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EXPORT ANALYSIS – INDONESIAN NATURAL RUBBER IMPORTS TO THE UNITED STATES, TIONGKOK, AND JAPAN

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Abstract

The second largest exporter of natural rubber in the world after Thailand is Indonesia. From 2010 to 2015, Thailand's natural rubber exports reached 19,229,423 tons, while Indonesia grew by 7.5% with total exports reaching 15,309,256 tons. In terms of quality, Indonesia's natural rubber is higher than Thailand's. However, in terms of productivity, the opposite happens, Thailand is superior, so more rubber production is produced.

The analysis method used is a quantitative model by compiling a simultaneous equation system model estimated by the *Two Stages Least Square* (2 SLS) method and then processed with the help of *Statistical Analysis System 9.1* (SAS). This study used secondary data in the form 1996-2015.

The research instruments that are the factors that affect Indonesia's natural rubber imports from the United States, Tiongkok, and Japan are the amount of Indonesia's natural rubber production, the volume of Natural Rubber imports from Tiongkok and Japan in the previous year, Japan's GDP. Then the factors affecting Indonesia's natural rubber exports to the United States, Tiongkok, and Japan are Indonesia's natural rubber production, Indonesia's natural rubber exports to other countries, Indonesia's natural rubber export volume to the United States, Tiongkok, and Japan in the previous year. Then the factors affecting the real price of Indonesian natural rubber, the real price of Indonesian domestic natural rubber, the real price of Indonesia's natural rubber exports the real price of world natural rubber in the previous year, the real price of domestic natural rubber in the previous year, the supply of natural rubber in the domestic market, and the export price of Indonesian natural rubber in the previous year.

Keywords*:* Export, Import, Natural Rubber, World Price, Domestic Price.

INTRODUCTION

Natural rubber is one of the plantation commodities that has an important role in the Indonesian economy. According to the Ministry of Agriculture (2013), in 2011 rubber had a contribution to Indonesia's GDP of 0.37%. Within 5 years rubber contributed 25% - 40% of foreign exchange to the total exports of plantation products, considering that 82% of Indonesia's natural rubber production was exported in the form of raw rubber while domestic rubber consumption only reached 18%. Rubber and palm oil are the two main commodities that produce the largest foreign exchange from the

plantation subsector (Daily Economic Balance Sheet, 2015). Indonesia's high natural rubber production and low domestic consumption of natural rubber make Indonesia the second largest producer and exporter after Thailand. Based on data obtained from 2010-2015, Indonesia's total natural rubber production was 20 million tons (Ditjenbun, 2015), and Thailand's total production reached 23 million tons (*The Thai Association*, 2015). In terms of quality, Indonesian natural rubber has a higher quality compared to Thailand. However, in terms of productivity, the opposite happens, Thailand is superior to Indonesia, so the production of rubber produced is more abundant and making Thailand the first largest exporter of natural rubber in the world after that followed by Indonesia which is ranked 2nd in the world. There are several countries that are the main natural rubber export markets for Indonesia, five of which are: the United States, Japan, Tiongkok, Korea, and India, each country experienced a growth in export volumes that were different from one another. Indonesia's natural rubber importing country utilizes natural rubber to meet the needs of the automotive industry, namely tire production of 75%, the rest is used as raw materials for other products, such as railroad sleepers, bridge mats, gloves, shoes, health equipment, and daily necessities. In addition to competition with natural rubber from Thailand, Vietnam, and Malaysia, Indonesia also had to deal with synthetic rubber as its substitution. This synthetic rubber is produced to overcome the limited amount of world natural rubber product that has the advantage of being resistant to chemical substances. The need for synthetic rubber will always be met because the supply is always there, while natural rubber is sometimes not met due to production that tends to fluctuate.

Based on the background and problems above, the question arises that is formulated in this study, namely (1) What factors affect the import of natural rubber from Indonesia? (2) What are the factors affecting Indonesia's natural rubber exports? and (3) How does the world natural rubber price, exploitation or domestic price of Indonesian natural rubber affect the natural rubber trade in the international market?

RESEARCH METHODS

Data Types and Sources

This research was conducted from June 2017 – January 2018. This data source is secondary data in the form of a time series from 1995 to 2015.

Data Analysis

The data analysis method is in the form of quantitative analysis using an econometric model. The estimation of the model using the Two Stage Least Square (2 SLS) method with data processing with Statistical Analysis System 9.1 (SAS).

Import of Natural Rubber from Indonesia

United States Natural Rubber Import Equation from Indonesia

$IKA_t = a_o + a_1 QK_t + a_2 PKD_t + a_3 SKI_{nt} + a_4 IKA_{t-1} + u_1$ (1)

Description =

IKA_t = Volume of U.S. natural rubber imports from Indonesia in t-year (tons)

QKt = Indonesia's natural rubber production in the t-year (tons)

PKD_t = Real price of world natural rubber in the tth year (Rp/Kg)

SKI_{nt} = Indonesia's Natural Rubber offering in the domestic market in t-year (tons)
IKA_{t-1} = Lag imports of U.S. natural rubber from Indonesia (tons)

Import of Natural Rubber from Tiongkok

$IKT_t = b_o + b_1 QK_t + b_2 PKD_t + b_3 PKI_{nt} + b_4 IKT_{t-1} + u_2$ (2)

Description =
IKT_t = Volume of Tiongkok natural rubber imports from Indonesia in t-year (tons)
QKt = Indonesia's natural rubber production in t-year (tons)
PKD_t = Real price of world natural rubber in t-year (Rp/Kg)
PKI_{nt} = Real price of Indonesian natural rubber in t-year (Rp/Kg)
IKT_{t-1} = Lag imports of Tiongkok natural rubber from Indonesia (tons)

Rubber Import Equation from Japan

$IKJ_t = c_0 + c_1 PKD_t + c_2 PKSD_t + c_3 GDPJ_t + c_4 IKJ_{t-1} + u_3$ (3)

Description =
IKJ_t = Volume of Japanese natural rubber imports from Indonesia in t-year (tons)
PKD_t = Real price of world natural rubber in t-year (Rp/Kg)
$PKSD_t$ = Real price of world synthetic rubber in t-year (Rp/Kg)
$GDPJ_t$ = Japan's per capita income in year to t (million/Rp)
IKJ_{t-1} = Lag imports of Japanese natural rubber from Indonesia (tons)

Total Imports of Natural Rubber

$IATJ_t = IKA_t + IKT_t + IKJ_t$ (4)

Description =
$IATJ_t$ = Total natural rubber imports of the US, Tiongkok, Japan and Indonesian t-year t(tons)
IKA_t = United States natural rubber import volume in t-year (tons)
IKT_t = Tiongkok's natural rubber import volume in t-year (tons)
IKJ_t = Japan's natural rubber import volume in t-year (tons)

Indonesia Natural Rubber Exports

Equation of Natural Rubber Exports to the United States

$EKA_t = d_0 + d_1 QK_t + d_2 EKL_t + d_3 EKA_{t-1}$ (5)

Description =
EKAt = Volume of Indonesia's natural rubber exports to the U.S. in the t-year (tons)
QKt = Indonesia's natural rubber production in t-year (ton)
EKLt = Volume of Indonesia's natural rubber exports to other countries in t-year (tons)
EKA_{t-1} = Indonesian natural rubber export lag to the United States (tons)

Similarities of Indonesia's Natural Rubber Exports to Tiongkok

$EKT_t = {}_0 + e_1 QK_t + e_2 EKL_t + e_3 EKT_{t-1}$ (6)

Description =
EKT_t = Volume of Indonesian natural rubber to Tiongkok in t-year (tons)
QKt = Indonesia's natural rubber production in t-year (tons)
EKLt = Volume of Indonesia's natural rubber exports to other countries in t-year (tons)

EKT_{t-1} =Lag volume of Indonesia's exports to Tiongkok (tons)

Equation of Indonesia's Natural Rubber Exports to Japan

$EKJ_t = f_0 + f_1 BC_t + f_2 PEK_t + f_3 EKJ_{t-1}$ (7)

Description =

EKJ_t = Volume of Indonesian natural rubber to Japan in t-year (tons)

QKt = Indonesia's natural rubber production in t-year (tons)

PEKt = Real price of Indonesia's natural rubber exports for the t-th year (Rp/Kg)

EKJ_{t-1} = Lag volume of Indonesia's exports to Japan

Total Natural Rubber Export Offer

EATJt = ESA + ESA + ESA + ESA (8)

Description =

EATJt = Indonesia's total natural rubber exports in t-year (tons)

EKA_t = Volume of Indonesian natural rubber to the United States in t-year (tons)

EKT_t = Volume of Indonesian natural rubber to Tiongkok in t-year (tons)

EKJ_t = Volume of Indonesian natural rubber to Japan in t-year (tons)

EKL_t = Export volume of Indonesian natural rubber to other countries in t-year (tons)

World Natural Rubber Price Equation

$PKD_t = g_0 + g_1 PKA_t + g_2 EATJ_t + g_3 PKD_{t-1}$ (9)

Description =

PKD_t = Real price of world natural rubber in t-year (Rp/ Kg)

PKA t = Real price of natural rubber in Thailand in the t-th year (Rp/ Kg)

EATJt = Indonesia's total natural rubber exports to the US, Tiongkok, Japan t-year (tons)

PKD_{t-1} = Lag real price of World natural rubber in t-th year (Rp/ Kg)

Indonesian Natural Rubber Price Equation

$PK_t = h_0 + h_1 IATJ_t + h_2 PK_{t-1}$ +(10)

Description =

PK_t = Domestic price of Indonesian natural rubber in t-year (Rp/Kg)

$IATJ_t$ = Total natural rubber imports of US,Tiongkok, Japan from Indonesia to t(tons)

Indonesia Natural Rubber Export Price Equation

$PEK_t = i_0 + i_1 SK_t + i_2 PKD_t + i_3 EKL_t + i_4 PEK_{t-1}$ + (11)

Description =

PEK_t = Real price of world natural rubber exports in t-year (Rp/Kg)

SK_t = Indonesian Natural Rubber Offering in the domestic market in t-year (tons)

EKL_t = Export volume of Indonesian natural rubber to other countries in t-year (tons)

PKD_t = Real price of world natural rubber in t-year (Rp/Kg)

PEK_{t-1} = Lag real price of Indonesia's natural rubber exports in the 1st year (Rp/Kg)

RESULTS AND DISCUSSION

Indonesian Natural Rubber Imports

The results of estimates on U.S. natural rubber imports from Indonesia show that all free variables have a presumptive parameter mark that matches expectations. Then the variables that have a significant effect are the variable price of world natural rubber and the variable of supply with a significance level of 10%. The the variable production of Indonesian natural rubber and the lag of US natural rubber imports from Indonesia did not have a significant effect on the real level of 25%. In other words, the variables in the equation have a relatively small influence (the real level is above 50%). The results of the estimation of the equation of Tiongkok natural rubber imports from Indonesia show that all free variables have a presumption mark as expected. A significantly influential variable is the import lag with a t-test result of 0.0190. As for the variables of Indonesian natural rubber production, the variables of world natural rubber prices, and the variables of Indonesian natural rubber prices have no real effect, so these three variables are still said to be able to affect the demand for Indonesian rubber from Tiongkok with the variables in the equation having a relatively small influence (real level above 50%). The results of the estimation of the Equation of Japanese natural rubber imports from Indonesia show that all free variables have a presumption mark as expected. The variables that have a significant effect are the Japanese GDP variable and the lag of Japanese natural rubber imports from Indonesia with a significance level of 5%. The variable real price of world natural rubber and the real price of world synthetic natural rubber has no real effect on imports and have no significant effect on the real level below 25%. In other words, the variables in the equation have a relatively small influence (the real level is above 50%).

Indonesia Natural Rubber Exports

Variables on Indonesia's natural rubber exports to the United States that have a significant effect are the variable volume of Indonesian natural rubber production (QK), the variable volume of Indonesian natural rubber exports to other countries (EKL), and the lag of Indonesian natural rubber exports to the United States (LEKA). Based on the results of research on Indonesia's natural rubber exports to the United States, it has a determination efficiency of 0.22629, which means that the free variable used can explain 22.62% of the conditions for Indonesia's natural rubber exports to the United States. The results of the statistical test F model of this equation have a value of 1.46 which shows that the variables affect together. For the value of elasticity in Indonesia's natural rubber exports to the United States, it is responsive to natural rubber production where if it is 1% of Indonesia's natural rubber production, the variable of Indonesia's natural rubber exports to the United States will experience changes in 1.28% in the short term and 1.00% in the long term, while the variable volume of exports to other countries, and the variable lag of Indonesia's natural rubber exports to the United States is inelastic both in the short and long term.

All variables in the equation of Indonesia's natural rubber supply to Tiongkok have a significant effect, namely the variable Indonesian natural rubber production volume (QK), the variable volume of Indonesian natural rubber exports to other countries (EKL) and the lag of Indonesian natural rubber exports to Tiongkok (LEKT)

have each variable having a significance level at a real level of 5%. The coefficient of determination in the equation is 0.85816, which means that the free variable used can explain 85.81% of the condition of Indonesia's natural rubber exports to Tiongkok. The results of the statistical test F model of this equation have a value of 30.25 which shows that the variables affect together. For the variable elasticity value of Indonesia's natural rubber exports to Tiongkok, respond to changes in Indonesia's natural rubber production, where if there is a 1% change in Indonesia's natural rubber production, Indonesia's natural rubber exports to Tiongkok have a change of 4.46% in the short term and 4.88% in the long term.

The variables in the equation of Indonesian natural rubber exports to Japan that have a significant effect are the variables in the volume of Indonesian natural rubber production (QK) and the lag of Indonesian natural rubber exports to Japan (LEKJ) each variable has a level of significance at a real level of 5% to 25%. The coefficient of determination in the equation of 0.93311 can explain 93.31% of the condition of Indonesia's natural rubber exports to Japan. The results of the statistical test F model of this equation have a value of 69.75 which shows that the variables affect together. The variable that has an elasticity value is the Indonesian natural rubber production variable, where if there is a 1% change in Indonesia's natural rubber production, the variable of Indonesian natural rubber exports to Japan occurs a change of 3.04% in the short term and 2.73% in the long term. According to Tety (2002), Indonesia's natural rubber exports to Japan are greatly influenced by the volume of Indonesian natural rubber production to Japan at a real level of 5% and are not responsive to changes in the price of Indonesian natural rubber exports. Then the equation of Indonesia's natural rubber exports to Japan is very responsive to changes in production volumes in the short and long term. If there is an increase of 1%, then the number of Indonesian natural rubber exports to Japan increased by 1.64% (long-term) and 3.36% (short-term) research in 2002.

Natural Rubber Price in International Market

Real Price of Natural Rubber World

The variables in the world natural rubber price equation that have a significant effect are the total volume of Indonesian natural rubber exports to the United States, Tiongkok, and Japan (EATJ) and the lag of the world natural rubber price (LPKD) each variable has a level of significance at a real level of 10%. The variable real price of Indonesia's natural rubber exports has no real effect on Indonesia's natural rubber supply to Tiongkok significantly at a real level below 25%. Then the coefficient of determination in the equation is 0.80358, which means that the free variable used can explain 80.35% of the conditions of the world`s natural rubber price. The results of the statistical test F model of this equation have a value of 20.46 which shows the variables affecting together. The Foreign-each variable has an elasticity value exceeding 1 which means that if there is an increase of 1% in the world natural rubber price, the world natural rubber price variable will respond by 1.69% in the short term and 1.38% in the long term. If there is a 1% increase in the variable of Indonesia's total natural rubber exports to the United States, Tiongkok, and Japan, the world natural rubber price variable will respond by 2.44% in the short term and 2.13% in the long term.

Real Price of Indonesian Domestic Natural Rubber.

The coefficient of determination in the equation is 0.58870, which means that the free variable used can explain 58.87% of the condition of the domestic natural rubber price. The results of the statistical test F model of this equation have a value of 11.45 which shows that the demand for Indonesian natural rubber from Tiongkok Japan from Indonesia (IATJ), and the lag in domestic natural rubber prices (LPK) have an effect together. For the elasticity value in this equation model, all variables have an elasticity value exceeding 1, which means that the Indonesian natural rubber price variable is responsive if there is a change of 1% then the total natural rubber imports of the United States, Tiongkok and Japan (IATJ) experience a change of 5.55% in the short term and 5.04% in the long term. Then if there is a change of 1% to Indonesia's domestic natural rubber price, the lag variable of Indonesia's domestic natural rubber price changes by 9.02% in the short and long term.

Real Price of Indonesian Natural Rubber Exports

The coefficient of determination in the equation is 0.75636, which means that the free variable used can explain 75.63% of the condition of Indonesia's natural rubber export prices. The results of the statistical test F model of this equation have a value of 10.87 which shows that all variables affect together.

For the elasticity value in this equation model, namely PKD, SK, and LPEK, where if there is a 1% change in the Indonesian natural rubber supply variable in the domestic market (SK), the variable price of Indonesian natural rubber exports will experience a change of 2.54% in the short term and 2.00% in the long term. Then if there is a 1% change in the world natural rubber real price variable (PKD), the variable price of Indonesian natural rubber exports will experience a change of 1.44% in the long term. Then if there is a change in the lag variable of the Indonesian natural rubber export price (LPEK) of 1% then the variable price of Indonesian natural rubber exports will experience a change of 1.02% in the short term and 1.55% in the long term.

CONCLUSIONS AND SUGGESTIONS

The conclusion obtained from this study is that the US natural rubber from Indonesia is influenced by the amount of Indonesian natural rubber production and the supply of Indonesian natural rubber to other countries and is elastic in the short and long term. Tiongkok's natural rubber imports from Indonesia were heavily influenced by Tiongkok's import volume in the previous year, while Japan's natural rubber imports from Indonesia were influenced by Japan's GDP and then also influenced by the variable imports of Japanese natural rubber from Indonesia in the previous year.

Indonesia's natural rubber exports to the United States are influenced by the amount of Indonesia's natural rubber production and are elastic to changes in the short and long term, then also influenced by the number of Indonesian natural rubber exports to other countries, and the number of Indonesian natural rubber exports to the United States in the previous year. Indonesia's rubber exports to Tiongkok are influenced by the amount of Indonesia's natural rubber production, the number of Indonesian natural rubber exports to other countries, and the number of Indonesian natural rubber exports

to Tiongkok in the previous year. Indonesia's rubber exports to Japan are influenced by the number of natural rubber exports.

Advice is given to companies the need for government intervention to build facilities and infrastructure that support information on the world's natural rubber trade, then the need for government intervention to conduct extension counseling to farmers for the rejuvenation of natural rubber plants and obtain superior seeds and fertilizers at affordable prices and so that Indonesia's natural rubber production increases.

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