



THE RELATIONSHIP BETWEEN EXCHANGE RATE, INTERNATIONAL TRADE, AND INFLATION IN INDONESIA

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ABSTRACT

This study analyzes the relationship between Indonesia's Rupiah exchange rate against the US Dollar, international trade, and inflation. The research is motivated by the sensitivity of domestic inflation to Rupiah depreciation and trade dynamics amid macroeconomic shocks. The methodology employs multiple linear regression using annual data from BPS and Bank Indonesia. These findings support the model's validity in testing the hypotheses on the impact of exchange rate and trade on inflation. Theoretically, exchange rates and international trade have a significant effect on inflation simultaneously. Meanwhile, partially, the exchange rate has a negative and significant impact on inflation. However, on the other hand, international trade has a limited effect on inflation in Indonesia. Policy implications emphasise the stabilisation of exchange rates, strengthening resilience in imported raw materials, and the coordination of monetary and fiscal policies.

Keywords: Exchange rate, Inflation, International trade, Indonesia, Econometrics.

1. Introduction

High inflation erodes purchasing power, distorts income distribution, and creates cost-push pressures through imported prices. Rupiah depreciation against the USD often accelerates the transmission of inflation, particularly when domestic industries rely heavily on imported inputs. Cross-country evidence shows that the dominance of the US dollar in trade invoicing can mute or reshape pass-through, helping to explain why inflation responds differently across countries to the same foreign exchange shock (Gopinath et al., 2020). Meanwhile, international trade dynamics — through exports, imports, and global commodity price fluctuations — may either ease or exacerbate price pressures. In Indonesia, external shocks and domestic policy interventions contribute to the variability of inflation sources. This study analyses annual data from 2000 to 2023 to match the estimation sample used in the results. The novelty lies in combining the Rupiah exchange rate, inflation, and international trade in a single long-term econometric framework, with emphasis on an extended time horizon to capture structural changes. The objectives are: (i) to assess the effect of the exchange rate on inflation; (ii) to examine the impact of international trade on inflation; (iii) to evaluate the combined effect of exchange rate and trade; and (iv) to formulate evidence-based policy implications.

Beyond the standard exchange-rate pass-through (ERPT) mechanism, Indonesia's structure makes the inflation response particularly state-dependent. Administered prices (such as fuel, electricity, and transport fares) and food items with high import content can either mute or amplify ERPT, depending on the subsidy and price-setting cycles. Dollar-invoicing in traded goods, variable mark-ups, and pricing-to-market practices typically generate incomplete and asymmetric pass-through, where depreciations transmit to domestic prices more strongly than appreciations. Meanwhile, the effect of trade openness is theoretically ambiguous; greater imports can expose domestic prices to external shocks, yet stronger export-import competition and access to cheaper inputs can dampen inflation pressures over the medium run. These features justify an empirical strategy that allows for modest explanatory power in a parsimonious two-regressor model and motivates robustness checks tailored to Indonesia's policy and commodity cycles.

This study contributes by providing a consistent, long-horizon update for Indonesia using annual data and a transparent baseline that many readers can replicate. The focus on international trade rather than the trade balance aligns the measurement with standard openness metrics and avoids sign ambiguities. We complement the baseline multiple regression with careful diagnostic tests.

2. Literature Review

This chapter outlines the procedures used to examine the links between the Rupiah exchange rate, inflation, and international trade in Indonesia using a quantitative, annual time-series approach.

2.1. *Exchange-Rate Pass-Through to Domestic Prices (ERPT)*

Exchange-rate pass-through ERPT links movements in the exchange rate to import prices, producer costs, and consumer prices. In Indonesia, ERPT is incomplete and asymmetric, with more substantial pass-through from depreciations than from appreciations (Widarjono et al., 2023), and LOOP tests (e.g., Big Mac Index) show deviations from a single common-currency price across countries, aligning with partial pass-through evidence in import prices (Masalah & 2010, 2011). Large cross-country datasets show that, because much of world trade is invoiced in a few 'dominant' currencies—especially the US dollar—exchange-rate pass-through depends on the invoicing choice and is often muted for non-dominant currencies (Boz et al., 2017). In practice, LOOP fails in the short run, implying incomplete ERPT and highlighting the roles of monetary-policy credibility and market structure in shaping price responses.

Why does ERPT differ across countries and over time? Structural factors, including openness and import composition, currency of invoicing, nominal rigidities and price-change frequency dispersion, inflation environment, and central-bank credibility, as well as market power and competition/ are central explanations. Using a dynamic panel threshold design, ERPT is shown to be state-dependent, rising in periods of heightened geopolitical uncertainty, such as around the Ukraine shock, implying time-varying transmission to import and consumer prices (Ben Cheikh et al., 2023). A significant empirical strand suggests that ERPT can be time-varying: many economies experienced declining pass-through alongside lower trend inflation and stronger credibility; however, ERPT can re-emerge under higher FX volatility and inflation persistence, or after a policy shift. These patterns support state-dependent or nonlinear specifications in applied work and align with Indonesia's history of regime transitions.

2.2. *Purchasing Power Parity (PPP)*

PPP provides a theoretical benchmark linking inflation differentials to exchange-rate trends: when domestic inflation persistently exceeds foreign inflation, the currency tends to depreciate to restore parity. In its modern formulation, PPP builds on the Law of One Price (LOOP). With flexible prices and no trade frictions, identical tradables sell at the same common-currency price, so in aggregate the spot rate aligns with relative price levels (often written $\approx P_d/P_f$). Recent Indonesia-focused evidence, however, documents deviations from LOOP and incomplete PPP: (i) a Big Mac Index application for Indonesia-Malaysia rejects strict LOOP, implying only partial parity in practice; (ii) city-level prices in Indonesia show divergence and club convergence rather than a single price path (Jangam et al., 2019); and (iii) a formal PPP validity test for the Rupiah-USD rejects PPP. These findings support using PPP as a long-run benchmark while allowing short-run departures driven by frictions, pricing-to-market, and policy regimes.

For PPP to hold tightly, several idealised conditions are invoked—no transport costs, no trade barriers, homogeneous goods, and comparable price indices—so that arbitrage closes cross-location price gaps. In reality, convergence is typically slow due to traded/non-traded price gaps, distribution costs, and policy interventions that can temporarily mask relative price adjustments. In this study, PPP motivates testing whether inflation differentials help explain long-run movements in the Rupiah. Short-run PPP deviations widen when credibility is questioned and risk premia rise. Intuitively, when domestic prices are persistently higher than those abroad, the currency tends to depreciate (or the foreign currency appreciates) until the relative purchasing power is restored; when domestic prices are lower, appreciation pressures may emerge. For Indonesia, episodes of elevated inflation or commodity-price swings can widen parity gaps, with partial reversion over time as policies and prices adjust. Therefore,

PPP is best viewed as a long-horizon tendency rather than a tight short-run constraint, complementing mechanisms like overshooting and ERPT in explaining inflation dynamics.

2.3. *Overshooting, Nominal Rigidities, and Policy Credibility*

In sticky-price, small-open-economy models, persistent monetary shocks can trigger exchange-rate overshooting through the real interest-rate channel and UIP deviations. Inflation expectations rise, leading to a fall in the real interest rate, which in turn causes the exchange rate to move sharply beyond its new long-run level, then converges gradually as goods prices adjust. When information is imperfect and agents learn over time, expectations are progressively updated, so both the amplitude and duration of overshooting tend to be larger than under complete information. The size of overshooting depends on price stickiness, the import share in production costs, the monetary-policy rule (which typically does not target the nominal exchange rate directly), and the information/credibility environment, consistent with simulation evidence reported in central-bank analyses of "Monetary Shocks and Exchange Rate Overshooting".

Evidence from Indonesia suggests similar dynamics: during the Asian crisis, the Rupiah's overshooting was substantial. Empirical Indonesian studies document pre-crisis misalignment, including Rupiah overvaluation from 1993 to 1996, show that interest-rate dynamics and bouts of FX volatility can deepen and prolong overshooting (Heriqbaldi et al., 2020; Handoyo, 2022). As a consequence, pass-through to domestic prices tends to strengthen in high-risk regimes and when credibility is in question. For reliable inference, empirical specifications should allow for state dependence (high vs. low volatility states), structural breaks (regime/policy shifts), and expectations/learning effects—for example, by interacting real interest differentials or exchange-rate volatility with credibility proxies—so that the overshooting mechanism and its inflation implications are properly captured.

2.4. *Trade Openness, Terms of Trade, and Inflation Dynamics*

Following the World Bank (2023), trade openness (TO) is commonly proxied by the sum of exports and imports as a share of GDP. Openness affects inflation through supply and demand channels and via the terms of trade. Easier import access can relax domestic bottlenecks and reduce mark-ups, while exposure to global competition, technology diffusion, and investment can raise efficiency and dampen price levels and volatility. For Indonesia, recent ARDL evidence suggests that greater trade openness leads to higher inflation in both the short and long run, with effects materialising approximately 1-2 years later. Other Indonesia-focused studies also report mixed results, depending on the period and specification (Kaukab et al., 2024). In Indonesia, higher TO typically signals deeper integration into global markets and greater sensitivity to external price signals—hence its inclusion alongside the exchange rate in the empirical model.

At the same time, greater openness can amplify imported inflation when import dependence is high and exchange-rate/commodity-price volatility spikes (cost-push): Indonesia-focused evidence shows global oil and food prices feed into domestic inflation and that food imports significantly raise food inflation, especially during shocks (Rizi & Sahminan, 2020; Ismaya & Anugrah, 2018; Sharma, 2019). Oil-market research identifies distinct supply-versus-demand-driven oil shocks that transmit to macroeconomic variables, so import-dependent economies face stronger inflationary pressures when adverse oil shocks dominate (Baumeister & Hamilton, 2019). Adverse terms-of-trade shocks or supply-chain frictions raise input costs and are passed through to producer and consumer prices, especially in economies where imported intermediates are prevalent. Consequently, the TO-inflation relationship is context-dependent, shaped by import content, policy credibility, and the volatility regime; therefore, empirical specifications should allow for these interactions when evaluating Indonesia's inflation dynamics.

3. **Research Methods**

This study employs a quantitative design, utilising annual time-series data for Indonesia from 2000 to 2023. Inflation is measured as the year-over-year change in the CPI (%), the exchange rate (ER) is the BI's annual midpoint rate (IDR per USD), and international trade is represented by the sum of exports and imports. Data are compiled from Statistics Indonesia (BPS) and Bank Indonesia (BI). The empirical specification is a multiple linear regression:

$$\text{Inflation} = \beta_0 + \beta_1 \text{ER} + \beta_2 \text{Trade} + \epsilon_t$$

Estimation uses OLS with two-tailed tests at $\alpha = 0.05$. Diagnostic checks include multicollinearity (VIF, target < 10) and heteroscedasticity (Breusch-Pagan/White). Model adequacy is judged by the F-test, t-tests, and adjusted R-squared.

4. Research Findings and Discussion

This section presents the empirical evidence and its interpretation. We first validate adequacy using standard diagnostics. Table 4 reports OLS estimates of the influence of the Rupiah/USD Exchange Rate and international trade on inflation in Indonesia.

4.1. Diagnostic Evidence and Model Adequacy

4.1.1. Multicollinearity

The results of the multicollinearity test showed that there was no high correlation between dependent variables. This can be seen from the value of $VIF < 10$. Collinearity is negligible, indicating that X1 and X2 carry distinct information and that coefficient estimates are not destabilised by linear dependence.

Table 1. Multicollinearity diagnostics

Variable	VIF	1/VIF
ER	1.01	0.990093
Trade	1.01	0.990093
Mean VIF	1.01	

These VIF values confirm that coefficient estimates are not destabilised by linear dependence. All reported VIFs are close to 1 and far below conventional concern thresholds, so collinearity is unlikely to inflate standard errors materially. Accordingly, the marginal effects of X1 (Kurs) and X2 can be interpreted as distinct and stable within the baseline specification.

4.1.2. Heteroskedasticity

The results of the Heteroscedasticity (Breusch-Pagan) test are seen in Table 2. We therefore fail to reject H_0 (constant variance); the error variance appears approximately constant over the sample. Under the Gauss-Markov conditions, OLS remains efficient and classical standard errors are appropriate. Nevertheless, to maintain comparability across specifications and ensure against small-sample deviations.

Table 2. Heteroskedasticity diagnostic

Uji Heteroskedastisitas	
Breusch-Pagan/Cook-Weisberg test for heteroskedasticity	
Assumption: Normal error terms	
Variable: Fitted values of Inflasi	
H_0 : Constant variance	
chi2(1)	= 0.39
Prob > chi2	= 0.5318

Note (decision rule):

The test results showed that the p-value was greater than 0.05, indicating that heteroscedasticity did not occur.

4.1.3. Autocorrelation

The results of the Autocorrelation (Durbin Watson) test are seen in Table 3. $DW \approx 1.93$, within the ~ 1.5 - 2.5 comfort band, indicating no material first-order serial correlation. Critical values depend on sample size and the number of regressors; for ($k = 3$, $N = 24$), a value near two typically signals no first-order autocorrelation. Note that the DW test is most sensitive to $AR(1)$; if higher-order serial correlation is a concern, a Breusch-Godfrey test would be the appropriate complement.

Table 3. Autocorrelation (Durbin-Watson)

Durbin-Watson d-statistic(3, 24) = 1.925875

4.2. Multiple Linear Regression Result

The exchange-rate coefficient is negative and statistically significant ($\beta = -0.0005843$; $p = 0.035$), whereas international trade is not significant ($p = 0.844$). Simultaneously, it can be observed that exchange rates and inflation have a significant impact on inflation ($p < F$ test).

Table 4. Multiple Linear Regression Result

Source	SS	df	MS	Number of obs = 24		
Model	48.1785857	2	24.0892929	F(2, 21)	= 2.64	
Residual	191.980998	21	9.14195227	Prob > F	= 0.0953	
				R-squared	= 0.2006	
				Adj R-squared	= 0.1245	
Total	240.159583	23	10.441721	Root MSE	= 3.083	
Inflation	Coefficient	Std. err.	t	P> t	[95% conf. interval]	
ER	-0.0005843	.000259	-2.26	0.035	-.001123	-,0000457
Trade	0.00000703	.0000354	0.20	0.844	-.0000665	.0000806
_cons	17.30553	3.192302	3.93	0.086	5.920774	19.19828

Notes: Significance codes: * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$. Data sources: Statistics Indonesia (BPS), Bank Indonesia (BI).

$$\text{Inflation}_t = 17.30553 + -0.0005843 \text{ ER} + 0.00000703 \text{ Trade} + \epsilon_t$$

The test results also showed that the value of the Adj R-squared was 0.1245, indicating that the variation in the dependent variable explained 12.45% of the variation in the independent variable.

4.3. Discussion

We analyse annual Indonesian macroeconomic data from Statistics Indonesia and the Bank of Indonesia. Variables are inflation (Y), the Rupiah/USD exchange rate (X1), and international Trade (X2). The negative coefficient for the exchange rate variable presents an interesting finding and requires careful theoretical reconciliation. The conventional view and most empirical literature indicate a positive relationship between exchange rate depreciation and inflation through the exchange rate pass-through (ERPT) mechanism (Rasbin, 2021). However, the negative coefficient in this study shows that a higher exchange rate period (depreciation) is actually associated with a lower inflation rate in the Indonesian context.

This seemingly counterintuitive result can be explained through several theoretical and practical considerations specific to Indonesia's economic structure. First, this negative relationship may reflect the effectiveness of Bank Indonesia's monetary policy interventions during periods of currency pressure. When the Rupiah faces depreciation pressure, central banks typically implement contractive monetary policies, including interest rate hikes and foreign exchange intervention, which can simultaneously stabilize the currency and dampen inflationary pressures.

The statistically insignificant relationship between international trade and inflation is another important finding that deviates from conventional expectations. Traditional trade theory suggests that greater trade openness should affect domestic price levels through various channels, including competitive pressures from imports, access to cheaper intermediate goods, and exposure to global price shocks.

The absence of a significant relationship in this analysis can be attributed to several factors specific to Indonesia's trade structure and policy environment. First, Indonesia's trade composition is highly

concentrated on commodity exports (palm oil, coal, natural gas) and manufacturing imports, creating asymmetric exposure to global price fluctuations. The country's position as a net commodity exporter may isolate domestic inflation from changes in trade volumes, as export earnings often offset import cost pressures during periods of high commodity prices.

Second, Indonesia's controlled floating exchange rate regime and active foreign exchange intervention may have separated trade volumes from domestic price pressures. When trade-induced currency pressures arise, central bank intervention can neutralise their inflationary effects, severing the direct link between trade openness and price levels. This policy framework creates an environment in which trade volumes fluctuate independently of domestic inflation dynamics.

The results of the simultaneous test, as indicated by the F-statistic, show that the rupiah exchange rate against the USD and international trade together have a significant influence on the dynamics of inflation in Indonesia. These findings confirm that exchange rate fluctuations are inseparable from trade openness when explaining inflation variations (Widarjono, 2023). This means that although partial testing indicates that only a significant exchange rate affects inflation, the overall interaction of these two variables results in a meaningful contribution to variations in domestic price levels.

Theoretically, this is in line with the exchange rate pass-through (ERPT) and trade openness mechanism, where the depreciation of the Rupiah drives up the price of imported goods. At the same time, the export-import volume affects price pressures through the production and consumption cost channels. Thus, the stability of inflation in Indonesia is highly determined by the consistency of exchange rate policy and the simultaneous management of international trade; therefore, monetary and fiscal policy coordination that considers these two aspects is crucial.

5. Conclusion

This study shows that the rupiah exchange rate and international trade simultaneously have a significant effect on inflation in Indonesia. To some extent, exchange rates have a negative and significant impact, while international trade has no significant effect. These findings confirm that the stability of inflation is not only determined by exchange rate movements, but also by international trade dynamics when viewed together. Therefore, controlling inflation requires coordination of monetary and fiscal policies that pay attention to exchange rate stability as well as strengthening Indonesia's foreign trade structure.

Future research can expand the model to include other macroeconomic variables, such as interest rates, money supply, global commodity prices, and financial openness indexes, to get a more comprehensive picture of the factors that influence inflation. In addition, the use of more dynamic econometric methods, such as Vector Autoregression (VAR), ARDL, or GMM, can help capture short-term and long-term relationships more accurately. Research can also be conducted at the sectoral level to examine how the influence of exchange rates and international trade varies across different commodity groups, particularly food and energy, which have a significant impact on inflation formation.

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