of fit, and parameter stability.

3.1.1 Diagnostic and Robustness Test Model

Table 2. Diagnostic and Robustness Test Model.

Diagnostic and Robustness Test Model	Method	T-Stat	Prob.	Result
Residual Normality Test	Jarque-Bera Test	2.617122	0.270209	Residuals are normally distributed
Serial Correlation Test	Breusch-Godfrey LM Test	Obs*R² = 1.186697	0.5525	No evidence of serial correlation
Heteroskedasticity Test	Breusch-Pagan-Godfrey Test	Obs*R² = 44.66421	0.0064	Heteroskedasticity detected
Robust Estimation	HC1 Robust Standard Errors			HC1 robust standard errors applied

As presented in Table 2, the results of the diagnostic tests show that the model meets most of the econometric assumptions. The Jarque-Bera test yielded a probability value of 0.2702, which is greater than the significance level of 5%, so the residual can be considered normally distributed. Furthermore, the Breusch-Godfrey LM test showed a probability value of 0.5525, so there was no evidence of autocorrelation in the residual model.

Because heteroskedasticity leaves the estimated coefficients unbiased but renders the standard errors inefficient, the model was re-estimated using the Huber–White–Hinkley (HC1) heteroskedasticity-consistent covariance estimator. The correction leaves every point estimate unchanged and alters only the covariance matrix, so that the reported t-statistics and p-values are robust. Table 3 documents the effect of the correction on the long-run significance levels.

Table 3. Long-Run Probability Values Before and After the HC1 Correction.

Variable	Prob. before HC1	Prob. after hc1	Change in status
BI_RATE	1,372222	1,020833	Remains insignificant
INFLATION	0.0008	0.0003	Remains significant at 1%
LNJCI	3,366667	2,6875	Remains insignificant
UST	0.0000	0.0000	Remains significant at 1%
VIX	0,409722	0,313889	Rises from 10% to 5% significance

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The correction does not reverse the direction or significance status of any variable except VIX, whose probability moves from 0.0590 to 0.0452 and therefore crosses into the 5% significance band. All subsequent results reported in this study are based on the post-HC1 estimation.

3.1.2 Stationarity Test

Table 4. Augmented Dickey-Fuller Unit Root Test.

Variable	Level (Prob.)	First Difference (Prob.)	Orde Integrasi
LNEXCRATE	0.0625	0.0000	I(1)
BI_RATE	0.4182	0.0000	I(1)
INFLATION	0.1707	0.0000	I(1)
LNJCI	0.4887	0.0000	I(1)
UST	0.6955	0.0000	I(1)
VIX	0.0029	0.0000	I(0)

The Augmented Dickey-Fuller (ADF) unit root test results are presented in Table 4. At the level form, only VIX is stationary, with a probability of 0.0029 below the 5% significance level. LNEXCRATE (0.0625), BI_RATE (0.4182), INFLATION (0.1707), LNJCI (0.4887), and UST (0.6955) fail to reject the unit root null at the level. After first differencing, all variables attain stationarity, with probabilities of 0.0000. The data therefore exhibit a mixed order of integration, combining I(0) and I(1), with no variable integrated at the second order, I(2).

3.1.3 Determination of Lag Length and Optimal Lag

Table 5. Determination of Optimal Lag Length.

Criteria	Result
Dependent Variable	LNEXCRATE
Number of Observations	136
Model Selection Criteria	Akaike Information Criterion (AIC)
Minimum AIC Value	-5.304373
Selected ARDL Models	ARDL (8,1,1,7,0,0)
Adjusted R^2	0.966001

As presented in Table 5, among all candidate specifications evaluated, the model with the lowest AIC value of -5.304373 is ARDL (8,1,1,7,0,0). This specification assigns a maximum lag of 8 to the dependent variable LNEXCRATE, a maximum lag of 1 to BI_RATE, 1 to INFLATION, 7 to LNJCI, and 0 to both UST and VIX. This lag structure is used in all subsequent estimation stages.

3.1.4 Cointegration Test

Table 6. Bounds test.

Dependent Variable	F-Statistic	Information
LNEXCRATE	11.333	There is a long-run relationship

Critical Value Bounds (Significance)	I(0)	I(1)
10%	2.08	3.00
5%	2.39	3.38
2.5%	2.70	3.73
1%	3.06	4.15

As presented in Table 6, the estimation results show an F-statistical value of 11.333. This value far exceeds the upper critical limit (Upper Bound) I(1) at a significance level of 5%, which is 3.38 (with the number of regressors k=5). This finding empirically rejects the zero hypothesis, thus confirming the existence of cointegration or a solid long-term equilibrium relationship between global and domestic monetary variables on the movement of the Rupiah exchange rate.

3.1.5 Long-Run Estimation

Table 7. Long-Run Estimation Results.

Variable	Coefficient	Std. Error	T-Statistic	Prob.
BI_RATE	-0.007493	0.005131	-1.460.339	1,020833
INFLATION	0.012176	0.003260	3.734.660	0.0003
LNJCI	-0.051645	0.059460	-0.868563	2,6875
UST	0.052446	0.009519	5.509.685	0.0000
VIX	0.000675	0.000333	2.025.884	0,313889
C	9.818.106	0.509702	1.926.245	0.0000

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Variable	Coefficient	Std. Error	T-Statistic	Prob.
EC=LNEXCRATE-(-0.0075BI_RATE+0.0122INFLATION-0.0516LNJCI+0.0524UST+0.0007VIX+9.8181)				

As presented in Table 7, three of the five independent variables are statistically significant in the long-run equation. INFLATION carries a positive coefficient of 0.012176 and is significant at the 1 percent level (0.0003). UST carries a positive coefficient of 0.052446 and is significant at the 1 percent level (0.0000), the largest coefficient magnitude among the significant regressors. VIX carries a positive coefficient of 0.000675 and is significant at the 5 percent level (0.0452). BI_RATE (coefficient -0.007493, p=0.1470) and LNJCI (coefficient -0.051645, p=0.3870) are not statistically significant at conventional levels. The intercept of 9.818106 is significant at the 1 percent level. The dummy variables D_TAPERTANTRUM and D_COVID were entered as fixed regressors. Under the EViews ARDL implementation, fixed regressors participate in the estimation but are excluded from the long-run form output; their coefficients are therefore reported only in the short-run equation.

3.1.6 Short-Run Estimation

Table 8. ECM Estimation Results

Variable	Coefficient	Std. Error	T-Statistic	Prob.
D(LNEXCRATE(-1))	-0.294862	0.069724	-4.228957	0.0000
D(LNEXCRATE(-2))	-0.204752	0.071021	-2.882966	0.0047
D(LNEXCRATE(-3))	-0.174093	0.072823	-2.390639	0.0185
D(LNEXCRATE(-5))	-0.236248	0.073042	-3.234395	0.0016
D(LNEXCRATE(-6))	-0.184925	0.075155	-2.460561	0.0154
D(LNEXCRATE(-7))	-0.157434	0.055893	-2.816704	0.0057
D(BI_RATE)	0.013918	0.007724	1.801953	0.0743
D(INFLATION)	-0.001878	0.002556	-0.734470	0.4642
D(LNJCI)	-0.351688	0.039902	-8.813734	0.0000
D(LNJCI(-1))	-0.181856	0.049409	-3.680599	0.0004
D(LNJCI(-5))	-0.184220	0.048989	-3.760452	0.0003
D(LNJCI(-6))	-0.118670	0.051072	-2.323558	0.0220
D_TAPERTANTRUM	-0.037430	0.007767	-4.819375	0.0000
D_COVID	0.026712	0.003820	6.991837	0.0000
COINTEQ(-1)	-0.367992	0.040242	-9.144541	0.0000

As presented in Table 8, the error correction term, COINTEQ(-1), carries a coefficient of -0.367992 with a probability of 0.0000. The coefficient satisfies both required conditions, it is negative in sign and statistically significant at the 1% level.

Six lags of the differenced dependent variable are significant, at lags 1, 2, 3, 5, 6, and 7, and every one of them carries a negative coefficient ranging from -0.157434 to -0.294862. Four terms of the differenced Jakarta Composite Index are significant: the contemporaneous term D(LNJCI) at -0.351688 (0.0000), together with lags 1, 5, and 6, all negative and significant at the 5% level or better. D(BI_RATE) carries a positive coefficient of 0.013918 and is significant only at the 10% level (0.0743). D(INFLATION) is not significant in the short run (coefficient -0.001878, p = 0.4642).

Both structural dummies are significant at the 1% level. D_TAPERTANTRUM carries a negative coefficient of -0.037430 (0.0000), while D_COVID carries a positive coefficient of 0.026712 (0.0000).

3.1.7 Stability Tests

The estimated model produces an R-squared of 0.972045, indicating that 97.20% of the variation in LNEXCRATE is explained by the regressors included in the specification, with the remaining 2.80% attributable to factors outside the model. The Adjusted R-squared of 0.966001, which penalises the number of parameters, remains at 96.60 percent. The overall F-statistic is significant at a probability of 0.0000. Parameter stability was assessed using the CUSUM (Cumulative Sum of Recursive Residuals) and CUSUMSQ (CUSUM of Squares) tests, presented in Figure 2 and Figure 3. Both plots remain inside the 5% significance bands across the entire recursive window, so the null hypothesis of parameter constancy is not rejected.

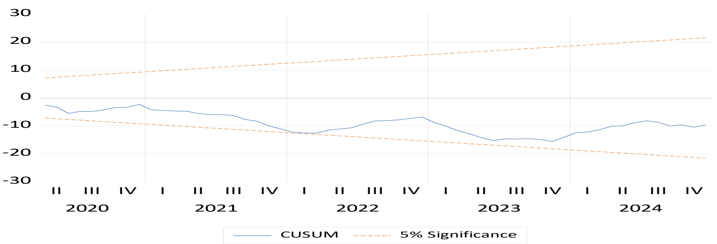

Figure 2. CUSUM Graph.

Ekonomi, Keuangan, Investasi dan Syariah (EKUITAS)
Vol 8, No 1, August 2026, Hal 156−167
ISSN 2685-869X (media online)
https://ejurnal.seminar-id.com/index.php/ekuitas
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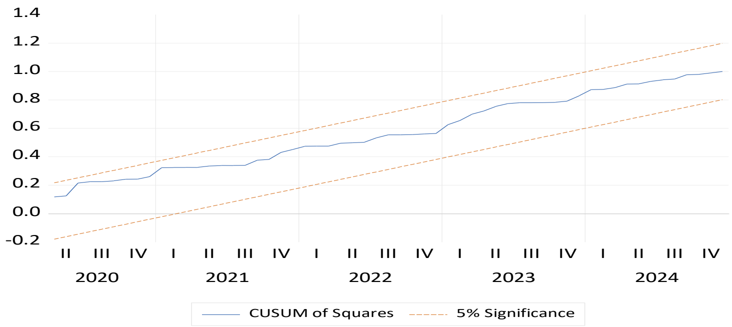

Figure 3. CUSUM of Squares Graph.

3.2 Discussion

The preceding section establishes a statistically admissible ARDL specification and reports separate short-run and long-run coefficient estimates for each determinant of the rupiah exchange rate. This section interprets those estimates, establishes the time frame over which each determinant exerts its influence, relates the findings to the theoretical framework adopted in this study, and evaluates their consistency with the existing empirical literature.

3.2.1 Model Validity as a Precondition for Economic Inference

The mixed order of integration documented in Table 4, in which VIX is stationary in levels while the remaining series are integrated of order one, corresponds to the data configuration for which the bounds testing procedure developed by (Pesaran et al., 2001) was designed. The choice of specification therefore carries substantive rather than merely procedural implications. Had an Autoregressive Distributed Lag Model been imposed, uniform first-differencing would have been required, and the level information embodied in the global volatility index would have been discarded. Since global risk aversion is treated in this study as a determinant of the equilibrium level of the exchange rate rather than of its rate of change, the retention of that information is material to the inferences that follow.

The rejection of homoskedasticity is itself economically interpretable. Over an observation window that encompasses the 2013 Taper Tantrum, the liquidity dislocation of early 2020, and the Federal Reserve tightening cycle of 2022-2024, non-constant residual variance is consistent with the volatility clustering routinely documented in foreign exchange series. The application of the Huber–White–Hinkley (HC1) covariance estimator preserves the point estimates while yielding standard errors that are asymptotically valid under heteroskedasticity of unknown form, in accordance with (Greene, 2018). It bears noting that the correction strengthens rather than attenuates the evidence for the external transmission channel, the probability value attaching to VIX declines from 0.0590 to 0.0452, which suggests that the weaker inference obtained under conventional standard errors reflected inefficient estimation of the covariance matrix rather than a genuinely fragile relationship.

Selecting the optimal lag length is crucial to capture the dynamics of adjustment between variables without significantly losing the degree of freedom. The determination of the optimal lag aims to obtain the most appropriate lag length to describe the dynamics of the relationship between variables. Selecting a lag that is too short can cause important information to not be captured, while a lag that is too long can lower the efficiency of the estimate. In this study, the optimal lag was selected using the Akaike Information Criterion (AIC) because it has a good ability to select the best model in the number of small to medium observations (Hamilton, 2020).

The Adjusted R^2 of 0.966001, the stable CUSUM and CUSUMSQ graph, and the coefficient of 0.000813 together indicate that the coefficients discussed below are structurally stable across the crisis episodes contained in the sample. Parameter constancy is a necessary condition for the resilience, since an adjustment coefficient estimated from an unstable specification would characterise a single historical episode rather than a durable property of the exchange rate process.

3.2.2 Inflation as the Binding Domestic Long-Run Constraint

Inflation is the only domestic variable that enters the cointegrating relationship significantly, with an estimated coefficient of 0.012176 significant at the one percent level. Given the semi-logarithmic specification, in which the dependent variable is expressed in natural logarithms while inflation is measured in percentage points, the coefficient admits interpretation as a semi-elasticity, a one percentage point increase in the annual inflation rate is associated, ceteris paribus, with an increase in USD/IDR of approximately 1.22 percent, and hence with nominal depreciation of the rupiah.

The sign and significance of this estimate accord with the relative version of the Purchasing Power Parity condition. Sustained increases in the domestic price level erode the real purchasing power of the rupiah relative to the United States dollar and diminish the price competitiveness of Indonesian tradable goods, such that the nominal exchange rate adjusts to restore relative price alignment. The result is consistent with (Utami & Islami, 2021), who identify inflation, the policy rate, and money supply as joint determinants of rupiah movements, and with (Maghfiroh

Ekonomi, Keuangan, Investasi dan Syariah (EKUITAS)
Vol 8, No 1, August 2026, Hal 156−167
ISSN 2685-869X (media online)
https://ejurnal.seminar-id.com/index.php/ekuitas
DOI 10.47065/ekuitas.v8i1.10926

& Jayadi, 2024), whose analysis of the ASEAN-5 economies within a Dornbusch overshooting framework reports the inflation gap to be a persistent determinant of exchange rates across both horizons.

The horizon dependence identified here nevertheless refines that body of evidence. The differenced inflation term is statistically indistinguishable from zero in the short-run equation (0.4642), whereas the level term is significant at the one percent level in the long-run equation. Inflation does not therefore appear to transmit to the exchange rate through high-frequency trading behaviour, its influence operates cumulatively, which is precisely the mechanism that PPP theory predicts, since convergence in relative price levels is a gradual process rather than a contemporaneous market signal. Specifications that admit inflation only in differenced form may consequently understate its equilibrium role.

3.2.3 US Treasury Yield as the Dominant External Anchor

The United States Treasury yield yields the largest statistically significant coefficient in the long-run equation, estimated at 0.052446 and significant at the one percent level. The point estimate implies that a one percentage point increase in the ten-year Treasury yield is associated with rupiah depreciation of approximately 5.24 percent in equilibrium, a magnitude exceeding that of domestic inflation by a factor of more than four.

This result is consistent with the predictions of International Capital Flow Theory. An increase in the risk-free return available on United States sovereign obligations raises the risk-adjusted premium required to induce continued holding of Indonesian assets, prompting portfolio reallocation from emerging market instruments toward Treasury securities. The associated capital outflow increases dollar demand in the domestic foreign exchange market and generates depreciation pressure on the rupiah. Comparable evidence has been reported for other emerging economies. Long-run relationships between United States Treasury bill rates, VIX, and United States money supply on the one hand and Indian financial market and monetary policy outcomes on the other are documented by (Padha & Chaubal, 2024). For Korea, it is found by (Lee, 2024), that dollar appreciation reduces government bond market liquidity under conditions of tightening global liquidity and foreign investor divestment. For Indonesia specifically, it is reported by (Muliarta & Widanta, 2023) that United States monetary policy exerts influence on the rupiah in both the short and the long run.

The asymmetry between the external and domestic coefficient magnitudes carries an implication that warrants emphasis. That the dominant long-run determinant of the rupiah is a variable determined outside the domestic policy domain indicates that exchange rate stability in a financially integrated emerging economy is only partially attributable to domestic policy conduct. This inference is consistent with the proposition, advanced by (Obstfeld et al., 2019), that the monetary policy trilemma has for such economies contracted toward a dilemma, in which the global financial cycle constrains domestic policy autonomy largely independently of the prevailing exchange rate regime.

3.2.4 Global Risk Aversion and the Flight-to-Quality Channel

The volatility index enters the long-run equation with an estimated coefficient of 0.000675, significant at the five percent level following the robust correction. Expressed in level terms, a one-point increase in VIX is associated with rupiah depreciation of approximately 0.07 percent. Although the coefficient is small in absolute magnitude, the appropriate basis for assessment is the empirical range of the regressor rather than a unit change. VIX ranged from the low teens during tranquil intervals to values exceeding eighty in March 2020; a displacement of forty index points during an episode of financial stress therefore implies depreciation pressure of approximately 2.7 percent operating through the risk premium channel alone, independently of any concurrent movement in interest rates or relative prices.

The estimate is consistent with the flight-to-quality mechanism formalised (Hull, 2023). Elevated expected volatility raises the premium demanded on emerging market exposure; institutional investors reduce positions in risk assets; and capital migrates toward instruments perceived as safe, principally the United States dollar and Treasury securities. The mechanism is corroborated in a multi-country setting by (Geng & Guo, 2021), reporting significant VIX spillovers to exchange rate volatility among Belt and Road economies that intensify in the aftermath of global shocks. The present finding extends that literature in one respect that merits attention: whereas prior work has predominantly established an effect of global risk aversion on the second moment of the exchange rate, the results obtained here indicate an effect on its equilibrium level.

The joint significance of the Treasury yield and the volatility index in the cointegrating relationship provides empirical support for treating global monetary conditions and global risk sentiment as analytically separable transmission channels rather than as a single composite external factor. The former operates through interest rate differentials and the reallocation of capital across expected returns, the latter operates through the risk premium and the reallocation of capital across perceived safety. The specification adopted here therefore addresses a limitation of studies that admit only one external indicator.

3.2.5 The Horizon Reversal of Domestic Determinants

The most theoretically consequential pattern in the estimates concerns the divergent behaviour of the policy rate and the equity index across the two horizons. The differenced policy rate carries a positive coefficient of 0.013918, significant only at the ten percent level, while the corresponding long-run coefficient is negative at -0.007493 and statistically insignificant. The positive short-run sign is inconsistent with the International Fisher Effect, under which

Ekonomi, Keuangan, Investasi dan Syariah (EKUITAS)
Vol 8, No 1, August 2026, Hal 156−167
ISSN 2685-869X (media online)
https://ejurnal.seminar-id.com/index.php/ekuitas
DOI 10.47065/ekuitas.v8i1.10926

an increase in the domestic policy rate should attract capital inflows and induce appreciation. Uncovered Interest Parity offers a reconciliation, an increase in the policy rate raises the nominal return on rupiah denominated assets while simultaneously conveying information that the monetary authority perceives depreciation pressure. Where the expected depreciation implied by that signal exceeds the interest differential on offer, no compensating inflow is induced. A further consideration concerns identification. Policy rate adjustments in Indonesia have historically been reactive to observed exchange rate weakness rather than pre emptive, so the positive short-run association may partly reflect policy endogeneity rather than a causal effect of monetary tightening on depreciation. The available specification does not permit this possibility to be excluded, and the estimate should accordingly be interpreted as a conditional association rather than as a structural elasticity.

The loss of statistical significance in the long-run equation indicates that the policy rate functions as a stabilisation instrument rather than as a fundamental anchor of exchange rate equilibrium. This finding complements the work of (Saputra et al., 2025), which identify the policy rate as a determinant within ARDL frameworks; the present evidence suggests that its influence is genuine but confined to the short run, and that specifications which do not separate the two time frames may overstate its equilibrium role.

The Jakarta Composite Index yields the largest and most precisely estimated coefficient in the short-run equation, at -0.351688 with a probability value of 0.0000, and retains significance at lags one, five, and six. As both variables are expressed in logarithms, the coefficient admits direct interpretation as an elasticity: a one percent increase in the index is associated with a decline in USD/IDR of approximately 0.35 percent, and hence with appreciation of the rupiah. Portfolio Balance Theory, following (Krugman et al., 2022), provides the corresponding mechanism, in that foreign portfolio inflows into Indonesian equities necessitate rupiah purchases, so that equity market performance and currency strength are linked contemporaneously through a common capital flow. The persistence of significance across multiple lags indicates that the relationship extends beyond a contemporaneous accounting identity to a sustained flow dynamic.

The equity index is nonetheless statistically insignificant in the long-run equation (0.3870). A plausible interpretation is that portfolio flows are high-frequency and readily reversible; they displace the exchange rate within the periods in which they occur, but because they are not anchored to the relative price of tradable goods or to structural returns on domestic capital, they do not determine the level at which the exchange rate settles.

Considered jointly, these results support a division of function among the determinants of the rupiah. Domestic financial variables govern short-run adjustment dynamics, while global monetary conditions and relative price levels govern long-run equilibrium. This separation is identifiable within an ARDL framework and is necessarily obscured by single-horizon specifications.

3.2.6 The Estimated Effects of the Taper Tantrum and COVID-19

Both structural dummies are significant at the one percent level, which indicates that the two episodes convey information regarding the exchange rate that is not fully absorbed by the continuous macroeconomic regressors. The pandemic dummy carries a positive coefficient of 0.026712, implying depreciation pressure during that period in excess of what the remaining regressors account for. This is consistent with the flight-to-quality interpretation, in that the March 2020 episode involved a generalised demand for dollar liquidity during which even conventionally safe assets were liquidated, generating capital outflows from emerging markets that could not have been anticipated from contemporaneous macroeconomic fundamentals.

The Taper Tantrum dummy carries a negative coefficient of -0.037430, which requires careful interpretation in view of the pronounced depreciation of the rupiah observed during 2013. The apparent inconsistency is resolved by attending to the conditioning set. Since the Treasury yield enters the specification contemporaneously with a large positive coefficient, the yield increase that characterised the episode is already captured by that regressor. The dummy therefore identifies the residual effect of the episode conditional on the yield channel, and that residual is estimated to be negative. Two mechanisms are plausibly consistent with this result. First, the stabilisation measures undertaken by Bank Indonesia during 2013, comprising substantial increases in the policy rate together with intervention in the foreign exchange market, may have partially offset the pressure transmitted through yields. Second, following the initial repricing, the exchange rate may have undergone a mean-reverting correction as market participants corrected the initial overshooting, in line with the Dornbusch framework applied to the Indonesian case (Syamad & Rossanto Dwi Handoyo, 2023). The negative coefficient should accordingly be understood as evidence of a policy assisted correction dynamic conditional on the external yield channel, and not as an indication that the Taper Tantrum was associated with unconditional appreciation of the rupiah.

3.2.7 Exchange Rate Resilience and the Speed of Adjustment

The principal contribution of this study rests on the estimated error correction coefficient of -0.367992, significant at the one percent level. The negative sign establishes the existence of a self-correcting mechanism, while the absolute magnitude quantifies its speed. The point estimate implies that approximately 36.8 percent of any deviation from long-run equilibrium is eliminated within one month, corresponding to a half-life of disequilibrium of approximately 1.5 months and to adjustment in excess of ninety-five percent within approximately seven months.

Assessed against the range of adjustment coefficients commonly reported in the exchange rate literature, which frequently lie between ten and twenty-five percent per period, a monthly adjustment speed of 36.8 percent indicates a comparatively high degree of resilience. Interpreted within the vulnerability and resilience framework of (Rose, 2017), the Indonesian case exhibits a distinctive configuration, combining high inherent exposure, evidenced by the dominance of the Treasury yield and the significance of the volatility index, with substantial absorptive and recovery capacity, evidenced by the magnitude of the error correction coefficient. Exposure and resilience are analytically distinct attributes, and the present evidence indicates that the rupiah ranks high on both.

This interpretation bears directly on the characterisation of external shocks to the rupiah. Since deviations are corrected rather than accumulated, shocks originating in global monetary conditions exert transitory rather than permanent effects on the equilibrium path of the exchange rate. The six statistically significant negative coefficients on lagged changes in the exchange rate reinforce this reading at the level of short-run dynamics, in that exchange rate changes in prior periods are systematically reversed in subsequent periods. Such mean-reverting behaviour is a property associated with a cointegrated system returning toward its attractor (Hamilton, 2020).

The methodological implication follows directly. Prior studies have predominantly measured exchange rate resilience through realised volatility or through the magnitude of depreciation observed during crisis windows. Both constitute measures of the amplitude of the disturbance rather than of the capacity of the system to recover from it. Operationalising resilience through the error correction coefficient, consistent with the approach advanced by (Wang & Liang, 2024), characterises recovery capacity as a structural parameter of the cointegrating system and thereby corresponds more closely to the conception of resilience employed in the broader economics literature.

4. CONCLUSION

This study concludes that the resilience of the rupiah exchange rate in the face of economic shocks has a different response pattern between the short and long term. In the long term, the movement of the Rupiah is still highly dependent on global financial conditions. Rising US Treasury yields and high global market uncertainty consistently continue to pressure the value of the Rupiah. This shows that domestic financial markets are still quite vulnerable to the phenomenon of capital flight, especially when global investors seek assets that are considered safer in times of crisis. Internally, the continued rate of inflation is also slowly eroding our currency exchange rates, a finding that is in line with the theory of purchasing power parity. Despite being squeezed by these long-term pressures, the rupiah apparently has very good durability in the short term, whose main role is supported by the performance of the stock market (JCI). Positive trends in the stock market can be an economic cushion that attracts foreign capital inflows, thereby instantly encouraging the strengthening of the Rupiah. Moreover, although sudden major shocks such as the COVID-19 pandemic proved to hit currency value directly, our financial markets have been able to adapt in a more dynamic way to past policy tightening events such as the Taper Tantrum. Based on the findings of this study, monetary policy that simply relies on the manipulation of the benchmark interest rate is considered insufficient to maintain the stability of the Rupiah in a long period of time. The relevant authorities need to focus more on fundamentally improving inflation and efforts to deepen the financial market so that our economy is not easily shaken by the flow of foreign capital in and out. Although the results of this study provide a clear picture, the conclusions drawn must still be interpreted carefully considering some limitations. The model used in this study still assumes that intervariable movements are always linear, and does not include direct intervention factors from Bank Indonesia in the money market such as the use of foreign exchange reserves. Therefore, further research is highly recommended to use an approach that is able to read the asymmetric effects of an economic shock, for example through the NARDL model, so that our understanding of the resilience of the Rupiah becomes much completer and more comprehensive. This study contributes theoretically by operationalizing exchange rate resilience as an empirically measurable adjustment-speed coefficient rather than a qualitative notion of stability, and contributes practically by providing Bank Indonesia with an empirical basis to calibrate the intensity and duration of stabilization policy responses to future global monetary shocks.

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Ekonomi, Keuangan, Investasi dan Syariah (EKUITAS)
Vol 8, No 1, August 2026, Hal 156−167
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