

Analysis of Factors Affecting the Volume of Rice Imports in Indonesia

Ahwan Nur Agustin^{1*}, Lucky Rachmawati²

Universitas Negeri Surabaya

Corresponding Author: Ahwan Nur Agustin ahwan.22076@mhs.unesa.ac.id

ARTICLE INFO

Keywords: Rice Imports, Rice Prices, Rice Production, Exchange Rates, ARDL

Received : 20, May

Revised : 22, June

Accepted: 25, July

©2026 Agustin, Rachmawati: This is an open-access article distributed under the terms of the [Creative Commons Atribusi 4.0 Internasional](https://creativecommons.org/licenses/by-sa/4.0/).



ABSTRACT

Indonesia is one of the world's largest rice producers, yet it remains dependent on rice imports to stabilize domestic supply and prices. This study analyzes the effects of local prices, international prices, national production, and the rupiah exchange rate on rice imports for 1993–2025 using the ARDL method. Long-run results show that international prices and the exchange rate have a significant positive effect on imports, while domestic production has a negative effect. Local prices have no significant long-run effect. In the short run, local prices are positive, domestic production negative, while the exchange rate and international prices are significant at certain lags. These findings confirm that Indonesia's rice imports are influenced by domestic and external factors.

INTRODUCTION

Rice is a commodity that plays a vital role as a primary source of carbohydrates, particularly in Asia. Indonesia is no exception, as the majority of its population relies on rice as a staple food. This reliance has existed for centuries and has even become an integral part of the cultural consumption patterns of the Indonesian people (Rozi et al., 2023). In the 2024–2025 period, Indonesia ranked as the fourth-largest rice consumer in the world, behind China, India, and Bangladesh, with total consumption reaching 36.6 million metric tons (Nugraheni, 2025). According to data from the Buletin Konsumsi Pangan Kementerian Pertanian, rice serves as the largest source of calories, accounting for approximately 39,96% of total national calorie consumption in 2024 (Kementerian Pertanian Republik Indonesia, 2024). Meanwhile, from the perspective of per capita consumption, the average per capita consumption is 92.1 kg per year (Badan Pangan Nasional, 2025a). This high consumption rate is closely linked to Indonesia's growing population, which increased from 275.77 million in 2022 to 281.60 million in 2024 (Badan Pusat Statistik, 2025b). This population surge could potentially increase demand for rice, making the availability of this commodity a serious concern for the government.

As an agrarian nation, Indonesia's agricultural sector employs 28,18% of the workforce and ranks as the third-largest contributor to GDP, accounting for 18,98% of GDP in 2024 (Badan Pusat Statistik, 2025a). Given the significant contribution of the agricultural sector to employment and the distribution of regional GDP, Indonesia should have the potential to achieve rice self-sufficiency (Gischa & Nailufar, 2019). Rice self-sufficiency is a condition in which the nation's rice needs are met primarily through domestic production. According to FAO guidelines (1999), a country is considered to have achieved self-sufficiency if its production is sufficient to meet at least 90% of its national needs (Kementerian Pertanian Republik Indonesia, 2019). Although ideally all needs could be met entirely (100%) by domestic production without relying on imports (Badan Pangan Nasional, 2025b). However, the reality in Indonesia is quite concerning, not only has the volume of rice imports shown a fluctuating trend, but there has also been a significant surge over the past five years. From 2020 to 2022 imports remained below 500.000 tons, but in 2023 rice imports surged by 613.61% to 3,06 million tons, and continued to rise to 4,51 million tons in 2024 (Anggela, 2024). This increase in imports is due to a rice production deficit in Indonesia caused by the El Niño climate phenomenon (Febiola, 2024). This increase in rice imports indicates that Indonesia has not yet been able to achieve its goal of rice self-sufficiency, as domestic production is still insufficient to meet the entire demand for rice consumption.

The Indonesian government often faces a dilemma when formulating rice import policies. On the one hand, the welfare of domestic farmers must be safeguarded through the Government Purchase Price (GPP) and various production input subsidies (Siswanto et al., 2018). On the other hand, retail price stability for consumers in vulnerable social groups is also a key consideration, as they are highly sensitive to changes in rice prices. Premature or excessive import decisions could potentially cause market distortions, such as a decline in farm-

gate prices, inflationary pressures, and social unrest. These complexities are further compounded by international price volatility, exchange rate fluctuations, and the interests of multiple stakeholders.

Theoretically, import volumes are determined by domestic supply deficits, which are influenced by a balance between price and macroeconomic conditions (Imam & Santosa, 2017). Domestic production capacity is also an internal factor that can influence the volume of imports; high production will reduce imports, while low production will increase reliance on imports. In addition to production factors, another determinant of import volume is the price of local rice. The price of local rice operates in two ways: a price increase can signal a supply deficit, necessitating imports, while a price decrease can reduce farmers' income (Salfina, 2022). On the other hand, international rice prices are also a factor in economic efficiency, as lower prices make imports a more profitable option. Due to the nature of the international rice market, trade volume accounts for less than 7% of total global production, which can cause rice prices to fluctuate more easily than those of other commodities (OECD Publishing, 2013). These tight market conditions lead to higher volatility in international rice prices, as even small changes in global supply or demand can trigger significant price movements in the global market (Childs & Baldwin, 2010). These international price effects are then significantly moderated by the exchange rate of the rupiah against the U.S. dollar. A strengthening rupiah makes imports cheaper, thereby increasing purchasing power for imports, while a weakening rupiah makes imports more expensive, reducing purchasing power for imports and subsequently encouraging a shift toward domestic production (Rassi et al., 2025).

A review of previous research reveals a research gap, for example the findings show inconsistent results. For instance, the study by (Paipan & Abrar, 2020), which used the ECM method, showed that rice production has a significant effect in the short term but not in the long term. Conversely, the study by (Fadhilah & Marseto, 2024) using multiple linear regression actually showed that local rice production had no significant effect. Similarly, regarding the exchange rate variable, (Isnaini et al., 2024) found a significant negative effect, while (Setiawati et al., 2024) stated that the exchange rate has no significant effect in either the short or long term. This empirical inconsistency indicates the need for a more comprehensive methodological approach, a more up-to-date analysis period (including the post-COVID-19 pandemic era), and the development of models incorporating additional variables. Furthermore, the analysis periods in previous studies are generally limited to older data (e.g., 1998–2020), making them unable to capture the latest dynamics following the pandemic and the implementation of stricter import policies.

This study differs from previous studies in several ways. First, it examines a unique sample with a more recent analysis period (1993–2025), which encompasses the post-COVID-19 pandemic dynamics as well as the significant surge in imports in 2023–2024 due to the El Niño phenomenon. Second, this study combines four variables from both internal and external factors, thereby providing a more comprehensive understanding of the determinants of rice imports. Third, this study offers methodological innovation by employing the

Autoregressive Distributed Lag (ARDL) approach, which distinguishes between short-term and long-term effects, thereby addressing the inconsistent results of previous studies that largely relied on multiple linear regression or ECM without comprehensive cointegration analysis. Thus, this study not only revalidates economic theories regarding import demand, production, and exchange rates in the context of strategic commodities but also provides up-to-date empirical evidence that can serve as a foundation for formulating more effective and proportionate rice import policies.

The objective of this study is to analyze the impact of local rice prices, international rice prices, national rice production, and the rupiah exchange rate on Indonesia's rice imports from 1993 to 2025, both in the short and long term, in order to provide a comprehensive understanding and evidence-based policy recommendations for the government in managing import policies and national food security.

LITERATURE REVIEW

Supply and Demand Theory

The theory of supply and demand explains how prices and quantities of goods are determined in the market through the interaction between buyers and sellers (Helmold, 2022). Demand is the quantity of a good that consumers are willing and able to purchase at various price levels during a specific period. The law of demand states that if the price of a good rises, the quantity demanded falls, and vice versa (Mankiw, 2018). Supply is the quantity of a good that producers are willing and able to sell at various price levels during a specific period. The law of supply states that if the price rises, the quantity supplied increases, and vice versa (Marwala & Hurwitz, 2017). Market equilibrium is achieved when the quantity demanded equals the quantity supplied (Marwala & Hurwitz, 2017). In the context of rice imports, imports emerge as a form of additional demand when domestic production is unable to meet consumption needs, resulting in excess demand that then prompts the government or businesses to import rice from international markets.

Relevant previous research, namely the study by (Kusmiati & Bowo, 2024), found that the price of imported rice has a significant effect on Indonesia's rice imports in both the short and long term. Furthermore, the study by (Paipan & Abrar, 2020) states that the price of domestic rice has a positive and significant effect on rice imports.

H1: Local rice prices (HBL) affect the volume of rice imports in Indonesia.

H2: International rice prices (HBI) affect the volume of rice imports in Indonesia.

Production Theory

Production Theory examines the relationship between inputs (factors of production) and outputs (goods produced), as well as how firms make decisions to maximize profits (Mankiw, 2018). Factors of production include capital, labor, land, and technology (Moss, 2022). In the short run, the Law of Diminishing Returns applies, stating that adding variable inputs to fixed inputs ultimately yields a lower return per unit (Truett & Truett, 2006). In the long run, all factors

of production are variable, allowing firms to adjust production capacity (Hoover, 2006). In the context of this study, the higher the domestic rice production, the lower the dependence on imports because domestic supply is able to meet domestic demand.

Relevant prior research, specifically the study by (Kusmiati & Bowo, 2024), found that rice production has a significant effect on rice imports in both the short and long term. Furthermore, the study by (Paipan & Abrar, 2020) found that rice production has a significant effect in the short term but not in the long term.

H3: National rice production (PBL) affect the volume of rice imports in Indonesia.

Exchange Rate Theory

The exchange rate indicates the number of units of one currency that can be exchanged for the currency of another country (Mankiw, 2018). For example, if the exchange rate of the rupiah against the US dollar is Rp17,000 per USD, then Rp17,000 is required to obtain 1 US dollar. One important theory in determining exchange rates is the Purchasing Power Parity (PPP) theory introduced by Gustav Cassel, which states that the exchange rate ideally reflects the relative purchasing power of the two countries, based on the law of one price, which states that the price of an identical good will be the same across different countries once converted to the same currency (Kargbo, 2003)(Krugman et al., 2018). When the rupiah appreciates (strengthens), it makes imported rice cheaper so leading to an increase in imports, conversely if the rupiah depreciates (weakens), it can make imported rice more expensive and leading to a decrease in imports.

Relevant prior research, specifically the study by (Fadhilah & Marseto, 2024), found that the exchange rate significantly influences rice imports in Indonesia. Furthermore, the study by (Isnaini et al., 2024) also confirmed that the exchange rate has a significant effect on rice imports.

H4: The rupiah exchange rate (NTR) affect the volume of rice imports in Indonesia.

METHODOLOGY

This study is a quantitative study using an associative approach. Quantitative research is a method that uses numerical data to identify relationships or influences between variables; the results are then analyzed using statistical calculations to test the formulated hypotheses (Creswell et al., 2007). The associative approach aims to analyze the relationship between two or more variables. In this study, the analysis is directed toward identifying the influence of local rice prices, international rice prices, local rice production, and the rupiah exchange rate as independent variables on the volume of rice imports in Indonesia as the dependent variable. This study is unidirectional, meaning it analyzes only the influence of independent variables on the dependent variable without testing for a reciprocal relationship.

This study uses secondary data in the form of time series data covering the period from 1993 to 2025. Time series data consists of data collected over time to provide an overview of the development of a phenomenon (Gujarati & Porter,

2012). The data sources come from official institutions, namely the Badan Pusat Statistik (BPS), the Kementrian Perdagangan Republik Indonesia, and the Food and Agriculture Organization (FAO), to ensure the validity and credibility of the data. The operational definitions of the variables include: rice imports (Y) are the volume of rice brought into Indonesia from abroad in a single year, measured in tons. Local rice price (X1) is the annual average price of medium-grade rice in the domestic market, measured in Indonesian Rupiah per kilogram. International rice price (X2) is the annual average price of Thai 5% Broken rice on a FOB (Free on Board) basis, measured in U.S. Dollars per ton. National rice production (X3) is the total rice output derived from converting Milled Dry Paddy (MDP) using a conversion factor of 62.74% across all provinces in a single year, measured in tons. The exchange rate (X4) is the annual average exchange rate of the Rupiah against the US Dollar, measured in Rupiah per US Dollar.

The data collection technique employed the documentation method, which involves searching for, recording, and compiling information from published official documents. Data were collected through literature reviews and searches of online databases provided by BPS, Kementrian Perdagangan, and FAO for the period 1993–2025. All data were then processed using E-views software. The data analysis technique used is the Autoregressive Distributed Lag (ARDL) method. One of the advantages of this method is its ability to accommodate variables with different integration levels, such as $I(0)$ and $I(1)$ (Pesaran et al., 2001). Additionally, ARDL is efficient for limited samples and can simultaneously estimate both short-term and long-term relationships.

The ARDL method in this study can be represented in the form of an Error Correction Model (ECM) as follows:

$$\Delta Y_t = \alpha^0 + \sum_{i=1}^p \beta_i \Delta Y_{t-i} + \sum_{i=0}^{q_1} \gamma_{1i} \Delta X_{1,t-i} + \sum_{i=0}^{q_2} \gamma_{2i} \Delta X_{2,t-i} + \sum_{i=0}^{q_3} \gamma_{3i} \Delta X_{3,t-i} + \sum_{i=0}^{q_4} \gamma_{4i} \Delta X_{4,t-i} + \lambda_1 X_{t-i} + \lambda_2 X_{1,t-i} + \lambda_3 X_{2,t-i} + \lambda_4 X_{3,t-i} + \lambda_5 X_{4,t-i} + \varepsilon_t$$

Where Y_t represents the volume of rice imports, X_1 is the local rice price, X_2 is the international rice price, X_3 is national rice production, and X_4 is the rupiah exchange rate. The Δ denotes the first-order derivative operator, while ε is the error term. This model structure allows for the simultaneous estimation of short-run and long-run relationships.

The analysis begins with a stationarity test using the Augmented Dickey-Fuller (ADF) Test at the level and first-difference levels to determine the order of integration for each variable. The data is considered stationary if the ADF probability value is less than the 5% significance level. Next, a cointegration test (bound test) is conducted to determine whether there is a long-term equilibrium relationship between the variables. If the F-statistic value is greater than the upper bound critical value, then a cointegration relationship exists.

Next, classical assumption tests were conducted to ensure that the model met the criteria for the Best Linear Unbiased Estimator (BLUE). The classical assumption tests included a normality test using the Jarque -Bera Test to determine whether the residuals are normally distributed, a heteroscedasticity test using the Breusch-Pagan-Godfrey Test to determine whether there is unequal variance in the residuals, an autocorrelation test using the Breusch-Godfrey

Serial Correlation LM Test to determine whether there is correlation among the error terms, and a linearity test using the Ramsey RESET Test to ensure the model specification is appropriate. Finally, model stability tests were conducted using the CUSUM Test and the CUSUM of Squares Test to ensure that the model parameters were stable throughout the observation period. The model is considered stable if the CUSUM and CUSUM of Squares plots fall within the critical bounds at a 5% significance level.

RESEARCH RESULT

Stationarity Test

This study began with a stationarity test of the data using the Augmented Dickey-Fuller (ADF) method to ensure that the time series data used did not produce spurious relationships between variables. The results of the ADF stationarity test at the level indicate that the dependent variable has a p-value smaller than the 5% significance level, so it is declared stationary at the level or integrated of order I(0). Meanwhile, all independent variables have p-values greater than 5% at the level, so they are not yet stationary and contain unit roots. After testing at the first-difference level, all independent variables showed p-values smaller than 5%, so they are declared stationary of order I(1). The combination of stationary variables at levels I(0) and I(1) indicates that the ARDL model is an appropriate approach to use in this study.

Table 1. Stationarity Test Results

Variable	Level I(0)	First Difference I(1)
Volume of rice imports (IB)	0,0007	0,0000
Domestic rice prices (HBL)	0,9671	0,0008
International rice prices (HBI)	0,4619	0,0008
National rice production (PBL)	0,4569	0,0010
Exchange rate of the rupiah (NTR)	0,7011	0,0013

Optimal Lag Test

After determining the integration order of the variables, the optimal lag was identified to determine the optimal lag length so that the ARDL model could accurately represent the dynamics of the data in both the short and long term using the lag length criterion based on the Akaike Information Criterion (AIC) value. The test results showed that the optimal lag selected was lag 4 because it had the lowest AIC value compared to the other lags. From the selected lag, the optimal ARDL model specification was obtained based on the smallest AIC value among the possible models, namely ARDL (4, 3, 4, 1, 2) with an AIC value of 30,176347.

Table 2. Optimal Lag Test Results

Lag	AIC
0	112,9584
1	107,6862
2	106,9212
3	105,7080
4	102,4600*

Cointegration Test

Next, a cointegration test was conducted using the Bound Test to determine whether there is a long-term relationship between the variables in the model. The results of the Bound Test showed an F-statistic value of 4,668557 which is greater than the upper bound for I(1) at both the 5% (4,223) and 10% (3,56) significance levels. Thus, this model exhibits a stable long-run relationship among the variables. The presence of cointegration serves as the basis for estimating the Error Correction Model (ECM), which will analyze the adjustment mechanism from short-run imbalances toward long-run equilibrium.

Table 3. Cointegration Test Results

F-Statistic Value		4,668557
Critical Value		
α Value	Lower Bound I(0)	Upper Bound I(1)
10%	2,525	3,56
5%	3,058	4,223
1%	4,28	5,84

ARDL-ECM Model Estimation

The ARDL model was estimated to identify the direction and magnitude of the independent variables' influence on the dependent variable in the long run, using a 10% significance level due to the limited number of time series data observations. Given the limited number of time-series observations, this study adopted a 10% significance level ($\alpha = 0.10$) to allow for the statistical identification of theoretically relevant relationships. This more lenient threshold is also supported by Kim & Choi (2017), who note that the 5% significance level is not always optimal for unit root tests on time-series data. Based on the estimation results, the local rice price variable has a negative coefficient of -123,8412 but is not statistically significant (prob. 0,6070 > 0,10), meaning that changes in local rice prices have not been proven to strongly influence rice imports in the long run. The international rice price variable has a positive coefficient of 9483,033 and is significant (prob. 0,0147 < 0,10), indicating that even as international rice prices rise, Indonesia continues to import rice. The national rice production variable has a negative coefficient of -0,036422 and is significant (prob. 0,0641 < 0,10), meaning that an increase in domestic rice production tends to reduce rice imports. The rupiah exchange rate variable has a positive coefficient of 302,1651 and is significant at the 10% level (prob. 0,0643 < 0,10), indicating that changes in the exchange rate are associated with an increase in rice imports, although this relationship is not dominant. The constant term has a negative coefficient and is not significant.

Table 4. ARDL Model Estimation Results

Variable	Coefficient	Prob.
D(HBL)	-123,8412	0,6070
D(HBI)	9483,033	0,0147
D(PBL)	-0,036422	0,0641
D(NTR)	302,1651	0,0643
C	-149268,0	0,2784

An Error Correction Model (ECM) estimation was conducted to analyze short-term dynamics and the speed of adjustment toward long-term equilibrium. Based on the ECM estimation results, the previous-period rice import variable has a positive and significant coefficient, indicating that an increase in rice imports in the previous period tends to increase rice imports in the current period. The local rice price variable has a positive and significant coefficient, indicating that an increase in local rice prices tends to increase rice imports in the short term. The current-period international rice price variable has a positive but insignificant coefficient; however, for the first through third lags, it has negative and significant coefficients, meaning that an increase in international rice prices in the previous period tends to reduce rice imports in the subsequent period. The national rice production variable has a negative and significant coefficient, indicating that an increase in domestic rice production tends to reduce rice imports in the short term. The current period rupiah exchange rate variable has a negative but insignificant coefficient, while the first lag has a negative and significant coefficient, meaning that a weakening of the rupiah exchange rate in the previous period tends to suppress rice imports. The Error Correction Term has a negative coefficient of -2,831246 and is significant, indicating a very rapid adjustment mechanism from short-term imbalances toward long-term equilibrium.

Table 5. ECM Model Estimation Results

Variable	Coefficient	Prob.
D(IB(-1),2)	1,287683	0,0049
D(IB(-2),2)	0,664483	0,0278
D(IB(-3),2)	0,467777	0,0111
D(HBL,2)	647,1337	0,0426
D(HBL(-1),2)	795,0199	0,0170
D(HBL(-2),2)	745,7421	0,0260
D(HBI,2)	692,4491	0,7858
D(HBI(-1),2)	-20195,79	0,0044
D(HBI(-2),2)	-20466,30	0,0008
D(HBI(-3),2)	-9908,012	0,0387
D(PBL,2)	-0,170495	0,0001
D(NTR,2)	-23,18688	0,9131
D(NTR(-1),2)	-445,5992	0,0218
CointEq(-1)*	-2,831246	0,0001

Classical Assumption and Linearity Tests

Next, classical assumption tests were conducted to ensure that the model met the Best Linear Unbiased Estimator (BLUE) criteria. The normality test using the Jarque-Bera Test yielded a p-value of 0,902428 which is greater than 0,05 indicating that the model is normally distributed. The autocorrelation test using the Lagrange Multiplier Test showed a Chi-Square probability value of 0,1267 which is greater than 0,05 meaning there is no autocorrelation in the model. The heteroscedasticity test using the Breusch-Pagan-Godfrey Test yielded a Chi-

Square probability value of 0,9947 which exceeds 0,05 so the model does not exhibit heteroscedasticity.

Table 6. Classical Assumption Tests Results

Classical Assumption Tests	Metode	Prob.
Normalitas	Jarque-Bera Probability	0,902428
Autokorelasi	Lagrange Multiplier Test	0,1267
	Probability Chi Square	
Heterokedastisitas	Breusch-Pagan-Godfrey Test	0,9947
	Probability Chi Square	

The linearity test using the Ramsey RESET Test yielded an F-statistic probability value of 0,6062 which is greater than 0,05 therefore, the model satisfies the linearity assumption. Consequently, all classical assumption tests have been met, and the model is deemed suitable for use in further analysis.

Table 7. Linearity Tests Results

	Value	df	Prob.
t-statistic	0,536573	8	0,6062
F-statistic	0,287911	(1, 8)	0,6062
Likelihood ratio	0,989979	1	0,3197

Model Stability Test

Next, a model stability test was conducted using the Recursive CUSUM Test and the CUSUM of Squares Test to ensure that the model parameters remained stable throughout the observation period. The results of the CUSUM test indicate that the cumulative CUSUM line lies within the dashed line at a 5% significance level similarly, the results of the CUSUM of Squares test show that the plot lies within the critical bound. Thus, there are no significant structural changes in the model during the study period, meaning the model parameters are stable and the estimation results can be considered consistent and reliable for both short-term and long-term analysis.

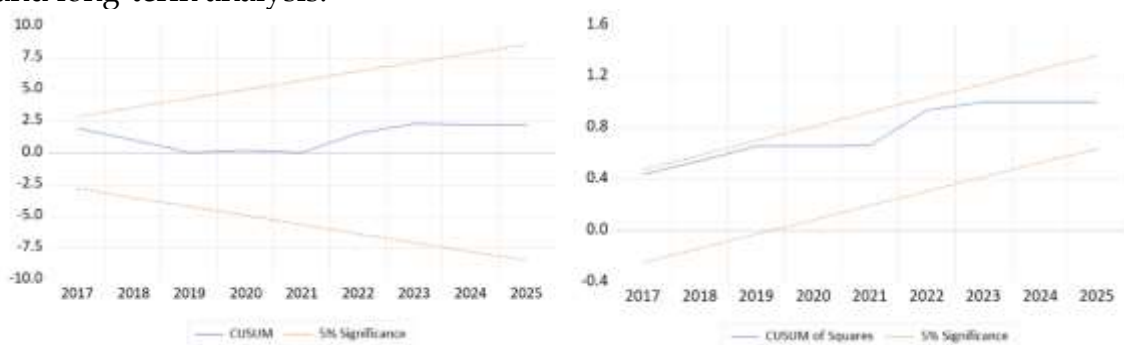


Figure 1. CUSUM Test Results and CUSUM of Squares Test Results

DISCUSSION

The Effect of Local Rice Prices on the Volume of Rice Imports in Indonesia

The results of the ARDL model estimation indicate that the price of local rice has a negative coefficient of -123,8412 but does not have a significant effect on rice imports in Indonesia in the long run, with a probability value of 0,6070. Similarly Setiawati et al., (2024) also found that domestic rice prices do not have

a significant effect in the long run. This finding is inconsistent with supply and demand theory, which states that when the price of local rice increases, imports should rise as a substitute. In the Indonesian context, the lack of a significant effect of local rice prices on imports can be explained by several factors. First, government policies regulating rice imports are not solely based on market price mechanisms but are more heavily influenced by national food security policies and political stability (Alam, 2025). The Indonesian government frequently intervenes in the rice market through the setting of Maximum Retail Prices (MRP) and market operations by Bulog. Second, rice imports in Indonesia are more determined by strategic factors such as national food reserves and trade policies than by short-term domestic price fluctuations (Anton et al., 2024). Thus, in the long run, import decisions are more strongly influenced by structural considerations rather than price responses alone. Accordingly, changes in domestic prices are not sufficiently strong to significantly affect the direction of import decisions.

Meanwhile, ECM estimation results show a different dynamic, in the short term local rice prices have a positive coefficient of 647,1337 and are significant both in the current period and in the lag. Similarly, Setiawati et al. (2024) also found that domestic rice prices have a significant effect in the short run. This indicates that in the short term, an increase in local rice prices actually boosts rice imports, consistent with the mechanism of food price stabilization policies. The impact of these price changes is significant in the short term because consumers and policymakers directly respond to price fluctuations by adjusting import volumes to maintain market stability (Sani et al., 2020).

The differing directions and significance of the effects on local rice prices in the long and short term suggest that responses to changes in domestic prices are not always consistent across time periods. In the long term, import decisions are more influenced by other strategic factors such as food security policies and international trade agreements, whereas in the short term, increases in domestic rice prices tend to be immediately addressed through increased imports to maintain supply and price stability in the domestic market.

The Effect of International Rice Prices on Rice Imports in Indonesia

The results of the ARDL model estimation for international rice prices show a positive coefficient of 9483,033 indicating a significant long-term effect on rice imports in Indonesia with a probability value of 0,0147. This finding suggests that even as international rice prices rise, Indonesia continues to import rice. Similarly, Zaneta and Ayuningsasi (2025) also found that international rice prices have a significant effect in the long run. This result appears to contradict import demand theory, which states that an increase in the price of imported goods should reduce import volume. However, this phenomenon can be explained through several economic perspectives. First, rice is a commodity with low (inelastic) demand elasticity in Indonesia because it is the primary staple food. When international rice prices rise, the massive domestic consumption needs, which cannot be easily substituted, compel Indonesia to continue importing rice to bridge the gap between domestic production and consumption (Zaneta &

Ayuningsasi, 2025). This is also consistent with Aisyah et al., (2025), who found that international rice prices have a positive and significant effect on rice imports in Indonesia. More competitive or stable international prices may encourage the government and market participants to increase import volumes in an effort to meet domestic demand that is not sufficiently covered by local production. Second, this positive relationship can also be explained through the theory of price parity in international trade. When international rice prices rise, this typically reflects global market conditions such as a global rice supply shortage, causing domestic rice prices in Indonesia to also tend to rise. To prevent even higher price spikes in the domestic market, the Indonesian government continues to import rice even when international prices are high as a price stabilization strategy. Thus, in the long run, Indonesia lacks adequate substitute options to replace rice imports. Therefore, even when international prices rise, import volumes cannot be immediately reduced, as import decisions are driven more by food security considerations rather than price efficiency concerns.

Meanwhile, the ECM estimation results provide a more complex perspective on short-term dynamics. In the current period, international rice prices have a positive but insignificant coefficient, however at certain lags, they exhibit a significant negative coefficient. This pattern indicates a time lag in the response of imports to changes in international rice prices. This negative lag phenomenon can occur when international rice prices rise in a previous period, importers and the government will delay or reduce imports in the subsequent period to avoid higher costs while relying on reserve stocks. This mechanism aligns with the theory of rational expectations, which states that market participants make decisions based on all available information, such as past price data and expectations of future prices (MUTH, 1961).

The difference in the direction and significance of the impact on international rice prices in the long and short term indicates a dualism in Indonesia's rice import decision-making. In the long term, rational cost considerations are often overridden by the structural need to meet national food requirements, whereas in the short term, import decisions are made rationally based on price considerations.

The Effect of Local Rice Production on Rice Imports in Indonesia

The results of the ARDL model estimation for local rice production show a negative coefficient of -0,036422, indicating a significant long-term effect on rice imports in Indonesia with a probability value of 0,0641 at a 10% significance level. Similarly, Muhammad et al., (2023) also found that local rice production has a negative effect in the long run. This finding aligns with production theory and supply theory, which state that an increase in domestic production reduces dependence on imports. This negative relationship reflects the principle of substitution between domestic production and imports in meeting national consumption needs. When local rice production increases, the supply of rice in the domestic market becomes more abundant, thereby reducing the need to import rice from abroad. The relatively small coefficient indicates that every 1ton

increase in local rice production reduces rice imports by only 0,036 tons. This reflects that although production affects imports, the effect is not very significant.

Meanwhile, the ECM estimation results show that in the short term, local rice production has a negative coefficient of -0,170495, and highly significant. The direction of the effect is consistent with the long term, but the larger coefficient value in the short term indicates that the response of imports to changes in local rice production is faster and stronger over a short period of time. This can be explained by import policy mechanisms that are responsive to domestic production conditions, where the government and Bulog actively monitor harvest yields and immediately make import decisions in the event of a production shortfall. Similarly, Paipan and Abrar (2020) also found that domestic rice prices have a significant effect in the short run. Given that Indonesia's rice production is influenced by various factors, the government has implemented numerous programs to increase output, such as new paddy field printing and land optimization. Nevertheless, domestic demand for rice remains high, making imports still a necessary option to maintain supply stability and national food security (Roza, 2025).

Although the direction of the effect is the same, there is a difference in the magnitude of the coefficient values between the long-term and short-term periods. This can be explained by differences in the nature of the government's import policy response. When rice production declines due to extreme weather or pest infestations, the government tends to rapidly increase import volumes to prevent supply shortages and price spikes. On the other hand, the government also continues to encourage increased domestic production through various agricultural programs so that dependence on imports can be gradually reduced. Thus, the smaller long-term coefficient reflects structural adjustments occurring over time, while the larger short-term coefficient reflects an immediate and direct policy response.

The Effect of the Rupiah Exchange Rate on Rice Imports in Indonesia

The results of the ARDL model estimation for the rupiah exchange rate show a positive coefficient of 302,1651, and indicating a significant long-term effect on rice imports in Indonesia with a probability value of 0,0643 at a 10% significance level. This contrasts with Paipan & Abrar, (2020), who found that the rupiah exchange rate has a negative effect in the long run. This finding of a positive coefficient contradicts conventional exchange rate theory, which states that a depreciation of the domestic currency should reduce imports because imported goods become more expensive in domestic currency terms. However, this positive relationship can be explained from several perspectives. First, this phenomenon reflects the highly inelastic nature of rice demand with respect to price. As a staple food, rice demand in Indonesia is insensitive to price changes (Tanduk, 2025). Thus, even though the rupiah weakens and the price of imported rice rises, the government and importers continue to import to meet consumption needs that cannot be postponed. Second, this positive relationship can be explained through the transmission mechanism of economic crises. During certain periods, the depreciation of the rupiah often coincides with unstable

economic conditions, such as the 1998 economic crisis and the 2008 global economic turmoil. Economic crises in Indonesia have led to a sharp depreciation of the rupiah's exchange rate as well as a decline in rice production. This decline in domestic production then forces the government to increase imports even as the exchange rate weakens, thereby creating a positive correlation between the exchange rate and rice imports in the long term.

Meanwhile, the ECM estimation results offer a different perspective on short-term dynamics. In the current period, the rupiah exchange rate has a negative but insignificant coefficient; however, at the first lag, it shows a negative coefficient of -445,5992 and significant. Similarly, Paipan and Abrar (2020) also found that the rupiah exchange rate has a negative effect in the short run. This indicates that a weakening of the rupiah exchange rate in the previous period tends to suppress rice imports in the subsequent period. This negative lag pattern is more consistent with conventional economic theory, whereby when the rupiah exchange rate weakens in the previous period, importers and the government will reduce imports in the subsequent period because the price of imported rice becomes more expensive in rupiah terms (Safi'i, 2025).

The difference in the direction of the exchange rate's influence – positive in the long term and negative in the short term – indicates a complex interaction between the exchange rate, domestic production, and food security policies. Under certain conditions, a weakening of the rupiah causes import costs to rise, thereby tending to suppress import volumes. However, over a longer period, exchange rate depreciation often occurs alongside macroeconomic instability, which also affects the capacity of domestic agricultural production. Consequently, even though import costs become more expensive, rice imports continue because domestic production is still unable to meet national demand, resulting in a positive relationship between the exchange rate and rice imports in the long term.

CONCLUSIONS AND RECOMMENDATIONS

Based on an analysis using the ARDL method for the period 1993–2025, it was concluded that local rice prices do not have a significant effect in the long run but do have a significant positive effect in the short run. International rice prices have a significant positive effect in the long run due to inelastic rice demand. National rice production has a significant negative effect in both the short and long term. The rupiah exchange rate has a significant positive effect in the long run. Overall, Indonesia's rice imports are more influenced by strategic and structural factors than by market price mechanisms alone. Theoretically, this study indicates that conventional import demand theory needs to be adapted for staple food commodities in developing countries. From a policy perspective, the government should prioritize increasing agricultural productivity and developing an integrated early warning system. For practitioners, farmers can utilize these findings for production planning, while importers can optimize the timing and volume of imports based on international price dynamics and exchange rates.

ADVANCED RESEARCH

Based on the conclusions and implications of this study, several recommendations can be proposed as follows. For the government, it is necessary to prioritize the enhancement of national rice production through the revitalization of the agricultural sector. The government should also develop a more responsive and data-driven stock management and import policy system, as well as strengthen coordination among relevant agencies in rice policy management to ensure the effectiveness of food security policies.

For farmers and agricultural business actors, it is advisable to improve productivity and farming efficiency through the adoption of modern agricultural technologies, business diversification, and the strengthening of farmer institutions. Cooperatives and farmer groups can play a significant role in increasing farmers' bargaining power and opening access to more profitable markets. The utilization of information technology, such as agricultural applications, can assist farmers in obtaining real-time information on prices, weather conditions, and best cultivation practices..

For future research, it is recommended to include additional variables such as rice consumption, population size, import tariff and quota policies, as well as dummy variables for specific policy periods. Future research could also use higher-frequency data (monthly/quarterly) or qualitative approaches to explore non-quantitative aspects of import decision-making.

REFERENCES

- Aisyah, S., Saparuddin, & Kuncara, H. (2025). *Pengaruh Konsumsi Beras, Produk Domestik Bruto (PDB) per Kapita, dan Harga Beras Internasional Terhadap Impor Beras di Indonesia Tahun 2010-2023*. 1(3), 970–985.
- Alam, W. Y. (2025). *Ekonomi Politik Ketahanan Pangan : Studi Kebijakan Impor Beras*. 5, 8367–8376.
- Anggela, N. L. (2024). Capai 3,06 Juta Ton, Impor Beras 2023 Pecah Rekor Tertinggi dalam 5 Tahun. *Espos Ekonomi*. <https://ekonomi.espos.id/capai-306-juta-ton-import-beras-2023-pecah-rekor-tertinggi-dalam-5-tahun-1840960>
- Anton, F., Kurniawan, A., Ramdhani, I., & Fitrie, R. A. (2024). *Analisis Pengambilan Keputusan Kebijakan Impor Beras dalam Konteks Pemenuhan Pangan Nasional di Indonesia*. 1, 1–15.
- Badan Pangan Nasional. (2025a). *Bangun Sistem Perberasan, NFA Tegaskan Komitmen Keberlanjutan dan Keadilan untuk Petani*. Badanpangan.Go.Id. <https://badanpangan.go.id/blog/post/bangun-sistem-perberasan-nfa-tegaskan-komitmen-keberlanjutan-dan-keadilan-untuk-petani>
- Badan Pangan Nasional. (2025b). *Menyongsong Swasembada Pangan, Kebijakan Harga GKP Lecut Petani Semangat Terus Menanam*. Badanpangan.Go.Id. <https://badanpangan.go.id/blog/post/menyongsong-swasembada-pangan-kebijakan-harga-gkp-lecut-petani-semangat-terus-menanam>
- Badan Pusat Statistik. (2025a). *Distribusi Persentase Produk Domestik Bruto Atas Dasar Harga Berlaku Menurut Lapangan Usaha (persen)*. Bps.Go.Id. <https://www.bps.go.id/id/statistics-table/3/T0UxS09GQIBTk5QWTBNdlVWUmxSMjV3Y3l0VWR6MDkjMy>

- MwMDAw/distribusi-persentase-produk-domestik-bruto-atas-dasar-harga-berlaku-menurut-lapangan-usaha--persen-.html?year=2024) .Dengan besaran nilai kontribusi sektor pertanian da
- Badan Pusat Statistik. (2025b). *Impor Beras Menurut Negara Asal Utama, 2017-2024*. Bps.Go.Id. <https://www.bps.go.id/id/statistics-table/1/MTA0MyMx/impor-beras-menurut-negara-asal-utama-2017-2023.html>
- Childs, N., & Baldwin, K. L. (2010). *Price Spikes in Global Rice Markets Benefit U.S. Growers, at Least in the Short Term*. Amber Waves. <https://www.ers.usda.gov/amber-waves/2010/december/price-spikes-in-global-rice-markets-benefit-u-s-growers-at-least-in-the-short-term?>
- Creswell, J. W., Hanson, W. E., Clark Plano, V. L., & Morales, A. (2007). Qualitative Research Designs: Selection and Implementation. *The Counseling Psychologist*, 35(2), 236–264. <https://doi.org/10.1177/0011000006287390>
- Fadhilah, R. A., & Marseto. (2024). Analysis of Factors Affecting Rice Imports in Indonesia. *COSTING: Journal of Economic, Business and Accounting*, 7, 10229–10239. <https://doi.org/10.18551/rjoas.2019-07.10>
- Febiola, A. (2024, July). RI Berpotensi Impor Beras 5,17 Juta Ton, Pengamat Khawatir Ketahanan Pangan Nasional. *Tempo*. <https://www.tempo.co/ekonomi/ri-berpotensi-impor-beras-5-17-juta-ton-pengamat-khawatir-ketahanan-pangan-nasional--34339>
- Gischa, S., & Nailufar, N. N. (2019). Indonesia sebagai Negara Agraris, Apa Artinya? *Kompas.Com*. <https://www.kompas.com/skola/read/2019/12/12/172322669/indonesia-sebagai-negara-agraris-apa-artinya?page=all#:~:text=Sumber:ASEAN,baik di darat maupun perairan.&text=Sektor pertanian juga memiliki peran,kopi%2C beras%2C dan tebu>
- Gujarati, D. N., & Porter, D. C. (2012). *Dasar-dasar Ekonomitrika* (Lima). Salemba Empat.
- Helmold, M. (2022). Economic Pricing, 3C-Pricing and Cost-Estimation Concepts. In *Performance Excellence in Marketing, Sales and Pricing* (pp. 63–73). https://doi.org/10.1007/978-3-031-10097-0_6
- Hoover, K. D. (2006). Is there a place for rational expectations in keynes's general theory? In A "Second Edition" of the *General Theory* (pp. 219–237). Taylor and Francis. <https://doi.org/10.4324/9780203980316-28>
- Imam, M. K., & Santosa, D. B. (2017). Determinants of Indonesia Import in 1981–2014. *Jejak*, 10(2), 341–349. <https://doi.org/10.15294/jejak.v10i2.11298>
- Isnaini, S. A., Indah, P. N., & Laily, D. W. (2024). Analysis of Factors Influencing Rice Imports in Indonesia. *Buletin Penelitian Sosial Ekonomi Pertanian Fakultas Pertanian Universitas Haluoleo*, 26(2), 105–115. <https://doi.org/10.37149/bpsosek.v26i2.1412>
- Kargbo, J. M. (2003). Food prices and long-run purchasing power parity in Africa. *Development Southern Africa*, 20(3), 321–336. <https://doi.org/10.1080/0376835032000108158>
- Kementrian Pertanian Republik Indonesia. (2019). *Arti Swasembada dan Capaian Sektor Pertanian*. Pertanian.Go.Id.

- <https://www.pertanian.go.id/?show=news&act=view&id=3621>
Kementrian Pertanian Republik Indonesia. (2024). *Buletin Konsumsi Pangan Semester II* 2024.
https://satudata.pertanian.go.id/assets/docs/publikasi/Buletin_Konsumsi_Smt2-2024-Gab.pdf
- Kim, J. H., & Choi, I. (2017). Unit Roots in Economic and Financial Time Series : A Re-Evaluation at the Decision-Based Significance Levels. *MDPI*, 5(3).
<https://doi.org/10.3390/econometrics5030041>
- Krugman, P. R., Obstfeld, M., & Melitz, M. J. (2018). International Economics, Theory and Policy. In *Pearson Education : Harlow.*, 2018 (11th Editi, Vol. 11, Issue International Economics).
- Kusmiati, & Bowo, P. A. (2024). of Factors Influencing Rice Imports in Indonesia. *Efficient: Indonesian Journal of Development Economics*, 7(1), 44–54.
- Mankiw, N. G. (2018). *PRINCIPLES OF ECONOMICS* (8th Editio). Cengage Learning.
- Marwala, T., & Hurwitz, E. (2017). Supply and Demand. In *Advanced Information and Knowledge Processing* (9783319661st ed., pp. 15–25). Springer London.
https://doi.org/https://doi.org/10.1007/978-3-319-66104-9_2
- Moss, C. B. (2022). *Production Economics: An Empirical Approach*. World Scientific.
<https://doi.org/https://doi.org/10.1142/12332>
- Muhammad, H., Hendrarini, H., & Mubarakah. (2023). ANALISIS FAKTOR-FAKTOR YANG MEMENGARUHI IMPOR BERAS DI INDONESIA. 25(1), 1023–1035.
- MUTH, J. F. (1961). *Rational Expectations and the Theory of Price Movements Author (s) : John F . Muth Published by : The Econometric Society Stable URL : https://www.jstor.org/stable/1909635*. 29(3), 315–335.
- Nugraheni, A. (2025). Peta Konsumsi Beras Dunia dan Momen Indonesia Berpaling dari Ketergantungan. *Kompas.Id*.
<https://www.kompas.id/artikel/peta-konsumsi-beras-dunia-dan-momen-indonesia-berpaling-dari-ketergantungan>
- OECD Publishing. (2013). *Global Food Security: Challenges for the Food and Agricultural System*.
<https://doi.org/http://dx.doi.org/10.1787/9789264195363-en>
- Paipan, S., & Abrar, M. (2020). Determinan Ketergantungan Impor Beras di Indonesia [Determinants of Rice Import Dependency in Indonesia]. *Jurnal Ekonomi Dan Kebijakan Publik*, 11(1), 53–64.
<https://doi.org/10.22212/jekp.v11i1.1443>
- Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, 16(3), 289–326.
<https://doi.org/10.1002/jae.616>
- Rassi, Y. W., Olivia, D., Humairoh, F., Sutomo, M. M., & Fauziah, N. S. (2025). The Impact of Exchange Rate Fluctuations on the Price Stability of Imported Commodities in Indonesia. *Formosa Journal of Applied Sciences*, 4(6), 1803–1818. <https://doi.org/10.55927/fjas.v4i6.189>
- ROZA, R. (2025). *Mendorong Paradiplomasi Lingkungan untuk Mendukung Agenda Diplomasi DPR RI*.

- Rozi, F., Santoso, A. B., Mahendri, I. G. A. P., Hutapea, R. T. P., Wamaer, D., Siagian, V., Elisabeth, D. A. A., Sugiono, S., Handoko, H., Subagio, H., & Syam, A. (2023). Indonesian market demand patterns for food commodity sources of carbohydrates in facing the global food crisis. *Heliyon*, 9(6). <https://doi.org/10.1016/j.heliyon.2023.e16809>
- Safi'i, M. R. (2025). THE INFLUENCE OF CONSUMPTION, PRODUCTION, PRICE, AND EXCHANGE RATE ON INDONESIA'S RICE IMPORTS. *Indonesian Interdisciplinary Journal of Sharia Economics (IJJSE)*, 8(3), 9507-9515. <https://doi.org/https://doi.org/10.31538/ijse.v8i3.7396>
- Salfina, L. (2022). Determination of Rice Prices to the Welfare of Petani in West Sumatra Province. *International Journal of Social Science and Human Research*, 05(01). <https://doi.org/10.47191/ijsshr/v5-i1-05>
- Sani, Y., Hodijah, S., & Rosmeli, R. (2020). Analisis impor beras Indonesia. *E-Journal Perdagangan Industri Dan Moneter*, 8(2), 89-98. <https://doi.org/10.22437/pim.v8i2.7837>
- Setiawati, R. I. S., Jaenudin, M., Amini, A. F., & Puspita, N. P. R. (2024). Short- and long-term determinants of Indonesia's rice import: An error correction model approach. *Jurnal Ekonomi & Studi Pembangunan*, 26(1), 61-79. <https://doi.org/10.18196/jesp.v26i1.24963>
- Siswanto, E., Sinaga, B. M., & Harianto, . (2018). Dampak Kebijakan Perberasan pada Pasar Beras dan Kesejahteraan Produsen dan Konsumen Beras di Indonesia. *Jurnal Ilmu Pertanian Indonesia*, 23(2), 93-100. <https://doi.org/10.18343/23.2.93>
- Tanduk, M. F. (2025). ANALYSIS OF RICE DEMAND IN RESPONSE TO RISING PRICES. 19(2), 3-9. <https://doi.org/10.15408/aj.v19i2.47199>
- Truett, D. B., & Truett, L. J. (2006). Production function geometry with "knightian" total product. *Journal of Economic Education*, 37(3), 348-358. <https://doi.org/10.3200/JECE.37.3.348-358>
- Zaneta, S., & Ayuningsasi, A. A. K. (2025). THE INFLUENCE OF RICE PRODUCTION, INTERNATIONAL RICE PRICES, POPULATION, AND GROSS DOMESTIC PRODUCT (GDP) ON INDONESIA'S RICE IMPORTS. 3(3), 843-859.