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DETERMINANTS OF INDONESIA'S SUGAR IMPORT VOLUME

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Abstract

Sugar is one of the strategic food commodities in Indonesia that plays an important role in fulfilling household consumption needs as well as serving as a raw material for the food and beverage industry. However, relatively low domestic sugar production has not been able to meet national demand, causing the government to continue importing sugar to maintain the availability of domestic sugar supplies. The high volume of sugar imports is driven by fluctuating international sugar prices, continuous population growth, and exchange rate fluctuations. This study aims to analyze the effect of international sugar prices, population size, and the United States dollar exchange rate on the volume of Indonesia's refined sugar imports. This study employed a quantitative approach with an associative research design and utilized time series data covering the period 1994–2024. The study consisted of 31 observations. The data used were secondary data obtained from various official sources such as the World Bank, the Food and Agriculture Organization (FAO), the United Nations (UN), and relevant government institutions. The analytical technique applied was multiple linear regression analysis using the Ordinary Least Square (OLS) approach processed through SPSS software. The results indicate that international sugar prices, population size, and the United States dollar exchange rate simultaneously have a significant effect on Indonesia's sugar import volume. Partially, international sugar prices have a negative and significant effect on Indonesia's sugar import volume. Population size has a positive and significant effect on Indonesia's sugar import volume, while the United States dollar exchange rate has a negative but insignificant effect on Indonesia's sugar import volume. The implications of this study suggest that, first, since international prices affect sugar import volume, the government needs to improve sugarcane sector productivity and maintain the stability of domestic sugar supplies in order to suppress domestic prices and reduce import dependency. Second, population growth should be accompanied by improvements in agricultural technology and agricultural productivity to balance increasing demand. Third, exchange rate stability should remain under the authority of the central bank, considering its close relation to international transactions.

Keywords: international sugar prices, sugar imports, population size, United States dollar exchange rate.

INTRODUCTION

Indonesia is one of the countries endowed with fertile land and abundant natural resources, possessing various economic sectors. Its abundant natural resources provide Indonesia with significant potential to become a developed country. Indonesia's natural wealth includes maritime resources such as fisheries, energy resources such as coal and petroleum, and agricultural resources, which have led Indonesia to be recognized as an

agrarian country due to its agricultural potential. The utilization of these natural resources is not only intended to meet domestic needs but is also exported abroad. However, despite its abundant resources, Indonesia does not solely engage in exports; import activities are also carried out to fulfill domestic needs arising from insufficient supplies across various sectors and commodities. Imports, as part of international trade, are intended to facilitate the availability of goods and services (Ndayisaba et al., 2020).

Indonesia, which is crossed by the equator and possesses a tropical climate along with fertile soil, is often referred to as the "Emerald of the Equator." These natural conditions have established Indonesia as an agrarian country due to its agricultural potential and the fact that a large proportion of its population works in the agricultural sector. Nevertheless, the country's substantial agricultural potential remains insufficient to meet domestic demand, thereby necessitating the importation of agricultural commodities. This condition arises because domestic agricultural production has not yet been capable of satisfying domestic needs (Aulia, 2024).

The development of Indonesia's agricultural subsector is highly important, not only for generating employment opportunities but also for creating added value and increasing both regional and national income. Agriculture contributes to a country's economic growth through five intersectoral linkages. These include the provision of surplus labor to industrial sectors, the supply of food for domestic consumption, the creation of markets for industrial outputs, and participation in international trade through tradable commodities (Afriyanti et al., 2023).

The importation of food commodities has become one of the challenges faced by Indonesia. This issue arises because the level of consumption is disproportionate to domestic production. High consumption levels cannot yet be fully met by domestic production, which consequently encourages import activities (Chisilia & Widanta, 2019).

Sugar is one of the essential commodities in Indonesia and is categorized as a strategic food commodity. It is also recognized as one of Indonesia's agricultural products designated as a special product alongside rice, corn, and soybeans in the World Trade Organization negotiation forum (Meylinah, 2023). Furthermore, the Regulation of the Minister of Trade Number 27 of 2017 emphasizes that sugar is one of the nine staple food commodities, together with rice, corn, soybeans, cooking oil, beef, poultry meat, shallots, and eggs.

Food constitutes a fundamental necessity for human survival, as humans cannot sustain life without it. Sugar is considered one of the staple commodities in Indonesia after rice (Dwipurwanti & Sasana, 2022). Sugar is widely utilized for household consumption as well as for the food and beverage industry. It also serves as a source of calories for humans and plays an essential role in daily life. However, excessive sugar consumption may increase the risk of addiction and various diseases such as obesity (Wiss et al., 2018). The Ministry of Health recommends a daily sugar intake of 50 grams or approximately four tablespoons per person. In the long term, food availability is crucial for improving human welfare.

As one of the commodities included in the nine staple goods, the utilization of sugar in Indonesia has continued to grow from year to year. The demand for food commodities increases annually in line with population growth. Food-related challenges arise from ongoing population growth and urbanization. Indonesia, as the fourth most

populous country in the world, continues striving to fulfill the food needs of more than 250 million people (Schreer & Padmanabhan, 2020).

According to data from the Center for Agricultural Data and Information Systems (2024), average per capita consumption of granulated sugar in 2024 reached 5.371 kg per year. The demand for sugar in Indonesia continues to increase annually because sugar is utilized not only for household consumption but also as a raw material in the food and beverage industry. In addition, Indonesia's population reached 283,748,173 people in 2024, further increasing sugar demand. National sugar production in the same year amounted to only 2.46 million tons. The insufficient domestic sugar supply has compelled the government to engage in international trade activities through annual sugar imports.

The type of sugar commonly known by the public is sugar derived from sugarcane, often referred to as white sugar or granulated sugar. In Indonesia, sugarcane-based sugar is classified into three categories: raw sugar, plantation white sugar, and refined sugar. Plantation white sugar is intended for direct household consumption and is therefore commonly known as granulated or white sugar. Raw sugar functions as the primary input in the production process of refined sugar. Meanwhile, refined sugar is used as a raw material in industries such as food, beverages, and pharmaceuticals. Refined sugar itself is sugar produced through the purification and recrystallization of raw sugar. In Indonesia, its utilization is restricted solely for indirect consumption through industrial sectors. This restriction exists because refined sugar is not intended for household consumption, serving as a protective measure for the domestic sugar industry.

Imports refer to the purchase and entry of goods from foreign countries into the domestic market. Imports are determined by a country's capability to obtain goods that can compete with foreign products. A country may be unable to fulfill certain needs for goods and services through domestic production due to various factors, thereby encouraging imports to meet those needs. Imported goods may be utilized either for consumption or as raw materials in production processes. Production deficits can therefore encourage a country to import specific goods from other countries in order to fulfill domestic consumption needs (Farina & Husaini, 2017).

National sugar consumption in Indonesia has continued to increase over time. The sugar industry, which had served as the primary supplier of sugar for Indonesian society since the independence era, was unable to sustain its golden period and adequately meet domestic needs. During the 1930s, Indonesia had 179 operating sugar factories. However, due to factors such as difficulties in acquiring new land for sugarcane cultivation, declining efficiency at the farm level, and government policies, the sugar industry experienced a decline after independence. By 2023, only 58 sugar factories remained operational in Indonesia (Directorate General of Plantations, 2023). The unstable economic conditions during the post-independence period were among the factors contributing to the decline in Indonesia's sugar production (Rusdi et al., 2021).

As the number of sugar factories declined, several former sugar factory buildings were repurposed into museums or other facilities. One example is the Colomadu Sugar Factory in Central Java. Due to declining production and the reduction of sugarcane

plantation areas, the Colomadu Sugar Factory conducted its final milling operation and ceased operations on May 1, 1997. Subsequently, the factory was designated as one of Indonesia's cultural heritage sites and is now frequently utilized for various activities (Prasetyo, 2022).

During the 1994–2024 period, Indonesia experienced several economic shocks that caused fluctuations in the economic sector. In 1998, Indonesia underwent an economic crisis that caused the exchange rate to depreciate to IDR 18,800 per US dollar. Subsequently, the 2008 global economic crisis affected international sugar prices and the United States dollar exchange rate, thereby increasing the cost of sugar imports, while fluctuations in global sugar prices influenced Indonesia's sugar import volume. In addition to the crises of 1998 and 2008, Indonesia also experienced the COVID-19 pandemic, which affected international sugar prices, population dynamics, and the US dollar exchange rate. Disruptions in global distribution and production caused fluctuations in international sugar prices, while the depreciation of the rupiah increased sugar import costs. On the other hand, consumption demand from households and the food and beverage industry remained high, compelling Indonesia to continue importing sugar in order to maintain domestic supply availability.

The development of sugar consumption in Indonesia during 2020–2024 demonstrates a consistent increase from year to year. Domestic consumption in absolute terms remained relatively high and exhibited an upward trend annually. The highest sugar consumption occurred in 2022, amounting to 8.13 million tons, while the lowest occurred in 2021 at 7.21 million tons. This increase in consumption may be influenced by several factors such as population size, per capita income, and sugar prices. Income and population size affect the level of national sugar consumption. Income influences purchasing power, while population size directly affects the amount of sugar consumed. Increases in both factors consequently contribute to fluctuations in national sugar consumption.

The high demand for sugar originating from households as well as its utilization as a raw material in the food and beverage industry has positioned Indonesia as the world's largest sugar importer, contributing 7.25 percent of total global sugar imports (Ministry of Agriculture, 2024). This condition has caused Indonesia's sugar trade balance to experience a deficit. One of the primary reasons for Indonesia's dependence on sugar imports is the low level of domestic production. Efforts to increase sugar production each year have still been insufficient to satisfy public consumption needs, which continue to exhibit an increasing trend annually. Factors contributing to Indonesia's continued sugar imports include limited land availability, inadequate access to advanced agricultural technology, climate change, and limited infrastructure, all of which hinder national agricultural productivity from keeping pace with domestic demand.

Another factor influencing imports is the price of the commodity itself (Sukirno, 2019:76). The high volume of imported sugar entering Indonesia may reduce the competitiveness of locally produced sugar in terms of both price and quality. From a pricing perspective, imported sugar tends to be cheaper than local sugar. In addition, the quality of imported sugar is generally considered superior, as locally produced sugar

is often less refined and more opaque in color compared to imported sugar, which is cleaner and whiter (Sartika et al., 2018).

Sugar prices in Indonesia continue to increase annually compared to imported sugar prices because the sugar industry in exporting countries is more developed than that of Indonesia, resulting in lower production costs in exporting countries. The following section presents international sugar prices over the six-year period from 2020 to 2024.

The high volume of sugar imports is driven by the substantial demand for sugar. One factor contributing to high demand is population growth. The higher the birth rate, the greater the need for necessities such as clothing, food, and housing, and vice versa (Marhaeni, 2018:13). Indonesia, as one of the countries with the largest populations in the world, benefits from a large labor force due to its demographic bonus while simultaneously facing significant challenges. Population growth poses a major challenge for the Indonesian government, particularly in maintaining food security for society. An increase in population size will increase the demand for consumer goods (Azzahra et al., 2021). Consequently, Indonesia's large population encourages the government to implement policies and regulations aimed at fulfilling public needs optimally. The following section presents the development of Indonesia's population over the five-year period from 2020 to 2024.

In conducting international trade activities, whether exports or imports, countries generally use a particular currency as a mutually agreed means of payment between exporting and importing countries. The United States dollar exchange rate is one of the currencies most commonly used in international trade transactions. The price of goods or commodities traded internationally follows fluctuations in the US dollar exchange rate because of its relative stability and its role as an international transaction currency. Import activities can operate effectively when there is stability in the domestic currency exchange rate against foreign currencies (Setyawati et al., 2019).

Based on the increasing demand for sugar for both consumption and industrial purposes in the food and beverage sector, Indonesia is compelled to import sugar to meet domestic demand due to insufficient domestic production caused by the suboptimal utilization of available production factors. The large volume of Indonesia's sugar imports has therefore encouraged an analysis of the factors influencing Indonesia's sugar import volume during the period from 1994 to 2024.

RESEARCH METHOD

This study employed a quantitative approach with an associative research design to analyze the relationship and influence of international sugar prices, population size, and the United States dollar exchange rate on Indonesia's sugar import volume during the 1994–2024 period. The research was conducted in Indonesia considering the country's substantial contribution to global sugar imports. The research variables consisted of independent variables, namely international sugar prices (X1), population size (X2), and the United States dollar exchange rate (X3), as well as the dependent variable, namely sugar import volume (Y), all of which were operationally defined based on their respective units of measurement. This study utilized time series data over a 31-year period, with secondary data obtained from various official institutions such as

government agencies and international organizations (Jaya, 2020; Ministry of Agriculture, 2024).

The data used consisted of quantitative data in the form of statistical figures related to the research variables and qualitative data as supporting information in the form of theories and information derived from scientific literature. Data were collected through a non-behavioral observation method using documentation techniques from various sources such as official reports, institutional publications, and relevant scientific journals. The data sources included institutions such as the Ministry of Trade, Statistics Indonesia (BPS), the World Bank, the United Nations (UN), and the Food and Agriculture Organization (FAO). This approach was intended to obtain accurate and comprehensive data to support the empirical analysis of the study (Jaya, 2020).

The data analysis technique employed was multiple linear regression analysis using the Ordinary Least Square (OLS) method, transformed into natural logarithmic form and processed using Statistical Product and Service Solutions (SPSS) software. The analysis was conducted to examine the influence of the independent variables both simultaneously (F-test) and partially (t-test) on the dependent variable. Prior to hypothesis testing, classical assumption tests were conducted, including tests of normality, multicollinearity, heteroscedasticity, and autocorrelation, to ensure that the model satisfied the criteria of the Best Linear Unbiased Estimator (BLUE). Thus, the analytical results are expected to provide unbiased estimates and empirically explain the factors influencing Indonesia's sugar import volume (Syarifuddin & Saudi, 2022; Jaya, 2020).

RESULTS AND DISCUSSION

General Overview of Indonesia

During the 2020–2024 period, the harvested area of sugarcane in Indonesia exhibited an increasing trend, reaching 520,823 hectares in 2024, although fluctuations still occurred due to policy factors, natural conditions, and land productivity. In line with this trend, sugarcane production also fluctuated but generally increased, reaching approximately 2.46 million tons in 2024. On the other hand, sugarcane productivity remained relatively stagnant and even showed a declining trend in recent years, reflecting persistent constraints related to efficiency and technology. Overall, these conditions indicate that the expansion of cultivated land has not been fully accompanied by improvements in productivity, thereby posing a challenge to supporting national sugar production.

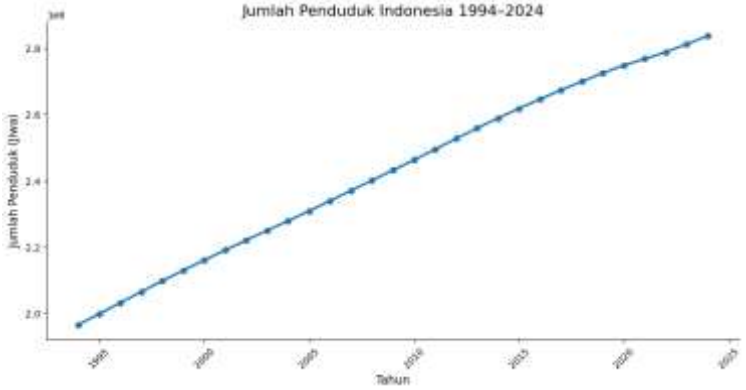
Description of Research Variables

International sugar prices refer to prices prevailing in the global market and serve as a benchmark in international trade. When international prices are lower than domestic prices, imports tend to increase because they are considered more economical.

Source: World Bank (2025)

During the 1994–2024 period, international sugar prices exhibited a fluctuating pattern, with the lowest point recorded in 1999 at US$0.14/kg and the highest point in 2011 at US$0.57/kg.

Indonesia's population has continued to increase each year, which directly affects the growth of consumption needs, including sugar consumption.



Source: United Nations (2024)

In 2024, Indonesia's population reached 283,748,173 people, reflecting the country's high domestic demand. This condition encourages the government to conduct imports in order to maintain the availability and stability of the national sugar supply.

The United States dollar exchange rate is an important factor in international trade because it affects the relative prices of imported goods.

Source: World Bank (2024)

An appreciation of the rupiah makes imports cheaper and tends to increase import activities, whereas depreciation causes imports to become more expensive. The data indicate that the United States dollar exchange rate has tended to increase in the long run; therefore, exchange rate stability is essential for maintaining the smooth operation of import activities.

The volume of Indonesia's refined sugar imports during the 1994–2024 period fluctuated considerably. This condition was influenced by several factors, including international sugar prices, Indonesia's population size, and the United States dollar exchange rate. The following figure illustrates the development of Indonesia's refined sugar imports.

Source: Food and Agriculture Organization (2024)

The development of Indonesia's refined sugar import volume during the 1994–2024 period experienced fluctuations. The figure indicates that the volume of refined sugar imports tended to increase annually. The highest import volume occurred in 2022, reaching 6,019,060 tons. In 2024, Indonesia's refined sugar import volume reached 5,319,021 tons.

Results of Multiple Linear Regression Analysis

Table 1. Multiple Linear Regression Analysis

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	T	Sig.
1	(Constant)	-12859607.314	1518291.330		-8.470	.000
	X1	-27020.815	10134.044	-.184	-2.666	.013
	X2	.070	.009	1.182	7.513	.000
	X3	-47.814	55.539	-.115	-.861	.397

a. Dependent Variable: Y

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	72822844074374.480	3	24274281358124.830	182.327	.000[b]
	Residual	3594679643566.614	27	133136283095.060		

Total	76417523717941.100	30			

a. Dependent Variable: Y
b. Predictors: (Constant), X3, X1, X2

Source: Processed by the author

Based on the results presented in Table 1 above, the regression model equation can be formulated as follows:

Y = α + β1X1 + β2X2 + β3X3 + μi
Y = -12.859.607,314 – 27.020,815(X_1) + 0,070(X_2) – 47,814(X_3)
SE = (1.518.291,330) (10.134,044) (0,009) (55,539)
t_{stast} = (-8,470) (-2,666) (7,513) (-0,861)
Sig = (0,000) (0,013) (0,000) (0,397)
F = 182,327
Sig F = 0,000

Based on the regression equation model above, the following conclusions can be drawn:

1. The International Sugar Price variable has a coefficient value of -27,020.815, indicating that every increase of 1 USD in international sugar prices will reduce the volume of refined sugar imports by 27,020.815 tons.
2. The Population variable has a coefficient value of 0.070, indicating that every increase of one person in the population will increase the volume of refined sugar imports by 0.070 tons.
3. The United States Dollar Exchange Rate variable has a coefficient value of -47.814, indicating that every increase of 1 rupiah in the dollar exchange rate will reduce the volume of refined sugar imports by 47.814 tons.

Classical Assumption Test

1) Normality Test

Table 2. Normality Test
One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		31
Normal Parameters[a,b]	Mean	.0000000
	Std. Deviation	346154.09110041
Most Extreme Differences	Absolute	.122
	Positive	.122
	Negative	-.104
Test Statistic		.122
Asymp. Sig. (2-tailed)		**.200**

a. Test distribution is Normal.
b. Calculated from data.

Source: Processed by the author

Based on Table 2, the Kolmogorov–Smirnov test indicates that the data can be considered normally distributed if the Asymp. Sig. value is greater than 0.05, whereas

the data are considered not normally distributed if the Asymp. Sig. value is less than 0.05. It is known that the variables of International Sugar Prices, Population, and the United States Dollar Exchange Rate have an Asymp. Sig. value of 0.200, which is greater than 0.05; therefore, the data are considered to be normally distributed.

2) Multicollinearity Test

Table 3. Multicollinearity Test

Model	Collinearity Statistic	
	Tolerance	VIF
(Constant)		
X1	.366	2.730
X2	.704	4.213
X3	.974	3.263

Source: Processed by the author

To determine whether multicollinearity exists in the regression model, the tolerance value and Variance Inflation Factor (VIF) can be examined. If the tolerance value is greater than 0.10 or the VIF value is less than 10, it can be concluded that the model does not experience multicollinearity. Based on Table 3, the multicollinearity test results indicate that all variables have tolerance values greater than 0.10 and VIF values less than 10. Therefore, it can be concluded that there is no high correlation among the independent variables in the model.

3) Heteroscedasticity Test

Table 4. Heteroscedasticity Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1506479.286	919547.173		-1.638	.113
	X1	-5087.964	6137.644	-.235	-.829	.414
	X2	.009	.006	1.061	1.641	.112
	X3	-33.971	33.637	-.555	-1.010	.321

a. Dependent Variable: Abresid

Source: Processed by the author

Based on the data processing results presented in Table 4, it is known that the independent variables (International Sugar Prices, Population, and Dollar Exchange Rate) do not affect the absolute residual values, either simultaneously or partially. This is indicated by the significance values of each variable, which are greater than the alpha level ($\alpha = 0.05$). Therefore, it can be concluded that at the 5% significance level, these variables do not have a significant effect on the absolute residual values. Thus, the regression model used does not indicate the presence of heteroscedasticity symptoms and is considered appropriate for prediction purposes.

4) Autocorrelation Test

Table 5. Autocorrelation Test

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson

1	.976[a]	.953	.948	364878.44975	.973

a. Predictors: (Constant), X3, X2, X1

b. Dependent Variable: Y

Sumber : Diolah oleh penulis

Based on the results of the autocorrelation test using the Durbin–Watson (DW-test) presented in Table 5 above, a value of 0.973 was obtained, where the value of du = 1.65, k = 3, and n = 31, with the following condition: 0 < DW < du. It can therefore be concluded that there is no positive autocorrelation in this study, as indicated by the value 0 < 0.973 < 1.65.

Uji Koefisiensi Determinasi (R Square)

Table 6. Coefficient of Determination

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.976[a]	.953	.948	364878.44975

a. Predictors: (Constant), X3, X1, X2

b. Dependent Variable: Y

Source: Processed by the author

Based on the analysis results in Table 6, the coefficient of determination (R^2) is 0.953. This indicates that the variables of international sugar prices, population size, and the United States dollar exchange rate jointly explain 95.3 percent of the variation in refined sugar import volume (Y), while the remaining 4.7 percent is influenced by other factors not included in this study.

Simultaneous Regression Coefficient Test (F-Test)

The simultaneous test (F-test) was conducted to determine the joint effect of international sugar prices, population size, and the United States dollar exchange rate on Indonesia's sugar import volume. With a significance level of 5% (α = 0.05) and an F-table value of 2.96, the calculated F-value obtained from the data analysis was 182.327. Since the calculated F-value is greater than the F-table value, H_0 is rejected. This result indicates that the three independent variables simultaneously have a significant effect on Indonesia's sugar import volume.

Partial Regression Coefficient Test (t-Test)

The t-test results indicate that, partially, international sugar prices have a negative and significant effect on Indonesia's refined sugar import volume (t-count = -2.666 < t-table = 1.701), implying that increases in international prices tend to reduce imports. Conversely, population size has a positive and significant effect (t-count = 7.513 > t-table = 1.701), indicating that population growth encourages an increase in sugar imports. Meanwhile, the United States dollar exchange rate has a negative but insignificant effect (t-count = -0.861 < t-table = 1.701), suggesting that exchange rate fluctuations have not had a substantial impact on imports. Overall, only international sugar prices and population size were proven to have a significant effect on Indonesia's refined sugar import volume.

Discussion

The Simultaneous Effect of International Sugar Prices, Population Size, and the United States Dollar Exchange Rate on Indonesia's Refined Sugar Import Volume

According to the law of demand, imports represent demand for goods that is influenced by several factors, including the price of the goods themselves (Sukirno, 2019:76). If international prices are lower than domestic prices, consumers tend to prefer imported goods because they are cheaper than domestically produced goods, thereby triggering an increase in imports.

Demand for goods is also influenced by population size. Population refers to the total number of people, citizens, or groups of individuals residing in a particular place or territory within a country at a certain time (Mifbakhuddin, 2024:5). The higher the birth rate, the greater the demand for necessities such as clothing, food, and housing, and vice versa (Marhaeni, 2018:13).

A country's imports are also affected by exchange rates. Exchange rates arise because of differences in currencies used among countries involved in international transactions. A depreciation in the exchange rate will cause imported goods to become more expensive and exported goods to become cheaper, and vice versa.

The results of this study indicate that international sugar prices, population size, and the United States dollar exchange rate simultaneously have a significant effect on Indonesia's refined sugar import volume. This finding is consistent with the study conducted by Sutanto and Muljaningsih (2022), which states that all independent variables affect sugar imports. Similarly, the research conducted by Rahayu (2017) found that production, consumption, exchange rates, sugar prices, and per capita income simultaneously have a substantial influence on the formation of Indonesia's sugar import value.

The Partial Effect of International Sugar Prices, Population Size, and the United States Dollar Exchange Rate on Indonesia's Refined Sugar Import Volume

1) The Effect of International Sugar Prices on Indonesia's Refined Sugar Import Volume

According to the law of demand, the lower the price of a good, the higher the demand for that good. Conversely, the higher the price of a good, the lower the demand for that good (Sukirno, 2019:76). In international trade, all trade activities use international prices as a benchmark. If international prices are lower than domestic prices, consumers tend to choose imported goods because they are cheaper than domestic products (Purba et al., 2021:140).

The results of this study indicate that international sugar prices have a negative and significant effect on Indonesia's refined sugar import volume. This finding is in line with the study conducted by Al Azam et al. (2024), which explains that international sugar prices partially have a negative effect on Indonesia's sugar import volume during the 2000–2019 period. Likewise, research conducted by Anggraeni et al. (2024) found that international sugar prices have a negative and significant effect on sugar imports in Indonesia during the 1992–2022 period. The regression result for the international sugar price variable in this study shows a coefficient value of -27,020.815, indicating a negative relationship with Indonesia's refined sugar import volume. This means that an

increase of 1 US dollar in international sugar prices will reduce Indonesia's sugar import volume by 27,020.815 tons, assuming the other independent variables remain constant.

International sugar prices, which tend to be lower than domestic sugar prices, have led to an increase in import activities. This condition is associated with harvested land areas that continue to fluctuate, with a percentage change of 5.52 percent over the past five years, which in turn causes domestic sugarcane production to remain insufficient. Meanwhile, demand for sugar commodities remains very high, ultimately driving up domestic sugar prices.

2) The Effect of Population Size on Indonesia's Refined Sugar Import Volume

A large population affects food demand as a non-demographic variable. Higher birth rates lead to increased food demand, and vice versa. In addition, higher birth rates also increase the demand for necessities such as clothing, food, and housing (Marhaeni, 2018:13).

The results of this study indicate that the population variable has a positive and significant effect on Indonesia's refined sugar import volume. These findings are consistent with the study conducted by Sutanto and Muljaningsih (2022), which states that population size has a positive and significant effect on sugar imports. Furthermore, research conducted by Aulia (2024) also found that the population variable positively and significantly affects the volume of sugar imports in Indonesia. The regression result for the population variable shows a coefficient value of 0.070, indicating a positive relationship with Indonesia's refined sugar import volume. This means that an increase of one person in the population will increase Indonesia's sugar import volume by 0.070 tons, assuming the other independent variables remain constant.

Domestic sugarcane production, which is later processed into sugar, has increased by only 3.91 percent over the past five years and remains insufficient to meet public demand compared to Indonesia's continuously growing population. This condition is caused by several factors, including weather conditions, technology limitations, and productivity constraints, all of which affect domestic sugarcane production levels.

3) The Effect of the United States Dollar Exchange Rate on Indonesia's Refined Sugar Import Volume

Exchange rates constitute one of the most important aspects of the international economy due to their substantial influence on the balance of current transactions and other macroeconomic variables. When the exchange rate increases, the rupiah depreciates, whereas when the exchange rate decreases, the rupiah appreciates (Simorangkir & Suseno, 2004:4).

The results of this study indicate that the United States dollar exchange rate has a negative but insignificant effect on Indonesia's sugar import volume. These findings differ from theoretical and empirical studies suggesting that the dollar exchange rate has a negative and significant effect. This discrepancy may occur because the demand for imported sugar changes and fluctuates over time according to a country's needs. High demand for sugar commodities requires sufficient supply availability to meet consumption needs, one of which is achieved through imports. The study conducted by Rahayu (2017) also found that the exchange rate has a negative but insignificant effect on sugar imports in Indonesia. The regression result for the exchange rate variable

shows a coefficient value of -47.814, indicating a negative relationship with Indonesia's sugar import volume. This means that an increase of 1 rupiah in the rupiah exchange rate against the United States dollar will reduce Indonesia's sugar import volume by 47.814 tons, assuming the other independent variables remain constant.

CONCLUSION

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

1. The variables of international sugar prices and population size have a significant effect on Indonesia's sugar import volume.
2. The United States dollar exchange rate variable has an insignificant effect on Indonesia's sugar import volume.

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