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The Effect of Inflation, Exchange Rate and Interest Rate on Indonesian Nutmeg Exports to China Market

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ABSTRACT
The objective of this study is to examine the trend of Indonesian nutmeg exports to the global market, with a particular focus on the Chinese market, and to assess the impact of macroeconomic variables, including inflation, exchange rates, and interest rates, on nutmeg exports. The data set spans the period from 1990 to 2023. The forecasting of export volume employs the ARIMA model, while the measurement of the impact of macroeconomic factors utilizes multiple linear regression. Regression analysis reveals that the inflation variable exerts no statistically significant effect on long-term export trends (p-value 0.7897 > 0.05). The exchange rate variable has a significant positive effect on nutmeg exports in the long term (p-value 0.0000 < 0.05), indicating that a depreciation of the rupiah increases nutmeg exports in the international market. The results indicate that interest rates have a significant negative effect on exports in the long term (p-value 0.0146 < 0.05). This is due to the fact that an increase in interest rates leads to an increase in production and borrowing costs, which in turn reduces export volumes. Furthermore, in the short term, none of the macroeconomic variables demonstrated a significant impact. The findings of this study indicate that the limited influence of macroeconomic factors in the short term can be attributed to the distinctive characteristics of nutmeg as a niche market commodity and the prevalence of cooperative agreements between firms. Nutmeg has essential uses and unique qualities that render its demand relatively stable and insensitive to price fluctuations or macroeconomic changes. This indicates that nutmeg, with its segmented is capable of maintaining consistent export volumes despite short-term fluctuations in economic conditions. In order to enhance competitiveness on the global market, a more focused marketing strategy and market diversification that incorporates the distinctive attributes of this commodity are essential.

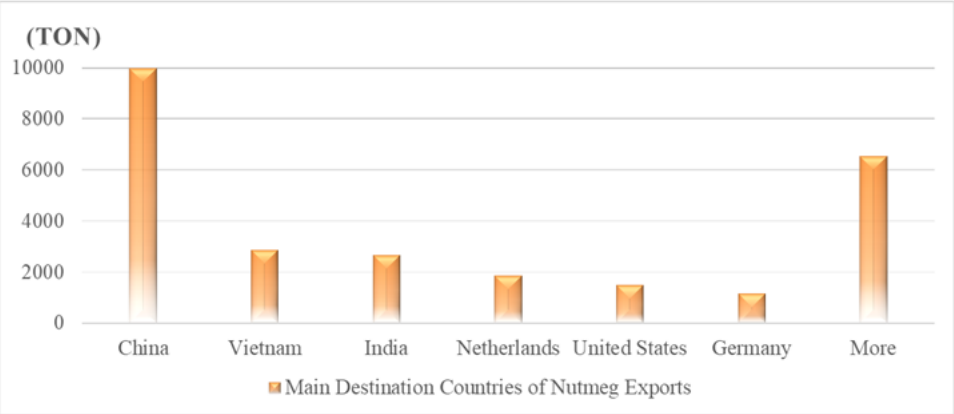
Keywords : Indonesian Nutmeg Exports; Export Trend; Inflation; Exchange Rate; Interest Rate

INTRODUCTION

Nutmeg *(Myristica fragrans Houtt.)* is one of Indonesia's most valuable commodities, originating from Maluku, which is known as the "queen of spices." It has significant economic value in the international market. According to data from the Ministry of Agriculture (2022), Indonesia has been able to produce 40,639 tons of nutmeg in 2021 from the production of Large State Plantations (PBN), People's Private Plantations (PR), and Large Private Corporate Plantations (PBS). In 2023, it is projected that Indonesia will be able to produce 44,597 tons of nutmeg. In consideration of the aforementioned data, the average annual increase in nutmeg production is estimated to be 4.64%. Based on this data, the Ministry of Agriculture, through the Directorate of Information and Public Relations (Pusdatin), anticipates that the annual increase in nutmeg production over the next few years will reach 49,645 tons by 2026. This implies an average annual increase of 5.98% between 2022 and 2026.

As indicated in the Ministry of Agriculture's (2022), the export value of Indonesian nutmeg in 2021 reached 198 million USD, representing a notable increase from the previous year's figure of 158 million USD. This value also marks the highest export value of nutmeg observed between 2012 and 2021. The primary products traded are the seeds and mace (nutmeg flower), which are utilized as raw materials in a multitude of industries, including food, beverage, pharmaceutical, and cosmetic production.

China represents the primary destination for Indonesian nutmeg exports, and recent years have witnessed a notable surge in demand from this market. In addition to fluctuations in the export volume of Indonesian nutmeg in the global market, China has been the primary export destination for the past five years. In 2021, China constituted the principal export market for Indonesian nutmeg, accounting for a 37.65% market share and an export volume of 9,991 tons. The export value of Indonesian nutmeg to China reached USD 45 million in 2021 (Ministry of Agriculture, 2022). The principal driving factors include China's rapidly accelerating economic growth, an increase in public awareness of health issues, and the utilisation of nutmeg in the production of spices and traditional medicinal remedies (BPS, 2023). This trend in nutmeg exports indicates an opportunity for Indonesia to strengthen its position in the global market and increase the added value of nutmeg products.



Source: BPS processed by Ministry of Agriculture

Figure 1
Indonesia's Nutmeg Export Destination Countries in 2021

In addition to global demand factors, Indonesia's nutmeg exports are also subject to influence from macroeconomic factors, including inflation, exchange rates and interest rates. Fluctuations in these factors can affect export performance. For example, exchange rate stability this could potentially enhance the competitive edge of Indonesian products in the global marketplace. Therefore, a comprehensive understanding of the dynamics of nutmeg exports and the influence of these macroeconomic factors is essential for the formulation of effective strategies to enhance Indonesia's export competitiveness in the future. The objective of this study is to analyse the trend of Indonesia's nutmeg exports, particularly to China and the global market, and examine the impact of inflation, exchange rates, and interest rates on Indonesia's nutmeg exports over the period from 1990 to 2023. The findings of this analysis are expected to provide valuable insights for stakeholders in the nutmeg industry, enabling them to optimize export strategies and enhance Indonesia's position in the global market.

Literature

Export Trends

As defined by Indriastiningsih and Darmawan (2019), forecasting is the process of estimating future needs, including the quantity, quality, time, and location of those needs, with the aim of meeting the demand for goods or services. In this case, export forecasting will assist in increasing exports of goods or services by predicting future export values. Based on Heizer & Render (2011), forecasting is classified based on the time period, namely: 1. Short-range Forecast with a period of up to one year and generally less than three months 2. Medium-range Forecast with a period of months to three years 3. Long-range Forecast with a period of more than three years.

International Trade

International trade can be defined as a form of buying and selling activity, whereby international trade actors seek to gain profit and benefit from these efforts (Adolf, 2016). Consequently, global trade is intended as a space for every country that has products of superior quality and innovation compared

to other countries to participate in these activities, thereby encouraging economic growth and income for that country.

Export

In accordance with Mankiw (2015), the term "exports" is defined as goods and services produced within a country and subsequently sold to a foreign market. Exports occur as a result of excess supply within a country. Export activities that are economically viable will generate profit opportunities for exporters, thereby positively influencing a country's economic growth. Consequently, the export of goods and services will lead to an increase in total expenditure, which will subsequently enhance national income.

Inflation

As defined by Bank Indonesia (2020), inflation is understood as a general and continuous increase in the prices of goods and services within a specified period. It is among the most crucial economic indicators. In order to prevent macroeconomic risks that could potentially destabilize the country's economy, the inflation growth rate is consistently aimed to be low and stable.

Exchange Rate

As posited by Anggraini & Yefriza (2019), the exchange rate represents the price of a foreign currency relative to that of the domestic currency. The role of exchange rates in facilitating international trade between countries that utilise disparate currencies is of pivotal importance. A country's exchange rate exerts a pronounced influence on international trade activities, encompassing both exports and imports. An appreciating dollar exchange rate, for instance, is likely to stimulate export volumes.

Interest Rate

As posited by Raharjo & Elida (2011), the Indonesian interest rate is the BI policy rate, this is indicative of the monetary policy stance that has been set by Bank Indonesia. The BI rate is subject to a number of influences, including economic conditions, inflation, economic growth, and exchange rate stability. This is part of the central bank's efforts to achieve inflation targets and stable economic growth.

METHOD

This research employs a quantitative methodology, utilizing secondary data from official sources, including the Ministry of Agriculture, the Data and Information Center, the Central Bureau of Statistics (BPS), Bank Indonesia, and other pertinent literature, spanning the period from 1990 to 2023 including nutmeg exports, inflation, exchange rate and interest rate. The research methods applied include data collection, data analysis, and forecasting. This research employs the ECM (Error Correction Model) regression data analysis technique, which produces two forms of equations long-term and short-term effects. The entire research process is conducted using the Eviews 13 software.

The objective is to test and analyze data using the ARIMA (Autoregressive Integrated Moving Average) method to predict trends in Indonesian nutmeg exports to the global market, with a particular focus on the main destination country of China. The objective is to forecast the volume of nutmeg exports to China for the period 2015-2026. Similarly, the forecast for the volume of nutmeg exports to the rest of the world is for the period 1990-2026. At the ECM test stage, the initial step is to conduct a stationary test, cointegration test, and classical assumption test. Subsequently, the R test (coefficient of determination), F test (overall), and T test (for each variable) are analyzed. The resulting equations are as follows:

The long-term equation is as follows:

$YExp_t = \beta_0 + \beta_1 Inf_t + \beta_2 ER_t + \beta_3 IR_t + e_t$

The short-term equation is as follows:

$DExp_t = \beta_0 + \beta_1 D(lnInf_t) + \beta_2 D(lnER_t) + \beta_3 D(lnIR_t) + \beta_4 ECT + e_t$

Des: Exp (Export), Inf (Inflation), ER (Exchange Rate), IR (Interest Rate), ECT (Error Correction Term)

RESULT

Table 1
Unit Root Stationarity Test Results of Indonesian Nutmeg Export Volume

Variable	Rate Statistic	t-statistic	Prob	Description
Volume of Indonesian Nutmeg Exports to China Period 2015 - 2023	2nd *difference*	-3.829290	0.0360	Stationary
Volume of Indonesian Nutmeg Exports to the World Period 1990 - 20231	1st *difference*	-8.003241	0.0000	Stationary

Source: Data processed

The results of the unit root stationarity test indicate that both variables have a value less than the alpha value. The variable representing the export volume of Indonesian nutmeg to China for the period 2015-2023 shows a p-value of 0.0360 < 0.05 at the second level of differentiation. Upon testing the variable export volume of Indonesian nutmeg to the global market over the period 1990-2023 at the first level of differentiation, the Prob value was found to be 0.000 < 0.05. This indicates that the data has passed the stationary test. It can be concluded that the value of the two variables has demonstrated stability in data variance at both the first and second levels.

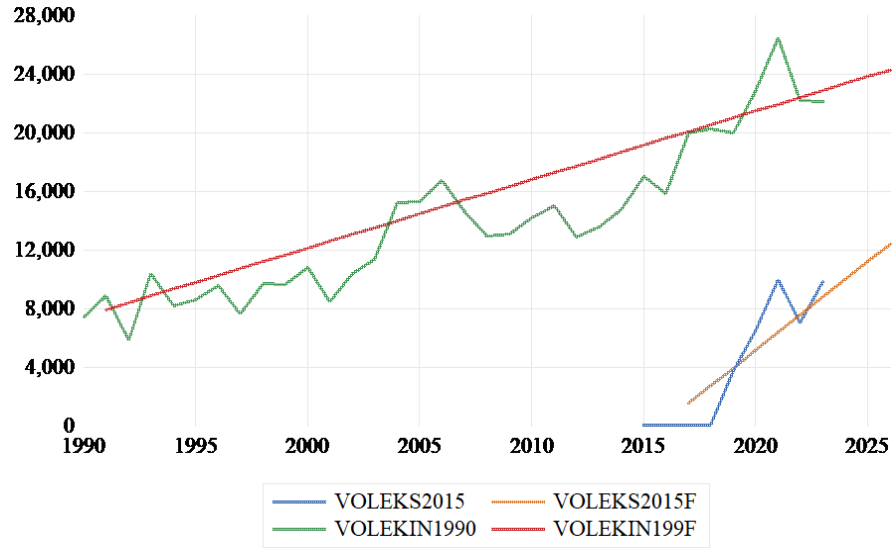
Table 2
Selection of the Best ARIMA Model on Indonesian Nutmeg Exports

Error	ARIMA	
	(1,2,0) (Nutmeg Exports to China)	(0,1,1) (Global Nutmeg Exports)
AIC	18,91148	18.17191
SC	18,94127	18.30796
HC	18,71056	18.21769
Adj R Square	-0,30337	0.092860
Normality	fulfilled	fulfilled
Autocorrelation	fulfilled	fulfilled
Heteroscedasticity	fulfilled	fulfilled
Stable AR/MAS Structure	Stable	Stable

Source: Data processed

The data in the table indicate that the optimal order for the ARIMA model of Indonesian nutmeg exports to the Chinese market for the period 2015-2023 is the ARIMA order (1,2,0). This is because it has a low value on the variable of Indonesian nutmeg exports to the world for the period 1990-2023, with several assumptions and the lowest value and stability of the AR/MA structure in the table, is shown in the ARIMA order (0,1,1). The assumptions of normality, autocorrelation, and heteroscedasticity are satisfied when the probability value is greater than the alpha value of 0.05. The stability of the AR/MA structure can be ensured when the AR/MA value is not greater than 1.0.

In 2021, nutmeg exports reached their highest point to date, with a notable increase in stability observed in the fluctuation pattern on an annual basis. Furthermore, the export trends of both variables demonstrate a positive trajectory. Furthermore, the upward trend in global nutmeg exports is mirrored by a corresponding increase in nutmeg exports to China, which represents the primary destination country.



Source: Data processed

Figure 2
Combined Trends of Indonesian Nutmeg Exports to China and the World

The results of the forecasting data for the year 2026 indicate that the volume of Indonesian nutmeg exports to China is expected to reach 12,410 tonnes. It is predicted that the export volume of Indonesian nutmeg to the global market will reach in excess of 24,265 tonnes in 2026. The favourable trajectory of this trend can inform future decision-making and mitigate the risk of adverse outcomes. This research is further buttressed by a study conducted by Sayidah et al. (2019), which indicates that the results of nutmeg export trends from 2002 to 2022 demonstrate a consistently positive Indonesian nutmeg export demand, exhibiting year-on-year growth.

Table 3
Unit Root Test on First Difference

Variable	ADF	P Value	Description
lnExport	-2.981151	0.0490	Stationery
lnInflation	-6.519527	0.0000	Stationery
lnExchange Rate	-4.761681	0.0006	Stationery
lnInterest Rate	-6.681385	0.0000	Stationery

Source: Data processed

The stationary test value on the variable reaches a satisfactory value at the initial level of differentiation. The results of the initial stationary test indicate that all values have attained a level below the alpha value. In the export variable, the value of 0.0490 < 0.05, indicating that the variable has passed the test. Similarly, the inflation variable has a value of 0.000 < 0.05, indicating that it has also passed the test. The same is true for the exchange rate variable, which has a value of 0.0006, and the interest rate variable, which has a value of 0.000. This indicates that the entire data set has passed the unit root stationary test.

Table 4
Cointegration Test

Variable	Coefficient	P Value	Description
ECT	-3.394184	0.0187	Cointegrated

Source: Data processed

In the context of an ECM analysis, the cointegration test can be generated and formulated based on the residual variance value of the variable in question. The ECT (Error Correction Term) value serves the function of correcting errors in the short-run value that affect the long-run value. The cointegration test value can be considered to be related when it has a value less than the significance value of 0.05.

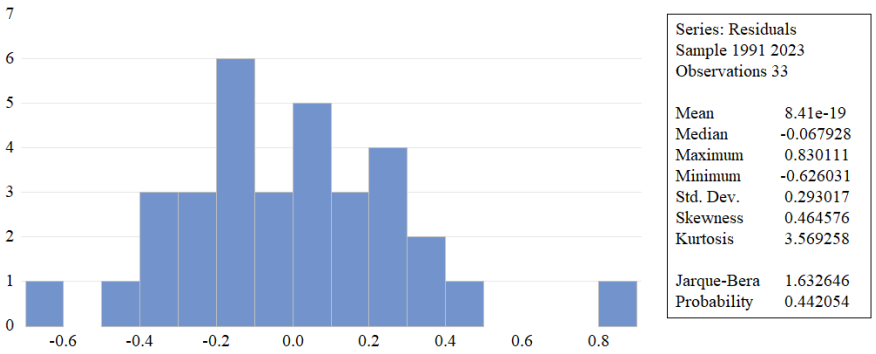
The p-value indicates that the ECT value is 0.0187 <0.05, thus it can be stated that the variables have a long-term relationship.

Table 5
Multicollinearity Test Values

Variable	Coefficient Varians	Uncentered VIF	Centered VIF
C	0.004114	1.383631	NA
D(lnInflation)	0.009613	2.934607	2.929298
D(lnExchangeRate)	0.201787	2.403383	2.986590
D(lnInterestRate)	0.031531	1.203926	1.203302

Source: Data processed

The results demonstrate that the VIF value of lnInf is 2.929298; lnExchange Rate is 2.986590; and lnInterest Rate is 1.203302. In each variable, the value is less than 10, indicating that the data is free from multicollinearity symptoms.



Source: Data processed

Figure 3
Normality Test

The Jarque-Bera probability value for the normality test on this research model is 0.442054, which is greater than 0.05. This indicates that the normality test is free from symptoms and that the data is normally distributed.

Table 6
Heteroscedasticity Test Results

F-statistic	1.094086	Prob. F (4,28)	0.3787
Obs*R-squared	4.460645	Prob. Chi-Square (3)	0.3472
Scaled explained SS	4.125376	Prob. Chi-Square (3)	0.3893

Source: Data processed

The results of the data processing tests indicate that the Obs * R Squared value is 0.3472, which exceeds 0.05 (0.3472 > 0.05). Consequently, the heteroscedasticity test assumption has been validated.

Table 8
Autocorrelation Test

F-statistic	0.332813	Prob. F (2,26)	0.7199
Obs*R-squared	0.823745	Prob. Chi-Square (2)	0.6624

Source: Data processed

The regression model demonstrates that the Prob. F count Obs * R Squared value is 0.6624, which exceeds the alpha level value (0.6624 > 0.05). Consequently, the results of this test indicate that there are no symptoms of autocorrelation.

Table 9
Long-term Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	3.883978	1.235364	3.143994	0.0037
(lnInflation)	0.038053	0.141396	0.269123	0.7897
(lnExchangeRate)	0.920227	0.111566	8.248268	0.0000
(lnInterestRate)	-0.589912	0.227604	-2.591835	0.0146
Adj R-squared				0.8506
Prob F-statistic				0.0000

Source: Data processed

$(Eks_t) = 3{,}883978 + 0{,}03805Inf_t + 0{,}920227ER_t - 0{,}589912\ JR_t + e_t$

- In the F-test, the long-term estimation results yielded a probability value (F-statistic) of 0.0000 <0.05, thereby accepting H1 and rejecting H0. This indicates that the independent variables exert an effect on the dependent variable.
- The coefficient of determination indicates a value of 0.850659, signifying that the entirety of the independent variables subjected to long-term analysis can account for the dependent variable to the extent of 85.0659%. The remaining 14.9341% is attributable to variables that were not included in the study.

Table 10
Short-term Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.027117	0.064142	0.422760	0.6757
D(lnInflation)	-0.064401	0.098047	-0.656834	0.5167
D(lnExchangeRate)	0.656962	0.449207	1.462493	0.1547
D(lnInterestRate)	-0.002948	0.273998	-0.010757	0.9915
ECT (-1)	-0.704419	0.177570	-3.967006	0.0005
Adj R-squared				0.288021
Prob F statistic				0.008327

Source: Data processed

$D(Eks_t) = 0{,}027117 - 0{,}064401DInf_t + 0{,}656962DER_t - 0{,}002948DJR_t - 0{,}704419EC_{(t-1)} + e_t$

- The F-test on short-term analysis indicates a p-value of 0.008327 < 0.05. This supports the rejection of the null hypothesis (H0) and the acceptance of the alternative hypothesis (H1), thereby demonstrating that the independent variable data can simultaneously affect the dependent variable.
- The coefficient of determination is 0.288021, indicating that the short-term tested data can be explained by 28.8021% of the independent variables, with the remaining 71.1917% of the dependent variable influenced by other variables not included in this study.

The Effect of Inflation on Indonesian Nutmeg Exports

The data presented in the above table indicates that the probability value for the long-term inflation variable is 0.7897 > 0.05. This indicates that the null hypothesis (H0) is accepted and the alternative hypothesis (H1) is rejected. It can thus be concluded that the inflation variable exerts no significant impact on Indonesian nutmeg exports in the long term. Similarly, the short-term analysis indicates that inflation has a probability value of 0.5167 > 0.05. Consequently, it can be inferred that inflation does not exert a notable influence on Indonesian nutmeg exports during the period between 1990 and 2023.

In accordance with the findings of Rosalina & Titik (2021), it can be concluded that the inflation rate did not exert any influence on the value of Indonesian exports between the years 2009 and 2020. The findings of this study are consistent with those of Nasrudin et al. (2023), who investigated the impact of total nutmeg production, exchange rates and inflation on nutmeg exports in Indonesia. Their results indicate that, while inflation has a significant effect on Indonesian nutmeg exports, it does not have a statistically significant impact on the level of nutmeg exports. The nutmeg commodity is a product that possesses distinctive characteristics and specific benefits. This characterisation reflects one of the defining features of niche markets. As Drea and Hanna (2000) posit in Nikmah et al. (2023),

niche marketing is the process of targeting market sub-segments according to specific needs and benefits, with the objective of offering a more tailored and effective marketing strategy. Consequently, given the segmented nature of the nutmeg market and the unavailability of suitable alternatives, the continued existence of nutmeg exports is assured. Thus, despite fluctuations in inflation, this product continues to attract importers.

One of the factors that can ensure the continuity of export activities in the context of inflationary fluctuations is the existence of contractual commitments between producer companies and consumer companies in countries that import. As stated by Saleh Mejaya et al. (2016) in Faisal et al. (2021), the majority of export systems in Indonesia utilise a cooperation contract system. This system proposes the examination of the exchange rate of the producer's currency against the US dollar. This implies that fluctuations in domestic inflation do not directly impact exports due to the influence of other contractual factors. As a result, when inflation occurs in Indonesia, it does not disrupt the export activity of nutmeg products to the main destination country, China. This is because there is a contractual attachment that cannot change the market price of nutmeg products.

The Effect of Exchange Rate on Indonesian Nutmeg Exports

The outcomes of the t-test on the Indonesian nutmeg export exchange rate in the long term demonstrate a statistically significant impact., with a probability value of 0.0000 < 0.05. This supports the hypothesis that the exchange rate variable has a partial effect on Indonesian nutmeg exports in the long term. In the short-term analysis, the probability value is 0.1547 > 0.05. Consequently, H0 is accepted and H1 is rejected, indicating that the exchange rate variable has no effect on Indonesian nutmeg exports in the short term.

The findings of this study align with those of the empirical study conducted by Novidayanti et al. (2019), entitled 'Factors affecting Indonesian nutmeg exports to Vietnam', which asserts that the exchange rate variable exerts a significant influence on Indonesian nutmeg exports. In accordance with the theory put forth by Boediono (2001), namely that a weakening or depreciation of the rupiah against foreign currencies will impact the value of exports and result in an increase, in general, companies tend to increase the amount of exported goods when the rupiah exchange rate weakens.

The decline in the rupiah exchange rate has provided an incentive for nutmeg producers to expand their operations into new markets. As demonstrated by the research of Juliani Purba et al. (2021), Indonesian nutmeg is competitively positioned in the global market, offering the potential for sustained market share through expansion into other countries. Consequently, when the rupiah exchange rate depreciates, it presents a favourable opportunity for broader global market penetration while maintaining exports to key destinations such as China.

In contrast to the long-term impact of exchange rates on exports, the short-term effect is negligible. Similarly, the short-term effect of inflation on nutmeg exports is also insignificant due to the presence of export contracts. Additionally, the short-term impact of exchange rates on Indonesian nutmeg exports is also minimal.

The Effect of Interest Rates on Indonesian Nutmeg Exports

The t-test results for the interest rate variable in the long-term relationship yield a value of 0.0146 < 0.05. This indicates that the null hypothesis (H0) is rejected and the alternative hypothesis (H1) is accepted. This implies that the interest rate variable exerts a partial influence on Indonesian nutmeg exports over the long term. In contrast, the short-term relationship yields a probability value of 0.9915 > 0.05 threshold. Consequently, the null hypothesis (H0) is accepted and the alternative hypothesis (H1) is rejected. This indicates that the interest rate variable exerts no discernible influence on Indonesian nutmeg exports in the short term.However, an increase in interest rates is likely to precipitate a decline in Indonesia's nutmeg exports to China and the global market during the 1990-2023 period.

The findings of Yuliyanti (2014) in Diana & Dewi, (2019) indicate that interest rates exert a considerable and adverse impact on fluctuations in the objective of this study is to examine the long- and short-term fluctuations of the rupiah exchange rate against the US dollar. As evidenced by research from Djulius and Nurdiansyah (2014) in Diana & Dewi, (2019), an increase in domestic interest rates will result in capital inflows accompanied by an appreciation of the rupiah currency. The strengthening of the exchange rate will render nutmeg export products more expensive in the international market,

thereby reducing their competitiveness and reducing the value of nutmeg exports. In order to finance nutmeg exports, exporters will borrow capital from banks to finance their export activities. Consequently, when interest rates rise, the cost of borrowing becomes more expensive. This condition will affect export activities that rely heavily on access to credit.

The short-term relationship between the interest rate variable and Indonesian nutmeg exports is not statistically significant. The presence of a contractual agreement serves to maintain the value and volume of exports at a consistent level, thereby enabling the continuation of exports despite the rise in short-term interest rates. This finding aligns with the assertion of Hernawaty et al. (2020) that contractual hedging represents a company's decision, formalised in an agreement between two parties, to safeguard against the risks associated with foreign currency transactions.

This research is in accordance with the empirical study conducted by Rosalina & Titik (2021), which states that interest rates have a significant negative effect on Indonesian exports between 2009 and 2020.

CONCLUSION

The export of Indonesian nutmeg to the Chinese and global markets has demonstrated a consistent upward trajectory. An analysis of export trends to China for the period 2015-2023 and to the world for the period 1990-2023 reveals a favourable direction. The expansion of global nutmeg export activity has been accompanied by a corresponding increase in nutmeg exports to China, which represents the primary destination country.

In the context of a long-term relationship, the inflation variable exerts a negligible influence on Indonesian nutmeg exports. The exchange rate variable exerts a positive influence on Indonesian nutmeg exports, whereas the interest rate variable exerts a negative influence. The inflation rate does not exert a positive influence on Indonesian nutmeg exports, as these commodities are included in niche markets with stable demand. Conversely, a weakening exchange rate will enhance the competitiveness of nutmeg prices in the international market. An increase in interest rates tends to elevate production costs and diminish the competitiveness of nutmeg exports in the international market. However, all variables exert an 85% influence on Indonesian nutmeg exports based on data for the period 1990-2023.

In the context of a short-term relationship, the observed results indicate that there is no discernible impact on Indonesian nutmeg exports. The existence of contractual ties with major destination countries, such as China, ensures that export activities will not be disrupted in the event of fluctuations in macroeconomic variables, including inflation, exchange rates and interest rates. Furthermore, the character of nutmeg commodities is also supportive of this argument. Nutmeg commodities are essential and offer unique benefits, and are included in niche markets. However, the three variables simultaneously influenced 28% of Indonesian nutmeg exports between 1990 and 2023.

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