THE FACTORS INFLUENCING IMPORT OF RAW CRYSTAL SUGAR FROM THAILAND TO INDONESIA

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ABSTRAK

This research aims to determine what factors influence the import of raw crystal sugar from Thailand to Indonesia. The method for determining regions is purposively used, namely, in Indonesia. The data collection method used in this research is secondary data. The data analysis method used is a multiple linear regression test with the Ordinary Least Square or OLS method. The results of this research are as follows: (1) The regression model used passed the classical assumption test, namely Multicollinearity, Heteroscedasticity, Autocorrelation, and Normality. (2). Factors that have a significant positive effect on the quantity of imported raw crystal sugar (raw sugar) from Thailand to Indonesia are GDP (gross domestic product) per capita. In contrast, one factor that significantly affects the number of imports of raw crystal sugar (raw sugar) from Thailand to Indonesia is the price of imported sugar. (3). Factors that do not significantly influence the quantity of raw crystal sugar imports from Thailand to Indonesia are sugar import tariffs and consumption rates..

INTRODUCTION

Indonesia is an agricultural country with vast land areas that local people can use for a livelihood (Muhamad et al., 2014). However, Indonesia's agricultural sector is not only a livelihood for the population but also to improve the Indonesian economy (Purnomo et al., 2021). The competitiveness of Indonesian agricultural commodities occupies a relatively high position in the international market (Kusumaningrum, 2019). The role of the agricultural sector in the economy of a country or region can be seen from several aspects, one of which is the contribution of the agricultural sector to the Gross Domestic Product (GDP) (Isbah & Iyan, 2016). The average agricultural GDP in Indonesia is 270,727.50 billion rupiah, which shows a positive development from 2002 to 2011, namely 4.55 percent (Kadek & Indrayani, 2014).

Sugar is an agricultural commodity that is very important for the Indonesian economy because the sugar industry is labor-intensive (Robiani et al., 2024). Labor-intensive means that the sugar industry actively involves farming households and workers (Joltreau, 2024). The sugar industry's processing process involves labor, where the labor involved in cultivating sugar cane and processing sugar cane into sugar is 28 thousand people and 27 thousand people, respectively (USDA, 2023).

The sugar area fluctuated, with an average sugar area of 424 thousand ha. Sugar productivity growth: The average sugar productivity increased by 0.88 percent. In contrast to Indonesia's sugar consumption, which increases yearly, according to (USDA, 2023), the average consumption in 2017 - 2021 is 7 million tons. Sugar production and consumption in Indonesia need to be reviewed simultaneously so that it can be seen whether production can meet or not meet sugar consumption in Indonesia. Production apparently cannot meet sugar consumption from 2017 to 2021 (USDA, 2023). In other words, a sugar production deficit occurs because production cannot meet sugar consumption. The production deficit caused the Indonesian government to import sugar. Sugar imported abroad comes from Thailand, India, Australia, and Brazil (USDA, 2023).

Several studies have analyzed the factors that influence sugar imports in Indonesia. The study Wiranata (2013) states that the factors influencing imports are population size, sugar consumption, and sugar production. The study Motta et al., (2021) states that sugar imports in Indonesia are influenced by several factors, namely sugar consumption, sugar prices, sugar production, and import duties. The study Putri &

Sentosa, (2022) states that the factors influencing sugar imports are the exchange rate, production, GDP, and inflation. The three studies above focus on sugar imports without looking at the sugar-exporting country, even though Thailand has had the highest sugar exports to Indonesia in recent years (USDA, 2023). Therefore, this study is interested in exploring the factors that influence Indonesia's import of sugar from Thailand.

RESEARCH METHOD

The data used is time series data for the 2008-2021 period obtained online from the Indonesian Central Bureau of Statistics (BPS), the United States Department of Agriculture's Foreign Agricultural Service or USDA Foreign Agricultural Service, the Food and Agriculture Organization (FAO) and related previous research with this research.

The data was analyzed using multiple linear regression with the following formula :

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$

Information:

Y : Import Volume of Thailand's raw crystal sugar (tons)
$\beta 0$: Intercept/cost constant
$\beta 1 – \beta 4$: independent variable regression coefficient
$X1$: Price of Imported Sugar (Rp/ton)
$X2$: Sugar import tariff (Rp/ton)
$X3$: GDP Per Capita (Rp/person)
$X4$: Sugar Consumption Rate (tons)
e : Random Error

GDP (Gross et al.) Per Capita

GDP per Capita is calculated based on information on Indonesia's GDP and population in a particular year (t). GDP per Capita is obtained from the formula :

$PDB\ perkapita_t = \frac{PDB_t}{total\ population_t}$

Price of Imported Sugar

The price of imported sugar is calculated based on information on the value of Thailand sugar exports, the quantity of Thai sugar exports, and the price of Thailand sugar exports in dollars.

USA, US dollar exchange rate against rupiah, price of Thailand sugar exports in rupiah, tariffs, value-added tax. The first step to calculate is the price of sugar exports from Thailand (in US dollars), which can be formulated as follows:

$HETUSA = \frac{NEGT}{KEGT}$

Information:

HETUSA : Thailand Export Sugar Price ($/ton)
NEGT : Thailand sugar export value ($)
KEGT : Thailand sugar export quantity (tons)

The second step that is calculated is the price of Thailand sugar exports in rupiah, which is formulated as follows:

$HETRP = HETUSA\ X\ NTUSARP$

Information:

HETRP : Thailand sugar export price (Rp/ton)
HETUSA : Thailand sugar export price ($/ton) NTUSARP: The exchange rate of the US dollar against the rupiah

The final step that is calculated is the import price of Thailand sugar, which is formulated as follows:

$HGTI = HETRP + T + VAT$

Information:

HGTI : Price of imported Thailand sugar (Rp/ton)
HETRP : Thailand sugar export price (Rp/ton)
T : Import tariff (Rp/ton)
VAT : Value-added tax (Rp/ton)

Sugar Import Tariffs

The import tariff value is calculated based on information on the value of the sugar import tariff in US dollars and the exchange rate of the US dollar against the rupiah. Sugar import tariffs can be formulated as follows:

$T = TUSA\ X\ NTUSARP$

Information:

Q : Sugar Import Tariff (Rp/ton)
TUSA : Sugar Import Tariff (Rp/ton)

NTUSARP : US Dollar Exchange Rate Against Rupiah

Sugar Consumption Rate

The rate of sugar consumption is calculated based on information on annual sugar consumption in Indonesia. The rate of sugar consumption can be formulated as follows:

$LKG = \frac{\text{KGTI} - \text{KGTS}}{\text{KGTS}} X\ 100\ \%$

Information:

LKG : Sugar consumption rate (%/year)

KGTI : Current year's sugar consumption (tons/year)

KGTS : Previous year's sugar consumption tons/year)

Test the classical assumption

The classical assumption test helps test whether a regression model is appropriate according to several assumptions: multicollinearity, heteroscedasticity, autocorrelation, and normality. If the regression model is based on the four assumptions above, then the regression model used in this research is appropriate. In contrast, if the regression model is not by the four assumptions above, then further modifications to the regression model are needed.

Multicollinearity Test

The multicollinearity test was conducted to determine the relationship between independent variables in a regression model. If there is multicollinearity, this indicates that the model used is not good. In this study, the VIF method is used to detect multicollinearity. The criteria for the VIF method are as follows:

a. If the VIF value for the independent variable is <10, then there is no multicollinearity in the regression model.

b. If the VIF value for the independent variable is > 10, then the regression model exhibits multicollinearity.

Heteroscedasticity test

The heteroscedasticity test is carried out to prove that the regression model does not have the same variance. The heteroscedasticity test is described in the hypothesis as follows:

$H0$: No heteroscedasticity problem

Ha: There is a heteroscedasticity problem. Remarks:

a. If the chi-square probability value > α (alpha) 1%, 5%, 10% means it fails to reject

$H0$. States that there is no heteroscedasticity problem.

b. If the chi-square probability value < α (alpha) 1%, 5%, 10% means rejecting

$H0$. States that there is a heteroscedasticity problem.

Autocorrelation test

This test determines whether there is a correlation or relationship between members of one observation and other observations at different times. The autocorrelation test is described in the hypothesis as follows:

$H0$: No autocorrelation problem

Ha: There is an autocorrelation problem. Information:

If the chi-square probability value > α (alpha) 1%, 5%, 10% means it accepts $H0$. States there is no autocorrelation problem.

If the chi-square probability value < α (alpha) 1%, 5%, 10% means rejecting

$H0$. States that there is an autocorrelation problem.

Normality test

The normality test is carried out to determine whether the residuals obtained are normally distributed. A good regression model is one whose residual values are normally distributed. The normality test is stated with the following hypothesis:

$H0$: Normally distributed residuals

Ha: Residuals are not normally distributed.

Information:

a. If the value of $\beta > \alpha$ (alpha) 1%, 5%, 10% means it fails to reject $H0$. This means that the residuals are normally distributed.

If the value of $\beta < \alpha$ (alpha) 1%, 5%, 10% means rejecting $H0$. This means that the residuals are not normally distributed.

F Test (simultaneous test)

This test is used to determine whether the independent variables together/simultaneously have a significant effect on the dependent variable. The hypothesis testing mechanism is as follows:

$H0$: $b1 = b2 = b3 = b4 = 0$, simultaneously the independent variable has no natural effect on the dependent variable.

$H1 = b1 \neq b2 \neq b3 \neq b4 \neq 0$, together the independent variables significantly affect the dependent variable.

Test Criteria:

If $Fhit \geq Ftabel$ or significance value ≤ α, then $H0$ is rejected

If $Fhit < Ftabel$ or significance value > α, then $H0$ is accepted.

R Test (coefficient of Determination)

The Coefficient of Determination (R2) test was carried out to explain the large proportion of independents who influence the dependent variable. The R2 test also measures how well the regression line is formed. The coefficient value is between 0 and 1 or around ($0 \leq r2 \leq 1$). If the coefficient value is close to 1, then the regression results will be better, and vice versa if the coefficient value is close.

T-test (partial test)

The t-test was carried out to determine the effect of individual independent variables on the dependent variable. The t-test hypothesis is stated as follows:

$H0$: $\beta i \leq 0$, no significant effect.

Ha: $\beta i \geq 0$, significant effect. Information:

a. If the probability value < α (alpha) 1%, 5%, and 10% means rejecting $H0$.

States that the independent variable has a significant effect on the dependent variable.

b. If the probability value > α (alpha) 1%, 5%, and 10% means it fails to reject $H0$.

This means the independent variable has no significant effect on the dependent variable.

RESULT AND DISCUSSION

Classic assumption test

The classical assumption test is an analysis carried out to assess whether there are classical assumption problems in an OLS linear regression model. Several tests are used to determine whether there are problems in the classical assumption test, namely the multicollinearity, heteroscedasticity, autocorrelation, and normality tests.

Multicollinearity Test

The multicollinearity test aims to determine whether a correlation is found between the independent variables in the regression model. A good model is one in which there is no correlation between variables. Multicollinearity can be seen from the Tolerance and Variance Inflation Factor (VIF).

Table 1. VIF Value of Each Independent Variable.

Variable	VIF	1/VIF
Price of Imported Goods	1,14	0,874979
Rate	1,11	0,899016
Gross Domestic Product (GDP) Per Capita	1,10	0,912028
Consumption Rate	1,07	0,933968
Mean VIF	1,11	

Source: Secondary Data Processed in 2023

The table above (Table 1) shows the VIF value of each independent variable. The VIF value ranges from 1 to 1.1. The average VIF value is 1.11. If the analysis results from the regression model show a tolerance value of more than 0.10 and a VIF value below 10, it can be concluded that multicollinearity does not occur (Anwar & Syafiqurrahman, 2016). Based on this literature, the results of this study show that multicollinearity does not occur.

Heteroscedasticity Test

A heteroscedasticity test is a situation with unequal variance in the residuals for all observations in the regression model. If the significance value between the independent variable and the absolute residual is > 0.05, heteroscedasticity will not occur (Mardiatmoko, 2020). In heteroscedasticity using the Breusch-pagan/cook Weisberg test, which states the prob value>$chi2$= 0.0000 > α (0.05) indicates that H1 is accepted and H0 is rejected, so the variable or regression model is free from heteroscedasticity problems.

Table 2. Heteroscedasticity Test.

Variable	Value	
	Chi-Sq. Statistic	**Prob**
Import	3,19	0,0743

Source: Secondary Data Processed in 2023

Table 2 shows the output results of the heteroscedasticity test for imports with a significant value of (0.0743) > 0.05. This shows that this variable is free from heteroscedasticity problems.

Autocorrelation Test

The autocorrelation test is used to test whether, in a linear regression model, there is a correlation between confounding errors in period t and confounding errors in period t-1 (previous). Autocorrelation arises because successive observations over time are related to each other. This problem arises because the residuals (nuisance errors) are not independent from one observation to another. Below are the results of the autocorrelation test. The results of the autocorrelation test can be seen in Table 3.

Table 3. Autocorrelation Test.

Lags (p)	Chi^2	Df	Prob > Chi^2
1	2,242	1	0,1343

Source: Secondary Data Processed in 2023

Normality Test

This research, the normality test used is data normality to determine whether the data is usually distributed using the Bera-Jarque test. The criteria for normality are said to be if the significance value (sig.) is > 0.05. Following are the results of the normality test as follows:

Table 4. Normality Test.

Chi^2	Prob > Chi^2
1,626	0,4435

Source: Secondary Data Processed in 2023

The table above (Table 4) shows the normality test results of (0.4435) > 0.05.
So, this shows that the data is usually distributed.

Simultaneous Test Results

The simultaneous test aims to determine simultaneously whether the regression coefficient of the independent variable influences the dependent variable or not. This is done through the F statistical and coefficient of determination tests (R square).

Statistical F test

The F test aims to see how the independent variables influence simultaneously or together on the dependent variable. If the probability value > F is greater than 5%, then H0 is accepted, or H1 is rejected. In other words, when H0 is accepted, the independent variables simultaneously or together do not affect the dependent variable. If the prob > F value is smaller than 5% then H1 is accepted or H0 is rejected. In other words, when H1 is accepted, the independent variables simultaneously or jointly influence the dependent variable (Wooldridge, 2019). The results of the statistical f-test can be seen in the table below.

Table 5. F Test Statistics.

Prob > F	F Statistics
0,0295	4,44

Source: Primary Data Processed in 2023

The table above (table 5) shows that Prob > F is 0.0295, meaning 0.0295 < 5 %. This indicates that H1 is accepted or H0 is rejected; in other words, the independent variables simultaneously or jointly influence the dependent variable.

Coefficient of determination test (R square)

The $R2$ test (coefficient of determination) aims to see how the independent variable can explain the dependent variable in the regression model. $R2$ is the percentage of sample variation in y explained by x (Wooldridge, 2019). If the value of $R2 = 1$, then all the independent variables used in the regression model can explain the dependent variable by 100%, while the value of $R2 = 0$. It shows that all the independent variables used in the regression model cannot explain the dependent variable by 0%. In other words, the independent variable outside the regression model can explain the dependent variable.

Table 6. Determination Coefficient Test (R Square).

R- squared
0,6638

Source: Secondary Data Processed in 2023

The table above shows that the value of *R*2 (squared) is 0.6638. This means that the Independent variable in the regression model can explain the dependent variable by 66.38%, and the remaining 33.62% is the Independent variable outside the regression model, which explains the dependent variable.

Partial Test

The Partial Test is used to see whether there is a significant or insignificant influence between the independent and dependent variables. The Partial Test is seen from the P value
> |t| and t statistics. Specifically, this research describes the partial Test based on the P value > |t|.

Table 7. Partial Test.

Variabel	**Koefisien**	**T**	**P > |t|**
Sugar Consumption Rate	-7324,826	-0,35	0,733
GDP Per Capita	0,0391859	3,95	0,003 ***
Sugar Import Tariffs	-0,8573575	-0,71	0,494
Price of Imported Sugar	-0,1659137	-2,14	0,061 *

Source: Secondary Data Processed in 2023

Note: *, *** is significant at α of 10%, 1%.

Based on table 7, the results of the test analysis are P > |t| can be described as follows:

1. P-value> |t| the rate of sugar consumption is 0.733. This value shows that 0.733 > 0.05, so it automatically accepts H0 and rejects H1, so it can be concluded that the rate of sugar consumption has no significant effect on the quantity of raw crystal sugar imports from Thailand.
2. P-value> |t| on GDP (gross domestic product) per capita of 0.003.

This value shows that 0.003 < 0.01, so it automatically accepts H1 and rejects H0, so it can be concluded that GDP (gross domestic product) per capita significantly affects the quantity of raw crystal sugar imports from Thailand with a confidence level of 99 %.

3. P value > |t| on Sugar Import Tariff of 0.494. This value shows that 0.494 > 0.1 means automatically accepting H0 and rejecting H1, so it can be concluded that the Sugar Import Tariff has no significant effect on the quantity of raw crystal sugar imports from Thailand.
4. P value > |t| on Imported Sugar Prices of 0.061. This value shows that 0.061 < 0.1 means automatically accepting H1 and rejecting H0, so it can be concluded that the price of imported sugar significantly affects the quantity of raw crystal sugar imports from Thailand with a confidence level of 90%.

The first variable that significantly influences quantity is GDP (gross domestic product) per capita. This research shows that GDP (gross domestic product) has a significant positive effect on the quantity of imported sugar. This happens because an increase in gross domestic product (GDP) indicates an increase in consumer purchasing power in Indonesia, which has implications for an increase in imported sugar when domestic sugar production cannot meet domestic sugar production. The results of this study are the same as those of Putri (2022), who states that GDP positively impacts the quantity of imports.

The following variable is the price of imported sugar, which significantly negatively affects the quantity of imported sugar. This research shows that the price of imported sugar hurts the quantity of imported sugar. The logical reason for the negative relationship between the two variables above is that the increase in the price of imported sugar from Thailand causes consumers in Indonesia to switch to consuming domestic sugar because the price of domestic sugar is lower than the price of imported sugar, so the demand for imported sugar decreases. The results of this study are the same as the study of Rivki., et al (2017) Different results were shown in Putri (2022) study, which stated that the price of imported goods positively affected the quantity of imports. The logical reason is that even though the price of imported goods has increased, domestic production cannot meet domestic consumption, so demand for imported goods has increased.

CONCLUSION

This study aims to determine the factors influencing the quantity of raw crystal sugar imports from Thailand to Indonesia. This study found that increasing Indonesia's GDP per capita significantly increased the quantity of raw crystal sugar imports from Thailand. However, the increase in imported sugar prices significantly reduced the quantity of raw crystal sugar imports from Thailand. The increase in the price of imported sugar, which reduces the quantity of imported sugar, can be used as momentum by the government to meet domestic sugar demand. One of them is that the government is expected to revitalize sugar factories to increase domestic sugar production and overcome the shortage of imported sugar for domestic consumption.

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