ANALYSIS OF THE EFFECT OF TOTAL PRODUCTION, INTERNATIONAL PRICE, EXCHANGE RATE, AND INFLATION ON THE VOLUME OF INDONESIAN RUBBER EXPORTS, 1980-2018
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Abstract
The purpose of this study is to partially and simultaneously analyze the influence of the variable production quantity, international prices, exchange rates, inflation on the volume of Indonesian rubber exports from 1980 to 2018. The research method uses quantitative methods. Sources of research data from publications of data collected by government officials or departments include the website of the Central Statistics Agency (BPS), Bank Indonesia (BI), the Ministry of Agriculture’s Data and Information Center (Pusdatin), Index Mundi. The research location was conducted in Indonesia. The data method used in this study is the non-behavioral observation method. Multiple linear regression is the type of data used in this study as an econometric tool to describe this research and also uses data analysis such as descriptive statistical tests, classical assumptions test, simultaneous test (F test), and partial test (t-test). The results of the analysis in this study indicate that the amount of production, international prices, exchange rates, and both simultaneously and simultaneously have a significant effect on the volume of Indonesian rubber exports during the years 1980-2018. Partially the amount of production has a positive and significant effect on the volume of Indonesian rubber exports in 1980-2018, while international prices, exchange rates and inflation have no significant effect on the volume of Indonesian rubber exports in 1980-2018.

Keywords: Production, International Prices, Exchange Rates, Inflation, Rubber Export Volume

INTRODUCTION
The agricultural sector is having an important role in economic activity in Indonesia, it can be seen from its contribution to Gross Domestic Product (GDP) of Indonesia which is around 12.81 percent in 2018 or is in third place after the Manufacturing, Wholesale and Retail Industry sectors, Car and Motorcycle Repair (Badan Pusat Statistik Indonesia, 2018). Agriculture is one of the sectors that is important the government which not only aims to achieve food self-sufficiency but also increases national exports (Ningsih & Kurniawan, 2016). Jeon (2013) said that if agriculture is neglected it will lead to the expansion of the unstable informal sector, this will affect the economy of a country. In addition, Rimbawan (2012) in his research also proved that the absorption of workers by the tradable sector (agriculture, industry, and mining & quarrying) was greater
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than the non-tradable sector (hotels, trade, restaurants, finance, transportation, etc.) which means the agricultural sector also plays an important role in the absorption of labor in Indonesia. The state of the Indonesian economy in a period of 25 years from 1990 to 2014 shows an increasing trend when viewed from several macro aggregate figures, namely income (GDP), tax revenue, employment opportunities, and education (Bendesa & Wiwin, 2020). One of the drivers of GDP growth is exports which then make exports something very important for a country. The cooperation of other factors is needed to build a good business climate, especially in the export product business in order to boost the quantity and quality of exports. These factors are population growth and economic recovery which can have a positive impact on the business world including the rubber product business (Rahman, 2016).

According to Batubara, Dison M.H. & Saskara (2015) the variable that is expected to have the greatest contribution to exports in the next ten years is the export itself with an average annual contribution of 88.46 percent, followed by a GDP contribution of 7.69 percent, imports of 3.85 percent, and foreign debt of close to zero percent. Then Tetry A. Sitohang (2016) in his journal also states that the ups and downs of Indonesia's foreign exchange reserves are influenced by the ups and downs of net exports, the dollar exchange rate and inflation together. Because exports contribute quite a lot to a country, including to increase foreign exchange and its economy, a country will try to maximize the potential of its domestic products to be exported abroad. One of Indonesia's leading export products to be exported abroad are plantation products which is one of the products in agricultural sectors. The increasing trend of plantation exports illustrates that plantation products have been able to compete in the international market so that they can make a very significant contribution to foreign exchange trade (Rosihan Asmara & Nesia Artdiyasa, 2008).

Among all of the agricultural sectors in Indonesia, the most prominent sector is the plantation sub-sector. The contribution of the plantation sub-sector to the Gross Domestic Product (GDP) of the agricultural sector was 3.30 percent in 2018 or was in the first place in the Agriculture, Livestock, Hunting and Agricultural Services sectors (Badan Pusat Statistik Indonesia, 2018). Rubber is one of the important plantation commodities in the export of the plantation sub-sector (Claudia, Yulianto, & Mawardi, 2016). Rubber known for its elastic qualities is a commodity that is used in many products and equipment around the world. About 85 percent of Indonesia's rubber production is exported abroad while the rest is for domestic consumption. Nearly half of the exported rubber production is shipped to other Asian countries, followed by North America and Europe. The large consumption of developed countries that are oriented towards the industrial sector opens up opportunities for Indonesia to increase its rubber exports abroad (Ngatindriatun, Pujiati, & Soesilowati, 2015).

Indonesia is the largest rubber producer in the world after Thailand, so in the global market the competitiveness of rubber is very good. Sabaruddin (2014) in his research stated that primary commodities such as rubber, palm oil and natural gas, which rely on their respective commodity exports, generally outperform China. The other research by Satayawaksakul & Choi (2017) shows that Indonesia has the highest comparative advantage among other rubber exporting countries. From that research, it can be concluded that Indonesia's rubber commodity has great potential to be developed so that it can make a greater contribution to Indonesia's foreign exchange.
Table 1: Indonesian Rubber Development, 1980-2018

| Year | Production (Ton) | Export Volume (Ton) | Import Volume (Ton) | Availability (Ton/Year) | Growth (% ) |
|------|-----------------|---------------------|--------------------|-------------------------|-------------|
| 1980 | 1,020,000       | 976,131             | 1,960              | 45,829                  | -           |
| 1981 | 963,238         | 812,800             | 2,324              | 152,762                 | 233.33      |
| 1982 | 899,214         | 797,608             | 1,847              | 103,453                 | -32.28      |
| 1983 | 1,006,980       | 938,032             | 365                | 69,313                  | -33.00      |
| 1984 | 1,032,598       | 1,009,558           | 24                 | 23,064                  | -66.72      |
| 1985 | 1,054,966       | 987,771             | 44                 | 67,239                  | 191.53      |
| 1986 | 1,113,133       | 958,692             | 151                | 154,592                 | 129.91      |
| 1987 | 1,130,351       | 1,092,325           | 0                  | 37,826                  | -75.53      |
| 1988 | 1,173,298       | 1,132,132           | 0                  | 41,166                  | 8.83        |
| 1989 | 1,209,037       | 1,151,409           | 823                | 58,451                  | 41.99       |
| 1990 | 1,275,295       | 1,077,331           | 792                | 198,756                 | 240.04      |
| 1991 | 1,328,172       | 1,220,020           | 1,250              | 109,402                 | -44.96      |
| 1992 | 1,398,448       | 1,267,605           | 680                | 131,523                 | 20.22       |
| 1993 | 1,475,438       | 1,214,568           | 817                | 261,687                 | 98.97       |
| 1994 | 1,499,424       | 1,244,950           | 2,320              | 256,794                 | -1.87       |
| 1995 | 1,573,303       | 1,324,295           | 7,566              | 256,574                 | -0.09       |
| 1996 | 1,574,026       | 1,434,285           | 4,729              | 144,470                 | -43.69      |
| 1997 | 1,552,585       | 1,404,010           | 6,599              | 155,174                 | 7.41        |
| 1998 | 1,611,898       | 1,641,186           | 13,567             | 34,279                  | -77.91      |
| 1999 | 1,604,359       | 1,494,543           | 17,962             | 127,778                 | 272.76      |
| 2000 | 1,501,428       | 1,379,612           | 32,548             | 154,364                 | 20.81       |
| 2001 | 1,607,461       | 1,453,382           | 9,298              | 163,377                 | 5.84        |
| 2002 | 1,630,359       | 1,495,987           | 9,911              | 144,283                 | -11.69      |
| 2003 | 1,792,348       | 1,662,210           | 17,840             | 147,978                 | 2.56        |
| 2004 | 2,065,817       | 1,874,261           | 7,648              | 199,204                 | 34.62       |
| 2005 | 2,270,891       | 2,024,593           | 6,687              | 252,985                 | 27.00       |
| 2006 | 2,637,231       | 2,286,897           | 6,905              | 357,239                 | 41.21       |
| 2007 | 2,755,172       | 2,407,972           | 9,915              | 357,115                 | -0.03       |
| 2008 | 2,754,356       | 2,283,158           | 12,570             | 483,768                 | 35.47       |
| 2009 | 2,440,347       | 1,991,533           | 12,729             | 461,543                 | -4.59       |
| 2010 | 2,734,854       | 2,351,915           | 17,096             | 400,035                 | -13.33      |
| 2011 | 2,990,184       | 2,556,233           | 15,902             | 449,853                 | 12.45       |
| 2012 | 3,012,254       | 2,444,503           | 26,908             | 594,659                 | 32.19       |
| 2013 | 3,237,433       | 2,701,995           | 24,527             | 559,965                 | -5.83       |
| 2014 | 3,153,186       | 2,623,471           | 28,753             | 558,468                 | -0.27       |
| 2015 | 3,145,398       | 2,630,313           | 32,747             | 547,832                 | -1.90       |
| 2016 | 3,357,951       | 2,619,331           | 30,557             | 769,177                 | 40.40       |
| 2017 | 3,680,428       | 2,991,909           | 29,773             | 718,292                 | -6.62       |
| 2018 | 3,630,268       | 2,811,954           | 46,952             | 865,266                 | 20.46       |

Growth Average (% / year)  
1980-2018  
28.89

Source: Direktorat Jenderal Perkebunan, processed by Pusdatin (2019)
This study proves the high competitiveness of Indonesia's rubber exports. If the smallholders are able to produce rubber with good quality, the level of competitiveness can increase more significantly (Arifin, 2013). One of the ways to improve the quality of rubber is by increasing the amount of capital through investment in technology and research. This step will increase the industry’s ability to increase production efficiency, such as producing new rubber seeds that can contribute to economic development (Mohd Fahmy-Abdullaha et al., 2020).

By increasing the quality of rubber products, the opportunities that arise from the large consumption of the foreign industrial sector can be utilized properly so as to increase the value of the product and the export competitiveness of rubber itself. Rubber farmers will also be able to benefit from the increase in rubber exports because based on the journal written by (Kuswanto, 2019) the problem of farmer welfare is not only determined by rubber production and the level of household consumption of farmers, but there are also factors that cannot be controlled by farmers, namely rubber prices and household consumption goods prices. There are also other factors, namely household expenses carried out by rubber farmers, one of which is influenced by the rejuvenation of the rubber tree itself (Marnisah, Karim, Sanmorino, & Jenahar, 2019).

During the 2008-2018 period, if rubber production was compared to the volume of exports, about 80 percent of Indonesia's rubber production was destined for export and the rest was for domestic consumption. Rubber itself is a commodity that is not consumed directly by humans, but rather an industrial demand or through an industrial process into a new form so that it can be used. Therefore, domestic demand for rubber in Indonesia is approached from the calculation of availability, namely production minus export volume and added volume of imports.

In general, the development of Indonesia's rubber export volume from 1980 to 2018 has been quite fluctuating. The highest export volume occurred in 2017, namely 2.99 million tons with a value of 5.10 billion US $, while the highest growth in rubber export volume occurred in 2010, which was 18.10 percent from 1.99 million tons in 2009 to 2.35 million tonnes in the following year. In 2018 the export volume decreased slightly compared to 2017, namely by 6.01 percent or decreased from 2.99 million tons to 2.81 million tons.

In the other side, the development of rubber availability for domestic consumption from year to year is quite volatile. Based on data from Direktorat Jenderal Perkebunan & Pusdatin (2019) in Table 1, it was recorded that in 2015 the availability of domestic rubber was 547.83 thousand tons or decreased by 1.90 percent from 558.46 thousand tons in the previous year, then in 2016 it increased again. 40.40 percent to 769.18 thousand tons. The increase in the availability of domestic rubber demand in 2016 was caused by an increase in production by 6.76 percent and a decrease in exports by 0.41 percent.

Furthermore, in 2017 that number again decreased to 718.29 thousand tons and vice versa in 2018 the availability again increased to 865.27 thousand tons. From these data, it can be seen that there is a strong relationship between rubber exports and the availability of rubber and the amount of domestic production in Indonesia.

Budiman & Penot (1997) in their research stated that there is a slight possibility of an increase in rubber production, a decrease in the age of immature rubber, an increase in tapping facilities and savings in tapping labor, as well as an increase in land prices and better rubber growth. Through this research, it can be seen that there are opportunities to increase the production of rubber commodities. This increase in production will also have an effect on increasing exports and fulfilling domestic consumption, where there are
problems in maximizing export potential due to a decrease in the amount of production accompanied by an increase in domestic rubber availability or domestic rubber consumption.

This study uses the theory of supply and demand for international trade. In the theory of international trade, some people say that the factors affecting exports can be seen from the demand and supply side. (Krugman, Paul, R & Obstfeld, 2000). From the demand side, exports are influenced by export prices, real exchange rates, world income and devaluation policies. Meanwhile, from the supply side, exports are influenced by export prices, domestic prices, real exchange rates, production capacity that can be produced through investment, imports of raw materials and deregulation policies.

The relationship between export volume and production also international prices itself can be illustrated from that theory where when the supply of production or international prices increases, exports will also increase. Prajanti et al., (2020) In his research, it proves that partially the production variables have a positive and significant effect on the volume of Indonesian coffee exports. Siburian, (2014) on the other side, stated that when the international rubber price increases, Indonesian rubber exporters will carry out greater production to increase export value.

Other research conducted by Purusa & Istiqomah (2018) states that an increase in world oil prices or international oil prices will increase export volumes in 5 ASEAN countries. Meanwhile, between export volume and exchange rate and inflation, the relationship can be illustrated as when the exchange rate and inflation decline, exports will increase.

In Mauliana & Jamal (2020) research, it shows that in long-term the exchange rate and inflation had a dominant influence on export activities in ASEAN-8 countries, while inflation had a dominant influence on exports in short-term. Chen, Y. C., & Rogoff (2003) prove that there is a relationship between exchange rates and export commodities. They found that the real exchange rates of Australia and New Zealand were driven by world commodity prices. Yazid & Mulyana (2016) said that there is a positive relationship between the amount of production and the exchange rate and the volume of Indonesian rubber exports.

Other research conducted by Dewi (2013) states that the amount of production, land area, and the US Dollar exchange rate simultaneously had a significant effect on Indonesian rubber exports in 1993-2013, which means that Indonesia's rubber exports were simultaneously influenced by these factors. Amelia Sri Pramana & Meydianawathi (2013) also show that the US Dollar exchange rate variable has the most dominant influence on Indonesia's non-oil and gas sector exports to the United States for the 1991-2011 period.

This illustrates that the exchange rate or exchange rate has a considerable influence on a country's export activities. On the other side, Widhi Ari & Meydianawathi (2014) in their research also stated that the increase in inflation of a country can cause the production costs of exported goods to be higher and with the high cost of producing these exported goods it will make exporters unable to produce optimally so that exports will decrease due to producing goods export commodities require a fairly high cost.

**RESEARCH METHODS**

The quantitative data is the type of data used in this research. The data source of this research comes from secondary data. Secondary data used in this study were obtained from the publication of data collected by official government or department, including the website of Badan Pusat Statistik (BPS), Bank Indonesia (BI), Pusat Data dan Informasi
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(Pusdatin) Kementerian Pertanian, Index Mundi. The location of this research was conducted in Indonesia. The object of this research includes one dependent variable and four independent variables. The objects in this study are the amount of domestic rubber production, international rubber prices, exchange rates, Indonesia's inflation rate, and the volume of Indonesian rubber exports in 1980-2018. This study uses annual data in the form of a time series with a total number of observations of 39. The data collection method used in this study is the non-behavioral observation method. Multiple linear regression is the type of data used in this research as an econometric tool to describe the characteristics of a sample or the observed location with the help of E-Views 10. This research also used data analysis like descriptive statistical test, classic assumption test, simultaneous test (F test), and partial test (t-test).

RESULTS AND DISCUSSION

The result of the data analysis test is shown below:

Table 1. Descriptive Statistics Test Results

|       | Y   | X1   | X2    | X3    | X4    |
|-------|-----|------|-------|-------|-------|
| Mean  | 1687169 | 1947260 | 1.689744 | 6764.821 | 9.431538 |
| Median| 1453382 | 1604359 | 1.610000 | 1073.000 | 1.360000 |
| Maximum | 2991909 | 3680428 | 4.750000 | 16800.00 | 77.60000 |
| Minimum | 797608.0 | 899214.0 | 0.490000 | 626.0000 | 2.000000 |
| Std. Dev. | 662993.0 | 857588.2 | 0.879720 | 5057.372 | 11.72006 |
| Observations | 39 | 39 | 39 | 39 | 39 |

Table 1 shows that the average value of the variable volume of Indonesian rubber exports is 1687169.0, then the middle value is 1453382.0, the maximum value is 2991909.0, the minimum value is 797608.0, and the standard deviation is 662993.0. The average value for the variable amount of domestic rubber production is 1947260.0, then the mean value is 1604359.0, the maximum value is 3680428.0, the minimum value is 899214.0, and the standard deviation is 857588.2.

The average value for the international rubber price variable is 1.689744, then the median value is 1.610000, the maximum value is 4.750000, the minimum value is 0.490000, and the standard deviation is 0.879720. The average value for the exchange rate variable is 6764.821, then the median value is 9073.000, the maximum value is 16800.00, the minimum value is 626.0000, and the standard deviation is 5057.372. The average value for the last variable or Indonesia's inflation rate is 9.331538, the median value is 8.360000, the maximum value is 77.60000, the minimum value is 2.000000, and the standard deviation is 11.72006. All variables have a sample of 39 observations.
Table 2. Multiple Linear Regression Analysis Results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C        | 204191,1    | 40616,50   | 5.027294    | 0.0000|
| X1       | 0.708665    | 0.033927   | 20.88768    | 0.0000|
| X2       | 8708,244    | 15025,19   | 0.579576    | 0.5660|
| X3       | 12.04802    | 5.595855   | 2.153026    | 0.0385|
| X4       | 721.6504    | 1288.465   | 0.560085    | 0.5791|

R-squared 0.990246  Mean dependent var 1687169.
Adjusted R-squared 0.989099  S.D. dependent var 662993.0
S.E. of regression 69221.93  S.D. dependent var 25.24723
Sum squared resid 1.63E+11  Schwarz criterion 25.46051
Log likelihood -487.3210  Hannan-Quinn crit. 25.32375
F-statistic 862.9733  Durbin-Watson stat 1.671553
Prob(F-statistic) 0.000000

The results obtained from the regression above, when included in the regression equation, obtain a multiple linear regression equation, namely:

\[ \hat{Y} = 204192,695 + 0.709 \times X_1 + 8707,522 \times X_2 + 12.048 \times X_3 + 721.706 \times X_4 \]

\[ t = (5.027) (20.887) (0.579) (2.153) (0.560) \]

\[ \text{Sig} = (0.000) (0.000) (0.566) (0.039) (0.579) \]

\[ F = 826,968 \]

\[ \text{Sig} = 0,000 \]

\[ R^2 = 0.990 \]

Table 3. Normality Test Results

| Statistical Measure | Value |
|---------------------|-------|
| Kurtosis            | 2.727 |
| Skewness            | -2.727 |
| Standard Deviation  | 65,477 |
| Mean                | 82,444 |
| Median              | 82,444 |
| Minimum             | 15,845 |
| Maximum             | 96,949 |
| Sample Size         | 361 |

In Table 3, it shows the results of the Jarque-bera test where the resulting probability value is 0.187597 or greater than the significance of 0.05. So it can be concluded that the data in this study were normally distributed. Because the residuals have been tested for normal distribution, the model is suitable for further analysis.
Table 4. Autocorrelation Test Results

Breusch-Godfrey Serial Correlation LM Test:

| F-statistic | Prob. F(2,32) | 0.6168 |
|-------------|---------------|--------|
| Obs*R-squared | Prob. Chi-square(2) | 0.5599 |

Table 4 shows that with the Lagrange Multiplier (LM) test the value of Prob Chi Square (2) which is the p value of the Breusch-Godfrey Serial Correlation LM test is 0.5599 which means that the value is greater than $\sigma = 5$ percent. If the probability value is greater than ($>$) $\sigma = 5$ percent or 0.05, the model under study is not affected by autocorrelation and is suitable for use for further analysis.

Table 5. Multicollinearity Test Results

| Coefficient Variance | Uncentered VIF | Centered VIF |
|----------------------|----------------|--------------|
| C                    | 1.65E+09       | 13.42710     | NA            |
| X1                   | 0.001151       | 42.23795     | 6.713592      |
| X2                   | 2.26E+08       | 6.631926     | 1.385560      |
| X3                   | 31.31359       | 18.01487     | 6.351537      |
| X4                   | 1660142.       | 3.010382     | 1.808429      |

In Table 5, it shows that for all the independent variables used, the VIF value at Centered VIF is smaller than 10. The amount of production ($X_1$) is 6.713592, the international price ($X_2$) is 1.385560, the exchange rate ($X_3$) is 6.351537, and inflation ($X_4$) of 1.808429, so it can be concluded that there is no multiple correlation (multicollinearity) between the independent variables and therefore the assumption of multicollinearity has been fulfilled.

Table 6. Heteroscedasticity Test Results

Heteroskedasticity Test: Glejser

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|----------|-------------|------------|-------------|-------|
| C        | 36398.07    | 21833.32   | 1.667088    | 0.1047|
| X1       | 0.003153    | 0.018238   | 0.172889    | 0.8638|
| X2       | 9591.225    | 8076.760   | 1.187509    | 0.2433|
| X3       | 0.140667    | 3.008041   | 0.046764    | 0.9630|
| X4       | -760.2432   | 692.6118   | -1.097647   | 0.2801|

In Table 6 above, it can be seen that all the independent variables used in this study have a probability value greater than or above 0.05 (significance level > 0.05), namely the
amount of production \((X_1)\) of 0.8638, international prices \((X_2)\) of 0.2433, the exchange rate \((X_3)\) of 0.9630, and inflation \((X_4)\) of 0.2801. From these results, it can be concluded that there is no heteroscedasticity problem in the data used in this study.

A. Simultaneous Significance Test of Regression Coefficient (F test)

To be able to know the effect simultaneously can be seen from the results of \(F_{\text{count}}\) where if the real level \((\alpha) = 0.05\) the result of \(F_{\text{count}} > F_{\text{table}}\ (3.14)\) then the independent variable is declared to have a simultaneous and significant effect on the dependent variable. Therefore, in the regression equation above the results of \(F_{\text{count}}\ (826.98) > F_{\text{table}}\ (3.14)\), it means that the variables of the amount of production, international prices, exchange rates, and inflation have a simultaneous and significant effect on the volume of Indonesian rubber exports in 1980-2018.

The \(R^2 \) value of 0.990 means that 99.0 percent of the variation in the volume of Indonesian rubber exports to the international market during 1980-2018 is influenced by the amount of production \((X_1)\), international prices \((X_2)\), exchange rate \((X_3)\), and inflation \((X_4)\), while the remaining 1.0 percent is influenced by other variables outside the specified model.

B. Hypothesis Test / Partial Test (t test)

1) Testing the effect of the amount of domestic rubber production \((X_1)\) on the volume of Indonesian rubber exports from 1980 to 2018:

With the real level \((\alpha) = 0.05\), \(t_{\text{table}} = 1.66864\) and \(t_{\text{count}} = 20.887\), it means that \(t_{\text{count}}\ (20.887) > t_{\text{table}}\ (1.66864)\) then \(H_0\) is rejected and \(H_1\) is accepted with a significance level of 0.000 < 0.05. From the test, it can be concluded that the amount of domestic rubber production has a positive and partially significant effect on the volume of Indonesian rubber exports in 1980-2018. The \(b_1\) coefficient value of 0.708665 means that if the amount of domestic rubber production increases by one tonne, the volume of Indonesian rubber exports will increase by 0.708665 tonnes assuming other variables, namely international prices \((X_2)\), exchange rates \((X_3)\), and inflation \((X_4)\) is constant.

2) Testing the effect of the amount of domestic rubber production \((X_2)\) on the volume of Indonesian rubber exports from 1980 to 2018:

With the real level \((\alpha) = 0.05\), \(t_{\text{table}} = 1.66864\) and \(t_{\text{count}} = 0.580\), which means \(t_{\text{count}} < t_{\text{table}}\) then \(H_0\) is accepted. Thus it can be concluded, because \(t_{\text{count}}\ (0.580) < t_{\text{table}}\ (1.66864)\) then \(H_0\) is accepted and \(H_1\) is rejected with a significance level of 0.5660 > 0.05. This means that partially the international rubber price does not have a significant effect on the volume of Indonesian rubber exports in 1980-2018.

The \(b_2\) coefficient value of 8708.244 means that if the international rubber price increases by one unit of US $ / kilogram, then the export volume of Indonesian rubber will increase by 8708.244 one ton unit assuming other variables, namely the amount of production \((X_1)\), the exchange rate \((X_3)\), and inflation \((X_4)\) is constant. The insignificant effect between international price variables on the volume of Indonesian rubber exports from 1980 to 2018 resulted in this research being tested because domestic production has a greater influence on the fluctuation of Indonesia's export volume. Several exporters and importers also mostly enter into price contracts before entering into buying and selling transactions so that when the price on the world market goes up or down, it will not have a significant effect on the agreed export amount.

3) Testing the effect of the amount of domestic rubber production \((X_3)\) on the volume of Indonesian rubber exports from 1980 to 2018:
With the real level ($\alpha$) = 0.05, $t_{\text{table}} = 1.66864$ and $t_{\text{count}} = 2.153$, which means $t_{\text{count}} > t_{\text{table}}$ then $H_0$ is rejected. Thus it can be concluded, because $t_{\text{count}} (2.153) > t_{\text{table}} (1.66864)$ then $H_0$ is rejected and $H_1$ is accepted with a significance level of 0.0385 < 0.05. From the test, it can be concluded that the exchange rate has a positive and significant effect partially on the volume of Indonesian rubber exports in 1980-2018. The $b_3$ coefficient value of 12.04802 means that if the exchange rate increases by one unit of Rp / US $, the volume of Indonesian rubber exports will increase by 12.04802 one tonne unit with the assumption of other variables, namely the amount of production ($X_1$), international prices ($X_2$), and inflation ($X_4$) is constant. The results of this study are not in accordance with the hypothesis which states that there is a negative relationship between the two variables, the resulting positive relationship is because when the Rupiah increases, investors will be interested in investing in Indonesia so that when investment in the plantation sub-sector, especially in rubber, increases, it will increase the amount and the quality of production and in turn this will also affect the volume of Indonesian rubber exports.

4) Testing the effect of the amount of domestic rubber production ($X_4$) on the volume of Indonesian rubber exports from 1980 to 2018:

With the real level ($\alpha$) = 0.05, $t_{\text{table}} = 1.66864$, and $t_{\text{count}} = 0.560$, which means $t_{\text{count}} < t_{\text{table}}$ then $H_0$ is accepted. Thus it can be concluded, because $t_{\text{count}} (0.560) < t_{\text{table}} (1.66864)$ then $H_0$ is accepted and $H_1$ is rejected with a significance level of 0.5791 > 0.05. This means that partially inflation does not have a significant effect on the volume of Indonesian rubber exports in 1980-2018.

The $b_4$ coefficient value of 721.6504 means that if inflation increases by one unit percent, the volume of Indonesian rubber exports will increase by 721.6504 one tonne unit with the assumption of other variables, namely the amount of production ($X_1$), international prices ($X_2$), and the exchange rate. ($X_3$) is assumed to be constant. The results of this study are not in accordance with the hypothesis which states that there is a negative relationship between the two variables, the resulting positive relationship is because inflation in Indonesia tends to be high in the year of observation, high inflation makes capital from debt or loans to produce goods and services increase so that exports also increase. The cause of the insignificance of the inflation variable is the greater influence of the production variable on the volume of Indonesian rubber exports for the period 1980-2018.

CONCLUSION

Based on the results of research with data analysis described in the previous chapter regarding the analysis of the effect of total production, international prices, exchange rates, and inflation on the volume of Indonesian rubber exports from 1980 to 2018, the following conclusions are obtained: The amount of domestic rubber production, international rubber prices, the exchange rate, and the inflation rate in Indonesia have a simultaneous and significant effect on the volume of Indonesian rubber exports. The amount of domestic rubber production partially has a positive and significant effect on the volume of Indonesian rubber exports. International rubber prices have a positive and insignificant effect on the volume of Indonesian rubber exports. The exchange rate partially does not have a negative and significant effect on the volume of Indonesian rubber exports. The inflation rate in Indonesia does not have a negative and significant effect on the volume of Indonesian rubber exports.
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