

Soybeans Import of Indonesia: What Makes Happen? (A Case in Indonesia)

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Abstract. Soybean is one of the government's food crop commodities intended for self-sufficiency. The disparity between national soybean output and consumption resulted in a deficit, resulting in a high level of imports. The large volume of Indonesian soybean imports, which is constantly rising, must be decreased, hence the goal of this study is to examine the variables that impact soybean imports. Secondary data in the form of panel data is used in this study. In this study, quantitative analysis was used as the method of analysis. Panel data regression analysis was employed as the quantitative analysis strategy. There are three variables that have a significant influence on soybean imports in Indonesia, according to the t-test statistic with a significance level of 5%, namely Indonesia's GDP per capita, soybean import prices in America, Canada, and Malaysia, and soybean import production in America, Canada, and Malaysia. Malaysia. Based on the results of statistical testing, it is known that Indonesia's GDP per capita, soybean import prices in America, Canada, and Malaysia, and soybean production in America, Canada, and Malaysia have a significant effect on soybean imports in Indonesia. However, the per capita income of the soybean-exporting country has no significant effect on Indonesia's soybean imports. The increase in GDP per capita indicates an increase in domestic consumption which will eventually encourage soybean imports.

Keywords: Consumption, Food Crop, Import, Soybeans, Self-sufficiency

1 Introduction

Soybean is one of the government's food crop commodities intended for self-sufficiency. This is demonstrated by the government's special efforts program (Upsus) for Indonesian food self-sufficiency, which includes soybeans in addition to rice and corn commodities in the special efforts program for rice, corn, and soybean self-sufficiency. The importance of soy self-sufficiency is based on two fundamental reasons. First soybeans are a source of cheap protein for the people of Indonesia that has been going on for a long time. So that when the amount of soybean production does not meet the number of needs, it will be a weak titik to various aspects including social, economic, and political. The second reason for the inability to self-sufficiency will quickly reduce foreign exchange which will be the country's weak point in the wider aspects and spectrum [1], [2]. According to statistics from the Central Statistics Agency (2017) [4], 84.6 percent of the total supply of 2.45 million tons of soybeans was utilized as food components in 2017, while 15.4 percent was used for other purposes.

As a source of vegetable protein, soybean is one of Indonesia's most important commodities. In addition to its usefulness as a consumption material, soybeans also have an important role as industrial raw materials for both the food and non-food industries. Soybean needs for food production such as tofu, tempeh, oncom, tauco and milk require soybeans by more than 80 percent, then non-food industrial raw materials such as paper, watercolors, ink and textiles require soybeans by 10 percent and 10 percent of the remaining is used for other needs [5]. But in other hand, domestic production is only able to produce an average of less than 15% every year [6]. According to Table 1, national soybean production fell from 2002 to 2003. Soybean production fell from 0.67 million tons in 2002 to 0.66 million tons in 2003. In 2004, output increased by 0.73 million tons, marking the third consecutive year of growth. Soybean production reached 0.80 million tons in 2005. In 2006, output fell to 0.74 million tons, down from 0.75 million tons in 2005. In 2007, there was a 0.15 million ton decrease in soybean output. This is due to a 0.12 million ha drop in soybean harvested area during that year. Domestic soybean output climbed to 0.97 million tons from 2008 to 2009. Some of the production declines that happened in the year

This is a result of the 0.72 million hectares of soybean harvested area being added. After 2009, however, soybean output fell for the next four years, namely 2010, 2011, 2012, and 2013. Soybean production fell to 0.78 million tons in 2013. This was due to a decline in soybean harvested area to only 0.55 million hectares across the four years. However, between 2014 and 2015, soybean output grew to 0.96 million tons, the most in the prior 16 years. The government's food self-sufficiency program for rice, corn, and soybeans has had a favorable impact, as the area planted with soybeans has grown to 0.61 million hectares.

Furthermore, technical advancements in seed supply have been able to boost soybean output to 1,569 kg/ha in 2015, the greatest level in the previous 16 years. Soybean production fell precipitously after 2015, reaching only 0.29 million tons in 2020, the lowest level in the prior 19 years. As a result of the incentives obtained, soybean producing land has been converted to other more profitable agricultural sectors. Even though the production level was still reasonably high at 1,160 kg/ha, soybean harvesting only left around 0.54 million hectares in 2017. Advances in soybean growing technologies have resulted in increased production. However, because productivity increase has lagged behind the pace of loss in harvested area, soybean output has failed to satisfy demand.

Soybean is a commodity that originates from a subtropical country rather than Indonesia. As a result, Indonesian soybean output lags behind that of subtropical nations such as America, Brazil, Argentina, China, India, and Paraguay, which account for 92.04 percent of global soybean production of 271.02 million tons [6]. Furthermore, soybean is not a food crop that farmers plant as a staple and priority. This is due to farmers' decreased interest in growing soybeans, which are less competitive and have a lower economic value than other food crops like rice and corn. The decreased trend in soybean harvested area in Indonesia from 2002 to 2017 reflects this situation.

Soybean is an important food commodity because, in addition to being a good source of protein, it is also inexpensive [7]. Tofu, tempeh, tauco, oncom, and soy milk are processed products made from soybean commodities as food components. In Indonesia, however, soybeans are primarily used as a raw ingredient for creating tempeh and industrial raw materials [8]. Soybeans may also be used as animal feed in Lebanon, which is one of the nations that rely on imports of soybeans [9]. Domestic production can only meet roughly 35% of overall national soybean demands, with the balance coming from imports.

On the other hand, the trend of soybean productivity which has increased every year is due to the influence of technological developments. this causes soybean production to have a

relatively small increasing trend. Meanwhile, national soybean consumption has an increasing trend every year. This is due to the high demand and public consumption of soybeans as a food source of vegetable protein, an increase in the population of Indonesia and an increase in public awareness of their health level. This indicates that there is a gap between soybean production and consumption which significantly affects the fulfillment of national soybean availability where domestic soybean production is only able to meet domestic needs of no more than 15 percent.

Therefore, most of the domestic soybean needs or 77 percent must be met from imports in 2020 (Central bureau of statistics, 2020). There is an imbalance between national soybean production and consumption resulting in a deficit so that imports are still high [10]. The volume of imports of Indonesian soybeans, which are quite high and always increasing, must be reduced. Based on the above background, the formulation of the problem raised by the author in this study is as follows (1) How are the effects of GDP, GDP per capita, import prices of soybeans and soybean production on soybean imports in Indonesia? (2) How big is the influence of GDP, GDP per capita, soybean import prices and soybean production on soybean imports in Indonesia?

Furthermore, import operations are linked to a variety of other economic factors. If domestic output is insufficient to meet national demands, imports must be used to bridge the gap. Imports can be minimized by increasing domestic output, such as by expanding the planted area and improving productivity. Meanwhile, increased local soybean output will result in a reduction in Indonesian soybean imports [11].

Meanwhile, the influence of pricing on imports is that if domestic soybeans are more expensive than imported soybeans, individuals will opt to buy imported soybeans since they are less expensive. Meanwhile, demand for imported soybeans is expected to rise, increasing the country's reliance on imports [12].

2 Methods

This study makes use of secondary data in the form of panel data, which includes time series data for the years 2010 to 2019 as well as cross-sectional data from the United States (USA), Canada, and Malaysia. The three nations chosen are meant to represent the entire volume of soybeans imported by Indonesia. This is due to the fact that the three chosen nations have an average import share of nearly 100%, accounting for 99.85% of total soybean imports. The optimal model is chosen from Pooled Least Square, Fixed Effect Model, and Random Effect Model before the data is analyzed [13].

In this study, quantitative analysis was used as the method of analysis. Panel data regression analysis was utilized as the quantitative analytic approach to investigate the factors that impact soybean imports in Indonesia from three soybean exporting nations.

$$Y_{it} = \alpha - \beta_1 GDP_INDONESIA_{it} - \beta_2 GDP_CAPITA_{it} + \beta_3 PRICE_IMPORT_{it} + \beta_4 PRODUCTION_{it} + e_{it}$$

Whereas: Y_{it} : Indonesian soybean import volume; α : Constant; $\beta_1, \beta_2, \beta_3, \beta_4$: Coefficient; $GDP_INDONESIA$: Indonesian Per capita GDP; GDP_CAPITA : Import countries Per capita GDP; $PRICE_IMPORT$: Soybeans import price; $PRODUCTION$: Origin countries

soybean production; e: Error term; i: Countries (USA, Canada, Malaysia); t: time series 2010-2019.

The hypothesis in this research is:

- H01: The are any positive influence between Indonesian percapita GDP towards Indonesian soybeans import volume.
- H02: The are any negative influence between import countries percapita GDP towards Indonesian soybeans import volume.
- H03: The are any positive influence between soybeans import price towards Indonesian soybeans import volume.
- H04: The are any positive influence between origin countries soybeans production towards Indonesian soybeans import volume.

3 Result and Discussion

Indonesia buys roughly 2 million tons of soybeans from the United States each year. This is due to the fact that America supplies the bulk of the world's imported soybean needs [14]. According to UN Comtrade data, the United States, Canada, and Malaysia are the only nations that consistently export soybeans to Indonesia.

From year to year, soybean demand continues to increase, but on the other hand, the gap between soybean production and demand for the past decades has led to dependence on imported soybeans [14]. Looking at the trend of existing data, the largest increase in import volume was in 2017 with an increase of more than 510 thousand kilograms of soybeans from the previous year. The gap that has occurred so far is caused by unstable soybean production and tends to fluctuate from year to year, while on the consumption side it is also noted that fluctuations are often unpredictable [15]. The instability of soybean production and consumption has made imports a way that the government continues to use in meeting domestic soybean needs [16].

The Chow Test, Hausman Test, and Langrange Multiplier Test are used to pick the optimal model for panel data regression before processing the data [13]. Based on the findings of the Chow test to determine the best model between the Pooled Least Square model and the Fixed Effect model, the Pooled Least Square model is the best model. This is demonstrated by the probability value in the Chow test (table 1), which is 1, indicating that the likelihood is more than 5%. Accepting H0, the best model is the Pooled Least Square Model, is the only conclusion that can be formed.

Table 1. Best Model Panel Test

Test	F-Statistics	Hypothesis and Results
Chow Test	1.0000	H0: CEM is the best model (p-value > 5%) H1: FEM is the best model (p-value < 5%) Result : H0 rejected, CEM is the best model
Lagrange Multiplier Test	0.1967	H0: CEM is the best model (p-value > 5%) H1: REM is the best model (p-value < 5%) Result : H0 rejected, REM is the best model

Source: Data Processed

Following the Chow test, the next step is to determine whether the Pooled Least Square Model or the Random Effect Model is the optimal model. Pooled Least Square is the best model based on the Lagrange Multiplier Test findings. The Lagrange Multiplier Test, which has a value of 0.1967, which signifies greater than 5%, rejects H1 and accepts H0, indicating that the Pooled Least Square model is the best model in this regression.

Normality test is used to see whether the residual value is normally distributed or not. The normality test was tested using the Jarque-Bera value with the following hypothesis:

H0: 5% > Jarque-Bera Probability

H1: 5% < Jarque-Bera Probability

Table 2. Normality Test

Jarque-Bera	0,915103
Probability	0,632831

Source: Data Processed

Based on the table above, the probability value of Jarque-Bera is more than 5% so that H0 is accepted and H1 is rejected, which means that the data in model 1 is normally distributed.

The multicollinearity test aims to determine whether the regression model has a correlation between independent variables or independent variables. To test multicollinearity, it can be done by looking at the correlation matrix value for each independent variable, if there is no value > 0.90, it can be concluded that the data is free from multicollinearity symptoms (Ghozali, 2018).

Table 3. Multicollinearity Test

	GDP	GDP_CAPITA	PRICE_IMPORT	PRODUCTION
GDP	1,00000	0,73740	0,30260	0,90964
GDP_CAPITA	0,73740	1,00000	0,56548	0,66741
PRICE_IMPORT	0,30260	0,56548	1,00000	0,35902
PRODUCTION	0,90964	0,66741	0,35902	1,00000

Source: Data Processed

Based on the table above, the variables GDP, GDP Per capita, Price, and Production have their respective coefficient values (0,73740; 0,30260; 0,90964; 0,66741). This shows that the independent variables are not correlated between variables because each coefficient value is more than 0.9.

Heteroscedasticity test is a test that assesses whether there is an inequality of variance from the residuals for all observations in the linear regression model. The model affected by heteroscedasticity can be seen from the obs*R-Squared value if the p value is more than 0.05, then there is no heteroscedasticity. The model in this study has an obs*R-Squared value of 9.8692, this indicates that the model is not affected by heteroscedasticity.

Table 4. Heteroscedasticity Test

F-Statistic	2,0201
Obs*R-Squared	9,8692

Source: Data Processed

The autocorrelation test aims to test whether in the linear regression model there is a correlation between the confounding error in period t and the error in the previous period $t-1$. If there is a correlation, it is called an autocorrelation problem. Autocorrelation arises because successive observations over time are related to each other. The model in this study was exposed to a positive autocorrelation as indicated by the Durbin-Watson value of 1,312624. However, this is not a problem because this research model is panel data regression.

Table 5. Autocorrelation Test

Mean dependent var	7.68E+08
S.D. dependent var	4.89E+08
Akaike info criterion	42.54938
Schwarz criterion	42.73620
Hannan-Quinn criter.	42.60914
Durbin-Watson stat	1.312624

Source: Data Processed

There are three variables that have a significant influence on soybean imports in Indonesia (table 1), according to the t-test statistic with a significance level of 5%, namely Indonesia's GDP per capita, soybean import prices in America, Canada, and Malaysia, and soybean import production in America, Canada, and Malaysia. Malaysia. The statistical t test revealed that importing nations' GDP per capita, such as the United States, Canada, and Malaysia, had no significant impact on the amount of Indonesian soybean imports.

Table 6. Estimation Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.77E+09	1.20E+09	-2.305535	0.0294
GDP	-0.000853	32928.47	2.737039	0.0110
GDP_CAPITA	-4.40	0.665432	2.566743	0.0537
PRICE_IMPORT	2096.623	701.2006	2.990048	0.0060
PRODUCTION	-1.754157	0.485166	-3.615584	0.0013
R-squared	0.416179	Mean dependent var		7.68E+08
Adjusted R-squared	0.348815	S.D. dependent var		4.89E+08
S.E. of regression	3.95E+08	Akaike info criterion		42.54938
Sum squared resid	4.05E+18	Schwarz criterion		42.73620
Log likelihood	-634.2406	Hannan-Quinn criter.		42.60914
F-statistic	6.178071	Durbin-Watson stat		1.312624
Prob(F-statistic)	0.002590			

Source: Processed Data

This model has a probability value of 0.000000, which is less than 5%, according to the findings of the F-statistical probability test. This demonstrates that the variables in this model, namely Indonesia's GDP per capita, the GDP per capita of soybean importers in America, Canada, and Malaysia, soybean import prices, and soybean output in America, Canada, and Malaysia, are all qualified to be employed as estimators. and have a large impact when combined.

Indonesia's GDP per capita has a coefficient value of -0.000853 with a probability value of 0.00853, according to the table of estimation findings above. This demonstrates that Indonesia's GDP is linked to the level of soybean imports in the country. The probability value

of Indonesia's GDP per capita, which is lower than the 5% level, demonstrates this. With the assumption of *ceteris paribus*, the coefficient of Indonesia's GDP per capita is -0.000853, which indicates that for every 1 unit rise in Indonesia's GDP, the amount of Indonesian soybean imports will fall by 0.000853 unit.

The findings of this study agree with previous study [17], who discovered that Indonesia's GDP per capita has a considerable negative impact on the amount of soybean imports. It is explained that in the short term the influence of negative GDP per capita on soybean import volume has a significant effect while in the long term the negative influence of GDP per capita on the volume of soybean imports is not significant. But the opposite, findings [18] study, which implies that if Indonesia's GDP per capita rises, so would the purchasing power and public consumption of Indonesian apples. According previous study [19], Indonesia's GDP per capita has a considerable impact on the volume of soybean imports. GDP per capita. This is because of the high and low demand for beef in Indonesia, which is determined by people's wealth.

Each nation of origin's GDP per capita, namely America, Canada, and Malaysia, has a coefficient of -4.40 and a probability of 0.0537. Because the probability value of America's, Canada's, and Malaysia's GDP per capita exceeds the 5% real threshold, the GDP per capita of each importing nation has no influence. However, the coefficient value indicates that for every 1% rise in GDP per capita in the United States, Canada, and Malaysia, the volume of imported soybeans will fall by 4.40 percent. The findings of this study in line with previous study [17], who discovered that GDP per capita has a negative and minor impact on soybean import volume [20], who claims that every dollar rise in the country's real GDP per capita leads in a USD 1 increase in the country's real GDP per capita.

The import price of Indonesian soybeans in importing countries such as America, Canada, and Malaysia has a coefficient value of 2096.623 with a probability value of 0.0077. With a probability that is less than the 5% significance level, this indicates that the price of Indonesian soybean imports has a significant relationship to the volume of Indonesian soybean imports. The coefficient value of 1.38% indicates that each increase in the price of Indonesian soybean imports in the United States, Canada, and Malaysia will increase the volume of Indonesian soybean imports by 10.96 percent. The results of this study are in line with the previous findings [21] that soybean import prices have a positive and significant impact on the volume of soybean imports in Indonesia both in the long and short term.

The results of the study are not in line with previous study [19], which states that the variable price of imported soybeans has no significant effect on the volume of imported soybeans due to the comparison of the price of imported soybeans being cheaper than the price of domestic soybeans in 2001 to 2017 so that the price situation cheaper imported soybeans. Soybean prices have a significant effect on the volume of soybean imports if the soybean price increases it will increase soybean imports in Indonesia.

This is an unusual discovery, given that previous research shows that an increase in commodity prices in the place of origin causes imports to decrease. This might be owing to a shortage of local soybean supply in Indonesia, and this sort of product is irreplaceable. Finally, at whatever basic price level, this has an influence on the requirement for high imports.

The coefficient value of imported soybean production in America, Canada, and Malaysia is 0.001, with a probability value of 0.0000. The likelihood value is less than 5%, indicating that the volume of imported soybeans in Indonesia has a substantial association with the output of imported soybeans in America, Canada, and Malaysia. The coefficient value of imported soybean production in importing nations is 0.001, meaning that a 1% increase in soybean output in the United States, Canada, and Malaysia will result in a 0.001% rise in

import volume in Indonesia. As a result of increased soybean output in importing nations, Indonesia will import more soybeans from the United States, Canada, and Malaysia.

The findings of this study discovered that local soybean production has a negative and substantial impact on the amount of soybean imports in Indonesia [22] [23], claiming that soybean output had a substantial impact on soybean imports in Indonesia from 1981 to 2011. This study found that soybean output had a major impact on import fluctuations in Indonesia. The findings of this study show that soybean output has a substantial impact on Indonesia's soybean import volume [23] [24].

4 Conclusion and Suggestion

Based on the results of statistical testing, it is known that Indonesia's GDP per capita, soybean import prices in America, Canada, and Malaysia, and soybean production in America, Canada, and Malaysia have a significant effect on soybean imports in Indonesia. However, the per capita income of the soybean-exporting country has no significant effect on Indonesia's soybean imports. The increase in GDP per capita indicates an increase in domestic consumption which will eventually encourage soybean imports. On the production side, it also shows that an increase in production volume in the country of origin will cause soybean exports to Indonesia to also increase. However, the increase in import prices in this research actually causes an increase in Indonesian soybean imports. This is a varied finding, considering that other research results show that an increase in commodity prices in the country of origin will actually cause imports to decline. In the case of Indonesia this may be due to the lack of local supply of soybeans and this type of commodity is irreplaceable. Finally, this has an impact on the need for high imports at any basic price level.

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