

DETERMINANTS OF INDONESIA'S WHEAT IMPORTS

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Received : 9 January 2024

Accepted : 1 February 2024

Published : 30 March 2024

ABSTRACT

Indonesia's wheat imports have consistently increased each year, driven by the growing population and demand for various wheat derivative products. Consequently, Indonesia has become the world's largest wheat importer in 2021. This study aims to determine the determinant factors of Indonesia's wheat imports during the 1990-2021 period. The data used in this study is time series data of 32 years from 1990 to 2021, which consists of annual data on the Indonesian wheat import volume, GNI, wheat consumption, rice consumption, exchange rate value, interest rate, domestic rice production, wheat price, rice price and wheat flour import tariff agreement. The data was processed using Eviews 9 with multiple linear regression models using the Ordinary Least Square (OLS) method. The regression results showed that GNI, wheat consumption, rice consumption and the exchange rate had positive impacts on the Indonesian wheat import volume during 1990-2021, while domestic rice production had negative impacts. On the other hand, interest rate, wheat price, rice price and wheat flour import tariff agreement have no significant effect on Indonesian wheat import volume.

Keywords: factors, import, Indonesian, trend, wheat

INTRODUCTION

The increasing population in Indonesia presents the great challenges in meeting the consumption needs of the community, particularly in the food sector. Wheat flour, derived from wheat plants, is one of the most popular food choices in Indonesia due to high nutritional content, taste good, and the processing process is relatively easier and more practical so that it is favored by all groups. However, the wheat plant is not native to Indonesia, so to meet the needs of the community, imports from other countries are needed, including Australia, Canada, Ukraine, Argentina and the United States.

Import is the activity of bringing in goods or services from other countries. A country will import when the conditions in the country do not have the ability to produce goods or services themselves (Utomo, 2015). High imports can cause several problems for the country, including dependence on imported commodities, reducing foreign exchange because it is used to pay import payment transactions, imported commodities will fill the domestic market at competitive prices so that it can reduce domestic productivity, and cause price uncertainty for farmers.

Indonesia is the world's largest wheat importer in 2021 with an import volume of 11.48 million tonnes, equivalent to \$3.5 billion, followed by other wheat importing countries, such as China, Nigeria, Turkey and Egypt. The total world wheat production in 2021 was 780 million tonnes (UN Comtrade, 2022). In 2021, Australia was the largest exporter of wheat to Indonesia, with an export volume of 4.7 million tonnes.

The proximity of Australia and Indonesia makes it easier to distribute wheat in both countries, which can influence the amount of imports from Australia (Utomo, 2015). Furthermore, the Indonesia-Australia Comprehensive Economic Partnership Agreement (IA-CEPA) designates Indonesia as the primary destination for Australian wheat exports (Nurhalimah & Pazli, 2019). Meanwhile, the second exporter of Indonesian wheat is Ukraine (3 million tonnes), which according to Prabawaty (2019), Ukraine's wheat production has grown rapidly because it is supported by climatic conditions suitable for wheat production so that it has a lower price compared to other Indonesian wheat supply countries.

The volume of Indonesia's wheat imports, which always increases every year, encourages

research on the factors that influence the increase in wheat imports in Indonesia. The results of this study can also be used as future reference material for the government and other stakeholders in determining appropriate policies regarding international trade, particularly wheat imports in Indonesia

METHOD

This study used secondary data in the form of time series data from 1990 to 2021. The data used consists of annual data on Indonesia's wheat import volume, GNI, wheat consumption, rice consumption, exchange rates, interest rates, domestic rice production, wheat prices, rice prices, and wheat import duty policies. In this study, there is an assumption that the wheat used in this study has HS code 1001 in the form of seeds and grains, both from durum wheat and other wheat, as well as meslin (wheat flour). The quality and type of wheat in this study are assumed to be the same.

The data used in this study were obtained and collected from various sources, including the websites of UN Comtrade (<https://comtradeplus.un.org/>), Food and Agriculture Organization (FAO) (<https://fao.org/faostat/en/#home>), World Bank (<https://data.worldbank.org/>), Central Bureau of Statistics (BPS) (<https://www.bps.go.id/>), Ministry of Finance of the Republic of Indonesia, and International Monetary Fund (IMF) (<https://data.imf.org>). In addition, the analytical tools used to process the data are EViews 9 and SPSS 25.

To find out the factors affecting Indonesia's wheat imports, we can use a multiple linear regression equation whose parameter estimation uses the Ordinary Least Square (OLS) method. The dependent variable in this research model is the volume of Indonesia's wheat imports, while the independent variables in this model consist of GNI, wheat consumption, rice consumption, exchange rate, interest rate, domestic rice production, wheat price, rice price, and wheat import duty policy. The equation form is as follows:

$$Y_2 = \beta + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \alpha_1 D_1 + e$$

Description:

Y_2 : Indonesia's wheat import volume (tonnes)

β : intercept/constant

$\alpha_1, \beta_1 - \beta_7$: regression coefficients

X_1 : GNI (US\$)

X_2 : wheat consumption (kg/capita/year)

X_3 : rice consumption (kg/capita/year)

X_4 : exchange rate (Rp)

X_5 : interest rate (%)

X_6 : domestic rice production (tonnes)

X_7 : wheat price (US\$/ton)

X_8 : rice price (US\$/ton)

D_1 : policy enactment dummy import duties on flour

0 = no policy applied import duties on flour

1 = duty policy in place wheat import entry

e : error term

Furthermore, to see the Goodness of Fit (suitability test) of the hypothesis, it is necessary to test the accuracy of the model consisting of the coefficient of determination test (R^2), simultaneous test (F test), and partial test (t test). The coefficient of determination (Adjusted R^2) is used to measure the ability of the regression model to explain the dependent variable. The adjusted coefficient of determination (Adjusted R^2) is better to use than the usual coefficient of determination (R^2) in multiple linear regression because it has been adjusted to the degree of freedom of the prediction equation. The F-statistic test is a test used to determine the relationship between all independent variables on the dependent variable simultaneously or together is significant or not. The t-statistic test is a partial test used to determine the relationship between the independent variables individually on the dependent variable whether significant or not (Gujarati, 2004).

RESULTS AND DISCUSSION

Wheat Importer

The prospect of wheat farming in Indonesia is considered less promising due to the lack of availability of land that has agro-climatic properties suitable for wheat plants. Wheat cultivation on lowland rice fields cannot be done because of the high daily temperature for plant growth. Meanwhile, mountain slopes or highlands with altitudes above 750 m above sea level have generally been utilized for the cultivation of vegetable crops that have higher economic value than wheat (Praptana & Hermanto, 2016).

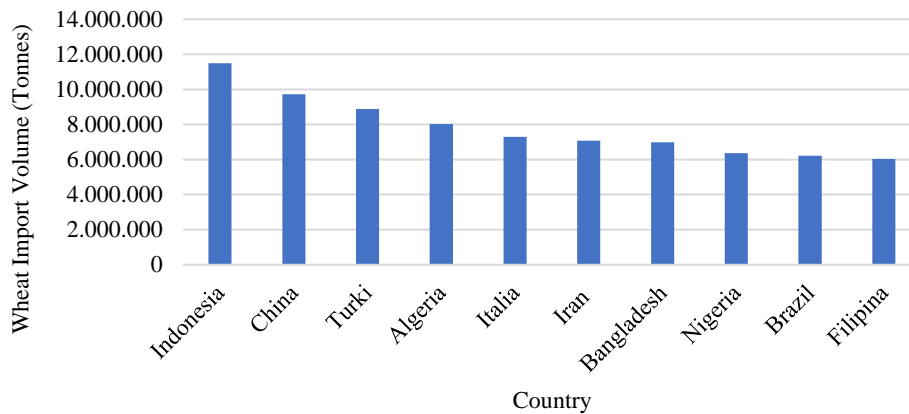


Figure 1. World's Largest Wheat Importers in 2021
Source: FAOSTAT, 2023

Based on Figure 1, it can be seen that the largest importer of world wheat is dominated by countries from the Asian continent. The lack of development of domestic wheat production has caused Indonesia to become the largest wheat importer among all countries in the world. Indonesia's wheat import volume in 2021 was 11,481,353.42 tons. This also causes wheat to be the most imported commodity in Indonesia in 2021.

According to Altuhaish et al. (2014), one of the wheat cultivation experiments in West Java Province was conducted in the lowlands of Bogor with an altitude of 176 m above sea level and a temperature of 29.8°C and in the highlands of Cianjur with an altitude of 1,100 m above sea

level and a temperature of 20.6°C from July to November 2012. The results showed that planting at low altitude with a hotter environment greatly affects growth and can reduce production yields. Therefore, domestic wheat production is considered less superior due to the difficulty of fulfilling wheat production factors so that imports are made because domestic wheat cannot compete with imported wheat, both in terms of price, quality and quantity.

Trend of Indonesia Wheat Import Volume

The fluctuation of Indonesia wheat import volume can be seen using trend analysis. The development trend can be seen in Figure 2 below.

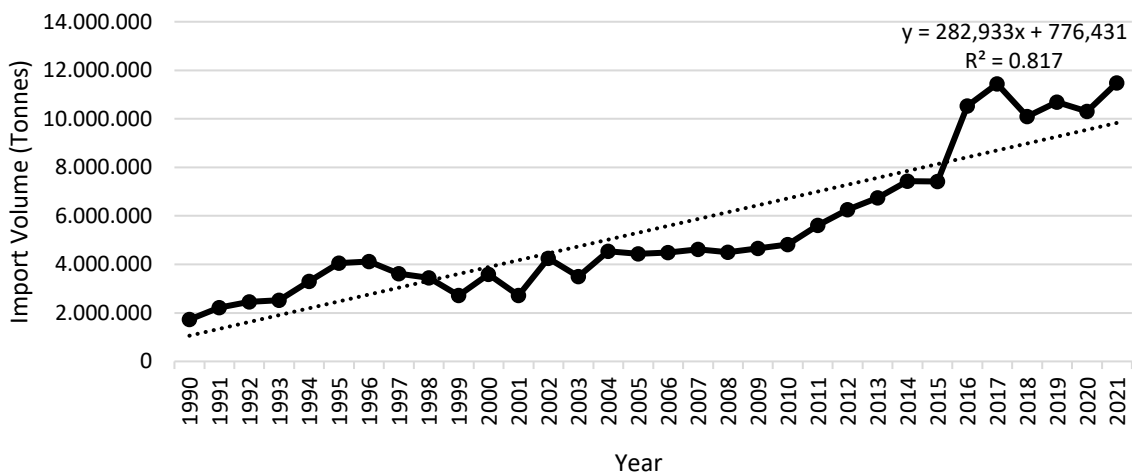


Figure 2. Trend Analysis of the Development of Indonesia's Wheat Imports
Source: UN Comtrade, 2022

Based on Figure 2, it can be seen that Indonesia's wheat import volume for 32 years (1990-2021) has fluctuated with an increasing trend. This shows that from year to year, Indonesia continues to import wheat to meet the

food needs of the community with the volume of Indonesia's wheat imports increases by 282,932.72 tons each year. Figure 2 also shows that Indonesia's wheat import volume jumped sharply in 2015-2016 by 42% and the highest

import volume occurred in 2021 (11.48 million tons).

Wright & Meylinah (2016) stated that the surge in wheat imports in 2015 - 2016 occurred due to an increase in wheat demand by the wheat flour industry in Indonesia as well as El Nino which caused a decrease in Indonesia's corn production and was exacerbated by restrictions on corn imports. This caused wheat imports to increase sharply as a result of wheat being a substitute for corn in the feed sector.

Meanwhile, according to Meylinah (2022), Indonesia's high wheat imports in 2021 can be influenced by the increase in wheat flour consumption per capita due to the trend of people's diet who like to consume bread, pizza, pasta, and instant noodles. The decline in Covid-19 cases and the recovery of economic activity also caused the demand for wheat-based foods to

increase. In addition, the substitution of corn to wheat as a feed ingredient due to the increase in international corn prices and restrictions on corn imports by Bulog also increased the volume of wheat imports in Indonesia.

Determinant Factors of Indonesia's Wheat Import Volume

The regression model that has avoided various classical assumption problems is then analyzed to prove the hypothesis and the accuracy of the model related to the determinants of Indonesia's wheat imports. To obtain the best significance results, the significance level (α) is used with a range of 1%, 5%, and 10%. The results of the multiple linear regression analysis of the determinants of Indonesia's wheat imports from 1990 to 2021 are shown in table 5 below

Table 5. Regression Analysis Results of Determinants of Indonesia's Wheat Imports Year 1990-2021

Variabel	Expected Sign	Coefficient	Std. Error	t-count	Probability.
Constant	+	8,130,130.60 ***	2,590,902.97	3.14	0.00
GNI	+	2.34E-06 *	1.22E-06	1.92	0.07
Wheat Consumption	+	199,477.19 ***	33,110.45	6.02	0.00
Rice Consumption	-	17,637.13 *	10,177.44	1.73	0.09
Exchange Rates	-	148.10 ***	44.90	3.30	0.00
Interest Rate	-	-26,304.61 ns	20,671.24	-1.27	0.22
Domestic Rice Production	-	-0.24 ***	0.04	-5.55	0.00
Wheat Price	-	1,305.64 ns	3,792.28	0.34	0.73
Rice Price	+	1,519.83 ns	2,697.50	0.56	0.58
Wheat Flour Policy Dummy	+	479,093.94 ns	301,168.53	1.59	0.13
R-squared					0.98
Adjusted R-squared					0.97
F-statistic					112.93
Prob(F-statistic)					0.00

Source: Secondary Data Analysis (2023)

Description:

- * Significant at 10% error rate
- ** Significant at 5% error rate
- *** Significant at 1% error rate
- Ns Not significant

Based on table 5, it can be seen that the regression model used has the following equation

$$Y_2 = 8,130,130.60 + 2.34E-06X_1 + 199,477.19X_2 + 17,637.13X_3 + 148.10X_4 - 26,304.61X_5 - 0.24X_6 + 1,305.64X_7 + 1,519.83X_8 + 479,093.94D_1 + e$$

where the volume of Indonesia's wheat imports in 1990-2021 (dependent variable) is influenced by the variables of GNI, wheat consumption, rice consumption, exchange rate, interest rate, domestic rice production, wheat

price, rice price, and wheat import duty policy (independent variable).

The multiple linear regression (OLS) results of the above model are known to have a coefficient of determination (Adjusted R²) of 0.97, which means that 97% of the variation in the dependent variable can be explained by the independent variables in the regression model used. Meanwhile, 3% of the variation in the dependent variable is explained by other variables outside the regression model used.

The results of multiple linear regression analysis in table 5 are also used to calculate the F-

test. In table 5, it can be seen that the F-statistic value is 112.93 and probability of the F-statistic value is 0.00. This means that the independent variables affect the dependent variable simultaneously because the probability of F-statistic value is smaller than the significance level ($\alpha = 1\%$).

The next test that can be known from the multiple linear regression results in table 5 is the T test. Based on table 5, it can be seen that the constant has the coefficient value 8,130,130.60, which means that the minimum import volume of Indonesian wheat assuming all independent variables are fixed or no change during the period 1990-2021 is 8,130,130.60 tons.

GNI

Based on table 5, it can be seen that the GNI variable has a probability of t-statistic value 0.07 which is smaller than α (10%), causing this variable have a significant effect on the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This is in accordance with the hypothesis that the GNI variable has a significant effect on the volume of Indonesia's wheat imports. The GNI variable also has a regression coefficient of 2.34E-06 or 0.00000234 which means that an increase in GNI of US\$1 will increase the volume of Indonesia's wheat imports by 0.00000234 tons or 2.34 grams.

The results of the analysis are in line with the research of Pradeksa et al. (2014) which states that the national income variable has a positive and significant effect on the volume of Indonesia's wheat imports. This is because the ability of consumers to consume an item is influenced by their income. With income, people's purchasing power can increase so that the demand for an item will also increase. That way, the increasing of Indonesian people in consuming processed wheat products must be accompanied by an increase in domestic income to compensate for Indonesia's wheat imports which have increased every year.

Wheat Consumption

Based on table 5, it can be seen that the wheat consumption variable has a probability of t-statistic value 0.00 which is smaller than α (1%), causing this variable to have a significant effect on the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This is in accordance with the hypothesis that the wheat consumption variable has a significant effect on the volume of Indonesia's wheat imports. Wheat consumption variable also has a regression coefficient of 199,477.19 which means that an increase in wheat consumption by 1 kg/capita/year will increase the

volume of Indonesia's wheat imports by 199,477.19 tons.

The results of the analysis are in line with research by Utomo (2015) which states that wheat consumption has a positive and significant effect on wheat imports. This is due to an increase in the consumption of processed wheat products by Indonesians, especially noodles, making Indonesia the second largest country after China in terms of instant noodle consumption in the world, thus increasing the volume of Indonesia's wheat imports. However, the high consumption of wheat in Indonesia can create several positive impacts, such as the absorption of labor to produce processed wheat products that are popular with the public and the emergence of foreign investment in industries engaged in wheat so as to improve the Indonesian economy.

Rice Consumption

From the data in Table 5, the rice consumption variable has a probability of t-statistic value 0.09 which is smaller than α (10%), causing this variable to significantly affect the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This is in accordance with the hypothesis that the rice consumption variable has a significant effect on the volume of Indonesia's wheat imports. The rice consumption variable also has a regression coefficient of 17,637.13 which means that an increase in rice consumption by 1 kg/capita/year will increase the volume of Indonesia's wheat imports by 17,637.13 tons.

The results of the analysis are in accordance with the research of Sari & Ayuningsasi (2020), which states that although rice is still the staple food of most Indonesians, wheat consumption has also increased because both have nutritional and carbohydrate content so that they can replace each other. In addition, wheat and rice can also be reached and consumed by all groups so that consumption of both is very high in Indonesia. Therefore, it is necessary to introduce diversification of food originating from Indonesia so that the population is not dependent on the consumption of rice and wheat, as well as being a help in times of rising food prices.

Exchange Rates

The exchange rate variable in Table 5 has a probability of t-statistic value 0.00 which is smaller than α (1%) so that the exchange rate variable has a significant effect on the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This is in accordance with the hypothesis that the exchange rate variable has a significant effect on the volume of Indonesia's wheat imports. The

exchange rate variable also has a regression coefficient of 148.10, which means that the weakening of the rupiah by Rp1 will increase the volume of Indonesia's wheat imports by 148.10 tons.

The results of this analysis are similar to the results of research by Utomo (2015) which states that the weakening of the rupiah exchange rate caused an increase in the volume of Indonesia's wheat imports. This is due to the Indonesian people who cannot be separated from wheat-based food products so that the volume of wheat continues to increase, despite the weakening rupiah. For this reason, the government provided several interventions to protect the domestic wheat flour industry from the effects of the weakening rupiah, such as setting lower wheat prices and increasing wheat flour prices. In addition, according to Ichwani et al. (2017), the way to keep the exchange rate ideal and stable can be done with the tax amnesty program as enacted in 2016 which has an impact on the price of goods to be better and normal. As a result, many investors invested back into Indonesia, making the rupiah value strengthen again.

Interest Rates

Based on table 5, it can be seen that the interest rate variable has a probability of t-statistic value 0.22 which is greater than α (10%) so that the interest rate variable does not significantly affect the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This is not in accordance with the hypothesis which states that the interest rate variable has a significant effect on the volume of Indonesia's wheat imports. In addition, the interest rate variable also has a regression coefficient of -26,304.61, which means that a 1% increase in interest rates will reduce the volume of Indonesia's wheat imports by -26,304.61 tons.

The results of this analysis are in accordance with the research of Malik & Nainggolan (2020) which states that macroeconomic conditions, such as interest rates, can have an insignificant effect on import volume. This is because these variables statistically have no direct effect on imports, both in terms of production and consumption. In addition, interest rates can negatively affect the volume of imports in accordance with the results of research by Kartikasari & Khoirudin (2022) which states that interest rates have an impact on people's purchasing power because when interest rates increase, people will prefer to save their money and reduce consumption, and vice versa, so that it will have an impact on imports made by Indonesia. Therefore, in order for economic

activities to run smoothly, Bank Indonesia must be able to maintain interest rates so that they are not too high or low because they can have an impact on people's welfare.

Domestic Rice Production

The domestic rice production variable in Table 5 has a probability of t-statistic value 0.00 which is smaller than α (1%) so that the domestic rice production variable has a significant effect on the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This is in accordance with the hypothesis that the domestic rice production variable has a significant effect on the volume of Indonesia's wheat imports. The domestic rice production variable also has a regression coefficient of -0.24, which means that an increase in domestic rice production by 1 ton will reduce the volume of Indonesia's wheat imports by 0.24 tons.

The results of the analysis of the increase in domestic rice production variables that significantly reduce the volume of wheat imports are in accordance with the opinion of Pradeksa et al. (2014) which states that the rice commodity is a substitute for wheat. This causes wheat and rice to have their respective needs in society. Although the current consumption pattern of the community has changed to processed wheat food because of its practicality, the need for rice is still high and rice is still the staple food of the Indonesian people. Therefore, the increase in domestic rice production has a negative effect on Indonesia's wheat import volume. Thus, there is a need for strict regulations to reduce the conversion of productive agricultural land because the need for public food is very high so that the reduction of productive land will reduce rice production in Indonesia and have an impact on increasing imports.

Wheat Price

The wheat price variable based on table 5 has a probability of t-statistic value 0.73 which is greater than α (1%), causing this variable to have no significant effect on the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This is not in accordance with the hypothesis that the wheat price variable has a significant effect on the volume of Indonesia's wheat imports. The wheat price variable also has a regression coefficient of 1,305.64 which means that an increase in wheat price by US\$1/ton will increase the volume of Indonesia's wheat imports by 1,305.64 tons.

The results of this wheat price analysis are in accordance with the research of Pradeksa et al. (2014) which states that international wheat prices

have a positive relationship with the volume of Indonesia's wheat imports. Wheat prices have a tendency to increase every year, as well as Indonesia's wheat demand due to increased consumption of processed wheat products. This causes Indonesia to continue to import wheat from the country in high volumes because Indonesia cannot produce its own wheat. In addition, the existence of low import taxes (0% for wheat grains and 10% for wheat flour) causes importers to benefit when importing wheat into Indonesia. Meanwhile, according to Jin & Koo (2003) who stated that the price variable is insignificant because importers are generally not so affected by price movements when the demand for wheat is high so that to meet the needs of the community, Indonesia continues to import wheat even though the price has increased. Therefore, Indonesia needs to establish good relations with all countries, especially wheat exporting countries, so that when there is an increase in prices or scarcity of wheat in one country, Indonesia can still import from other countries to meet the needs of the community.

Rice Price

The rice price variable in Table 5 has a probability of t-statistic value 0.58 which is greater than α (1%), causing this variable to have no significant effect on the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This is not in line with the hypothesis that the rice price variable has a significant effect on the volume of Indonesia's wheat imports. The rice price variable also has a regression coefficient of 1,519.83 which means that an increase in rice price by US\$1/ton will increase the volume of Indonesia's wheat imports by 1,519.83 tons.

The results of this analysis are similar to the research of Sari & Ayuningsasi (2020) which states that rice prices have a positive and insignificant relationship with Indonesia's wheat import volume. This is because people have different preferences regarding the consumption of rice and wheat so that even if the price of rice increases, the volume of Indonesia's wheat imports will also increase. Meanwhile, this variable is not significant due to other independent variables that have a stronger influence on the volume of Indonesia's wheat imports so that an increase in rice prices does not have a direct effect on reducing the volume of Indonesia's wheat imports. Therefore, from the results of this analysis, it can be seen that food diversification is considered to be a help to the community when there is an increase in food prices. This makes the introduction of food

substitutes for wheat and rice need to be increased again.

Wheat Flour Policy Dummy

Based on table 5, it is also known that the wheat import duty policy dummy variable has a probability of t-statistic value 0.13 which is greater than α (10%). This indicates that the wheat import duty policy variable does not significantly affect the volume of Indonesia's wheat imports, assuming other independent variables are held constant. This result is not in accordance with the hypothesis which states that the wheat import duty policy variable has a significant effect on the volume of Indonesia's wheat imports.

The existence of dummy variables can provide information that the volume of wheat imports when the wheat import duty policy (0%) is imposed will be greater than when the import duty is not imposed. The wheat import duty policy dummy variable has a regression coefficient of 479,093.94 which means that when the import duty is not imposed, the value of wheat imports is the same as when it is constant, which is 8,130,130.60 tons. However, the value of wheat imports will increase when the wheat import duty policy is implemented, which is 8,609,224.54 tons (constant + dummy coefficient). This is because the coefficient of the dummy variable when the policy is applied is 1, while when the policy is not applied, the dummy coefficient is 0 or equal to a constant. Therefore, in this regression model, the wheat import duty policy dummy variable is a variable that has a positive and insignificant effect on Indonesia's wheat import volume.

The results of this analysis are similar to the results of Lagaida & Novianti (2022) who stated that Indonesia's wheat import duty can cause an increase in the volume of Indonesia's wheat imports. This is because Indonesia's wheat flour import tariff of 10% is among the lowest import tariffs compared to other countries in the world, such as China which sets a tariff of 71% and Bangladesh at 15%, so that when there is an imposition of wheat import tariffs, high wheat imports still occur. The existence of wheat import tariffs causes the supply and price of domestic wheat to compete with imported wheat. In addition, wheat entering Indonesia can also encourage the development of wheat-based domestic industries so that it can absorb a lot of labor and improve the welfare of the Indonesian people. Therefore, it is necessary to impose optimal import tariffs to protect the domestic industry from commodity dumping. However, when import tariffs are imposed, it needs to be supported by an increase in domestic wheat

production in order to continue to meet consumer needs at competitive prices.

CONCLUSIONS

The conclusion of this study is that the factors that positively affect the volume of Indonesia's wheat imports during the period 1990 to 2021 are GNI; domestic wheat consumption; domestic rice consumption; and exchange rates, while domestic rice production has a negative effect.

Suggestions that can be given are that the government needs to maintain the stability of the rupiah, inflation, and interest rates to maintain the sustainability of people's economic activities which have an impact on increasing people's purchasing power and welfare. In addition, it is necessary to support food diversification policies to food sources other than wheat, such as corn and tubers, so that Indonesia is not too dependent on wheat imports.

ACKNOWLEDGMENTS

Thank you to the data providers who facilitated this research and to all those who assisted in the completion of this research.

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