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Determinants of Indonesian Rice Imports

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This research analyzes the determinants of rice imports in Indonesia, a critical issue for national food security. The study investigates the influence of rice production, international rice prices, population growth, and per capita expenditure. Utilizing annual secondary data from 2000-2024, the research employs multiple regression analysis. Results indicate that, simultaneously, all four independent variables significantly affect Indonesia's rice imports. Partially, rice production has a negative and significant influence, showing increased domestic output reduces import needs. Population growth impacts positively and significantly, reflecting how expanding population drives demand and pressures domestic supply. Similarly, per capita expenditure on staple grains shows a positive and significant influence, implying heightened purchasing power, if not met by adequate production, increases import requirements. Conversely, international rice prices are found to have no significant influence, suggesting import decisions prioritize urgent domestic needs and price stabilization over global market fluctuations.

Key Words: Rice Imports, Production, International Rice Prices, Population Growth, Per Capita Expenditure.

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I. Introduction

Indonesia, as one of the world's largest nations, possesses vast agricultural potential supported by a tropical climate and fertile land. With approximately 50.19% of its 191.09 million hectares classified as suitable for agriculture (Ritung et al., 2015), the country is naturally positioned to be self-sufficient in food production. Rice, as the primary staple food consumed by over 96% of households (BPS, 2022), holds strategic importance not only in terms of nutrition but also in maintaining socio-economic and political stability. Consequently, the dynamics of rice production and importation are central to Indonesia's food security agenda.

Despite its agricultural endowment, Indonesia continues to face persistent challenges in achieving rice self-sufficiency. Historical data from 2000 to 2024 reveal significant fluctuations in both production and consumption. The highest production was recorded in 2017 at 42.42 million tons, while the lowest occurred in 2005 at 29.05 million tons. Meanwhile, consumption peaked in 2018 at 36.63 million tons and reached its lowest in 2003 at 28.34 million tons (BPS, 2024). These imbalances have necessitated periodic rice imports, which serve as a buffer against domestic supply deficits and price volatility. In 2024, Indonesia imported 4.51 million tons of rice—the highest volume in two decades—underscoring the country's continued reliance on external sources to meet domestic demand.

Several structural and environmental factors contribute to Indonesia's rice import dependency. One of the most pressing issues is the conversion of agricultural land to non-agricultural uses, including urban development and infrastructure expansion (Ramadhan et al., 2024). This trend has reduced the availability of productive land and disrupted traditional farming systems. Additionally, climate change and extreme weather events such as El Niño have adversely affected crop yields and harvest cycles (Aissiyah & A'la, 2025). These disruptions highlight the vulnerability of domestic rice production to external shocks and reinforce the need for strategic import policies.

Beyond production constraints, other macroeconomic and demographic variables play a significant role in shaping Indonesia's rice import patterns. International rice prices, population growth, and per capita expenditure on staple grains are among the key determinants. While global rice prices, as measured by the FAO index, have shown considerable volatility—peaking at 139.4 points in 2008—their influence on Indonesia's import decisions appears limited (FAO, 2025). Empirical evidence suggests that import policies are driven more by domestic supply-demand dynamics and price stabilization efforts than by global market

fluctuations (Juliashar et al., 2024). This indicates a policy orientation that prioritizes internal food security over external price signals.

Population growth is another critical factor influencing rice imports. Indonesia's population reached 281.6 million in 2024, with a growth rate that, although declining, continues to exert pressure on food demand (BPS, 2024). According to Malthusian theory, unchecked population growth can outpace food production, leading to shortages and increased reliance on imports. Empirical studies confirm that population growth has a positive and significant effect on rice import volumes (Dinar et al., 2023; Ramadhan et al., 2025). As the population expands, so does the aggregate demand for rice, necessitating supplementary imports to bridge the gap between domestic production and consumption.

In addition to demographic pressures, rising per capita expenditure on staple grains reflects changing consumption patterns and increasing purchasing power. Between 2000 and 2024, average monthly per capita expenditure on rice rose from Rp20,344 to Rp94,641 (BPS, 2024). Engel's law posits that while the proportion of income spent on food may decline as income rises, the absolute amount tends to increase. In Indonesia's case, rice remains a consumption priority, and higher income levels have translated into greater demand. When domestic production fails to keep pace with this demand, imports become a necessary instrument to ensure availability and affordability.

The theoretical framework underpinning Indonesia's rice import behavior can be explained through classical international trade theories. David Ricardo's theory of comparative advantage suggests that countries should import goods that are costly or inefficient to produce domestically (Nopirin, 2018). In Indonesia's case, the relatively high cost of rice production—due to land scarcity, low productivity, and infrastructural limitations—makes imported rice from countries like Thailand and Vietnam more competitive. The Heckscher-Ohlin model further supports this view, positing that countries will export goods that utilize abundant production factors and import those that rely on scarce resources (Bakara et al., 2024). Given Indonesia's constraints in land and agricultural efficiency, rice imports serve as a rational response to domestic limitations.

Against this backdrop, the present study seeks to analyze the determinants of Indonesian rice imports by examining the influence of four key variables: rice production, international rice prices, population growth, and per capita expenditure. Using annual secondary data from 2000 to 2024 and employing multiple linear regression analysis, the study aims to provide empirical insights into the relative importance of each factor. Preliminary findings indicate that rice production has a negative and significant effect on import volumes, while population growth and per capita expenditure exert positive and significant influences. Interestingly, international rice prices do not show a statistically significant impact, reinforcing the notion that domestic considerations outweigh global price dynamics in shaping import decisions.

The implications of these findings are multifaceted. First, they underscore the need for targeted interventions to enhance domestic rice production through improved agricultural practices, land protection policies, and technological innovation. Second, they highlight the importance of demographic planning and food diversification strategies to mitigate the impact of population growth on rice demand. Third, they suggest that import policies should be adaptive and responsive to domestic consumption trends, rather than being overly reactive to international price movements. Finally, the study contributes to the broader discourse on food economics and trade policy by offering a nuanced understanding of the interplay between domestic and global factors in shaping rice import behavior.

In conclusion, Indonesia's rice import dynamics are shaped by a complex interplay of production capacity, demographic trends, consumption behavior, and trade policy. While the country possesses significant agricultural potential, structural constraints and external shocks continue to undermine self-sufficiency efforts. By identifying and analyzing the key determinants of rice imports, this study provides a foundation for evidence-based policymaking aimed at achieving sustainable food security. The findings not only enrich the academic literature on food economics and international trade but also offer practical recommendations for policymakers seeking to balance domestic production goals with the realities of global market integration.

II. Research Methods

This study uses a quantitative approach with an associative design, which aims to identify and analyze the relationship between independent variables and bound variables in a systematic manner. According to Sihotang (2023), the quantitative approach is a scientific method that emphasizes numerical measurement and statistical analysis to explain social or economic phenomena. Meanwhile, the associative approach is used to test the cause-and-effect relationship between two or more variables, as described by Albertus et al. (2020).

The object of this study is the determinants of Indonesian rice imports, focusing on four independent variables, namely rice production (X1), international rice prices (X2), population growth (X3), and per capita expenditure of the grain-grain group (X4), as well as one bound variable, namely the volume of Indonesian rice imports (Y). This research was carried out in Indonesia using annual secondary data for the period 2000 to 2024, obtained from official sources such as the Central Statistics Agency (BPS), the Ministry of Agriculture, the Food and Agriculture Organization (FAO), and the World Bank.

The type of data used is quantitative data in the form of a time series, which reflects the dynamics of variables from year to year. According to Sugiyono (2013), quantitative data allows for objective and measurable analysis, making it suitable for testing the relationships between variables in regression models. The data source used is secondary data, namely data that has been available and collected by official institutions, as well as relevant results of previous research.

The number of observations in this study is 125, which was obtained from a combination of five variables over 25 years. The data collection method is carried out through literature studies, by accessing documents, statistical reports, and scientific publications relevant to the research topic. The data analysis technique used is multiple linear regression analysis using the Ordinary Least Square (OLS) method, which aims to measure the simultaneous and partial influence of free variables on bound variables (Ghozali, 2013).

The regression model used in this study was transformed in the form of logarithms to overcome differences in data scale and improve the interpretability of the results. According to Utama (2017), logarithmic transformations in multiple regression can help normalize data distribution and reduce heteroscedasticity. The analysis is carried out with the help of EViews software version 9, which allows comprehensive statistical testing.

To ensure the validity of the regression model, a series of classical assumption tests were performed, namely normality, multicollinearity, heteroscedasticity, and autocorrelation tests. The normality test was carried out using the Kolmogorov-Smirnov method, which aims to test whether the residual model is normally distributed (Budi et al., 2024). The multicollinearity test used the Variance Inflation Factor (VIF), with a VIF threshold of < 10 as an indicator of the absence of a high correlation between independent variables (Effiyaldi et al., 2022). Heteroscedasticity tests are performed to detect residual variance inequality, assuming that a good model must have homogeneous residual variance (Maziyya et al., 2015). Meanwhile, the autocorrelation test uses Durbin-Watson statistics, to ensure that there is no correlation between residuals over time (Cassany, 2019).

Hypothesis testing was carried out through the F test and the t test. The F test was used to test the simultaneous influence of all independent variables on the bound variables, with a significance level of 5 percent. If the value of Fcal > Ftable and the significance value < 0.05, then the model is considered significant simultaneously (Sujarweni, 2019). The t-test is used to test the partial influence of each independent variable on the bound variable. If the tcal value > the table and the significance value < 0.05, then the independent variable has a partial significant effect (Amelia et al., 2021).

With the approach and analysis techniques used, this study is expected to be able to provide a comprehensive overview of the factors that affect Indonesia's rice imports, as well as contribute to the development of national food security policies based on data and empirical analysis.

III. Results and Discussion

3.1 Research Results

3.1.1 Overview of the Indonesian Territory

Indonesia is the largest archipelago in the world located in the Southeast Asian region, between the Asian continent and Australia, and is flanked by the Indian Ocean and the Pacific Ocean. Geographically, Indonesia is located at the coordinates of 6° North Latitude to 11° South Latitude and 95° to 141° East Longitude, making it a country with a tropical climate rich in sunshine all year round (Khuluqi & Muwahid, 2023). Based on data from the Geospatial Information Agency (2025), Indonesia has a land area of 1,903,369 km² and consists of 17,508 islands, with around 6,000 inhabited islands. This strategic geographical location not only provides advantages in terms of biodiversity and natural resources, but also makes Indonesia an important route in international trade.

With a population of 281.6 million people in mid-2024 (BPS, 2024), Indonesia occupies the fourth position as the country with the largest population in the world. The majority of the population embraces Islam, which is 87.2 percent of the total population (BPS, 2024a). The system of government adopted is a presidential republic, where the head of state and head of government are held by the President and Vice President who are directly elected by the people through general elections every five years.

Indonesia's tropical climate produces two main seasons, namely the rainy season and the dry season. The dry season usually lasts from May to October, while the rainy season occurs between November to April. These climatic conditions are very supportive of the agricultural sector, especially in the production of food commodities such as rice. Rice, as the main product of the rice crop, has been a staple food of the Indonesian people for a long time, not only due to geographical and climatic factors, but also because of the traditions and culture of consumption that have been passed down from generation to generation.

As an agrarian country, Indonesia has great potential in the agricultural sector. Most of the population works in this sector, mainly as farmers. Fertile soil and a supportive climate make agriculture a leading sector in the national economy. However, challenges such as land conversion, climate change, and fluctuations in commodity prices have caused domestic rice production to not be able to fully meet national consumption needs. Therefore, the Indonesian government still relies on rice imports from other countries to maintain food availability and price stability in the domestic market (Ariyanti et al., 2024).

With a complex geographical, demographic, and climatic background, Indonesia faces major challenges in realizing sustainable food security. Therefore, an understanding of the characteristics of Indonesia's territory is important in formulating strategic policies, especially in the management of the production and distribution of major food commodities such as rice.

3.1.2 Description of Research Variables

This study aims to analyze the factors that affect rice imports in Indonesia during the period 2000 to 2024. In order to achieve this goal, this study uses five main variables, consisting of one bound variable and four independent variables. The bound variable in this study is the volume of Indonesian rice imports (Y), while the independent variables include rice production (X1), international rice prices (X2), population growth (X3), and per capita expenditure of the rice-grain group (X4).

The variable volume of rice imports (Y) is measured in units of million tons per year, which reflects the amount of rice imported by the Indonesian government to meet domestic consumption needs. This data was obtained from the Central Statistics Agency and shows quite sharp fluctuations over the past 25 years, with the highest volume recorded in 2024 at 4.51 million tons and the lowest volume in 2005 at 0.19 million tons (BPS, 2024).

Rice production (X1) is the main indicator that reflects domestic capacity to meet food needs. Measured in million tons per year, this variable shows dynamics influenced by crop area, productivity, and climatic conditions. The highest production occurred in 2017 at 42.42 million tons, while the lowest production was recorded in 2005 at 29.05 million tons (BPS, 2024). Rice production has a close relationship with import volume, where an increase in domestic production tends to reduce import demand (Dinar et al., 2023).

International rice prices (X2) are measured using the global price index published by the Food and Agriculture Organization (FAO), with a point index unit. This index reflects the average price of rice in the global market and is used to analyze the influence of world price fluctuations on import decisions. The highest index was recorded in 2008 at 139.4 points, while the lowest index occurred in 2002 at 42.6 points (FAO, 2025). Although theoretically international prices can affect import volumes, the results of the study show that this variable does not have a partially significant influence on Indonesian rice imports (Juliashar et al., 2024).

Population growth (X3) is a demographic variable measured in percent per year. This variable reflects the rate of increase in Indonesia's population from year to year, which directly affects the demand for staple food commodities such as rice. Data shows that although the growth rate tends to decrease, the population continues to increase, reaching 281.6 million people in 2024 (BPS, 2024). Population growth has a positive and significant influence on rice imports, as population increase encourages increased consumption (Ramadhan et al., 2025).

The per capita expenditure of the grain-grain group (X4) is measured in rupiah units per month and reflects people's purchasing power of rice commodities. Data shows a significant upward trend, from Rp20,344 in 2000 to Rp94,641 in 2024 (BPS, 2024). This variable is used as an indicator of effective consumption, where an increase in spending indicates an increase in demand. The results of the study show that per capita expenditure has a positive and significant influence on the volume of rice imports, because the increase in people's purchasing power is not always offset by an increase in domestic production (Putri & Kistanti, 2023).

Using these five variables, this study built a multiple linear regression model to test the simultaneous and partial influence on the volume of Indonesian rice imports. The selection of variables is based on theoretical and empirical relevance, and is supported by valid and reliable official statistical data. The description of these variables is an important basis for further analysis, in order to understand the dynamics of food security and rice trade strategies in Indonesia.

3.2 Data Analysis

The data analysis in this study was carried out to test the influence of rice production, international rice prices, population growth, and per capita expenditure on the volume of Indonesian rice imports during the period 2000 to 2024. The analysis technique used is multiple linear regression with the Ordinary Least Square (OLS) approach, which aims to measure the simultaneous and partial relationship between independent variables and bound variables (Ghozali, 2013). Before the regression test is carried out, descriptive statistical analysis and classical assumption tests are first carried out to ensure the validity of the model.

Descriptive statistics show that the average volume of Indonesian rice imports over the past 25 years is 1.14 million tons, with a maximum value of 4.51 million tons and a minimum of 0.19 million tons. Rice production averaged 35.42 million tons, with fluctuations between 29.05 million tons to 42.42 million tons. International rice prices, measured in point indexes, have an average of 94.44 points, with a high of 139.4 points and a low of 42.6 points. Population growth shows an average of 1.16 percent per year, while the per capita expenditure of the grain group has an average of Rp50,150 per month, with the highest value of Rp94,641 and the lowest of Rp20,112 (BPS, 2024; FAO, 2025).

Classical assumption tests are performed to ensure that the regression model meets the necessary statistical requirements. The normality test using the Kolmogorov-Smirnov method showed that the residual data was normally distributed with a probability value of 0.620 (Budi et al., 2024). The multicollinearity test showed that all independent variables had a Variance Inflation Factor (VIF) value below 10, so there was no indication of serious multicollinearity (Effiyaldi et al., 2022). The heteroscedasticity test yielded a probability value of F of 0.6147, which means that there is no heteroscedasticity problem (Maziyya et al., 2015). The autocorrelation test using Durbin-Watson statistics yielded a value of 1.9, which is in the range of no autocorrelation (Cassany, 2019).

Table 1. Results of Multiple Linear Analysis Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-5.186363	1.985988	-2.611478	0.0167
X1	-0.118856	0.041867	-2.838895	0.0101
X2	-0.004453	0.007915	-0.562613	0.5800
X3	5.840054	1.190958	4.903662	0.0001
X4	8.32E-05	1.56E-05	5.332012	0.0000
R-squared	0.650202	Mean dependent var		1.141080
Adjusted R-squared	0.580243	S.D. dependent var		1.072800
S.E. of regression	0.695053	Akaike info criterion		2.287199
Sum squared resid	9.661975	Schwarz criterion		2.530975
Log likelihood	-23.58999	Hannan-Quinn criter.		2.354812
F-statistic	9.293981	Durbin-Watson stat		1.899998
Prob(F-statistic)	0.000206			

Source: Secondary Data, 2024 (processed)

Based on Table 1, it is obtained that the R-square value is 0.650202. Thus, it can be concluded that the variable of Indonesian rice imports (Y) can be explained by an independent variable of 65 percent, while the remaining 35 percent is explained by variables outside the regression model. Based on the multiple linear regression analysis in Table 4.13, the following equations can be made:

And = $a + \beta 1X1 + \beta 2X2 + \beta 3X3 + \beta_{4X4}$

And = -5.186363 - 0.118856 - 0.004453 + 5.840054 + 8.32E-05

Std. = (1.985988) (0.041867) (0.007915) (1.190958) (1.56E-05)

Prob = (0.0101) (0.5800) (0.0001) (0.0000)

R2 = 0.650202

Prob = 0.000206

The results of multiple linear regression showed that simultaneously, the four independent variables had a significant effect on the volume of Indonesian rice imports, with an F-statistical value of 9.29 and a probability value of 0.0002. A determination coefficient value (R^2) of 0.65 indicates that 65 percent of the variation in rice import volume can be explained by rice production variables, international rice prices, population growth, and per capita expenditure, while the rest is influenced by other factors outside the model.

Partially, the results of the t-test showed that rice production had a negative and significant influence on rice imports, with a coefficient value of -0.118 and a probability value of 0.0101. This indicates that increasing domestic rice production will reduce the volume of rice imports, in line with demand theory and previous research results (Dinar et al., 2023; Ramadhan et al., 2025). Population growth has a positive and significant influence, with a coefficient value of 5.84 and a probability value of 0.0001, indicating that the increase in the population encourages an increase in the need for rice imports. The per capita expenditure of the grains group also had a positive and significant effect, with a coefficient value of 8.32E-05 and a probability value of 0.0000, which means that the increase in people's purchasing power also increased the volume of rice imports. In contrast, international rice prices have no statistically significant effect on rice imports, with a coefficient value of -0.004 and a probability value of 0.5800, suggesting that import decisions are more influenced by domestic demand than global price fluctuations (Juliashar et al., 2024).

Overall, the results of the data analysis show that Indonesia's food security, especially in terms of rice, is strongly influenced by domestic production dynamics, population growth, and people's consumption patterns. The implication of these results is the need for a comprehensive policy strategy to increase rice production, manage population growth, and optimize consumption so that dependence on imports can be gradually reduced.

3.3 Discussion of Research Results

3.3.1 Simultaneous Effects of Rice Production, International Rice Prices, Population Growth, and Per Capita Expenditure on Indonesian Rice Imports

Rice production, international rice prices, population growth, and per capita expenditure of the grain group simultaneously have a positive effect on Indonesia's rice imports. These results show that these four variables are not only individually affected but also simultaneously related to each other in determining the value of rice imports. This study confirms that the dynamics of national rice imports are the result of complex interactions between domestic production factors, global market conditions, and demographic structure and people's consumption patterns. In other words, changes in one or a combination of these variables will collectively affect the decision and volume of rice imports made by Indonesia.

Furthermore, the results of the analysis show that rice production has a negative and significant influence on Indonesian rice imports. This means that any substantial increase in domestic rice production will tend to reduce the colume of rice imports. This research is consistent with the efforts and goals of national food security to reduce the number of dependencies on imported rice, where adequate domestic production capacity is the main key (Wibawa et al., 2023).

On the other hand, international rice prices were identified as having no significant influence on Indonesian rice imports. This condition indicates that decisions and volumes of rice imports in Indonesia may be based more on internal factors such as domestic supply deficits and efforts to maintain price stability in the domestic market, rather than solely relying on price levels in the international market. The government's priority, through Bulog, to maintain the availability and stability of domestic prices tends to reduce the direct sensitivity of import volumes to short-term global price fluctuations (Juliashar et al., 2024).

Furthermore, the results of the study revealed that population growth has a positive and significant influence on Indonesia's rice imports. The implication is that the increase in the population directly contributes to the increase in the volume of rice imports. In line with economic theory, population growth will aggregate increase demand for staple food commodities such as rice. When consumption needs due to population growth cannot be fully met by domestic production, imports will be a strategic option in closing the gap in order to maintain food availability and social stability (Tambunan et al., 2024).

Finally, the analysis shows that the per capita expenditure of the grain group also has a positive and significant influence on Indonesia's rice imports. This means that an increase in purchasing power or the allocation of public expenditure for rice commodities, especially rice, will tend to increase the need for rice imports. This increase in expenditure reflects the increase in effective public demand for rice. If people have greater financial capacity to buy rice, aggregate demand will increase, and if it is not offset by domestic production, then the pressure to carry out imports will be greater (Putri & Kistanti, 2023).

Simultaneously, this research model has an R-square value of 65 percent, which shows that the variables of rice production, international rice prices, population growth, and per capita expenditure of the grain group together are able to explain 65 percent of the variation in the value of Indonesian rice imports. The remaining 35 percent is explained by other factors that were not included in the research model. This figure confirms that the model built is quite powerful in predicting and explaining the dynamics of Indonesian rice imports based on the variables studied.

3.3.2 Influence of Rice Production, International Rice Prices, Population Growth, and Partial Per Capita Expenditure on Indonesian Rice Imports

1) The Effect of Rice Production (X1) on Rice Imports (Y)

Rice production in general is the basis for determining domestic rice prices and the implementation of rice imports for domestic food needs. Based on data from the Central Statistics Agency from 2000-2024, rice production is experiencing a fluctuating phase that tends to increase from the beginning to the end of the research period. However, the increase does not mean that domestic food sufficiency is guaranteed so that Indonesia is free to implement imports.

The hypothesis in this study states that rice production has a partial negative effect on Indonesian rice imports. The results of the test are in accordance with the hypothesis that domestic rice production shows negative and significant results on rice imports carried out by Indonesia. The rice production coefficient is -0.119. Based on this coefficient, every 1 million tons of rice production will have an impact on reducing the volume of rice imports by 0.119 million tons. This indicates that the variables of Indonesian rice production have a strong influence on Indonesian rice imports.

This result is certainly in line with the theory of demand law, which when the demand for rice in the country increases, which means that the quantity and demand for domestic rice food is quite large if not balanced with the same production, it will have a direct impact on domestic food prices (Wibawa et al., 2023). To prevent a sharp spike in rice prices and as a form of the government's efforts to meet the food needs of the community, the implementation of imports is appropriately carried out to maintain price stability and meet the quantity of domestic rice food needs. In addition, the theory of comparative advantage also plays a role in the implementation of Indonesian rice imports, because Indonesia has not been able to achieve stable production due to high relative costs, rice imports can be the best solution in meeting domestic needs (Nopirin, 2018).

Theoretically, the results of this study can be explained through the theory of comparative advantage, in which according to Ricardo a country will export goods that can be produced at a relatively lower cost than other countries. In this context, Indonesia does not have a comparative advantage of domestic rice production, so compared to strengthening production that requires high relative costs, to get around this, the government carries out imports to meet the food needs of the community. Meanwhile, the Heckscher-Ohlin (H-O) theory explains that a country will export goods produced depending on the abundant production factors in that country. Indonesia, which has not been able to meet domestic needs due to many external factors such as weather, land conversion, and a decrease in harvest area, causes Indonesia to tend to be unable to strengthen exports compared to imports. So with this, Indonesia is required to import rice from countries that have abundant agriculture, especially in rice production to maintain the stability of domestic food prices. Thus, the results of this study are in line with international trade theory which emphasizes that trade occurs due to domestic needs that require wider market access, increase resource allocation and maintain the stability of food reserves and domestic prices (Wibowo, 2024).

In addition, this research is certainly in line with the research carried out by Dinar et al., (2023) which researched the Analysis of Factors Affecting Indonesian Rice Imports, the results of the research conducted showed that rice production has a significant negative effect on Indonesian rice imports. This result is certainly in line with the research carried out by I. Ramadhan et al., (2025) entitled Why Indonesia Should Import Rice in the Midst of Self-Sufficiency Efforts, with the partial result that rice production variables have a negative and significant effect on Indonesian rice imports.

2) The Effect of International Rice Prices (X2) on Rice Imports (Y)

International rice prices are one of the crucial factors that affect the volume of rice imports, assuming that the increase in global prices will suppress a country's desire to import and vice versa. This study tested the hypothesis that international rice prices have a partial negative effect on Indonesian rice imports. However, the results of the regression test show that international rice prices do not have a statistically significant influence on Indonesian rice imports. This means that price fluctuations in the global market are not the main or direct determining factor in the volume of rice imports carried out by Indonesia.

The hypothesis in this study states that international rice prices have a partial negative effect on Indonesian rice imports. The results of the test are not in accordance with the hypothesis that domestic international rice prices show insignificant results on rice imports carried out by Indonesia. The international rice price coefficient is -0.004. The interpretation of the coefficient is that every increase of 1 point in the international rice price index will have an impact on reducing the volume of rice imports by 0.004 million tons. With the insignificance of this variable, it means that international rice prices have not been able to strongly affect Indonesian rice imports.

The insignificance of the influence of international rice prices can be represented from several perspectives related to Indonesia's domestic food policy. As a country with rice as a very strategic staple food, the decision and volume of rice imports by the Indonesian government, through Perum Bulog, tends to be based more on

the urgency of meeting domestic food needs and stabilizing prices in the domestic market (Rizky, 2023). The top priority is to ensure the availability of supply to prevent scarcity and price volatility that can trigger inflation and social instability, even if it means importing at economically unfavorable global price conditions. Thus, domestic demand that is not met by domestic production is the main driver of imports, going beyond price sensitivity considerations in the international market. The existence of government intervention mechanisms and the management of strategic rice reserves can also dampen the direct transmission of international price influences into import volumes, making imports more of a short-term supply stabilization instrument than a purely response to global market price dynamics (Mutiasari & Indrajaya, 2019).

Theoretically, the results of this study can be explained through the concept of inelastic demand for prices for basic commodities in the context of state policy. Although the Law of Demand generally affirms a negative relationship between price and quantity demanded, in the case of strategic commodities managed by the state, non-price factors often play a more dominant role. The concept of national food security and price stabilization function can modify the response of imports to international price changes (Mankiw, 2016). When the main goal is to maintain domestic supply and price stability, governments may be willing to pay higher prices in global markets to prevent a domestic food crisis. It is also in line with international trade theory which emphasizes that trade occurs due to urgent domestic needs, encouraging countries to access global markets in order to maintain the stability of food reserves and domestic prices (I. Ramadhan et al., 2025).

Moreover, these findings are consistent with some previous studies. For example, research conducted by Rai and Wibowo (2020) on *the Analysis Relationship of Imported Rice with Rice Production, Imported and Domestic Rice Prices with VECM*, also found that international rice prices do not have a significant effect on Indonesian rice imports both in the short and long term. This result is also in line with the research carried out by Juliashar et al., (2024) entitled The Effect of Rice Imports from Thailand and Vietnam on the Stability of Rice Prices in Indonesia, with partial results showing that international rice price variables do not have a significant effect on Indonesian rice imports with one of them being caused by the uncertainty of import policies, on the other hand international rice prices tend to increase every year but this is not the case affect Indonesia's rice imports significantly as a result of relatively stable domestic rice demand even though rice supply is responsive to external factors. The consistency of these findings from various studies strengthens the argument that in the case of Indonesia, the urgent need for domestic supply and efforts to maintain price stability at the consumer level often dominate rice import decisions, making international price variables statistically less significant.

3) Effect of Population Growth (X3) on Rice Imports (Y)

Population growth is one of the fundamental demographic factors that directly affects the total demand for staple commodities, including rice. As the population grows, the need for food consumption in aggregate will also increase, potentially creating pressure on domestic supply and boosting import demand. This study tested the hypothesis that population growth has a partial positive effect on Indonesian rice imports. The results of the regression test confirmed this hypothesis, showing that population growth has a positive and statistically significant influence on Indonesia's rice imports.

The hypothesis in this study states that population growth has a partial positive effect on Indonesia's rice imports. The results of the test are in accordance with the hypothesis, that population growth shows positive and significant results for rice imports carried out by Indonesia. The population growth coefficient is 5,840. The interpretation of the coefficient is that every 1 percent increase in population growth will have an impact on increasing the volume of rice imports by 5.840 million tons. This indicates that the variable of Indonesia's population growth has a strong influence on Indonesian rice imports.

These findings indicate that any substantial increase in population will contribute to an increase in the volume of rice imports. As a country with a large and growing population, the significant rate of population growth directly enlarges the national rice consumer base. Despite efforts to increase domestic production, the consistent pace of population growth creates constant pressure on the ability of domestic supply to meet all needs. When production is unable to keep pace with the growth in demand driven by population growth, imports become an important mechanism to close supply gaps, maintain food availability, and prevent price fluctuations and scarcity in the domestic market (Dinar et al., 2023).

Theoretically, the results of this study are very much in line with Demand Theory and Engel Theory. According to the Demand Theory, an increase in the number of consumers (due to population growth) will shift the demand curve to the right, which indicates an increase in the quantity demanded at each price level. Assuming domestic production is unable to respond proportionately, the gap between domestic demand and supply will widen, thus driving the need for imports. In addition, Engel's theory states that although the proportion of expenditure on food tends to decrease as income increases, the absolute need for food will continue to increase as the number of household members or the population as a whole increases. In this context, population growth directly drives an increase in the need for rice as a staple food, regardless of the level of per capita income. In relation to the theory of international trade, although it does not directly explain the mechanism of the influence of population growth on imports, this phenomenon can be seen as a general driver for a country to engage in trade (imports) in order to meet domestic needs that exceed domestic production capacity, a principle underlying various trade theories.

In addition, the findings of this study are consistent with several previous studies that examined the relationship between demographics and food imports. For example, a study conducted by Dinar et al., (2023) on the Analysis of Factors Affecting Rice Imports in Indonesia, also found that population growth has a positive and significant effect on Indonesia's rice imports. This result is also in line with the research carried out by Ramadhan et al., (2025) entitled Why Indonesia Still Has to Import Rice in the Midst of Swamada Efforts, with partial results showing that population growth variables have a positive and significant effect on Indonesian rice imports. The consistency of these findings from various studies strengthens the argument that population growth is a major driver of aggregate demand that is constantly depressing domestic rice supplies, thus making imports one of the inevitable solutions to maintain national food availability.

4) The Effect of Per Capita Expenditure (X4) on Rice Imports (Y)

Per capita expenditure on staple commodities such as grains is often assumed to have a complex relationship with import volumes. The hypothesis of this study states that per capita expenditure will have a partial negative effect on Indonesia's rice imports, assuming that the increase in people's purchasing power may reflect increased access to domestic production or diversification of consumption. However, the results of the regression test actually show that the per capita expenditure of the grain group has a positive and statistically significant influence on Indonesian rice imports. These findings indicate that any increase in individual average expenditure for the grain group actually contributes to an increase in the volume of rice imports.

The hypothesis in this study states that the per capita expenditure of the grain group has a partial negative effect on Indonesia's rice imports. The results of the test are not in accordance with the hypothesis that per capita expenditure shows positive and significant results on rice imports carried out by Indonesia. The coefficient of expenditure per capita is 0.00008323. The interpretation of the coefficient is that every 10 thousand increase in expenditure per capita will have an impact on increasing the volume of rice imports by 8.323 million tons. This indicates that Indonesia's per capita expenditure variable has a strong influence on Indonesia's rice imports.

The results that are contrary to this hypothesis can be interpreted as that the increase in per capita expenditure on grains reflects an increase in the purchasing power and effective demand of the people for rice, the increase of which is not fully able to be met by domestic production. In the context of Indonesia as a developing country, an increase in income is often followed by an increase in the consumption of staple foods such as rice, rather than immediately followed by significant diversification or a decrease in dependence. As a commodity *normal good* (or even *superior good* at a certain income level), when people have more money to spend on food, the portion of spending on rice can increase absolutely. If this increase in consumption exceeds the supply capacity of domestic production, the supply gap will widen, and imports become the solution to maintain domestic availability and price stability (Puspita & Agustina, 2019).

Theoretically, these findings are highly relevant to Demand Theory and Engel Theory. According to Demand Theory, an increase in income (which is reflected in an increase in per capita expenditure) will shift the demand curve to the right, signaling an increase in the quantity demanded at each price level, especially for normal goods. In the context of rice as a staple food, an increase in individual purchasing power will collectively increase the demand for national aggregates. Moreover, these results are in line with the implication of Engel's

theory which states that although the proportion of spending on food may decrease as income increases, the absolute amount of money spent on food will still increase as per capita income or expenditure increases. For countries with large populations and economic growth, this means that absolute rice consumption will tend to increase.

In relation to international trade theory, this result can be explained through the principle of unmet domestic needs. Although theories such as Comparative Advantage and Heckscher-Ohlin (H-O) emphasize specialization and cost efficiency, the reality is that a country will import goods if its domestic needs (driven by per capita consumption) exceed efficient or adequate production capabilities. In the case of Indonesia, the high per capita expenditure on rice reflects strong demand, which if not offset by stable and efficient local production, will encourage involvement in international trade (imports) to maintain the stability of food reserves and domestic prices. This reflects that trade occurs not only because of differences in the cost of production, but also because of the existence of essential domestic needs that must be met, in line with the basic principle that trade serves as wider market access to sustain domestic consumption needs.

In addition, these findings are consistent with several previous studies that examined the relationship between per capita expenditure and food imports. For example, a study conducted by Sugiyanto (2006) on Rice Demand in Indonesia: *Revisited*, also found that an increase in income or per capita expenditure has a positive and significant effect on the import of staple food commodities when juxtaposed with income but on the contrary will have a negative effect if it is associated with prices. These results are also in line with the research carried out by Putri and Kristianti (2023) entitled Determinants of Rice Imports in Indonesia in 1984-2022, with partial results showing that the per capita expenditure variable is positively correlated with Indonesian rice imports but not significant in the short term but on the contrary in the long term which provides positive and significant results. The consistency of these findings from various studies reinforces the argument that the improvement in welfare reflected in per capita spending, if not balanced with adequate production growth, will directly depress domestic supply and drive the need for rice imports.

IV. Conclusions and Suggestions

Conclusion

Based on the results of the analysis and discussion, the following conclusions can be drawn:

1) The results of the study show that rice production, international rice prices, population growth, and per capita expenditure simultaneously have a statistically significant effect on Indonesia's rice imports.

2) The results of the study show that the variable of rice production partially has a negative and significant effect, population growth and per capita expenditure partially have a positive and significant effect, while international rice prices are partially insignificant to Indonesian rice imports.

Suggestions

Based on the results of the analysis of the conclusions that have been described, the following suggestions can be proposed:

1) It is necessary to optimize the rice import strategy by considering public consumption patterns and domestic rice production, so that it can adjust import figures and trade policies more adaptively.

2) The level of domestic rice production is one of the indicators that greatly affects the implementation of imports. The government should be able to consider the quality and quantity produced domestically by providing intensive support to farmers or workers in the agricultural sector to develop, procure fertilizers and seeds, as well as counseling on technology in increasing rice harvest.

3) Rice has fluctuating prices due to demand in the market. This is also what causes the high price of domestic rice, imports are still carried out in fulfillment of domestic food reserves and price stabilization so that producers and consumers get the same rights.

4) The increase in the population every year will have an impact on the consumption of rice as a staple food. Based on this, Indonesia should prepare adaptation strategies such as food diversification so that people's consumption needs can be met.

5) The government should be able to strengthen bilateral cooperation with countries of origin of imports to find solutions from low domestic production to high demand, especially in encouraging better production.

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