The Effect of Production, Price, Exchange Rate, And Trade Policy on Indonesian Tuna Exports to Japan from 2009 to 2023

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	ABSTRACT
Keywords: Exchange Rate; Export Volume to Japan; Tuna Production; Tuna Export Price.	Tuna is an essential commodity in the fishing and marine due to its high economic value and ability to generate foreign exchange for the country. Analysis of the factors affecting Indonesia's tuna exports to Japan is very important based on Japan's position as the main export market for Indonesian tuna in order to help formulate effective policies in increasing the competitiveness and volume of Indonesian tuna exports. Therefore, the purpose of this research is to analyze the effect of tuna fish production in Indonesia, the real price of tuna fish exports, and the real rupiah-US dollar exchange rate on the volume of Indonesian tuna fish exports to Japan. The data used is quantitative with secondary data sources from the United Nations Commodity Trade Statistics Database (Un Comtrade), Badan Pusat Statistik (BPS), and Kementerian Kelautan dan Perikanan (KKP) from 2009 to 2023. Time series data for 15 years were analyzed using multiple linear regression models (Ordinary Least Square). The results showed that simultaneously, production variables, real prices, and real exchange rates had a significant influence on the volume of Indonesian tuna exports to Japan. However, partially, only the real exchange rate has a significant effect on export volume but the direction of the effect is negative, while production and real prices have no significant effect on export volume. Policy recommendations include enhancing production efficiency and product quality through fleet modernization and stronger processing capacity, stabilizing the rupiah exchange rate, and promoting the use of hedging instruments among tuna exporters. These measures aim to mitigate exchange rate risks and strengthen Indonesia's tuna export competitiveness in high-value markets such as Japan.

INTRODUCTION

Indonesia is a country with many islands and is the largest maritime country in the world located in the tropics. According to information from the Geospatial Information Agency, Indonesia has a land area of 1.9 million km², while its water area reaches 6.4 million km². This makes Indonesia rich in fishery potential in terms

of both quantity and variety (Hasanah, 2020). Fisheries consist of several main commodities, one of which is tuna. Tuna is one of Indonesia's flagship commodities, contributing to economic growth and the development of the fisheries sector.
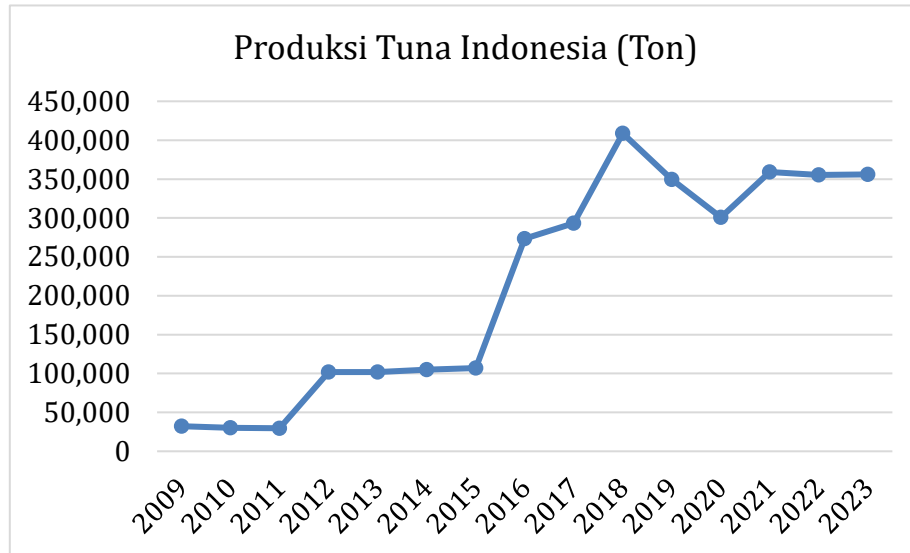

Figure 1. Indonesia Tuna Production 1994 – 2023
Source: Kementerian Kelautan dan Perikanan (KKP) (2025)

Indonesia is one of the major tuna-producing countries that plays a significant role in the global tuna industry. Tuna production in Indonesia over the past fifteen years has been quite fluctuating but has increased annually. In 2023, the potential tuna production in Indonesia is estimated to reach 350,000 tons. With such a large production volume, Indonesia has the potential to dominate the international market for this industry.

Exports are the driving force of a country's economy. When a country engages in export activities, it generates income in the form of foreign currency, known as foreign exchange, which serves as a source of income for the country. The marine and fisheries sector is a key contributor to Indonesia's growth and development. One of Indonesia's leading marine commodities is tuna. The high production volume of Indonesian tuna enables Indonesia to export tuna to various countries. The volume of Indonesian tuna exports can be seen in Table 1.

Table 1. Indonesian Tuna Export Volume 2019 – 2023 (Kg)

Negara Tujuan	2019	2020	2021	2022	2023
China	156.520	36.138	7.893	1.385	21.084
Jepang	2.260.401	2.990.514	2.771.325	1.559.246	3.270.132
Amerika	84.362	85.852	18	166.320	752.682

Source: Un Comtrade (2025)

One of the main export destinations for Indonesian tuna is Japan. According to the United Nations Commodity Trade, Japan was the largest importer of Indonesian tuna from 2019 to 2023, with a total value of 3,270,132 kg in 2023. Japan is the world's largest market for tuna, especially fresh tuna.

Table 2. Indonesian Tuna Export Value 2019 – 2023 (US$)

Negara Tujuan	2019	2020	2021	2022	2023
China	727.239	170.081	22.652	10.872	223.176
Jepang	12.139.539	15.046.805	12.091.920	8.034.561	3.270.132
Amerika	719.067	555.636	90	1.398.157	7.663.698

Source: Un Comtrade (2025)

Indonesia trades tuna on the international market in fresh, frozen, and canned forms. Table 2 shows that Indonesia's tuna exports to Japan rank first in terms of value. However, during 2019–2023, this value was quite volatile (unstable). This could be influenced by various factors that could have a positive or negative impact on Indonesia's tuna exports to various countries.
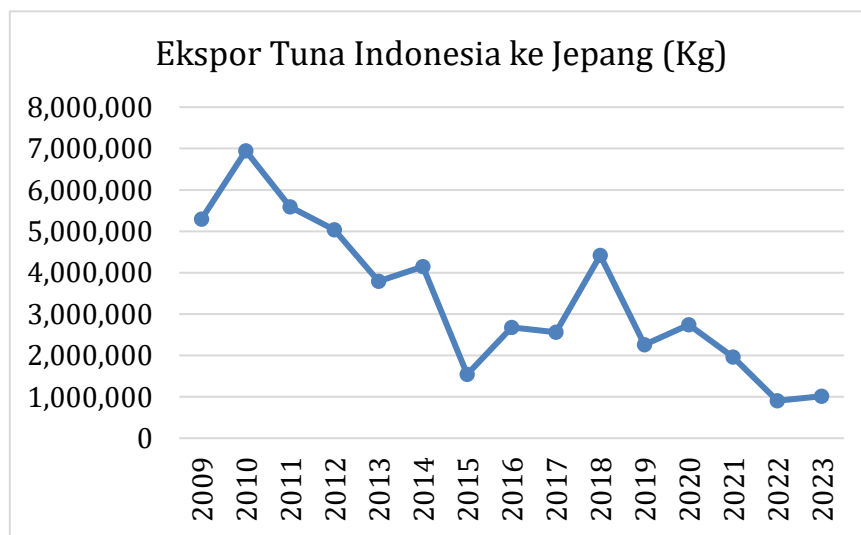

Figure 2. Volume of Indonesian Tuna Exports to Japan 2009 – 2023 (Kg)
Source: Processed Data (2025)

The large number of competing countries in tuna exports has made competition in the global tuna market increasingly fierce. The threat of tuna extinction must be a concern for the government because export market opportunities (downstream) are inextricably linked to the availability of tuna commodities in Indonesian waters (upstream) (Agung and Almubaraq, 2022). Therefore, the objective of this study is to analyze the influence of each variable on tuna production in Indonesia, the real export price of tuna, and the real exchange rate of the rupiah to the US dollar on the volume of Indonesian tuna exports to Japan.

LITERATURE REVIEW

1. Tuna

Nursya' ban, et al. (2021), define tuna as a large pelagic marine fish that lives at depths of 5–200 m and measures 28–58 cm depending on the depth at which it lives. Globally, there are seven tuna species of commercial value in the international market: Albacore Tuna (Thunnus Alalunga), Bigeye Tuna (Thunnus Obesus), Skipjack Tuna (Katsuwonus pelamis), Yellowfin Tuna (Thunnus albacares), and three species of Bluefin Tuna (Thunnus Thynnus, Thunnus Maccoyii, Thunnus Orientalis). (FAO. 2022. The State of World Fisheries and Aquaculture 2022. Rome: Food and Agriculture Organization of the United Nations).

2. Factors Affecting Tuna Exports

According to Hidayati et al. (2017), the factors that significantly influence Indonesian tuna exports are production, price, exchange rate, previous year's export volume, and the implementation of product quality requirements. The presence of the World Trade Organization (WTO) in trade has created greater opportunities for Indonesian agricultural commodities to access markets in developed countries. However, at the same time, processed agricultural commodities from developed countries can also enter the domestic market, competing with similar products produced by Indonesia. The extent of export opportunities and import threats depends heavily on the competitiveness of Indonesia's agricultural commodities. The higher the competitiveness, the greater the export opportunities and the smaller the import threat from such commodities.

Based on the above factors, not all of them can be used as variables in this study. The previous year's export volume and the implementation of product quality requirements were not included in this study due to the unavailability of such data. Therefore, this study only uses three variables: Indonesian tuna production, Indonesian tuna prices, and the real exchange rate of the rupiah to the US dollar. The selection of these three variables is also supported by several previous studies.

1. Production

Production in this study refers to the amount of a commodity produced by an exporting country. According to Hidayati et al. (2017), Indonesian tuna production, which is the result of fishing at sea, is influenced by seasonal conditions, the facilities and infrastructure used, and human resources (fishermen).

2. Price

According to Hidayati et al. (2017), tuna prices in the international market are determined by global export strength and global import demand, as well as tuna prices in the international market. Prices in the international market are passed on to the domestic market, serving as a guide for setting domestic and export prices. In international trade, the formation of export and import prices is

influenced by changes in the exchange rate of a country's currency against another country's currency.

3. Exchange Rate

The exchange rate is the price of a domestic currency against a foreign currency (Sriyono and Kumalasari, 2020). In international trade, every participating country must first standardize its monetary system or payment instruments, which are used in trade transactions through foreign exchange rates. The exchange rate most commonly used is the currency's exchange rate against the dollar, as the dollar is a relatively stable currency in the economy (Sutrisno, 2022).

METHOD

This study analyzes the factors that influence Indonesian tuna exports to Japan. Therefore, this study uses quantitative methods with secondary data. Secondary data is data obtained systematically in the form of time series data and data obtained from documents or research reports from agencies or other supporting data sources. The data used in this study consists of time series data spanning a fifteen-year period from 2009 to 2023. The data used in this study is sourced from the United Nations Commodity Trade Statistics Database (UN Comtrade), the Central Statistics Agency (BPS), the Ministry of Marine Affairs and Fisheries (KKP), and other relevant information obtained from literature, mass media, and electronic media (internet).

Data analysis methods use multiple linear regression analysis (Ordinary Least Squares) with the Statistical Product for Service Solutions (SPSS) program version 25. This study involved three independent variables, namely tuna production in Indonesia (X1), real tuna export prices in Indonesia (X2), and the real rupiah-US dollar exchange rate (X3), as well as one dependent variable, namely tuna export volume in Indonesia. The formulation of the multiple linear regression method (Ordinary Least Square) is as follows:

$$Y = \beta 0 + \beta 1 X1 + \beta 2 X2 + \beta 3 X3 + e$$

Y	= Volume of Indonesian tuna exports to Japan (Kg/Year)
B0	= Constant
β1, β2, β3	= Regression coefficients
X1	= Tuna production in Indonesia (Tons/Year)
X2	= Real price of tuna exports in Indonesia (US$)
X3	= Real exchange rate of the rupiah against the US dollar (Rp/US$)
e	= Disturbance error

Linear regression analysis based on Ordinary Least Square (OLS) must meet the classical assumption test conducted to ensure the validity of the regression model. These tests include multicollinearity and heteroscedasticity tests.

Multicollinearity is assessed using the Variance Inflation Factor (VIF), where if the VIF value is < 10, there is no multicollinearity or no correlation between the independent variables (Ghozali, 2016). Heteroscedasticity can be detected through a scatter plot, where the points are scattered randomly without forming a specific pattern, and their distribution appears above or below zero on the Y-axis (Iba and Wardhana, 2024).

After ensuring that the data is free from classical assumption violations, statistical tests are conducted. Statistical tests are performed to determine the validity or invalidity of the null hypothesis. Three statistical tests are conducted: the Coefficient of Determination Test (R^2), the F-test, and the t-test. The R coefficient is used to measure the strength of the relationship between two variables. The F test is used to determine the simultaneous or simultaneous effect of independent variables on dependent variables with a significance level of 0.05. The t-test is used to determine the significance of the effect of independent variables on dependent variables individually (partially).

RESULT AND DISCUSSION

The factors affecting the volume of Indonesian tuna exports to Japan were obtained by entering the independent variables suspected of affecting Indonesian tuna exports to Japan (dependent variables) into the regression equation model. There were three independent variables used, namely tuna production in Indonesia, the real price of tuna exports in Indonesia, and the real exchange rate of the rupiah against the US dollar. The data used in this study is a time series spanning 15 years, from 2009 to 2023.

Classical Assumption Test

1) Multicollinearity Test Results

The multicollinearity test is used to determine whether there is correlation (interdependence) between independent variables in a multiple linear regression model. If there is a correlation among the independent variables, the relationship between the independent variables and the dependent variable becomes disrupted. Multicollinearity can be identified through the tolerance value and VIF (Variance Inflation Factor). According to Ghozali (2016), there are two conditions under which research data can be said to exhibit multicollinearity or not:

a) Tolerance Value < 0.10 and VIF > 10, then multicollinearity occurs or there is correlation between independent variables.

b) Tolerance Value > 0.10 and VIF < 10, then multicollinearity does not occur or there is no correlation between independent variables.

Based on Table 3, the results of the multicollinearity test show that there are no significant signs of multicollinearity in the model. This can be seen from the tolerance value, which is greater than 0.1 for all variables, namely 0.189 for tuna

production. The real price of tuna exports is 0.951. Then, for the real exchange rate of the rupiah against the US dollar, it is 0.193.

Table 3. Multicollinearity Test Results

	Model	Collinearity Statistics	
		Tolerance	VIF
1	Produksi Tuna (Ton/Tahun)	.189	5.281
	Harga Riil Ekspor Tuna (US$)	.951	1.051
	Nilai Tukar Riil Rupiah–Dolar (Rp/US$)	.193	5.186

Source: Processed Data (2025)

2) Heteroscedasticity Test Results

The heteroskedasticity test in the regression model is used to determine the constant disturbance error in all independent variables. A regression model that meets the requirements is one where the variance of the residuals from one observation to another remains constant, or homoskedasticity. A good regression model is one that is homoskedastic or does not exhibit heteroskedasticity (Ghozali, 2016). The detection of heteroscedasticity can be done by looking at whether there is a certain pattern in the scatterplot graph between the two, where the Y-axis is the predicted Y, and the X-axis is the residual (predicted Y – actual Y) that has been studentized. Basis of analysis (Ghozali, 2013):

1. If there is a specific pattern, such as points forming a specific regular pattern (wavy, widening then narrowing), this indicates that heteroscedasticity has occurred.
2. If there is no clear pattern, and the points are scattered above and below the 0 mark on the Y-axis, then heteroscedasticity has not occurred.

Table 4. Heteroscedasticity Test Results

Model	t	Sig.
Produksi Tuna (Ton/Tahun)	.640	.535
Harga Riil Ekspor Tuna (US$)	.607	.556
Nilai Tukar Riil Rupiah–Dolar (Rp/US$)	-.865	.405

Source: Processed Data (2025)

Based on Table 4, the results of the heteroscedasticity test show that there are no signs of heteroscedasticity in the model. This can be seen from the significance value (Sig.) which is greater than 0.05 for all variables, namely 0.535 for tuna production. The real export price of tuna is 0.556. Then, the real exchange rate of the rupiah to the US dollar is 0.405. Therefore, it can be concluded that the assumption of homoscedasticity is satisfied in this model.

Multiple Linear Regression Analysis

The results of the influence of tuna production in Indonesia (X1), the real

export price of tuna in Indonesia (X2), and the real exchange rate of the rupiah to the US dollar (X3) on Indonesian tuna exports to Japan (Y) can be determined using multiple linear regression analysis processed with the help of the Statistical Product for Service Solutions (SPSS) program version 25, yielding the following results.

Table 5. Multiple Linear Regression Analysis Results

Variabel Independen	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	13685356.236	2569254.836		5.327	.000
Produksi Tuna (Ton/Tahun)	4.485	4.023	.353	1.115	.289
Harga Riil Ekspor Tuna (US$)	69600.120	149624.101	.066	.465	.651
Nilai Tukar Riil Rupiah–Dolar (Rp/US$)	-931.313	245.825	-1.190	-3.789	.003

Source: Processed Data (2025)

Based on the results of the multiple linear regression analysis in Table 5, the following regression equation can be obtained:

$$Y = 13685356.236 + 4.485X_1 + 69600.120X_2 - 931.313X_3$$

The regression equation yields a constant value of 13,685,356.236. If all independent variables (X1, X2, and X3) are zero, then the volume of Indonesian tuna exports to Japan (YY) will be 13,685,356.236 kg/year.

Statistical Test Results

1. F-test (simultaneous test)

The F-statistic test measures the goodness of fit, i.e., the accuracy of the sample regression function in estimating actual values. If the significance level of F < 0.05, the regression model can be used to predict the independent/free variable. The criterion for testing hypotheses using the F statistic is that if the significance level is <0.05, the alternative hypothesis is accepted, stating that all independent variables simultaneously and significantly influence the dependent variable (Ghozali, 2016).

Table 6. F-Test Statistical Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36171988460358.670	3	12057329486786.225	13.848	.000[b]
	Residual	9577386127076.262	11	870671466097.842		

Model	Sum of Squares	df	Mean Square	F	Sig.
Total	45749374587434.940	14			

Source: Processed Data (2025)

The F test shows that the regression model as a whole is significant in explaining the variation in tuna export volume. The F value is 13.848 with a significance of 0.000, which means that at least one of the independent/free variables (tuna production, real tuna export prices, and the real exchange rate of the rupiah against the dollar) has a significant effect on tuna export volume. Therefore, this regression model can be considered effective in explaining the relationship between these variables and tuna export volume.

2. t-test (partial test)

The t-test can be performed by comparing the t-probability value (p-value) with the significance level (α). If the t-probability value < α, then the independent variable partially influences the dependent variable. The t-test criterion is a significance level of 0.05 (Ghozali, 2006). In this study, the t-test results are presented in Table 7.

Table 7. T-test Statistical Results

Model	t	Sig.
1 (Constant)	5.327	.000
Produksi Tuna (Ton/Tahun)	1.115	.289
Harga Riil Ekspor Tuna (US$)	.465	.651
Nilai Tukar Riil Rupiah–Dolar (Rp/US$)	-3.789	.003

Source: Processed Data (2025)

The t-test statistics show that the constant in this model is significant with a value of 0.000. This means that even if all variables in the regression model are considered zero, there is still a base value for tuna export volume. Furthermore, the t-test statistics also show that the effect of production on tuna export volume is not statistically significant with a value of 0.289. The effect of the real price of tuna exports on tuna export volume is also not significant, with a significance of 0.651. The effect of the real exchange rate of the rupiah against the dollar on tuna export volume is significant, with a value of 0.003.

3. Determination Coefficient Test (R^2)

According to Ghozali (2016), the coefficient of determination test aims to measure how well the model explains the variation in the dependent variable. The coefficient of determination value ranges from zero to one. A small R2 value indicates that the ability of the independent variables to explain the dependent variable is very limited. The classification of correlation coefficients without considering direction is as follows:

1. 0   : No correlation
2. 0 to 0.49   : Weak correlation
3. 0.50   : Moderate correlation
4. 0.51 to 0.99   : Strong correlation
5. 1.00   : Perfect correlation

Table 8. Statistical Results of the Coefficient of Determination

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.889[a]	.791	.734	933097.77949

Source: Processed Data (2025)

Based on Table 8, the coefficient of determination (R Square) value obtained is 0.791. This means that 79% of the variation in tuna export volume can be explained by the variables included in the model, namely tuna production, real tuna export prices, and the real rupiah-US dollar exchange rate. The remaining 21% cannot be explained by this model or may be influenced by other factors not included in the analysis. The relatively high R Square value indicates that this model has a fairly good ability to explain the variation in tuna export volume.

The Effect of Tuna Production in Indonesia (X1) on Indonesia's Tuna Export Volume to Japan

Data analysis results show that Indonesian tuna production (X1) yields a t-calculated value of 1.115, which is lower than the t-table value of 2.201. Thus, since 1.115 < 2.201, H_0 is accepted and H_1 is rejected. In addition, the significance value of 0.289, which exceeds the 0.05 significance threshold, indicates that partially, Indonesia's tuna production has an insignificant effect on the volume of tuna exports to Japan. In other words, an increase in tuna production tends to be followed by a rise in export volume, but the effect is not statistically strong enough or proven to be significant.

This finding indicates that production availability is not the sole determinant of tuna exports. Even though production increases, exports do not automatically rise if they are not supported by other factors such as processing industry capacity, quality standards, and access to global markets (Fitriani, 2019). These aspects play a more decisive role in determining whether increased production can be successfully absorbed by international markets, particularly Japan. Therefore, it can be concluded that tuna production only serves as a supporting factor rather than a dominant factor in influencing export volume.

This result is consistent with previous studies, particularly the research conducted by Efendi and Marseto (2023), which found that Indonesian tuna production had no significant influence on tuna exports to the United States for the period 2010–2021. The challenges posed by tariff and non-tariff barriers

played an important role in shaping this outcome. Tariff barriers caused significant economic losses for Indonesia as an exporting country, while non-tariff barriers included issues such as export permits, health certification, sanitation standards, quality standards, environmental issues, human rights issues, and terrorism. In addition, demand factors also had a significant impact on Indonesia's fresh tuna exports in nearly every period (Efendi and Marseto, 2023).

Similarly, Darmawan and Utomo (2023) also found that Indonesia's tuna production has a positive but insignificant effect on export volumes to Japan, indicating that fluctuations in production do not directly trigger large increases in exports. Furthermore, Resnia et al. (2015) emphasized that the insignificance of production is closely related to the mismatch between Indonesia's tuna quality and the strict product standards applied by importing countries, particularly Japan, which refers to the CODEX standards established by FAO and WHO. This suggests that beyond production growth, compliance with international quality standards and the ability to overcome non-tariff barriers are crucial determinants of Indonesia's tuna export performance.

The Effect of Real Tuna Export Prices in Indonesia (X2) on the Volume of Indonesian Tuna Exports to Japan

The results of data processing show that real tuna export prices (X2) produce a t-value of 0.465, which is smaller than the t-Table value of 2.201, or 0.465 < 2.201, meaning that H0 is accepted and H1 is rejected. The significance level of the real price of tuna exports is 0.651, which is greater than 0.05 (significance level). Partially, the real price of tuna exports has a positive but insignificant effect on the volume of Indonesian tuna exports to Japan. If the real price of tuna exports increases, the volume of Indonesian tuna exports to Japan tends to increase as well. Although the direction of the influence is positive, statistically, the influence of the real price of tuna exports on the volume of Indonesian tuna exports to Japan is not strong enough or not proven to be significant. This means that an increase in the real price of tuna exports does not necessarily have a real impact on the increase in Indonesian tuna exports to Japan. This could be due to other factors that are more dominant in influencing exports.

This aligns with the research conducted by Alfayed and Tasri (2021), which found that statistically, price has a positive but insignificant influence on Indonesia's tuna exports to Singapore. The results of this study highlight the complexity of Indonesia's tuna export dynamics, where real export prices are not the primary determining factor. The Singapore market is a high-purchasing-power market with a preference for quality, so prices have a positive but insignificant influence on Indonesian tuna exports to Singapore. The Japanese

market is similar, where tuna demand is elastic, meaning that price changes do affect demand, but in the context of high-quality products, consumers still choose tuna that meets quality standards, so price fluctuations do not always lead to significant changes in purchase volume.

The Impact of the Real Exchange Rate of the Indonesian Rupiah–US Dollar (X3) on the Volume of Indonesian Tuna Exports to Japan

Data analysis results show that the real exchange rate of the rupiah–US dollar (X3) yields a t-value of 3.789, which is greater than the t-table value of 2.201 (3.789 > 2.201), meaning H1 is accepted and H0 is rejected. The significance level of the real exchange rate between the rupiah and the US dollar is 0.003, which is lower than 0.05, indicating that this variable has a statistically significant effect on the volume of Indonesian tuna exports to Japan. The regression coefficient is negative, implying that when the real exchange rate increases (the rupiah depreciates against the dollar), the volume of tuna exports to Japan decreases.

This outcome suggests that a weaker rupiah does not automatically enhance export competitiveness. On the contrary, depreciation tends to increase production costs because a substantial portion of inputs, such as fuel, fishing gear, and processing materials, still depend on imports. Higher costs reduce exporters' margins and production capacity, which in turn lowers export volumes. Furthermore, Japan enforces strict requirements regarding product quality, food safety, and sustainability (Resnia et al., 2015), making price competitiveness alone insufficient to boost exports.

This finding aligns with the study of Syahnaz, Brillyantina, Agustina, and Slamet (2025), which demonstrated a significant negative influence of the exchange rate on Indonesia's tuna export volume. Efendi and Marseto (2023) also reported a significant negative effect of the exchange rate on Indonesian tuna exports to the United States during 2010–2021. These results contrast with international trade theory proposed by Krugman et al., (2015), which states that currency depreciation should increase export competitiveness by making goods cheaper in foreign markets. In the case of Indonesian tuna exports, however, non-price factors such as input dependence on imports and strict quality standards in the Japanese market appear to outweigh the potential price advantage of a weaker rupiah.

Tuna Commodity Policy Recommendations

Production and real export prices of tuna do not significantly affect export volumes, yet maintaining supply stability and price competitiveness remains crucial. Government incentives are needed to enhance production efficiency

through fleet modernization and strengthening processing industry capacity. Improving product quality is also essential for meeting the stringent standards of high-value markets such as Japan. Previous studies indicate that insignificant production effects are closely linked to mismatches between Indonesian tuna quality and CODEX standards (Resnia et al., 2015), while non-price factors such as quality and sustainability play a more decisive role in export competitiveness (Fitriani, 2019). Similarly, Darmawan and Utomo (2023) found that tuna production has a positive but insignificant effect on exports to Japan, highlighting that quality improvement and efficiency are more strategic than merely increasing quantity.

The government and monetary authorities, such as Bank Indonesia, need to pay close attention to macroeconomic factors, particularly the stability of the rupiah exchange rate. Research indicates that the exchange rate has a significant impact on the export volume of Indonesian tuna to Japan, making exchange rate stabilization an essential part of macroeconomic policy to maintain export competitiveness. Simultaneous interventions in both the spot and derivatives markets (a combined intervention strategy) have proven more effective in maintaining rupiah stability compared to interventions conducted in only one market (Juhro and Azwar, 2021).

Direct interventions by monetary authorities are complemented by risk management strategies that are crucial for fisheries businesses. Januardi and Hasya (2024) found that random walk hedging strategies are more effective in maintaining rupiah stability against foreign currencies than consistent hedging strategies or no hedging at all. The government should encourage fisheries businesses, particularly tuna exporters, to utilize hedging instruments through collaboration with banks and financial institutions, providing protection against the risks of exchange rate fluctuations.

CONCLUSION

Based on the research results, it can be concluded that simultaneously, the variables of tuna production, real export prices, and real exchange rates significantly affect the volume of Indonesia's tuna exports to Japan. However, partially, only the real exchange rate has a significant effect, while tuna production and the real export price do not have a significant effect. The recommendation that can be given from this analysis is that the government needs to utilize FTAs (Free Trade Agreements) such as IEU – CEPA (Indonesia – European Union Comprehensive Economic Partnership Agreement) for duty-free or low-duty exports to the European market. FTA is a trade agreement between two or more countries aimed at reducing or

eliminating trade barriers, such as tariffs, quotas, or technical regulations. With IEU – CEPA, tariffs can be gradually reduced to 0%, making Indonesian tuna prices more competitive compared to rival countries like Thailand and the Philippines. Therefore, it is necessary to implement product certification and standards, export infrastructure, and product promotion to the European market so that IEU – CEPA can be implemented promptly. In addition, business operators can implement hedging instruments, commonly using forward contracts, where exporters and banks agree on a specific exchange rate for future transactions.

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