JHSS (Journal of Humanities and Social Studies)
https://journal.unpak.ac.id/index.php/jhss
Volume 09, Number 01, Page 295-301
e-ISSN: 2598-120X; p-ISSN: 2598-117X

DETERMINANTS OF RUBBER EXPORTS ON ECONOMIC GROWTH IN NORTH SUMATRA PROVINCE\

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Article history: *received 21 April 2025; revised 02 May 2025; accepted 24 May 2025* *DOI: https://doi.org/10.33751/jhss.v9i1.11895*

Abstract. This study aims to analyze the determinants of rubber exports to economic growth in North Sumatra province for the period 2013 to 2023. The variables of rubber determinants used in this study are the price of rubber, the amount of rubber production, and the rupiah exchange rate. The data used is secondary data by collecting annual reports interpolated into quarters published by Bank Indonesia, Central Bureau of Statistics. Data analysis techniques using classical assumption tests and continued with multiple linear regression analysis using SPSS 2022. The results of this research are the determinants of rubber exports with variable prices have a negative and significant effect on economic growth, variable production quantities have a positive and significant effect on economic growth and variable exchange rates have a negative effect on economic growth. Simultaneously determinant of rubber exports affect economic growth with a contribution of 41.8 percent.

Keywords: determinants, exports, price, quantity produced, exchange rate, economic growth.

I. INTRODUCTION

Indonesia is a country that possesses abundant natural resources both on land and in waters. The potential in utilizing Indonesia's natural wealth can help drive economic growth in Indonesia. The land in Indonesia has fertile soil, allowing for the cultivation of various types of crops that can serve as sources of income. Large-scale planting can have a significant impact on the country's economy. Various types of crops that can be planted on a large scale such as rubber, palm oil, coffee, and others. The form of large-scale planting is plantations. According to Adam Smith's classical theory in (Asbiantari et al., 2018), a country can experience economic growth if specialization in the production of a good or service is formed. This specialization is what will eventually give a country added value compared to others, making the goods or services worthy of international trade.

The government is targeting a golden Indonesia by 2045 by boosting economic growth. It is expected that economic growth in Indonesia will increase every year. However, the expected economic growth has not yet met the target. Economic growth in Indonesia experiences fluctuating conditions each year. Here is the economic growth in Indonesia. From the image above, it can be seen that the economic growth in Indonesia is still experiencing a fluctuating state. In 2019, the economic growth in Indonesia was 5.02 percent, but in 2020, the economic growth drastically decreased to -2.07 percent. This happened due to the Covid-19 pandemic that affected the entire world. In 2021 and 2022,

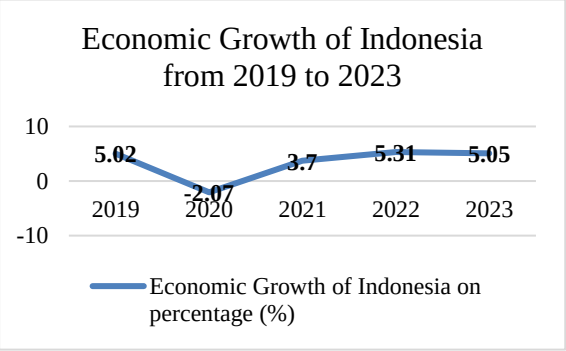

Figure 1 Economic Growth in Indonesia 2019-2023
Source: Central Bureau of Statistics Indonesia (2024)

Indonesia's economic growth increased to 3.7 percent and 5.31 percent, respectively, but in 2023 it experienced a decline again to 5.05 percent. North Sumatra is one of the provinces in Indonesia that produces and exports rubber. The potential to maximize regional economic growth through rubber exports needs to be considered in terms of land availability, production volume, and price. In reality, many farmers and rubber entrepreneurs are shifting their agricultural efforts from rubber to other crops. Thus, there has

Volume 09, Number 01, Page 295-301
e-ISSN: 2598-120X; p-ISSN: 2598-117X

been a decline in the value of rubber exports in North Sumatra. Here is the value of rubber exports in North Sumatra:

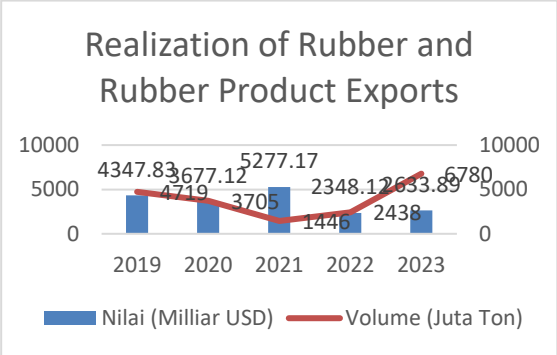

Figure 2. Value of Rubber Exports from North Sumatra 2019-2023. Source: Processed data (2024)

During the period from 2019 to 2023, the export value of rubber and rubber products in North Sumatra decreased due to a decline in rubber export value in 2022. Rubber and rubber products from North Sumatra consist of natural rubber, processed rubber, and rubber products. Rubber is a superior type of agriculture in North Sumatra. The cultivation of rubber commodities should be able to contribute to economic growth in North Sumatra by exporting rubber products to target countries. Based on the available data, the value and volume of rubber exports have decreased, which means that rubber exports have not yet maximized their contribution to economic growth in North Sumatra. Price is an export factor that influences economic growth. According to research conducted by Lestari & Zulaikha (2019), the unstable price of rubber in Lampung affects the monthly income levels of farmers, forcing them to take on side jobs to meet their living needs and leading to a shift in land use from rubber plantations to other more productive crops in order to improve stable and even better economic growth in the region. The price of rubber in North Sumatra has been declining every year, as shown in the following export rubber prices.

Table 1.1 Rubber Export Prices in North Sumatra Province from 2019 to 2023

Years	**Price (Rp/Kg)**
2019	9.631
2020	7.934
2021	12.267
2022	7.000
2023	7.297

Source: Processed data (2024)

From the table above, the price of rubber in 2019 was 9,631 Rp/Kg, in 2020 the price of rubber decreased to 7,934 Rp/Kg. In 2021, the price of rubber increased significantly to 12,267 Rp/Kg, but in 2022 and 2023, the price of rubber decreased again to 7,000 Rp/Kg and 7,297 Rp/Kg, respectively. The inconsistent price of rubber and its inability to cover planting costs make rubber planting unfeasible. Rubber production has proven to be a tool for increasing exports and meeting domestic demand. The high demand for rubber products in both local and international markets is evidence that the demand for rubber raw materials has a satisfying potential for continuous growth. Here is the rubber production volume in North Sumatra. Rubber production has experienced fluctuating increases, from 309,017 tons in 2019, an increase to 309,973 tons in 2020, another increase to 310,016 tons in 2021, a decrease to 310,000 tons in 2022, and a further decrease to 307,800 tons in 2023. The year 2023 is the lowest rubber production in the last five years. A large rubber production will increase rubber exports abroad, thereby boosting economic growth in North Sumatra.

Another factor that influences exports is the exchange rate of the rupiah. According to Fihri et al. (2021), the exchange rate is the price of a currency from one country measured against another currency. The exchange rate plays an important role in making decisions for consumers where prices are obtained from one country to another. When one object is exchanged for another, it can be compared with the exchange rate of another. Here are the exchange rates in Indonesia.

Table 3 Average Exchange Rates in Indonesia from 2019 to 2023

Years	Average Exchange Rate (Rupiah Against Dollar)
2019	9.879
2020	10.117
2021	10.813
2022	10.361
2023	10.183

Source: Processed Data (2024)

From the data above, the average exchange rate of the rupiah has experienced fluctuating conditions. In 2019, the average exchange rate of the rupiah was 9,879 Rupiah, in 2020 the average exchange rate of the rupiah increased to 10,117 Rupiah, and in 2021 the average exchange rate of the rupiah increased to 10,813 Rupiah. In 2022, the average exchange rate of the rupiah decreased to 10,361 Rupiah, and in 2023, the average exchange rate of the rupiah decreased to 10,183 Rupiah. The stable exchange rate of the rupiah encourages foreign consumers to import rubber from Indonesia, especially from North Sumatra province.

International Trade

Trade comes from the word "dagang," which is a verb meaning to engage in commerce. The definition of trade or commerce is an activity where humans exchange one type of goods for another, whether between individuals or business units with each other (Diphayana, 2018). Trade can be defined as the exchange of goods, services, or money that is mutually

Volume 09, Number 01, Page 295-301
e-ISSN: 2598-120X; p-ISSN: 2598-117X

beneficial or advantageous, based on the voluntary consent of each party.

Understanding Export

A country can export its manufactured goods to another country if those goods or their production cannot meet domestic needs. An even more important factor is the country's ability to produce goods that can compete in the foreign market. In general, it can be said that the more types of goods with such special characteristics produced by a country, the more exports can be carried out (Sukirno, 2012). Based on that theory, there are several factors that influence the export of a commodity to the international market, namely international prices, demand and supply factors between countries, and domestic factors (government policies towards foreign trade). In addition, exports are also implicitly influenced by the exchange rate of a country's currency with other countries. Exports from an Islamic Perspective

1) Price

Price is a certain level of value that is formed as a result of a joint opportunity between producers. The price of a good is greatly determined by the balance between supply and demand in the goods and services market. This means that the price of a good cannot be immediately formed by the producer's desire for a high price according to the law of supply or the consumer's desire for a low price according to the law of demand. In the Islamic perspective, the issue of price equilibrium is very important. The role of the government in stabilizing prices and the methods to address issues if price instability occurs are the most important. There are many differing opinions among scholars regarding government price setting; some justify it, while others do not.

Production

2) Exchange Rate

According to Ali (2019), the exchange value (value in exchange) is the ability of a good to be exchanged for another good in the market. In financial management, the exchange rate is defined as the rate at which one country's currency can be exchanged for another country's currency. In the era of simple societies, exchange rates were determined by the productivity or labor of humans in producing goods or services.

3) Economic Growth

According to Hasyim (2016), economic growth is a process of continuous change in the economic conditions of a country towards a better condition from one period to the next. This economic growth means an increase in income without a direct correlation to the increase in population.

II. METHOD

Type of Research

The research was conducted using quantitative research methods. It is called quantitative because the data examined in this research is in numerical form and to determine whether there is an influence or relationship between the independent variable and the dependent variable.

Research Data Sources

This research is sourced from institutions related to this study such as the Central Bureau of Statistics of Indonesia, the Central Bureau of Statistics of North Sumatra, and Bank Indonesia Reports. The data needed for analysis includes Prices, Exchange Rates, Production Volume, and economic growth in North Sumatra Province for the period from 2013 to 2023.

Population

The population in this study consists of all data on Prices, Exchange Rates, Production Volume, and economic growth in Indonesia for the period from 2013 to 2023, published by the relevant agencies. The population in this study is in the province of North Sumatra.

Sample

The sampling technique used in this research is Saturated Sampling or total sampling, which is a sampling determination technique where all members of the population are used as samples (Sugiyono, 2016). The sample taken in this study is the Province of North Sumatra.

Research Data Methodology

The data collection technique in this research was conducted through Documentation, which involved gathering documents in the form of statistical records from past annual reports that have been published by official institutions, namely the Central Bureau of Statistics of Indonesia, the Central Bureau of Statistics of North Sumatra, the Investment Coordinating Board, and Bank Indonesia through the official websites of each institution and downloaded from the internet.

A. Partial Test (t-test)

1) If $\alpha < 0.05$, then H0 is rejected and Ha is accepted, meaning the independent variable affects the dependent variable.

2) If $\alpha > 0.05$, then H0 is accepted and Ha is rejected, meaning the independent variable does not affect the dependent variable (Rahmani, 2016).

a. Simultaneous Test (F Test)

This test is conducted using a significance level of 0.05 (α = 5%). The criteria for hypothesis testing are:H0 $\beta = 0$, meaning the independent variable does not affect the dependent variable.

H0 $\beta \neq 0$, meaning the independent variable affects the dependent variable.

Coefficient of Determination (R2)

The coefficient of determination (R2) essentially measures the extent to which a model can explain the variation in the dependent variable. The R2 value is between zero and one. A small or near-zero R2 value means that the ability of one variable to explain the dependent variable is very limited.

Volume 09, Number 01, Page 295-301
e-ISSN: 2598-120X; p-ISSN: 2598-117X

III. RESULT AND DISCUSSION

North Sumatra North Sumatra was formed during the Dutch colonial period known as the Government of Sumatra, covering the entire island of Sumatra. North Sumatra, led by a Governor with the center of government in the city of Medan. After independence, in the first session of the Regional National Committee (KND), Sumatra Island was then divided into three sub-regions, consisting of: North Sumatra, Central Sumatra, and South Sumatra. North Sumatra itself is a combination of three administrative regions known as residencies, namely: the Residency of Aceh, the Residency of East Sumatra, and the Residency of Tapanuli.

Figure 4 Map of North Sumatra Province

Each region in the regency is led by a regional head, namely the Regent, while the City region is led by the Mayor. Here are the districts/cities in the province of North Sumatra. In this study, descriptive statistical analysis is viewed from the minimum value, maximum value, average, and standard deviation. The variables used are Rubber Prices, Production Volume, Exchange Rate, and Economic Growth. The results of the descriptive statistical analysis in this study are as follows.

The Rubber Price variable with a sample size of 44 has a minimum value of 5310 and a maximum value of 18925, with a mean of 9235.2 and a standard deviation of 3195.467. The Production Quantity variable with a sample size of 44 has a minimum value of 306 and a maximum value of 335, with a mean of 315.05 and a standard deviation of 9.358. The Exchange Rate variable with a sample size of 44 has a minimum value of 9984.96 and a maximum value of 15437.92, with a mean value of 13687.7383 and a standard deviation of 1370.53853. The Economic Growth Variable with a sample size of 44 has a minimum value of -1.5 and a maximum value of 6.7, with a mean value of 4.386 and a standard deviation of 1.9672.

Classic Aumsi Test

Data Normality Test

The criteria for the Kolmogorov Smirnov normality test are that if the significance value or probability > 0.05, it means the data is normally distributed, and if the significance value or probability < 0.05, it means the data is not normally distributed.

Table 3 Results of the Normality Test

One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		44
Normal Parameters[a,b]	Mean	0E-7
	Std. Deviation	1.78154422
Most Extreme Differences	Absolute	.224
	Positive	.139
	Negative	-.224
Kolmogorov-Smirnov Z		1.483
Asymp. Sig. (2-tailed)		.075

a. Test distribution is Normal.
b. Calculated from data.

Source: SPSS 22 Data Output processed

Based on the results of the Kolmogorov Smirnov test in the table above, it can be seen that the probability values for all data groups are 0.075, which is greater than the α value of 0.05 (0.075 > 0.05). It can be stated that all probability values in all data groups are normally distributed or the data meet the classical assumptions.

Multicollinearity Test

Multicollinearity Test aims to examine whether there is a correlation between independent variables in the regression model. A group of data is said to have multicollinearity if the Tolerance value is < 0.10 or the VIF value is > 10. If the Tolerance value > 0.10 or the VIF value < 10, it means there is no multicollinearity among the variables in the regression model. The results of the multicollinearity test conducted in this study are as follows.

Table 4 Results of Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	256.9727	3313.890	NA
X1	2.12E-08	26.10085	2.733960
X2	0.002605	3336.650	2.874796
X3	4.59E-08	112.0254	1.086968

Source: SPSS 22 Data Output processed

Based on the results of the multicollinearity test in the table above, it can be said that the variable Rubber Price (X1) has a VIF value of 2.733960. the variable Rubber Production (X2) has a VIF value of 2.874796. The Exchange Rate Variable (X3) has a VIF value of 1.086968. Therefore, the VIF values of the three independent variables are less than 10. therefore, it can be concluded that there are no signs of multicollinearity in the regression model.

Heteroskedasticity Test

The Heteroscedasticity Test is conducted to determine whether a regression model exhibits unequal variance of residuals from one observation to another. If the

Volume 09, Number 01, Page 295-301
e-ISSN: 2598-120X; p-ISSN: 2598-117X

variance of the residuals from one observation to another remains constant, it is called homoscedasticity. The White test is conducted by regressing the squared residuals with the independent variable, the squared independent variable, and the interaction of the variables. If the value of Prob Obs*RSquared > 0.05, then there is no sign of heteroscedasticity.

Table 5 Results of Heteroskedasticity Test with the White Test

Heteroskedasticity Test: White

F-statistic	0.785977	Prob. F(9,34)	0.6307
Obs*R-squared	7.577747	Prob. Chi-Square(9)	0.5772
Scaled explained SS	14.10509	Prob. Chi-Square(9)	0.1186

Source: SPSS 22 Data Output processed

Based on the table above, the results of the heteroscedasticity test using the White Test show a Prob Obs*RSquared value of 0.5772, which is greater than 0.05. Therefore, it can be concluded that the regression model does not exhibit heteroscedasticity symptoms.

Autocorrelation Test

The autocorrelation test aims to see whether there is a correlation between the disturbance error in period t and the disturbance error in period t-1 (previously) in a linear regression model.

Table 6. Results of the Autocorrelation Test

Runs Test

	Unstandardized Residual
Test Value[a]	.51599
Cases < Test Value	22
Cases >= Test Value	22
Total Cases	44
Number of Runs	7
Z	-4.729
Asymp. Sig. (2-tailed)	.067

a. Median

Source: SPSS 22 Data Output processed

Based on the table above, the value of Asymp, Sig. (2-tailed) is 0.067, which is greater than (> 0.05). It can be concluded that there are no signs of autocorrelation.

Multiple Linear Regression Test

Multiple Regression Analysis aims to analyze the influence of the variables Rubber Price (X1), Rubber Production (X2), and Exchange Rate (X3) on Economic Growth (Y) in North Sumatra Province, with the following regression results obtained.

Table 7. Results of Multiple Linear Regression Test

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.775	16.030		-.235	.815
	X1	-.032	.000	-.168	-.1711	.041
	X2	.051	.051	.244	3.006	.018
	X3	-.001	.000	-.359	-2.403	.021

a. Dependent Variable: Y

Source: SPSS 22 Data Output processed

Based on the table above, it is known that the estimated value of the model's regression equation parameters is as follows:
Economic Growth = - 3.775 + 0.032X1 + 0.051X2 - 0.001X3 + e

The multiple linear regression equation above can be explained as follows.

a. The constant in the equation above is -3.775, which means that if there is no influence from Rubber Prices (X1), Rubber Production (X2), and Exchange Rate (X3) being equal to zero, the value of Economic Growth (Y) would be -3.775.

b. The regression coefficient for the rubber price variable is negative, indicating a value of 0.032. This can be concluded that every 1% increase in rubber prices will decrease economic growth by 0.032, assuming other independent variables remain constant.

c. The regression coefficient for the rubber production variable is positive, indicating a value of 0.051. It can be concluded that every 1% increase in rubber production will increase economic growth by 0.051, assuming other independent variables remain constant.

d. The regression coefficient for the exchange rate variable is negative, indicating a value of -0.001. This can be concluded that every 1% increase in rubber prices will result in a decrease in economic growth by 0.001, assuming other independent variables remain constant.

Hypothesis Testing

a. Partial Test (t-test)

Partial Test (t-test) is conducted to test a research hypothesis regarding the influence of each independent variable partially on the dependent variable. The basis for the decision is as follows: If α < 0.05, then H0 is rejected and Ha is accepted, meaning the independent variable affects the dependent variable. Conversely, if α > 0.05, then H0 is accepted and Ha is rejected, meaning the independent variable does not affect the dependent variable.

Based on the table above, the results of the partial test (t-test) conducted to determine whether each independent variable used in this study has a partial effect on Economic Growth. It can be concluded for each variable as follows:

1) The Influence of Rubber Prices on Economic Growth in North Sumatra.

It is known that the Sig. value is 0.041, which is greater than 0.05, so it can be concluded that the Ha Hypothesis is accepted and the Ho Hypothesis is rejected, meaning that the Rubber

Volume 09, Number 01, Page 295-301
e-ISSN: 2598-120X; p-ISSN: 2598-117X

Price variable has a significant effect on Economic Growth in North Sumatra.

Table 8 Results of the t-test (Partial Test)
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-3.775	16.030		-.235	.815
	X1	-.032	.000	-.168	-.1711	.041
	X2	.051	.051	.244	3.006	.018
	X3	-.001	.000	-.359	-2.403	.021

a. Dependent Variable: Y
Source: SPSS 22 Data Output processed

2) The Influence of Production Volume on Economic Growth in North Sumatra.
It is known that the Sig. Value is 0.018, or less than 0.05, so it can be concluded that the Ha Hypothesis is accepted and the Ho Hypothesis is rejected, which means that the Production Quantity variable has a significant effect on Economic Growth in North Sumatra.
3) The Influence of Exchange Rates on Economic Growth in North Sumatra.
It is known that the Sig. Value is 0.021, or less than 0.05, so it can be concluded that the Ha Hypothesis is accepted and the Ho Hypothesis is rejected, which means the Exchange Rate variable has a significant effect on Economic Growth in North Sumatra.
a. Simultaneous Test (F Test)
Simultaneous Test (F Test) is conducted to test a research hypothesis regarding the simultaneous or collective influence of independent variables on the dependent variable. The basis for the decision is that if the F significance value < α = 0.05, it can be concluded that the independent variables simultaneously have a significant effect on the dependent variable. Thus, the hypothesis (Ha) is accepted, and conversely, if the F significance value > α = 0.05, it can be concluded that the independent variables simultaneously do not affect the dependent variable. Thus, the hypothesis (H0) is accepted.

Table 9 F-Test Results (Simultaneous Test)
ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	29.934	3	9.978	2.924	.045[b]
	Residual	136.478	40	3.412		
	Total	166.412	43			

a. Dependent Variable: Y
b. Predictors: (Constant), X3, X1, X2
Source: SPSS 22 Data Output processed

Based on the table above, the significant value is 0.045. Thus, the Sig. value of 0.005 < 0.05. The results of this study indicate that the Ha Hypothesis is accepted and H0 is accepted, meaning that the Independent Variables (Rubber Prices, Production Volume, and Exchange Rate) simultaneously influence economic growth in North Sumatra.
a. Coefficient of Determination (R2)
The coefficient of determination (R2) shows how well the independent variables used can explain the dependent variable.

Table 10. Results of the Coefficient of Determination (R2) Test
Model Summaryb

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.424[a]	.180	.418	1.84714	.215

a. Predictors: (Constant), X3, X1, X2
b. Dependent Variable: Y
Source: SPSS 22 Data Output processed

Based on the table above, the Adjusted R Square (R2) coefficient value is 0.418 or 41.8%. This indicates that the extent of the ability of the variables Rubber Price (X1), Production Volume (X2), and Exchange Rate (X3) explains the influence on Economic Growth (Y) by 41.8%, while the remaining 58.2% is explained or influenced by other variables. This means that the Price of Rubber, Production Quantity, and Exchange Rate explain the magnitude of the influence on Economic Growth by 41.8%, while the remaining 58.2% is influenced by other factors that were not studied.

The discussion in the research explains the determinants of rubber exports in North Sumatra province from 2013 to 2023. With the variables being studied being rubber prices, the amount of rubber production, and the exchange rate of the rupiah. The Influence of Rubber Prices on Economic Growth in North Sumatra From the results of the partial test (t-test), the t-value obtained was -1.711 while the t-table value was 1.680, and the test result showed 1.711 > 1.680. The significance value was 0.041 > 0.05, H0 was rejected and Ha was accepted. This means that from the test results, it can be concluded that there is a partial negative influence of rubber export determinants with the price variable on economic growth in North Sumatra province. The study of the export factor with the price variable has a negative impact on economic growth in North Sumatra province. This indicates that lower rubber prices will reduce economic growth. This is in line with the research conducted by Juni Karlina et al. (2022), whose findings state that the Export Price of CPO has a negative impact on Indonesia's CPO Exports to the top ten destination countries from 2008 to 2020. However, it differs from the research conducted by Angelina et al. (2024), whose findings indicate that there is a positive but not significant partial effect of the international price of natural rubber on Indonesia's economic growth from 1991 to 2020.
The Influence of Production Volume on Economic Growth in North Sumatra

The results of the partial test (t-test) obtained a t-value of 3.006 while the t-table value was 1.680, and the test form was 3.006 > 1.680. Meanwhile, the significance value was 0.018 > 0.05, H0 was rejected and Ha was accepted. This

Volume 09, Number 01, Page 295-301
e-ISSN: 2598-120X; p-ISSN: 2598-117X

means that the results of the test can be concluded partially that there is an influence of export determinants with the variable of production quantity on economic growth in North Sumatra province.

IV. CONCLUSION

The results of the research conducted on the determinants of rubber exports on economic growth in North Sumatra province for the period from 2013 to 2023 with the variables of rubber prices, rubber production volume, and the exchange rate of the rupiah. The results obtained from the partial test between the rubber export factor and the rubber price variable on economic growth have a significantly negative impact. The condition is that if the price of rubber increases by 1 percent, it will decrease growth by 3.2 percent. The factor of rubber exports with the variable of rubber production quantity has a significantly positive impact on economic growth. The condition is that if the production volume increases by 1 percent, it will boost economic growth by 5.1 percent. and the factor of rubber exports with the variable of the exchange rate of the rupiah against economic growth has a significantly negative impact. The provision states that if the exchange rate increases by 1 percent, it will decrease economic growth by a certain percentage. Based on the F-test results, the determinants of rubber exports with the variables of rubber prices, rubber production volume, and the exchange rate simultaneously have a positive and significant impact on economic growth in North Sumatra province. The results of the coefficient of determination test yielded a value of 0.418, meaning that the export determinants with the variables studied contribute 41.8 percent to economic growth, while the remaining 59.2 percent is influenced by other variables from export factors not examined in the study.

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