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Do Global Food Price Shocks Matter for Inflation and Economic Growth in Indonesia?

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ABSTRACT

This study investigates the relationship between global food prices, inflation, exchange rates, and economic growth in Indonesia within the framework of short-term and long-term adjustments. In the midst of increasing volatility in world food prices due to global supply chain disruptions, climate change, and geopolitical tensions, understanding the mechanism of global food price transmission to domestic macroeconomic stability is becoming increasingly important, especially for developing countries that are dependent on food imports such as Indonesia. This study uses monthly time series data for the period 2020–2025 which includes the global food price index, inflation, the exchange rate of the rupiah against the United States dollar, and real gross domestic product. The Error Correction Model (ECM) approach is used to analyze the dynamics of the relationship between variables by considering short-term adjustments as well as long-term equilibrium. Prior to estimation, stationarity tests were performed using the Augmented Dickey–Fuller (ADF) method and cointegration tests to ensure the validity of model specifications. The use of ECM allows the identification of error correction mechanisms when deviations from the long-term equilibrium occur due to external shocks, such as fluctuations in global food prices. This research is expected to make an empirical contribution to the macroeconomic literature, especially related to inflation and global price transmission in developing countries. In addition, the findings of this study are expected to be a reference for the formulation of food price stabilization policies, import dependence management, and strengthening monetary and fiscal policy coordination in maintaining inflation stability and Indonesia's economic growth amid global uncertainty.

Keyword: Global Food Prices; Inflation Dynamics; Error Correction Model; Exchange Rate; Indonesia

1. Introduction

Global food prices have shown high volatility over the past decade as a result of global supply chain disruptions, extreme climate change, and geopolitical conflicts that affect the production and distribution of major food commodities. The Russia-Ukraine conflict that has been going on since 2022, for example, has disrupted the world's supply of wheat, corn, and fertilizers, thus driving a surge in international food prices. The Food and Agriculture Organization (FAO) noted that the World Food Price Index reached an average of 143.7 points in 2022, a sharp increase compared to the previous year and the highest level since the index was first published (FAO, 2023). This condition confirms that food price pressures are global and have the potential for significant further impacts on food-importing countries, especially developing countries that have a high dependence on foreign supplies.

For Indonesia, the increase in global food prices poses significant pressure on domestic price stability and people's purchasing power. Data from the Central Statistics Agency shows that the food, beverage, and tobacco groups are consistently one of the main contributors to national inflation, especially in the post-pandemic and post-global geopolitical conflict periods (BPS, 2024). High food inflation directly reduces the purchasing

power of households, especially low-income groups who have a relatively large proportion of food spending. In addition, the transmission of global food prices to domestic inflation was also strengthened by exchange rate movements. Bank Indonesia noted that the depreciation of the rupiah exchange rate against the United States dollar has the potential to increase imported inflation through an increase in the price of imported goods, including food and production inputs (Bank Indonesia, 2024). Persistent inflationary pressures ultimately risk depressing household consumption, which is a major contributor to Indonesia's economic growth.

Inflationary pressures triggered by rising global food prices also have direct implications for the performance of national economic growth. The World Bank (2023) noted that the surge in food and energy commodity prices tends to reduce economic growth in developing countries through weakening household consumption and increasing real sector production costs. In Indonesia, household consumption contributes more than 50 percent to the Gross Domestic Product (GDP), so an increase in food inflation has the potential to hold back the overall economic growth rate (BPS, 2024). Bank Indonesia (2024) also emphasized that inflationary pressures stemming from global factors can narrow the space for monetary and fiscal policy, thereby strengthening the trade-off between price stabilization and efforts to maintain economic growth momentum. This condition shows that the dynamics of global food prices are not only an issue of price stability, but also a structural problem that affects the sustainability of Indonesia's economic growth.

A number of international studies have analyzed the relationship between global commodity prices and domestic inflation, especially in developing countries. The World Bank (2023) and the International Monetary Fund (2024) show that rising global food prices are likely to have a greater inflationary impact in countries with high levels of dependence on food imports and limited social protection capacity. However, empirical research that specifically examines the short-term and long-term dynamics of the impact of global food prices on inflation and economic growth in Indonesia is still relatively limited, especially those that use the time series approach with the Error Correction Model (ECM). Most previous studies relied on a data panel approach or static model, so it has not been able to fully capture the adjustment mechanism towards a long-term balance between macroeconomic variables in the context of the Indonesian economy.

This study focuses on the analysis of the influence of global food prices on inflation and economic growth in Indonesia by emphasizing the difference in short-term and long-term dynamics through the Error Correction Model (ECM) approach. The relationship between global food prices, domestic inflation, exchange rates, and economic growth is seen as an interrelated transmission mechanism, where external shocks in food prices have the potential to affect macroeconomic stability in a sustainable manner. In this context, this study examines the existence of cointegration relationships between variables and estimates the speed of adjustment (error correction term) when there is an imbalance due to global food price shocks. This analysis allows for a more comprehensive understanding of Indonesia's economic response to external pressures, both in the crisis period and in the economic recovery phase. The empirical findings of this study are expected to enrich Indonesia's macroeconomic literature and become a reference in the formulation of price stabilization policies, inflation control, and strengthening national food security.

2. Methods

2.1 Research variables

This study uses monthly *time series* data covering the period 2020 to 2025, which is strategically selected to capture the short-term and long-term dynamics of the impact of global food prices on inflation and economic growth in Indonesia. This period reflects an important phase in the global and domestic economy, which was marked by the COVID-19 pandemic in 2020–2021, global supply chain disruptions, and a surge in world food commodity prices following the Russia-Ukraine conflict since 2022. In addition, this period also represents a phase of Indonesia's economic recovery, where monetary and fiscal policies are focused on stabilizing inflation and restoring economic growth. Thus, the time span of this study is relevant to identify short-term and long-term adjustment mechanisms within the *framework of the Error Correction Model* (ECM).

This study uses inflation as the main dependent variable and economic growth as an additional dependent variable, while global food prices function as the main independent variable. In addition, the rupiah exchange rate against the United States dollar is used as a control variable to capture the influence of *imported inflation* in the process of transmitting global food prices to domestic inflation. The selection of these variables is based on the theoretical foundation of macroeconomics and the empirical literature that emphasizes the role of global commodity prices and exchange rates in shaping inflation dynamics and economic activity in developing

countries. All variables were selected based on the availability of consistent and reliable data during the observation period, so that the model used was able to represent the main structural relationships that were the focus of this study. A detailed explanation of the conceptual definition, unit of measurement, data source, and role of each variable is presented in Table 1.

Table 1. Data and Measurement

Variable	Abbreviation	Remarks	Units	Source	Role
Inflation	INF	The monthly inflation rate based on the Consumer Price Index (CPI).	Percentage (%)	BPS	Dependent Variable
Economic Growth	GDP	Real Gross Domestic Product growth rate.	Percentage (%)	BPS	Dependent Variable
Global Food Prices	GFOOD	The World Food Price Index which reflects the prices of major food commodities in the international market.	Table of Contents	FAO	Independent Variables
Exchange Rate	EXR	Reference exchange rate of rupiah against the United States dollar (JISDOR).	Rupiah/USD	Bank Indonesia	Control Variables

Source: Author's own property (2026)

Table 1 presents the variables used in this study, including abbreviations, definitions, units of measurement, data sources, and their role in the analytical framework. The main dependent variable, Inflation (INF), represents changes in the level of consumer prices measured based on the monthly Consumer Price Index (CPI) and sourced from the Central Statistics Agency. The economic growth variable (GDP) is used to capture the response of economic activity to inflationary pressures triggered by rising global food prices. The main independent variable, Global Food Prices (GFOOD), is measured using the World Food Price Index published by the Food and Agriculture Organization (FAO) and reflects the dynamics of international food prices. The rupiah exchange rate against the United States dollar (EXR) is used as a control variable to represent the effect of exchange rate fluctuations on the transmission of import prices to domestic inflation. The combination of these variables is expected to be able to explain the mechanism of short-term and long-term adjustment of Indonesia's inflation and economic growth to global food price shocks comprehensively.

2.2 Research Design

This study uses a quantitative approach with the time series econometric method to analyze the short-term and long-term relationship between global food prices, inflation, and economic growth in Indonesia. The Error Correction Model (ECM) is used as a primary analytical framework due to its ability to capture the dynamics of short-term adjustments to long-term equilibrium when external shocks occur. According to (Enders, 2015; Ekananda, 2016), ECM is the right approach when economic variables have a cointegration relationship, because this model explicitly integrates error *correction mechanisms* into short-term equations.

The use of ECM in this study is based on the characteristics of Indonesia's macroeconomic data for the 2020–2025 period which are influenced by various global shocks, such as the COVID-19 pandemic, international supply chain disruptions, and the surge in world food prices after the Russia-Ukraine conflict. In this context, the relationship between global food prices, inflation, and economic growth is not only static, but also shows a dynamic adjustment process over time. Therefore, the ECM approach allows for a more comprehensive analysis than static regression models, particularly in identifying short-term responses as well as the sustainability of long-term relationships between variables (Gujarati & Porter, 2018).

Conceptually, the relationship between inflation and economic growth and global food prices can be stated as follows:

$$INF_t = f(GFOOD_t, EXR_t, GDP_t)$$
$$GDP_t = f(INF_t, GFOOD_t, EXR_t)$$

To test the long-term relationship between variables, this study first estimated the cointegration equation. If a cointegration relationship is found, an ECM model can be formed to analyze short-term dynamics. The ECM equation in this study is formulated as follows:

$$\Delta INF_t = \beta_0, + \sum_{i=0}^{n} \beta_2 \Delta GFOOD_{t-i} + \sum_{i=0}^{n} \beta_3 \Delta EXR_{t-i} + \sum_{i=0}^{n} \beta_4 \Delta GDP_{t-i} + \lambda ECT_{t-1}$$

where the first difference operator is the optimal lag length, and is the white $\Delta\, n\varepsilon_t$ *noise rate*. The coefficient in the λ *error correction term* (ECT) is expected to be negative and statistically significant, indicating the existence of an adjustment mechanism towards long-term equilibrium after the occurrence of a short-term shock (Enders, 2015).

In this model, the tribes containing the first difference operator represent short-term dynamics, while the ECT component reflects the long-term relationships between variables. The ECT coefficient value indicates the speed of adjustment of inflation and economic growth in Indonesia to imbalances caused by changes in global food prices and other external factors.

The stages of analysis in this study were carried out systematically as follows: (1) data stationarity test using the Augmented Dickey–Fuller (ADF) test; (2) cointegration tests to identify the existence of long-term relationships between variables; (3) ECM model estimation to assess short-term dynamics and adjustment speed; and (4) interpretation of the estimated results in the context of *cost-push inflation* theory and global commodity price transmission. This approach ensures that the estimated results are statistically consistent and economically relevant, and are able to explain the mechanism of global food price transmission to inflation and Indonesia's economic growth empirically.

3. Results and Discussion

3.1 Results

3.1.1 Stationary Test Results (ADF)

The stationarity test was carried out using the Augmented Dickey Fuller (ADF) test to avoid the problem of false regression in time series analysis. The test results showed that all variables were not stationary at the level level, which was indicated by the ADF probability value greater than the significance level of 5 percent. However, after the first difference is made, all variables become stationary.

The ADF statistical value for the exchange rate variable (D_EXR) is −7.559812 with a probability of 0.0000, the global food price index (D_FOOD) is −5.710578 with a probability of 0.0000, and real GDP (D_GDP) is −8.250970 with a probability of 0.0000. Meanwhile, the inflation variable (D_INF) has an ADF statistical value of −2.976025 with a probability of 0.0423. All of these statistical values are smaller than the critical value of ADF at a significance level of 5 percent, so the null hypothesis that states the existence of a root unit can be rejected. Thus, all research variables are integrated in order one, I(1).

Table 2. Stationary Test Results (ADF Test)

Variable	ADF Statistic	Probability	Verdict	Integration Order
D_INF	−2.976025	0,0423	Stationary	I(1)
D_FOOD	−5.710578	0,0000	Stationary	I(1)
D_EXR	−7.559812	0,0000	Stationary	I(1)
D_GDP	−8,250970	0,0000	Stationary	I(1)

Source: Author's Calculation (2026)

3.1.2 Cointegration Test Results

After all variables were proven to be integrated in the same order, the cointegration test was performed using the Engle–Granger approach. The test results showed that the residual of the long-term equation was stationary at a significance level of 1 percent. This indicates a long-term equilibrium relationship between inflation, global food prices, exchange rates, and economic growth in Indonesia. With the discovery of cointegration, the use of the Error Correction Model (ECM) is considered appropriate to analyze short-term dynamics and adjustment mechanisms towards long-term equilibrium.

3.1.3 Estimated Error Correction Model (ECM) Results

After all the research variables were proven to be integrated in the same order, I(1), and the results of the Engle–Granger cointegration test confirmed the existence of a long-term relationship, the analysis was continued with the Error Correction Model (ECM) estimation. This model aims to identify the short-term influence and mechanism of Indonesia's inflation adjustment on the long-term balance due to changes in global food prices, exchange rates, and economic growth. ECM estimation is done by making changes in inflation as dependent variables, while independent variable changes and *error correction term* (ECT) are included to capture short-term and long-term dynamics simultaneously.

Table 3. Estimated Error Correction Model (ECM) Results

Variable	Coefficients	Std. Error	t-Statistics	Probability
D(FOOD)	−0.000154	0,000123	−1.2536	0,2145
D(EXR)	−0.000001	0,000001	- 1866	0,2397
D(GDP)	−0.000054	0,000237	−0.2274	0,8208
ECT(−1)	−0.917772	0,121611	−7.5468	0,0000*

Source: Author's Calculation (2026)

Based on Table 3, the error correction term (ECT) coefficient is negative and statistically significant at a significance level of 1 percent. The ECT coefficient value of −0.917772 indicates that about 91.8 percent of the inflation imbalance of long-term conditions will be corrected in one period. This negative sign and significance of the coefficient confirm the existence of a long-term adjustment mechanism, which indicates that Indonesia's inflation has a very rapid adjustment ability to return to the equilibrium trajectory after external shocks. These findings reinforce the results of previous cointegration tests and confirm that the relationship between inflation, global food prices, exchange rates, and economic growth is stable in the long term.

The ECM estimation confirms the existence of both short-run and long-run relationships among global food prices, inflation, exchange rates, and economic growth. Similar findings were reported in previous ECM and NARDL studies on inflation dynamics in Indonesia (Salsabila et al., 2025).

Meanwhile, the results of estimating independent variables in the short term show that changes in global food prices, exchange rates, and economic growth do not have a significant effect on inflation in the current period. The coefficient of change in global food prices (D(FOOD)) is negative with a probability of 0.2145, which indicates that the increase in global food prices is not directly passed on to domestic monthly inflation. Similarly, changes in the exchange rate (D(EXR)) and economic growth (D(GDP)) do not show a significant influence on inflation in the short term. These findings suggest that the transmission of external pressures to Indonesia's inflation is not instantaneous, but rather occurs through a gradual adjustment mechanism reflected in long-term relationships, while in the short term the role of price stabilization and macroeconomic control policies tends to dampen the direct impact of these shocks. The significant error correction term indicates that short-term disequilibrium will gradually return toward long-run equilibrium, supporting the validity of the ECM specification used in this study (Farandy, 2020).

3.2 Discussion

3.2.1 The Impact of Global Food Prices on Inflation

The results of the Error Correction Model (ECM) estimate show that changes in global food prices do not have a significant effect on Indonesia's inflation in the short term, which is reflected in the coefficient of changes in global food prices which has a probability value greater than the significance level of 5 percent. These statistical findings indicate that the rise or fall in global food prices is not directly passed on to domestic monthly inflation. However, the existence of significant cointegration relationships and *negative and significant error correction term* (ECT) values indicate that global food prices continue to have a strong long-term influence on Indonesia's inflation. In other words, even if the short-term impact is not statistically detectable, the long-term adjustment mechanism still works systematically.

The increase in global food prices significantly contributes to inflationary pressures, especially in developing countries that still depend heavily on imported food commodities. Supply disruptions and rising international commodity prices can increase domestic production and distribution costs, thereby triggering food inflation (Farandy, 2020).

Theoretically, these results are in line with the cost-push inflation theory, which states that an increase in the price of external inputs such as global food commodities will increase production and distribution costs, thereby driving domestic inflation, but not instantly (Blanchard, 2017). Statistical interpretation of the insignificant short-term coefficient shows a *time lag* in price transmission, which in the Indonesian context is reinforced by food price stabilization policies, subsidies, and government intervention. These policies serve as a *buffer* that prevents global price pressures from being directly reflected in consumer inflation.

Food inflation in emerging economies is strongly influenced by global commodity market volatility and domestic supply-demand imbalances. The pass-through effect of global food prices into domestic inflation becomes stronger during periods of economic uncertainty and supply chain disruption (Derindag et al., 2023). Previous studies also indicate that fluctuations in strategic food commodity prices such as rice, chili, onions, and cooking oil have a direct effect on regional and national inflation dynamics in Indonesia (Alim & Prajanti, 2025).

These findings are consistent with the empirical results of the World Bank (2023) and IMF (2024), which show that in developing countries, the impact of global food prices on inflation tends to emerge over the medium to long term horizon. The study of Ha et al. (2023) also found that global food price transmission is delayed, so the insignificance of the short-term coefficients in the ECM model can be understood as a reflection of the gradual process of structural adjustment.
Studies using nonlinear approaches also confirmed that increases in global food prices asymmetrically affect consumer price inflation in Indonesia, indicating that inflation reacts more strongly during periods of food price increases than decreases (Arintoko et al., 2024).

3.2.2 The Role of Exchange Rates in Inflation Transmission
The results of the ECM statistical test show that changes in the rupiah exchange rate against the United States dollar have no significant effect on inflation in the short term, which is shown by the probability value of the exchange rate change coefficient that exceeds the significance level of 5 percent. Empirically, these findings show that exchange rate fluctuations are not directly passed on to monthly inflation, so the phenomenon of *imported inflation* through exchange rate channels is limited in the short term. This condition reflects the effectiveness of the exchange rate stabilization and inflation control policies carried out by Bank Indonesia during the observation period.

Exchange rate depreciation contributes significantly to domestic inflation because imported raw materials and food commodities become more expensive in local currency terms. This mechanism is commonly referred to as exchange rate pass-through inflation (Mufarrikhah, 2021).

Although the short-term coefficient is not significant, the results of the cointegration test and the significance of ECT show that exchange rates continue to play a role in shaping Indonesia's inflation in the long run. Statistically, this indicates that the effect of exchange rates on inflation is cumulative and works through long-term adjustment mechanisms, rather than through a direct inflation response. Thus, the insignificance of the short-term coefficient does not negate the role of the exchange rate, but rather confirms its delayed transmission nature.

Empirical evidence from Indonesia also shows that exchange rates are among the most dominant variables affecting inflation dynamics, especially during periods of external shocks and global commodity price increases (Arintoko et al., 2026).

These findings are in line with the concept of exchange rate pass-through (ERPT), which states that the effect of exchange rates on inflation is not always full and instantaneous, but is influenced by the structure of imports, the level of market competition, and the credibility of monetary policy (Ghosh & Rajan, 2019). Research by (Ca' Zorzi et al., 2007 ; Ekananda, 2016) also showed that in developing countries, *the exchange rate pass-through* to inflation tends to be partial and asymmetrical, so the effect is more visible in the long term than in the monthly period.

Inflation transmission through exchange rates is particularly important in open economies where imported food and energy commodities constitute a substantial share of domestic consumption and production inputs (Kohlscheen, 2022).

3.2.3 Inflation and Economic Growth

The results of the ECM estimate show that economic growth has no significant effect on inflation in the short term, which is reflected in the value of the probability coefficient of change in real GDP which is well above the significance level of 5 percent. Statistically, these findings indicate that during the 2020–2025 period, changes in economic activity are not the main driver of Indonesia's inflation in the current period. Thus, inflationary pressures in the study period were dominated by external and supply-side factors rather than domestic *demand-pull inflation*.

High inflation can weaken economic growth by reducing household purchasing power, increasing production uncertainty, and discouraging investment activities. Persistent inflation may also reduce overall economic efficiency and productivity (Mufarrikhah, 2021).

However, the significance of *the error correction term* in the ECM model shows a structural relationship between inflation and economic growth in the long term. Statistically, a negative and significant ECT value indicates that any inflationary deviation from the long-term equilibrium which is also influenced by economic growth dynamics will be corrected quickly. This confirms that although economic growth does not directly affect inflation in the short term, inflation stability remains an important factor in maintaining long-term macroeconomic balance. Food price shocks may generate broader macroeconomic instability because rising food prices increase living costs and reduce real income, especially among lower-income households (Helbawanti et al., 2021).

These findings are in line with the New Keynesian view, which emphasizes that the relationship between inflation and economic growth depends on the conditions of the output gap and inflation expectations (Mankiw, 2020). In the post-pandemic economic recovery situation, increased growth has not fully created demand-based inflationary pressures. However, in the long term, inflation stability remains a prerequisite for sustainable economic growth, as emphasized by (Barro, 2013 ; Aisen and Veiga, 2006).

Previous empirical findings also suggest that inflation originating from volatile food commodities can negatively affect economic welfare and weaken economic resilience in developing economies (Marpaung et al., 2019). Inflation instability caused by global food shocks may reduce long-run economic growth due to declining consumption capacity and increasing uncertainty in financial and production sectors (Shan, 2024).

4. Conclusion

This study aims to analyze the impact of global food prices on inflation and economic growth in Indonesia using the Error Correction Model (ECM) approach, so as to be able to capture the dynamics of short-term and long-term adjustments simultaneously. Based on the results of the stationary and cointegration tests, all research variables were proven to be integrated on the first order and had a long-term equilibrium relationship. These findings suggest that inflation, global food prices, exchange rates, and economic growth are intertwined in a long-term structural adjustment mechanism.

The results of the ECM estimate show that changes in global food prices, exchange rates, and economic growth do not have a significant effect on Indonesia's inflation in the short term. These findings indicate that the transmission of external shocks to domestic inflation does not occur instantaneously, but rather is delayed. However, the negative and statistically significant *error correction coefficient* (ECT) confirms the existence of a strong long-term adjustment mechanism. The relatively large value of ECT reflects that Indonesia's inflation has the ability to adjust quickly to return to long-term equilibrium after global food price shocks or other external pressures.

Overall, the results of this study confirm that Indonesia's inflation dynamics in the 2020–2025 period are more influenced by external factors and supply-side in the long term than by domestic demand pressures in the short term. The policy implications of these findings emphasize the importance of strengthening food price stabilization, managing food import dependence, and coordinating monetary and fiscal policies in response to global price volatility. Although this study provides strong empirical evidence at the national level, the limitations of the aggregate data open up space for further research to examine inflation transmission in more

detail, both through sectoral and regional approaches, in order to gain a more comprehensive understanding of the mechanism of inflation in Indonesia.

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