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DETERMINANTS OF SOYBEAN IMPORT DEPENDENCE IN INDONESIA

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Abstract. The phenomenon of soybean import dependence in Indonesia refers to a chronic condition in which the majority of the country's soybean demand is met through imports due to the highly limited and declining domestic production. Soybeans are a strategic food commodity in Indonesia, particularly as the primary raw material for tofu and tempeh, which are widely consumed by the population. However, the high Import Dependency Ratio (IDR) for soybeans reaching 90.05% in 2021 indicates that Indonesia remains heavily reliant on imported supplies to meet domestic needs. This dependence poses risks to national food security due to global price fluctuations, exchange rate volatility, and potential distribution disruptions. This study aims to analyze the effects of soybean production, soybean consumption, inflation, and the Rupiah-to-USD exchange rate on soybean import dependence in Indonesia. A quantitative approach was employed, using multiple linear regression models with annual time series data from 1989 to 2023. The dependent variable is the Import Dependency Ratio (IDR), while the independent variables consist of soybean production, soybean consumption, inflation, and the U.S. Dollar exchange rate. The results reveal that, partially, soybean consumption and the exchange rate have a positive influence on soybean import dependence, while soybean production and inflation have a negative influence. Simultaneously, all four variables significantly affect the IDR. The findings suggest the need for strategies to boost domestic production and stabilize the exchange rate to reduce soybean import dependence and strengthen national food security.
Keywords: Soybean Import Dependence, Soybean Production, Soybean Consumption, Inflation, U.S. Dollar Exchange Rate

INTRODUCTION

Indonesia is endowed with abundant natural resources and holds significant potential in the development of agricultural commodities. Its agricultural output is diverse and plentiful, serving both domestic needs and export markets. In 2022, agriculture contributed 12.4% to Indonesia's GDP for the broad agricultural sector and 9.22% for the narrow agricultural sector (Ministry of Agriculture, 2023). Within the same year, five agricultural subsectors contributed to GDP as follows: food crops (2.32%), horticulture (1.44%), plantation crops (3.76%), livestock (1.52%), and agricultural services and hunting (0.18%) (Ministry of Agriculture, 2022).

Despite these positive contributions from domestic production, Indonesia still shows considerable dependence on imports in several food crop subsectors.

According to GoodStats Data (2024) and the Food and Agriculture Organization (FAO), the country continues to rely on imports to meet specific food needs. In 2023, both the value and volume of imported commodities in several food crop subsectors exhibited significant fluctuations, reflecting changes in domestic demand and trade policies.

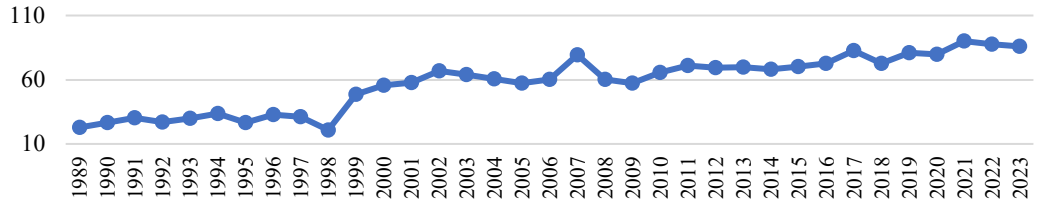
Within the food crop subsector, soybeans have the widest gap between local production and import volume. This is due to domestic soybean production being insufficient to meet national demand, while soybean consumption continues to rise in line with population growth and changing consumption patterns. Consequently, the government consistently imports soybeans, leading to persistent import dependence. The soybean import dependence phenomenon in Indonesia is a chronic situation in which most of the national soybean requirement is supplied through imports, as domestic production remains severely limited and shows a declining trend.

Soybeans are one of the most economically valuable food crops. Their development has been pursued intensively because they are linked to various sectors (Supriana et al., 2019). Soybeans rank among the top three staple food commodities in Indonesia's food crop subsector, alongside rice and maize. They have multiple uses, particularly as a raw material for the plant-based protein food industry and the livestock feed industry. In addition to being a source of plant protein, soybeans provide fats, minerals, and vitamins and can be processed into various products such as tofu, tempeh, tauco, soy sauce, and soy milk (Natalia et al., 2017).

Tofu and tempeh are especially popular among Indonesians, not only because of their high nutritional value but also due to their affordability and widespread availability. Consequently, soybean demand in Indonesia continues to increase in tandem with population growth. According to the Head of the Subdirectorate for Soybeans, Directorate of Cereals, Directorate General of Food Crops, Ministry of Agriculture, the government cannot significantly curb the flow of soybean imports. This is because soybeans are not classified as a "lartas" (restricted or prohibited) commodity. The government has stated that soybean imports may enter the country at any time and in any volume without requiring recommendations from any agency, including the Ministry of Agriculture (detikFinance, 2021).

Historically, the increase in soybean imports in Indonesia began in the 1980s, when the government adopted economic deregulation policies driven by international institutions such as the International Monetary Fund (IMF). For this reason, the present study covers the period from 1989 to 2023 to provide a comprehensive overview of the dynamics of soybean import dependence. The year 1989 was chosen as the starting point because it marks the beginning of consistent data availability from international institutions such as FAO and from domestic sources. It also coincides with the onset of intensified liberalization in the food sector and recurring food price pressures resulting from inflation and exchange rate fluctuations. The year 2023 was chosen as the end point because it represents the most recent year with complete data.

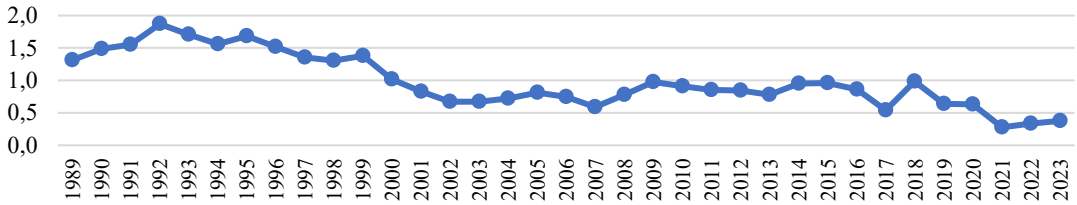
Indonesia's high dependence on soybean imports can be seen in Figure 1, which shows persistently high annual IDR values. Based on data from the Ministry of Agriculture and FAO, Indonesia's soybean IDR during 1989–2023 ranged from 22.90% to 85.98%, with the highest value recorded in 2021 at 90.05%, This means that more than 90 percent of the national soybean demand must be met through imports.low and unstable domestic production.



Source: Ministry of Agriculture and FAO (processed)

Figure 1. Import Dependency Ratio (IDR) of Indonesian Soybeans 1989-2023

This phenomenon is exacerbated by various obstacles such as land conversion, low incentives for soybean farmers, and the cheaper competitiveness of imported soybeans compared to local soybeans (Patrisia & Setiawina, 2022)

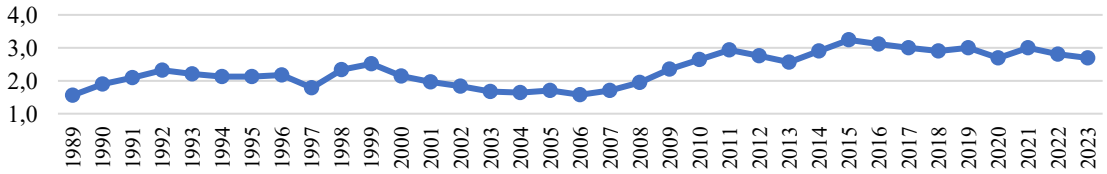


Source: BPS, Ministry of Agriculture, and FAO (processed)

Figure 2. Indonesian Soybean Production 1989-2023 (million tons)

This low domestic production reflects the continued challenges facing soybean farming in Indonesia. Although soybeans are a strategic food commodity, the number of farmers engaged in soybean farming is relatively limited compared to other commodities such as rice and corn. According to data from the Central Statistics Agency (BPS), in 2023, the five provinces with the highest number of soybean farmers in Indonesia were East Java (77,385 farmers), Central Java (26,144 farmers), the Special Region of Yogyakarta (24,763 farmers), West Nusa Tenggara (17,391 farmers), and West Java (5,830 farmers).

Figure 3 shows that soybean consumption in Indonesia fluctuates, tending to increase from year to year. From 1989 to 2023, soybean consumption in Indonesia



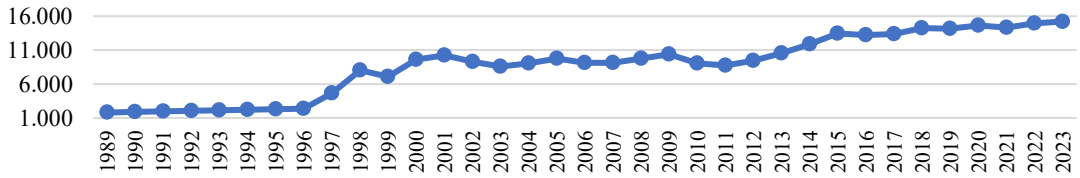
fluctuated.

Source: BPS and Ministry of Agriculture (processed)

Figure 1. Indonesian Soybean Consumption 1989-2023 (million tons)

This high soybean consumption is certainly not evenly distributed across Indonesia, but rather concentrated in provinces with large populations and high consumption of soy-based products. According to data from the Central Statistics Agency (BPS), in 2023, the five provinces with the highest household soybean consumption in Indonesia were West Nusa Tenggara (2.73,000 tons), West Java (2.36,000 tons), East Java (1.89,000 tons), Central Java (1.30,000 tons), and Banten (0.71,000 tons).

Furthermore, inflation is also a factor that can affect soybean import volumes. High inflation leads to increases in the prices of goods and services in general, including staple foods like soybeans. This directly reduces purchasing power, especially among low- to middle-income groups, resulting in decreased consumption of these food commodities.



Source: Central Statistics Agency

Figure 4. Inflation in Indonesia 1989-2023 (percent)

From 1989 to 1997, inflation in Indonesia was relatively stable, hovering around single digits, before sharply increasing in 1998 due to the monetary crisis, which caused inflation to reach 77.6 percent, the highest in Indonesian history. This spike was triggered by the plummeting Rupiah exchange rate against the US Dollar, which briefly reached Rp17,000 per USD. Inflation began to decline in 1999 as a result of stabilization policies and cooperation with the IMF. Entering the 2000-2008 period, inflation showed a fluctuating pattern but was generally controlled, although it spiked in 2005 and 2008 due to rising global oil prices and domestic fuel price adjustments, which had a broad impact on the prices of basic necessities. Thereafter, from 2009 to 2023, inflation tended to be more stable in the range of 4–7 percent, reflecting the resilience of the Indonesian economy after the global crisis. Inflation weakened sharply in 2020 due to the COVID-19 pandemic, which suppressed demand, before rising again in 2021–2022 due to disruptions to global supply chains, the Russia–Ukraine conflict, and rising fuel prices. 2022 saw the highest inflation peak during this period, but it was successfully suppressed in 2023 thanks tostabilization of domestic supply and effective economic policies.

Source: Ministry of Trade

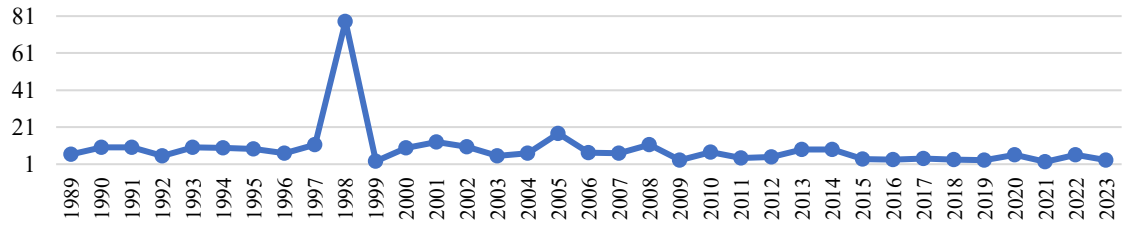


Figure 5. United States Dollar Exchange Rates 1989-2023 (Rupiah)

Besides inflation, the US dollar exchange rate also affects soybean import volumes. The rupiah exchange rate is a relative price, defined as the value of one currency against another. It determines the purchasing power, at least for goods traded, of one currency against another. Changes in the exchange rate significantly impact the prices of traded goods. An appreciation in a country's rupiah will lower the prices of its exports and increase import prices for its trading partners.(Hardianti & Setiawina, 2021).

Most previous studies used data up to 2019, thus not accounting for the impact of the COVID-19 pandemic and subsequent global price fluctuations. Therefore, more comprehensive research over a longer period is needed to understand the determinants of Indonesia's soybean import dependence. Furthermore, although the IDR indicator is highly relevant, according to a review of several studies, studies specifically examining the factors influencing Indonesia's soybean import dependence are still relatively limited.

Based on this explanation, it is advisable to conduct research on the Determinants of Soybean Import Dependence in Indonesia in the period 1989-2023. In addition to inflation, the U.S. Dollar exchange rate also influences the volume of soybean imports. The Rupiah exchange rate represents a relative price, defined as the value of one currency in relation to another. It determines purchasing power, particularly for goods traded between different currencies. Changes in the exchange rate significantly affect the prices of traded goods. An appreciation of the Rupiah in a given country will lower the price of its exports and increase the price of imports for its trading partners (Hardianti & Setiawina, 2021).

Most previous studies used data only up to 2019, thus failing to capture the impacts of the COVID-19 pandemic and subsequent global price fluctuations. Therefore, a more comprehensive study is needed, covering a longer period to better understand the determinants of soybean import dependence in Indonesia. Moreover, although the Import Dependency Ratio (IDR) is a highly relevant indicator, a review of existing literature indicates that specific research examining the factors affecting soybean import dependence in Indonesia remains limited. Based on this rationale, the present study investigates theDeterminants of Soybean Import Dependence in Indonesia over the period 1989–2023.

METHOD

This study employs a quantitative associative approach to analyze the relationships between soybean production, soybean consumption, inflation, and the U.S. Dollar exchange rate with soybean import dependence in Indonesia during the 1989–2023 period. The research is conducted in Indonesia due to the phenomenon of declining local soybean production, rising consumption, and the inability of domestic production to meet demand, resulting in high import dependence.

The research object comprises annual data for 35 years, obtained from various institutions including Statistics Indonesia (BPS), the Ministry of Agriculture, the Food and Agriculture Organization (FAO), and the Ministry of Trade. Secondary numerical (quantitative) data were collected through non-behavioral observation (Sugiyono, 2020; Hardani et al., 2020; Bungin, 2017).

The analytical technique used is multiple linear regression with the Ordinary Least Squares (OLS) method, in which the dependent variable is transformed into

logarithmic form, processed using EViews 12 software. The regression model is tested both simultaneously (F-test) and partially (t-test) to determine the effect of each independent variable on the dependent variable, namely soybean import dependence. Prior to hypothesis testing, classical assumption tests are conducted, including normality (Jarque-Bera test), multicollinearity (Variance Inflation Factor and tolerance), heteroskedasticity (White test), and autocorrelation (Breusch-Godfrey test), to ensure the validity of the regression model (Wooldridge, 2021; Gujarati, 2003).

Operational definitions of the variables are clearly formulated for better understanding: soybean import dependence is measured using the Import Dependency Ratio (IDR) according to FAO standards; soybean production and consumption are expressed in million tons per year; inflation is expressed as a percentage; and the Rupiah exchange rate against the U.S. Dollar is expressed in Rupiah units. All data are annual and analyzed to determine both the simultaneous and partial effects on soybean import dependence in Indonesia (FAO, 2023; BPS, 2024; Ministry of Trade, 2023; Ministry of Agriculture, 2023).

RESULT AND DISCUSSION

Results of Multiple Linear Regression Analysis

The results of the multiple linear regression analysis of the effects of soybean production (X1), soybean consumption (X2), inflation (X3), and the U.S. Dollar exchange rate (X4) on soybean import dependence in Indonesia (Y), obtained from data processing using EViews (Econometric Views) version 12, are as follows.

Table 1. Multiple Linear Regression Analysis

Variables	Coefficient	Std. Error	t-Stat	Prob.
C	4.012640	0.199513	20.11213	0.0000
PRODUCTION	-0.450122	0.146414	-3.074304	0.0045
CONSUMPTION	0.060664	0.076412	0.793910	0.4335
INFLATION	-0.012145	0.002703	-4.492896	0.0001
EXCHANGE RATE	4.13E-05	1.66E-05	2.498198	0.0182
R-Squared	0.913303	Mean dependent var		3.970723
Adjusted R-Squared	0.901743	SD dependent var		0.440561
SE of regression	0.138098	Akaike info criterion		-0.990146
Sum squared residual	0.572130	Schwarz criterion		-0.767953
Log likelihood	22.32755	Hannan-Quinn criter.		-0.913445
F-Stat	79.00824	Durbin-Watson stat		1.120640
Prob(F-Stat)	0.000000			

Source: data processed by researchers, 2025

Based on the results in table 1, the following regression model equation was obtained.

$Log\_Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu_i$
Log_Y = 4.012640 – 0.450122X1 + 0.060664X2 – 0.012145X3 + 0.000413X4
SE = (0.19951)(0.14641)(0.07641)(0.00270)(0.0001)
t_{stat} = (20.1121)(-3.07430)(0.79391)(-4.49289)(2.49819)
Prob. = (0.0000) (0.00045) (0.4335) (0.0001) (0.0182)
Fstat = 79.00824
Prob. = 0.000000

The results of the multiple linear regression analysis equation above obtained a constant value of 4.012, which means the constant has a positive value so that the dependent variable of soybean imports (Y) is influenced by the four independent variables, namely soybean production, soybean consumption, inflation, and the US Dollar exchange rate.

Classical Assumption Test Results

1. Normality Test

A normality test is performed to determine whether, in a regression model, an independent variable and a dependent variable, or both, have a normal or non-normal distribution. If a variable is not normally distributed, the statistical test results will decrease. Data normality testing can be performed using the Jarque-Bera test in the Eviews application, with the condition that if the Jarque-Bera probability is > 0.05, the data has a normal distribution, whereas if the Jarque-Bera probability is < 0.05, the data does not have a normal distribution.

Table 1. Normality Test

Jarque Bera	2.893810
Probability	0.235297

Source: data processed by researchers, 2025

The data transformation performed was semi-log, converting the dependent variable to a logarithm. The dependent variable was changed to Log_IDR, and after data transformation, the data were found to have a normal distribution with a Jarque-Bera probability of 0.235. The regression model after semi-log data transformation is:

$Log\_Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \mu_i$ ……(4.1)

2. Autocorrelation Test

The autocorrelation test is defined as the correlation between observations measured based on the time series in a regression model, or in other words, an observation is influenced by the error of the previous observation. As a result of the presence of autocorrelation in a regression model, the obtained regression coefficient becomes inefficient, meaning the error rate becomes very large and the regression coefficient becomes unstable.(Gujarati, 2003)A good test model is free from autocorrelation. One way is to use the Breusch-Godfrey Serial Correlation LM Test. By using the Breusch-Godfrey test, there is a hypothesis if the probability value ≥ 0.05 then H0 is rejected and H1 is accepted, this means there is no autocorrelation. Conversely, if the probability value ≤ 0.05 then H0 is accepted and H1 is rejected, this means there is autocorrelation.

Table 3. Autocorrelation Test

F-Stat	1.573894	**Prob. F (2,28)**	0.2250
Obs*R-Squared	3.537092	**Chi-Square Prob. (2)**	0.1706

Source: Data processed by researchers, 2025

Based on Table 3, using the Breusch-Godfrey test, the probability for the F-Statistic is 0.225, and the Chi-Square probability for Obs*R-Squared is 0.170. Since all probabilities have a value ≥ 0.05, there is no autocorrelation.

3. Heteroscedasticity Test

The heteroscedasticity test aims to determine whether there is inequality in the variance of the residuals from one observation to another in the regression model. If the variance from the residuals from one observation to another remains constant, it is called homoscedasticity, and if it varies, it is called heteroscedasticity. A good regression model is one that is homoscedastic or does not experience heteroscedasticity. One way to determine the presence or absence of heteroscedasticity in a multiple linear regression model is to use the White test. If the probability value is <0.05, there is a heteroscedasticity problem, while if the probability value is >0.05, there is no heteroscedasticity problem.

Table 4. Heteroscedasticity Test

F-Stat	0.776717	**Prob. F (4,30)**	0.5491
Obs*R-Squared	3.284527	**Chi-Square Prob. (4)**	0.5114
Scaled explainedSS	3.876903	**Chi-Square Prob. (4)**	0.4229

Source: Data processed by researchers, 2025

Based on table 4, using the White test, the probability for each F-Statistic is 0.549, the Chi-Square probability for Obs*R-Squared is 0.511, and the Chi-Square probability for Scaled explained SS is 0.422. Because all probabilities have a probability value > 0.05, there is no heteroscedasticity problem.

4. Multicollinearity Test

The multicollinearity test aims to determine whether a regression model contains correlations between independent variables. Multicollinearity can be determined by measuring the variance inflation factor (VIF). A VIF value <10 indicates that the regression model is free from multicollinearity. Conversely, a VIF value >10 indicates that the regression model exhibits multicollinearity.

Table 5. Multicollinearity Test

Variables	VIF
Product	6.932616
Consum	2.640873
Inflation	1.168664
USD	9.560677

Source: data processed by researchers, 2025

Based on the results of data analysis in table 5, it shows that the Variance Inflation Factor (VIF) value in the independent variables has a VIF value smaller than 10 with the VIF value of each independent variable, namely soybean production of 6.932, soybean consumption of 2.640, inflation of 1.168, and the US Dollar exchange rate of 9.560. It can be concluded that there is no multicollinearity between the independent variables in the regression model.

Simultaneous Influence Test Results (F-test)

This test was conducted to determine whether the independent variables in this study—soybean production, soybean consumption, inflation, and the US dollar exchange rate—simultaneously significantly influenced Indonesia's dependence on soybean imports from 1989 to 2023. The test steps are as follows:

1. Hypothesis formulation
   a. H0 : βi = 0 : soybean production, soybean consumption, inflation, and the US dollar exchange rate do not have a significant effect on Indonesia's dependence on soybean imports.
   b. H1: At least one of βi ≠ 0 (i = 1, 2, 3, 4) soybean production, soybean consumption, inflation, and the US Dollar exchange rate simultaneously have a significant effect on dependence on soybean imports in Indonesia.
2. Determining the level of significance (α) = 0.05 or a 95% confidence level with the numerator degree of freedom (k – 1) and the denominator degree of freedom (n – k) then Ftable = F(α)(k-1,nk). Therefore, the numerator degree of freedom = (k – 1) = (5 – 1) = 4 and the denominator degree of freedom = (n – k) = (35 – 5) = 30 so that Ftable = F(0.05)(4.30) = 2.69.
3. F count = 79.00824
4. Test criteria

   If Fcount > Ftable or the significance value ≤ 0.05 then H0 is rejected and H1 is accepted, which means that the variables of soybean production, soybean consumption, inflation, and the US Dollar exchange rate simultaneously have a significant effect on dependence on soybean imports in Indonesia.

   If Fcount < Ftable or the significance value ≥ 0.05 then H0 is accepted and H1 is rejected, which means that the variables of soybean production, soybean consumption, inflation, and the US Dollar exchange rate simultaneously do not have a significant effect on dependence on soybean imports in Indonesia.
5. Data processing results

   F count = 79.00824, F table = 2.69 with a significance value of 0.0000.
6. Conclusion

   Because Fcount (79.008) > Ftable (2.69) with a significance value of 0.0000 ≤ 0.05 then H0 is rejected and H1 is accepted. This means that the variables of soybean production, soybean consumption, inflation, and the US Dollar exchange rate simultaneously have a significant effect on the dependence on soybean imports in Indonesia. With the determinant coefficient (R-Squared) in this study of 0.913 which indicates that 91.3 percent of the dependence on soybean imports in Indonesia is influenced by soybean

production, soybean consumption, inflation, and the US Dollar exchange rate while the rest is influenced by other factors not included in the research model.

Partial Influence Test Results (t-test)

1. **The effect of soybean production (X1) on Indonesia's dependence on soybean imports (Y)**
   a. Hypothesis formulation

H0: β1 ≥ 0, then the soybean production variable partially does not have a negative and significant effect on the dependence on soybean imports in Indonesia.

H1: β1 < 0, then the soybean production variable partially has a negative and significant effect on dependence on soybean imports in Indonesia.

   b. The level of significance, (α) = 0.05 or with a confidence level of 95% and degrees of freedom (df) = (n – k) then t table = t(α/2)(nk). Therefore, the degrees of freedom (df) = (n – k) = (35 – 5) = 30 so that t table = t(0.025)(30) = 2.042.
   c. Determining thitung

$t_1 = \frac{b_1 - \beta_1}{s_{b1}} = \frac{-0.450122}{0.146414} = -3.074304$

   d. Test criteria

If tcount < ttable or significance < 0.05, then H0 is rejected and H1 is accepted, conversely if tcount ≥ ttable or significance ≥ 0.05, then H0 is accepted and H1 is rejected.

   e. Data processing results

thitung < t tabel = -3.074304 < 2.042 with significance 0.0045 < 0.05

   f. Conclusion

Since thitung (-3.074304) < ttabel (2.042) with a significance value of 0.0045 < 0.05, H0 is rejected and H1 is accepted. This means that the soybean production variable partially has a negative and significant effect on Indonesia's dependence on soybean imports.

2. **The effect of soybean consumption (X2) on dependence on soybean imports in Indonesia (Y)**
   a. Hypothesis formulation

H0: β2 ≤ 0, then the soybean production variable partially does not have a positive and significant effect on dependence on soybean imports in Indonesia.

H1: β2 > 0, then the soybean production variable partially has a positive and significant effect on dependence on soybean imports in Indonesia.

   b. The level of significance, (α) = 0.05 or with a confidence level of 95% and degrees of freedom (df) = (n – k) then t table = t(α/2)(nk). Therefore, the degrees of freedom (df) = (n – k) = (35 – 5) = 30 so that t table = t(0.025)(30) = 2.042.
   c. Determining thitung

$t_2 = \frac{b_2 - \beta_2}{s_{b2}} = \frac{0.060664}{0.076412} = 0.793910$

d. Test criteria

If t count ≤ t table or significance > 0.05, then H0 is accepted and H1 is rejected, conversely if t count > t table or significance ≤ 0.05, then H0 is rejected and H1 is accepted.

e. Data processing results

thitung ≤ ttabel = 0.793910 ≤ 2.042 with significance 0.4335 > 0.05

f. Conclusion

Since t count (0.7939) ≤ t table (2.042) with a significance value of 0.4335 > 0.05, H0 is rejected and H1 is accepted. This means that the soybean consumption variable partially has a positive but insignificant effect on Indonesia's dependence on soybean imports.

3. The effect of inflation (X3) on dependence on soybean imports in Indonesia (Y)

a. Hypothesis formulation

H0: β3 ≥ 0, then the inflation variable partially does not have a negative and significant effect on dependence on soybean imports in Indonesia.

H1: β3 < 0, then the inflation variable partially has a negative and significant effect on dependence on soybean imports in Indonesia.

b. The level of significance, (α) = 0.05 or with a confidence level of 95% and degrees of freedom (df) = (n – k) then t table = t(α/2)(nk). Therefore, the degrees of freedom (df) = (n – k) = (35 – 5) = 30 so that t table = t(0.025)(30) = 2.042.

c. Determining thitung

$t_3 = \frac{b_3 - \beta_3}{s_{b3}} = \frac{-0.012145}{-0.002703} =$ -4.492896

d. Test criteria

If t count ≥ t table or significance ≥ 0.05, then H0 is accepted and H1 is rejected, conversely if t count < t table or significance < 0.05, then H0 is rejected and H1 is accepted.

e. Data processing results

thitung < t tabel = -4.492896 < 2.042 with significance 0.0001 < 0.05

f. Conclusion

Since thitung (-4.492896) < t tabel (2.042) with a significance value of 0.0001 < 0.05, H0 is rejected and H1 is accepted. This means that the inflation variable partially has a negative and significant effect on Indonesia's dependence on soybean imports.

4. The effect of the United States Dollar exchange rate (X4) on Indonesia's dependence on soybean imports (Y)

a. Hypothesis formulation

H0: β4 ≥ 0, then the US Dollar exchange rate variable partially does not have a negative and significant effect on dependence on soybean imports in Indonesia.

H1: β4 < 0, then the US Dollar exchange rate variable has a partial negative and significant effect on dependence on soybean imports in Indonesia.

b. The level of significance, (α) = 0.05 or with a confidence level of 95% and degrees of freedom (df) = (n – k) then t table = t(α/2)(nk). Therefore, the

degrees of freedom (df) = (n – k) = (35 – 5) = 30 so that t table = t(0.025)(30) = 2.042.

c. Determining thitung

$t_4 = \frac{b_4 - \beta_4}{s_{b4}} = \frac{4.13E-05}{1.66E-05} = 2.498198$

d. Test criteria

If t count ≥ t table or significance ≥ 0.05, then H0 is accepted and H1 is rejected, conversely if t count < t table or significance < 0.05, then H0 is rejected and H1 is accepted.

e. Data processing results

Thitung ≥ ttabel = 2.498198 ≥ 2.042 with significance 0.0182 < 0.05

f. Conclusion

Since t-count (2.498198) ≥ t-table (2.042) with a significance value of 0.0182 < 0.05, H0 is accepted and H1 is rejected. This means that the US Dollar exchange rate variable does not have a partial negative and significant effect on Indonesia's dependence on soybean imports. However, these results actually indicate that the US Dollar exchange rate has a positive and significant effect.

Discussion of Research Findings

1. **The Effect of Soybean Production (X1) on Soybean Import Dependency in Indonesia (Y)**

   Theoretically, when the production of a commodity increases significantly, the need for imports can be reduced. According to Duwila's (2015) production theory, an increase in production represents a maximal human effort to enhance utility and reduce dependence on external sources, in this case, imports. Higher domestic soybean production is expected to meet national consumption needs, thereby lowering the level of import dependency. Conversely, if domestic production is low or unstable, imports become the primary option to meet public demand. This reflects Indonesia's ongoing challenges in increasing soybean production, whether in terms of harvested area, productivity, or farmers' interest. Consequently, low domestic production drives higher import dependency.

   The findings of this study indicate that soybean production has a negative and significant effect on soybean import dependency in Indonesia. This is consistent with Ardhana et al. (2023), who found that soybean production has a negative and significant effect on soybean imports, as well as Mahdi & Suharno (2019), who reported the same conclusion. The regression results show that Indonesia's soybean production has a negative regression coefficient of 0.45 for soybean import dependency. This means that if soybean production increases by 1 million tons, soybean import dependency in Indonesia will decrease by 0.45 percent, assuming other independent variables remain constant.

2. **The Effect of Soybean Consumption (X2) on Soybean Import Dependency in Indonesia (Y)**

   In theory, consumption and imports of a food commodity tend to have a positive relationship. Keynes's consumption theory suggests that

consumption increases alongside rising income; however, if consumption exceeds domestic production capacity, demand for imported goods will also increase (Keynes, 1936). When demand or consumption for a commodity grows while domestic production cannot meet the need, imports are typically used to fill the supply gap. This is also the case for soybeans in Indonesia, which serve as the primary raw material in processed food industries such as tofu, tempeh, and other soybean-based products. National soybean demand tends to rise in line with population growth, dietary shifts, and greater nutritional awareness.

Although theoretically, an increase in soybean consumption is expected to correspond to an increase in imports to safeguard supply, this study finds that soybean consumption has a positive but statistically insignificant effect on soybean import dependency in Indonesia. This suggests that, although national soybean consumption has risen, the increase does not directly and significantly impact import dependency. These results differ from Ardhana et al. (2023), Grace et al. (2021), Ardiansyah & Faridatussalam (2023), and Hardianti & Setiawina (2021), who found a positive and significant effect, but align with Assifah & Widanta (2022), who found no significant impact.

The regression results show that Indonesia's soybean consumption has a positive regression coefficient of 0.060 for soybean import dependency. In other words, a 1 million ton increase in soybean consumption theoretically raises import dependency by 0.06 percent, but this effect is not statistically strong enough to be considered significant.

3. The Effect of Inflation (X3) on Soybean Import Dependency in Indonesia (Y)

Theoretically, inflation has a complex relationship with international trade, including imports. High inflation tends to reduce purchasing power, increase prices, and create economic instability, which may heighten a country's dependency on imports particularly for staple commodities that cannot be produced domestically in sufficient quantities. In Indonesia, soybeans are one such staple commodity with high import dependency, and inflation influences this dependency pattern. Keynes's theory notes that inflation can suppress aggregate demand by reducing real purchasing power, thereby lowering consumption for commodities such as soybeans, which are price-elastic.

This study finds that inflation has a negative and significant effect on soybean import dependency in Indonesia. This aligns with Satwika Putra & Sukadana (2021), who found that inflation has a negative and significant effect on soybean imports. The regression results indicate that inflation in Indonesia has a negative regression coefficient of -0.01 for soybean import dependency. This means that a 1 percent increase in inflation reduces soybean import dependency by 0.01 percent, assuming other variables remain constant.

4. The Effect of the U.S. Dollar Exchange Rate on Soybean Import Dependency in Indonesia (Y)

Theoretically, the U.S. dollar exchange rate has a negative relationship with import activity, especially in developing countries like Indonesia. When the U.S. dollar strengthens, the price of imported goods, including soybeans, becomes more expensive. This condition should reduce import dependency because the cost of imports rises. Accordingly, the initial hypothesis of this study posited that the U.S. dollar exchange rate would have a negative and significant effect on soybean import dependency.

However, this study finds that the U.S. dollar exchange rate instead has a positive and significant effect on soybean import dependency in Indonesia. This means that even when the U.S. dollar strengthens, dependency on soybean imports continues to rise. This reflects a condition in which the need for imported soybeans cannot be suppressed, even when import prices increase due to rupiah depreciation.

Based on Prebisch's (1962) Dependency Theory, developing countries tend to be trapped in a structure of dependence on developed countries, particularly in the international trade of strategic commodities. From the perspective of exchange rate theory as discussed by Mankiw (2021) and Krugman (2002), a weaker domestic currency should make imported goods, including soybeans, more expensive in the domestic market, thereby reducing import volumes. In reality, however, soybeans have inelastic demand due to high domestic needs.

These findings contradict Grace et al. (2021) and Mahdi & Suharno (2019), who reported a negative and significant effect, but are consistent with Satwika Putra & Sukadana (2021) and Reviane et al. (2024), who found a positive and significant effect. The regression results show that the U.S. dollar exchange rate has a positive regression coefficient of 0.00041 for soybean import dependency in Indonesia. This means that if the U.S. dollar exchange rate increases by 100 rupiah, soybean import dependency in Indonesia will rise by 0.41 percent, assuming other variables remain constant.

CONCLUSION

Based on statistical tests, analysis, and discussion, the conclusions are as follows:

1. Soybean production, soybean consumption, inflation, and the U.S. dollar exchange rate collectively have a significant effect on soybean import dependency in Indonesia.
2. Soybean production has a statistically significant negative effect on soybean import dependency; soybean consumption has no statistically significant effect; inflation has a statistically significant negative effect; and the U.S. dollar exchange rate, contrary to the initial hypothesis, has a statistically significant positive effect on soybean import dependency in Indonesia.

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