

Analysis of Factors Affecting Rice Import Volume in Indonesia

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Abstract

Rice imports are a strategic issue in national food security, especially when domestic production is unable to meet domestic demand. This study aims to analyze the factors that influence the volume of rice imports in Indonesia in the period 1999–2023. The independent variables used in this study include domestic rice production, domestic rice consumption, domestic rice prices, and international rice prices. Meanwhile, the dependent variable is rice imports. The approach used in this study is a quantitative approach with annual secondary data obtained from the Central Statistics Agency (BPS), the Ministry of Agriculture, and the FAO. The data analysis technique used is multiple linear regression with the help of SPSS software version 25. The results of the analysis show that the variables of international rice prices and domestic rice prices have a positive and significant effect on rice imports. Meanwhile, the variables of domestic rice production and consumption do not have a significant effect, but have a negative relationship to import volume. This indicates that Indonesia's dependence on the global market is still high in meeting its rice needs. The coefficient of determination (R^2) of 41.6% indicates that variations in rice imports can be explained by the five independent variables. This research provides input for the government to strengthen food security by increasing domestic production and monitoring fluctuations in global rice prices.

Keywords: Rice Imports, Production, Consumption, Domestic Rice Prices, International Prices, Land Area

INTRODUCTION

Rice is a primary food commodity and a staple food for the majority of Indonesia's population. As an agricultural country, Indonesia is highly dependent on rice, both in terms of consumption and production. According to data from the Central Statistics Agency

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(2022), approximately 95% of Indonesians' carbohydrate consumption still relies on rice. Rice also plays a strategic role in social, economic, and even national political aspects. The availability and stability of rice prices are often sensitive issues that can affect inflation, household welfare, and broader social stability. In fact, according to Widarso & Djamaluddin (2024), rice availability and prices are often used as direct indicators in evaluating national food security. Therefore, rice can be a determining factor in food policy in Indonesia.

First, domestic rice production (X1) is the primary factor influencing Indonesia's rice import needs. According to Ricardo's theory of comparative advantage, increased domestic production will reduce dependence on imports because food availability is sufficient to meet the population's needs. However, in practice, despite increased production, uneven distribution, post-harvest issues, and rice quality often pose obstacles, leaving room for imports (Arinta, 2021). In the Indonesian context, high rice production in certain years successfully suppresses imports, but when production declines due to crop failures or climate anomalies, imports increase again to maintain national food stability. Research by Azzalia and Arka (2023) shows that domestic rice production significantly influences imports, as the greater the production, the smaller the volume of rice imported from abroad.

Second, domestic rice consumption (X2) influences imports through the ever-increasing national food demand. With a large population, Indonesia has a very high rice consumption rate, so even though domestic production is relatively large, it is often insufficient to meet national needs (Fitriani, 2022). Rising consumption is pressuring the government to increase foreign supplies to prevent shortages or price spikes in the domestic market. In some cases, increased consumption has also led to shifts in rice distribution patterns, particularly in urban areas that are more vulnerable to food inflation. A study by Lestari (2020) confirms that domestic consumption has a positive relationship with rice imports, where increased public demand for rice encourages the government to import to ensure stock availability.

Third, domestic rice prices (X3) are an important indicator in determining import volume. According to price theory, sharp increases in domestic prices usually occur due to a lack of domestic supply, prompting the government to import to stabilize prices (Soekirno, 2019). Higher domestic rice prices compared to international prices also increase import incentives because it is cheaper to import rice from abroad. Research by Prasetyo (2021) shows that domestic rice prices significantly influence import decisions, as the price difference between domestic and international markets impacts Indonesia's

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rice trade mechanism. This situation indicates that imports are not only a strategy to meet demand but also a government instrument to maintain price stability in the domestic market.

Fourth, international rice prices (X4) play a role in determining the costs Indonesia must bear when importing. According to international trade theory, fluctuations in global prices will directly impact import volumes in rice-importing countries. If international prices rise, imports can decrease due to excessive costs. However, in Indonesia's case, despite rising global rice prices, imports continue to maintain food availability (Sugiharto, 2023). This is due to Indonesia's dependence on supplies from major producing countries such as Thailand, Vietnam, and India. Therefore, international prices are a strategic factor influencing the size of imports, although the government sometimes prioritizes stock availability over cost considerations alone.

Fifth, the area of rice fields harvested (X5) is a structural factor determining domestic production capacity. The larger the area of land used for rice cultivation, the greater the potential production, thereby reducing import needs (Subekti, 2022). However, the conversion of agricultural land to non-agricultural uses, particularly in urban areas, poses a major challenge to Indonesia's food security. Research by Rahmawati (2021) found that the decline in rice field area is directly proportional to the increase in rice imports, as national production capacity is unable to bridge the gap between consumption and availability. Therefore, land area is a key variable in determining Indonesia's dependence on imported rice.

In addition to these internal factors, government policies, climate change, and global market conditions also influence the dynamics of Indonesian rice imports. Fiscal policies such as fertilizer subsidies, agricultural intensification programs, and the government's rice reserve strategy (CBP) play a role in maintaining the balance between production, consumption, and imports. A study by Hartono (2020) emphasized that rice imports are determined not only by production and consumption factors, but also by the price stabilization policy implemented by the government through the Logistics Agency (Bulog).

According to studies by Arinta (2021) and Sugiharto (2023), the dynamics of Indonesian rice imports are heavily influenced by a combination of domestic and global factors. Fluctuating production, high consumption, and limited land are the main drivers of imports, while domestic and international prices serve as controlling variables through market mechanisms. In other words, rice imports in Indonesia are the result of a complex



interaction between structural factors, policies, and global market conditions that influence each other.

Objectives

This study aims to comprehensively analyze the factors influencing rice imports in Indonesia, with independent variables being domestic rice production, domestic rice consumption, domestic rice prices, international rice prices, and harvested land area. The main objective of this study is to identify the extent to which each variable contributes to influencing rice import volume, both partially and simultaneously. In addition, this study also aims to assess the combined influence of these five variables on rice imports in Indonesia and provide relevant policy recommendations to maintain national food security. By understanding the factors influencing rice imports, the government is expected to be able to formulate more effective strategies, both in supporting increased domestic production and in determining appropriate international trade policies.

DISCUSSION

This study employed a quantitative approach. To determine the extent to which the research results could be generalized to a wider population, a quantitative approach was chosen because it provides an objective picture based on numerical data. The research method used was a quantitative method with multiple linear regression analysis. This analysis was conducted using SPSS version 25 statistical software, which utilizes a specific model according to the predetermined analysis requirements.

Accordingly, this study aims to determine the influence of domestic rice production, domestic rice consumption, domestic rice prices, international rice prices, and land area on rice imports in Indonesia.

This study utilized secondary data obtained from the Central Statistics Agency (BPS), the Ministry of Agriculture, and the World Bank for the period 1999–2023. Furthermore, the author conducted a literature review to obtain a theoretical basis and support the discussion, referencing scientific articles, research journals, and official reports from relevant institutions.

Domestic rice production (X1) in this study is the amount of rice produced domestically each year, measured in tons. Domestic rice consumption (X2) is the total rice consumed by Indonesians in one year, calculated on a national scale in tons. Domestic rice price (X3) refers to the average price of rice on the domestic market, expressed in rupiah per kilogram. International rice price (X4) is the average price of rice

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on the global market, usually referring to the export price of major producing countries, measured in USD per ton. Land area (X_5) represents the total harvested rice land in Indonesia used in one year, measured in hectares. The dependent variable, Rice Imports (Y), is measured by the total volume of rice imported by Indonesia each year, expressed in tons.

The regression model used in this study can be written as follows

$$Y = a + b_1X_1 + b_2X_2 + \dots + b_pX_p + e$$

Y = volume impor beras

X_1 = Production

X_2 = Consumption

X_3 = Domestic Rice Prices

X_4 = International Prices

X_5 = Land Area

α = Constant

$\beta_1, \beta_2, \beta_3$ = Regression coefficient
of each independent variable e =
error term

Classical Assumption Test

Normality Test

Table 1. The Result of Normality Test

	<i>Unstandardized Residuals</i>	Note
Asymp. Sig. (2-tailed)	0.158	Normal

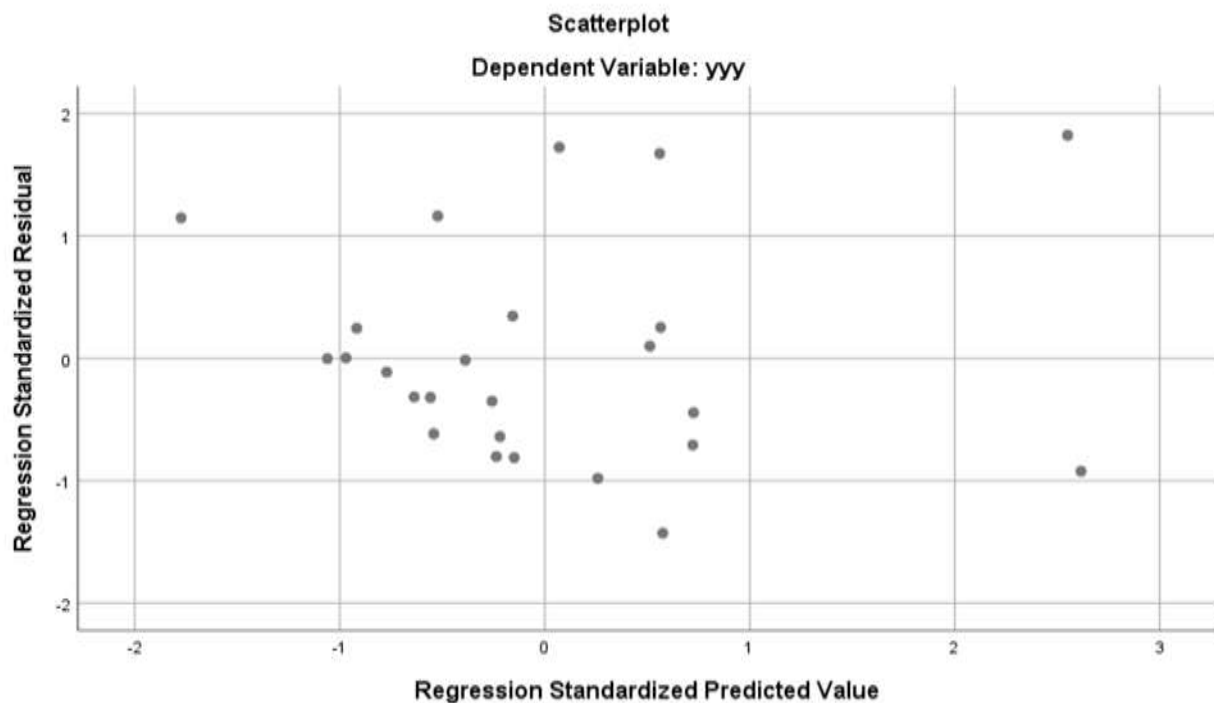
Based on Table 1, the results of the normality test show that the Asymp. Sig. (2-tailed) value is 0.158. Therefore, it can be concluded that the data is normally distributed, as the significance value is greater than 0.05. All formulas or formulas must also be numbered.



Multicollinearitas Test**Table 2. The Result of Multicollinearitas Test**

Independent Variable	Tolerance	VIF	Note
(X1)	0.252	3.976	There is no multicollinearity
(X2)	0.152	6.573	There is no multicollinearity
(X3)	0.247	4.048	There is no multicollinearity
(X4)	0.361	2.772	There is no multicollinearity
(X5)	0.275	3.630	There is no multicollinearity

Based on Table 2, the tolerance values for each variable are greater than or equal to 0.10, and the VIF values for each variable are less than 10. Therefore, it can be concluded that there is no multicollinearity, or in other words, there is no correlation among the independent variables in this regression model.

Heteroscedasticity Test**Table 3. The Result of Heteroscedasticity Test**

the results of the heteroscedasticity test in this study are shown through a scatterplot between the standardized residual values and the standardized predicted values. The scatterplot shows that the data points are randomly distributed above and below the zero horizontal line without forming any specific pattern such as narrowing, widening, or wavy lines. This random distribution pattern indicates that the residual variance is constant, meaning there are no symptoms of heteroscedasticity.

Therefore, it can be concluded that the independent variables used in this study Rice Production, Rice Consumption, Domestic Rice Prices, and International Rice Prices have met the classical assumptions of homoscedasticity. This indicates that the regression model used does not experience heteroscedasticity, thus the estimation results obtained can be considered reliable and suitable for use in further analysis.

Autocorrelation Test

Table 4. The Result of Autocorrelation Test

Model	Durbin-Watson
I	936

Based on the results of the autocorrelation test using the Durbin-Watson method, the Durbin-Watson value of 936 indicates that there is no serious autocorrelation in this regression model. This value is still close to 2, suggesting that the model meets the assumption of residual independence.

Multiple Linear Regression Analysis

Table 5. The Result of Multiple Linier Regression Test

	Unstandarized Coefficients	
	B	Std. Error
Constant	2621387.719	4388981.050
X1	-0.330	0.237
X2	0.633	0.166
X3	270.809	97.598
X4	1577.499	2152.602
X5	-0.711	0.237



The regression equation from the multiple linear regression analysis can be formulated as follows:

$$Y = \alpha + \beta_1 PB + \beta_2 KB + \beta_3 HL + \beta_4 HI + \beta_5 LL + \varepsilon$$

$$IB = 2621387.719 - 0.330 + 0.633 + 270.809 + 1577.499 - 0.711$$

The constant (α) of 2621,387.719 indicates that if all independent variables (production, consumption, domestic prices, international prices, and land area) are set to zero, the estimated volume of rice imports is 2,621,387.719 tons.

The regression coefficient for rice production (X_1) is -0.330, a negative regression coefficient indicating that every 1-unit increase in rice production will reduce rice imports by 0.330 units, assuming other variables remain constant. This result aligns with the theory that higher domestic production reduces the need for rice imports.

The regression coefficient for rice consumption (X_2) is 0.633, a positive regression coefficient indicating that every 1-unit increase in rice consumption actually increases rice imports by 0.633 units. This indicates that high domestic consumption has the potential to increase import needs if domestic production is unable to meet demand.

The domestic rice price coefficient (X_3) is 270.809. This positive regression coefficient means that every 1 unit increase in the domestic rice price (e.g., rupiah/kg) will increase rice imports by 270.809. This indicates that the higher the domestic rice price, the more likely the government is to open import restrictions to suppress market prices.

The international price coefficient (X_4) is 1577.499. This positive coefficient indicates that every 1 unit increase in the international rice price will increase rice imports by 1577.499. This means that even though the price of rice on the international market is increasing, Indonesia still tends to import, likely due to high domestic demand that cannot be met by local production.

The land area coefficient (X_5) is -0.0711. This negative regression coefficient means that every 1 unit increase in agricultural land area will reduce rice imports by 0.711. This shows that the larger the land area available for rice production, the smaller the dependence on rice imports, although its effectiveness also depends on the level of productivity of the land.



Hypothesis Testing Result**Table 7. The Result of Hypothesis Test**

Variable	t	Sig.
Constant	0.597	0.557
X1	-2.828	0.011
X2	3.825	0.001
X3	2.775	0.012
X4	3.825	0.473
X5	-3.001	0.007

a. Rice Production (X1) on Rice Import Volume (Y)

significance value of 0.011 was obtained, which is less than 0.05. This means there is a significant effect between rice production and rice import volume. Therefore, H_0 is rejected and H_1 is accepted.

b. Rice Consumption (X2) on Rice Import Volume (Y)

Asignificance value of $0.001 < 0.05$, which means there is a significant effect between rice consumption and rice import volume. Therefore, H_0 is rejected and H_2 is accepted.

c. Domestic Rice Price (X3) on Rice Import Volume (Y)

significance value of $0.012 < 0.05$, which means there is a significant effect between domestic rice prices and rice import volume. Therefore, H_0 is rejected and H_3 is accepted.

d. International Rice Prices (X4) on Rice Import Volume (Y)

The significance value is $0.473 > 0.05$, indicating no significant effect between international rice prices and rice import volume. Therefore, H_0 is accepted and H_4 is rejected.

e. Land Area (X5) on Rice Import Volume (Y)

The significance value is $0.007 < 0.05$, indicating a significant effect between land area and rice import volume. Therefore, H_0 is rejected and H_5 is accepted.1. The result of the first hypothesis test (H_1)



CONCLUSION

Based on the test results and data analysis outlined in the previous discussion, the author concludes that:

1. Rice production had a negative and significant effect on Indonesia's rice imports during the 1999–2023 period. The higher domestic rice production, the lower Indonesia's dependence on rice imports. This finding supports the food self-sufficiency theory, which emphasizes the importance of increasing domestic production to reduce vulnerability to international markets. By increasing agricultural productivity, Indonesia can reduce import pressure and maintain national food stability.

2. Rice consumption had a positive and significant effect on Indonesia's rice imports during the 1999–2023 period. The continued increase in public consumption, coupled with population growth, has led to an increased demand for rice, which domestic production cannot always meet. This has prompted the government to import to cover the supply deficit, making domestic consumption the primary driver of import policy.

3. Domestic rice prices had a positive and significant effect on Indonesia's rice imports during the 1999–2023 period. Rising domestic rice prices often prompt the government to resort to imports as a price stabilization instrument. Thus, imports were not solely due to supply shortages, but also as a strategy to suppress food inflation and protect public purchasing power.

4. International rice prices had no significant impact on Indonesia's rice imports in the 1999–2023 period. Fluctuations in global rice prices were not a major determinant of Indonesia's rice import policy. This suggests that import decisions were more influenced by domestic conditions, such as stock availability, public consumption, and domestic price stability, rather than by international price dynamics.

5. Land area had a significant and negative impact on Indonesia's rice imports in the 1999–2023 period. The greater the area of available and productively managed rice fields, the greater the domestic production capacity, thereby reducing the need for imports. However, the conversion of agricultural land to non-agricultural uses remains a serious challenge that could increase dependence on imported rice in the future.

6. This study provides novelty by combining the variables of production, consumption, domestic prices, international prices, and land area in the analysis of their impact on Indonesia's rice imports. While most previous studies have focused solely on production and consumption, this study broadens the analysis by incorporating price and land availability. Thus, the results of this study provide theoretical and practical contributions to the formulation of Indonesian food security and rice trade policies.

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