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Monetary Policy Transmission and Economic Growth in Indonesia: An Error Correction Model Analysis, 2000-2023

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ABSTRACT

Indonesia's economic performance over the past two decades has been shaped by persistent monetary fluctuations, particularly in inflation, policy interest rates, and the Rupiah exchange rate. These dynamics have contributed to recurring volatility in output and created challenges for maintaining stable and inclusive growth. This study aims to examine both the short-run and long-run effects of key monetary variables inflation, the BI policy rate, and the exchange rate on Indonesia's economic growth during 2000-2023. Using annual macroeconomic data from BPS and Bank Indonesia, the analysis employs an Error Correction Model (ECM) to capture long-term equilibrium relationships and to identify adjustment patterns following short-term shocks. The results indicate a stable long-run cointegrating relationship among the variables. Inflation and the policy rate exert significant negative effects on economic growth, with their long-run impacts being stronger than their short-run influences. In contrast, Rupiah depreciation shows a modest but positive long-run association with growth, reflecting the role of external competitiveness. The error-correction term demonstrates a meaningful and gradual adjustment toward long-run equilibrium, suggesting that deviations from stability are corrected over time. Overall, the findings highlight the importance of maintaining credible price stability, calibrating interest-rate decisions carefully, and managing exchange-rate movements to support sustainable economic expansion. The study underscores that consistent and coordinated monetary policy remains essential for strengthening Indonesia's long-term growth resilience.

Keywords: Economic Growth, Inflation, Interest Rate, Exchange Rate, ECM

INTRODUCTION

Indonesia's economic performance over the past two decades has been shaped by persistent fluctuations in key monetary variables, particularly inflation, policy interest rates, and the Rupiah exchange rate. These factors play a central role in influencing investment decisions, consumption patterns, trade competitiveness, and overall macroeconomic stability. Previous studies emphasize that volatility in monetary

indicators often creates uncertainty, weakens purchasing power, and affects the transmission of policy signals to the real sector (Sunaryono, 2024; Medyawati & Yunanto, 2021). Despite maintaining moderate and positive long-term growth, Indonesia continues to experience periods of instability associated with price movements, global shocks, and changes in financial market conditions.

Inflation has historically shown considerable variability, driven by supply-side pressures, exchange-rate pass-through, and global commodity cycles. Such dynamics challenge the effectiveness of monetary authorities in stabilizing prices and anchoring expectations (Ramadhaniyati et al., 2023). At the same time, adjustments in the BI Policy Rate influence borrowing costs and aggregate demand, yet several studies note that the transmission process in Indonesia is often characterized by structural delays and asymmetric responses (Handayani & Kacaribu, 2021; Elisa et al., 2023). The exchange rate adds further complexity; while depreciation may enhance export competitiveness, it can also increase the burden of foreign-denominated liabilities and trigger capital outflows (Wily & Lubis, 2023; Sunaryono, 2024).

Although numerous studies have examined the impact of individual monetary variables on economic growth, research that simultaneously analyzes inflation, interest rates, and exchange rates within a unified framework over an extended period remains limited. Most existing works focus on shorter time spans, single transmission channels, or employ models that do not explicitly distinguish between short-run and long-run dynamics. This creates a gap in understanding how monetary factors interact over time to influence Indonesia’s growth trajectory, especially amid heightened global uncertainty

Responding to this gap, the present study investigates the long-run equilibrium relationships and short-run adjustments between inflation, the BI policy rate, the exchange rate, and economic growth using an Error Correction Model (ECM). By covering the period 2000-2023 with consistent annual data, this research provides a comprehensive assessment of Indonesia’s monetary transmission mechanism and offers empirical evidence relevant for policy formulation. The study contributes to the literature by integrating multiple monetary channels within a single empirical framework and by quantifying their differential effects on economic growth over both horizons.

LITERATURE REVIEW

Economic Growth Theory

Economic growth is commonly explained through the framework of the Solow Swan model, which highlights the roles of capital accumulation, labor growth, and technological progress as long-run drivers of output. In this framework, macroeconomic stability is essential for sustaining investment and productivity growth. Empirical extensions of the model emphasize that monetary variables such as inflation, interest rates, and exchange rates affect growth by shaping expectations, financial conditions, and resource allocation (Nguyen & Su, 2022; Asteriou & Pilbeam, 2020). For developing economies, stable monetary conditions are necessary to maintain investment momentum and prevent distortions that slow capital formation (Ahmad & Raza, 2021).

Inflation and Output Dynamics

Inflation affects economic activity through its influence on purchasing power, production costs, and investment decisions. Moderate inflation is often associated with stable economic activity, yet persistent or volatile inflation can disrupt planning horizons and reduce real income (Hove et al., 2020). Empirical studies in emerging markets show that high or unstable inflation lowers growth by increasing uncertainty and weakening financial intermediation (Chughtai et al., 2021). Price instability also amplifies vulnerability to external shocks, making inflation control a central objective of monetary authorities (Musa & Ibrahim, 2022).

Interest Rate Transmission

Interest rates serve as a primary tool for monetary policy and influence economic growth through credit markets, investment decisions, and consumption patterns. Higher policy rates raise borrowing costs, tighten financial conditions, and dampen aggregate demand (Huang & Liu, 2021). The effectiveness of this channel depends on the depth of financial markets, competition within the banking system, and the responsiveness of lending rates to policy adjustments (Osei & Adams, 2022). In many developing economies, transmission is gradual due to structural rigidities, creating differences between short-run and long-run effects (Tursoy, 2019).

Exchange Rate Effects on Growth

The exchange rate affects output through multiple pathways: export competitiveness, import prices, investment decisions, and balance-sheet exposures.

Depreciation may stimulate exports but simultaneously increase the cost of imported inputs and foreign-denominated debt (Mehmood et al., 2020). Conversely, appreciation can reduce inflationary pressures but weaken export-led growth. The net effect depends on a country's trade structure, external liabilities, and financial openness (Adeniran & Raheem, 2022). Therefore, exchange-rate stability is crucial for macroeconomic planning, especially in economies exposed to global commodity cycles and capital flow volatility.

Error Correction Model (ECM) Framework

The Error Correction Model is widely used to analyze the interaction between non-stationary macroeconomic variables that share a long-run equilibrium relationship. ECM separates short-run adjustments from long-run dynamics, allowing researchers to examine how quickly variables revert toward equilibrium after experiencing shocks (Yuan & Pang, 2021). This approach is particularly relevant for monetary variables, which often respond differently over short and long horizons due to market rigidities, expectations, and policy lags (Duo & Zhang, 2022). The ECM framework has been widely applied in macroeconomic studies to assess policy transmission and structural relationships in developing countries (Karimi et al., 2019).

Synthesis

The theoretical literature suggests that inflation, interest rates, and exchange rates play significant roles in shaping short-run fluctuations and long-run growth. Monetary stability supports investment, strengthens financial markets, and reduces uncertainty, while instability in these variables can weaken economic performance. The ECM framework provides an appropriate tool to evaluate these relationships by integrating short-run and long-run dynamics. This theoretical foundation supports the need to empirically examine how monetary policy variables influence Indonesia's economic growth over time.

METHOD

This study employs a time-series econometric approach to examine the short-run and long-run relationships between Indonesia's economic growth and key monetary variables namely inflation, the BI policy rate, and the exchange rate using annual data from 2000 to 2023. The analysis begins by ensuring the statistical properties of each

variable, as non-stationary data may lead to misleading inferences. To address this, the Augmented Dickey-Fuller test is applied to identify the order of integration, followed by the Johansen cointegration procedure to determine whether the variables share a stable long-term equilibrium relationship. This two-step approach is considered appropriate for macroeconomic studies involving mixed integration orders and relatively small sample sizes (Harris & Sollis, 2021; Gujarati, Porter, & Gunasekar, 2020).

Given evidence of cointegration, the Error Correction Model (ECM) is used as the main estimation framework, allowing the separation of short-run adjustments from long-run dynamics. The ECM captures how rapidly deviations from equilibrium are corrected, which is essential in understanding monetary policy transmission, especially in economies characterized by structural rigidities and policy lags (Shin & Yoo, 2021). Prior to estimation, the optimal lag length is determined using Akaike and Schwarz criteria to ensure model efficiency and avoid over-parameterization. The estimation process is carried out using EViews, following standard macroeconometric practices.

To ensure model validity, several diagnostic tests are conducted, including the Durbin Watson statistic to detect autocorrelation, the Jarque Bera test to examine residual normality, the White test for heteroskedasticity, and the Variance Inflation Factor to assess multicollinearity. These diagnostics are essential to confirm that the estimated ECM meets the assumptions required for reliable inference and policy interpretation (Wooldridge, 2020; Asteriou & Hall, 2021). Given the annual nature of the data and the limited number of observations, the study acknowledges potential limitations in capturing rapid cyclical dynamics; however, the ECM remains suitable for evaluating long-term adjustment patterns and the gradual transmission of monetary variables.

RESULT

This section presents the empirical findings derived from the Error Correction Model (ECM), followed by an integrated discussion linking the results to relevant empirical literature. The analysis focuses on the dynamic interactions between Indonesia’s economic growth and three key monetary variables inflation, the BI policy rate, and the Rupiah exchange rate using annual data from 2000 to 2023.

Descriptive Statistics

The descriptive statistics illustrate the underlying characteristics of the variables throughout the study period. Indonesia's GDP growth averaged 5.61 percent with a standard deviation of 2.45, reflecting notable fluctuations during periods such as the global financial crisis and the COVID-19 pandemic. Inflation averaged 6.28 percent, indicating persistent price pressures above the medium-term target range. The BI Rate averaged 6.36 percent, showing an active monetary stance to stabilize inflation, while the Rupiah exchange rate fluctuated between Rp8,007 and Rp16,350 per USD, pointing to external volatility affecting trade and capital flows. These trends are consistent with IMF assessments highlighting Indonesia's sensitivity to global shocks (IMF, 2022) and align with the observations of Sunaryono (2024) regarding the vulnerability of domestic demand to external uncertainty.

Unit Root and Cointegration Tests

The Augmented Dickey Fuller test indicates that some variables are stationary at level while others become stationary after first differencing. The Johansen cointegration test confirms the presence of one significant long-run equilibrium vector among the variables, implying that monetary variables and economic growth move together over the long run. This finding supports the suitability of ECM for the analysis, consistent with the methodological recommendations of Harris and Sollis (2021) and Nguyen and Su (2022), who note that cointegrated macroeconomic variables in emerging economies require models capable of distinguishing long-run equilibrium from short-run deviations.

ECM Estimation: Long-Run and Short-Run Effects

The long-run estimation results demonstrate that inflation exerts a negative and statistically significant effect on economic growth, with a coefficient of -0.28. This indicates that a 1 percent increase in inflation reduces GDP growth by approximately 0.28 percent. The short-run coefficient, although smaller, remains negative, confirming the disruptive impact of price instability on output. This result reinforces earlier findings by Medyawati and Yunanto (2021) and Chughtai et al. (2021), who emphasize that elevated inflation weakens purchasing power, reduces investment incentives, and heightens economic uncertainty.

The BI policy rate also shows a negative and significant long-run effect (-0.45), while its short-run effect is statistically insignificant. This suggests that interest-rate policy influences the real economy primarily through gradual adjustments in lending rates and financial market expectations. Such delayed transmission aligns with the findings of Handayani and Kacaribu (2021) and Elisa et al. (2023), who document structural rigidities and asymmetric bank responses in Indonesia's rate-setting behavior.

In contrast, the exchange rate exhibits a positive long-run effect on GDP growth (0.08), indicating that Rupiah depreciation within a manageable range can enhance export competitiveness and stimulate economic activity in the long run. However, the short-run coefficient remains insignificant, suggesting that trade and production adjustments require time to materialize. This pattern corresponds with the conclusions of Mehmood et al. (2020) and Adeniran and Raheem (2022), who note that emerging economies often experience delayed benefits from currency depreciation due to import dependence and production constraints.

The error correction term (ECT) is significant and negative at -0.22, suggesting that approximately 22 percent of disequilibrium is corrected each year. This gradual speed of adjustment reflects the structural characteristics of Indonesia's economy and aligns with the findings of Liu and Park (2019), who observe similar adjustment patterns in other Asian economies.

Diagnostic Tests and Model Validity

Diagnostic tests confirm that the ECM is robust and statistically valid. The Durbin-Watson statistic is close to 2, indicating no autocorrelation; the Jarque Bera test confirms normally distributed residuals; the White test indicates homoscedastic residual variance; and VIF values below 5 rule out multicollinearity. These results affirm that the estimated model satisfies key econometric assumptions necessary for reliable interpretation, consistent with recommendations by Wooldridge (2020) and Harris and Sollis (2021).

Discussion

Overall, the empirical findings reinforce a substantial body of literature emphasizing the critical role of monetary stability in supporting long-run economic performance. The negative effects of inflation and interest rates indicate that stable prices and prudent monetary tightening are central to maintaining investment and

sustaining growth. These results are broadly consistent with earlier studies such as Chughtai et al. (2021), Ahmad and Raza (2021), and Medyawati and Yunanto (2021), all of whom highlight the detrimental impact of inflation and high interest rates on emerging market growth trajectories.

Meanwhile, the long-run positive effect of exchange rate depreciation underscores the potential benefits of a competitive currency in economies where export sectors play a substantial role. This finding resonates with the observations of Mehmood et al. (2020) and Torres and Olivera (2021), who note that depreciation can stimulate growth when supported by adequate production capacity and stable macroeconomic conditions. Taken together, the results illustrate the interconnected nature of monetary policy variables and highlight the importance of policy coordination. Maintaining price stability, calibrating interest-rate decisions with consideration of lagged transmission effects, and managing exchange-rate fluctuations collectively play a central role in safeguarding Indonesia's long-term growth prospects.

CONCLUSION

This study examined the role of key monetary variables inflation, the BI policy rate, and the Rupiah exchange rate in shaping Indonesia's economic growth over the period 2000-2023 using an Error Correction Model. The results confirm the existence of a stable long-run relationship among these variables, indicating that monetary conditions and real economic activity are closely interconnected over time.

Inflation and the policy interest rate both exert a negative and significant long-run effect on economic growth, underscoring the importance of maintaining price stability and ensuring that policy rate adjustments are carefully calibrated to avoid unnecessary pressure on investment and domestic demand. In contrast, Rupiah depreciation shows a modest but positive association with long-run growth, reflecting the potential gains from improved export competitiveness when external conditions and productive capacity allow such benefits to materialize.

The negative and significant error-correction term suggests that deviations from long-run equilibrium are gradually corrected, highlighting the presence of structural adjustment dynamics within Indonesia's economy. These findings reinforce the view that monetary policy should operate with a long-term perspective, recognizing the

delayed transmission of interest-rate changes and the gradual impact of exchange-rate movements.

Overall, the study emphasizes that coherent monetary management particularly through disciplined inflation control, prudent interest-rate setting, and careful exchange-rate stabilization plays a critical role in supporting Indonesia's sustainable growth trajectory. Future research would benefit from incorporating higher-frequency data, additional external variables, or nonlinear specifications to capture asymmetries and structural shifts that may influence policy transmission in evolving macroeconomic conditions.

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