

DETERMINANTS OF RUBBER PRICE IN THAILAND PERIOD 2011 – 2016

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ABSTRACT

Rubber was cultivated in Thailand since the 1990s. Thailand becomes the top producer and exporter of natural rubber in the world since that time. The main objective of this study is to identify and analyze the effect of export rubber, exchange rate Thai bath to US dollar, and rubber production to rubber price (the price of Thailand). The monthly data that is used in this research is from period of 2011: January 1st to 2016: December 31st, thus 72 months in total. The study used Multiple Linear Regression. The results from this research showed that export rubber, exchange rate Thai bath to US dollar, and rubber production were the factors affecting to the rubber price (the price of Thailand) at significant level 0.05. Meanwhile, export rubber, exchange rate Thai bath to US dollar, and rubber production have the negative relationship with the rubber price (the price of Thailand). The study suggested that Thai government should provide appropriate responsive measures and set production plan in accordance with the estimated future price trend.

Keywords: *Rubber price in Thailand, Export, Exchange rate, Production.*

INSTIRASI

Karet dibudidayakan di Thailand sejak 1990-an. Thailand menjadi penghasil dan pengekspor karet alam terbesar di dunia sejak saat itu. Penelitian ini bertujuan untuk mengidentifikasi dan menganalisis pengaruh karet ekspor, Kurs Thai bath terhadap US dolar, dan produksi karet terhadap harga karet (harga Thailand). Data yang digunakan dalam penelitian ini adalah data bulanan dari 2011:1 Januari sampai 2016:31 Desember, sehingga jumlah total observasi adalah 72. Penelitian ini menggunakan Regresi Linear Berganda. Hasil dari penelitian ini menunjukkan bahwa ekspor karet, Kurs Thai bath terhadap US dolar, dan produksi karet adalah faktor-faktor yang mempengaruhi harga karet (harga Thailand) pada tingkat signifikan 0,05. Sementara itu, ekspor ikaret, Kurs Thai bath terhadap US dolar, dan produksi karet memiliki hubungan negatif dengan harga karet (harga Thailand). Studi ini menyarankan bahwa pemerintah Thailand harus memberikan langkah-langkah responsif yang tepat dan menetapkan rencana produksi sesuai dengan perkiraan tren harga masa depan.

Kata kunci: *Harga karet di Thailand, Ekspor, Kurs, Produksi*

INTRODUCTION

Discovery Thailand, the Kingdom in Southeast Asia. It is bordered in west and northwest by Myanmar (Burma), in south by the Andaman sea, in east and north east by Laos PDR, in south east by Cambodia, in south by the gulf of Thailand (an inlet of the South China Sea), and by Malaysia. Adventure Thailand the Land of smiles this is a virtual guide to “Muang Thai” often translated as the “Land of free”, as this call their country. Thai bath is Thailand’s currency.

Rubber was cultivated in Thailand since the 1990s. Thailand became the top producer and exporter of natural rubber in the world since that time. This is because the climatic are practiced in rubber production (Investment, Thailand's Rubber Industry, 2017). Rubber trees are cultivated in monoculture and commercial scale. The latex is produced tremendously and commercially. Most of the rubber plantations are privately owned (Poungchompu S. a., 2015).

Rubber tree is a perennial. It is native to the Amazon basin of Brazil and Peru, South America. The native is called Caoutchouc, meaning "tree cry". Until 1770, Joseph Priscilla found that rubber can be used to remove the pencil, so it is called a rubber eraser or rubber, which is used in England and Holland only in South America. The Para is called the rubber.

Hevea brasiliensis, the rubber tree or Pará rubber tree, is a medium to the large tropical tree in the Euphorbiaceae (spurge family) native to South America (the Brazilian and Bolivian region covering Amazon and Orinoco river basins), which produces a milky sap (latex) that is the primary source of natural rubber. Although some wild-grown trees are still tapped for their sap, most commercial production now comes from rubber tree plantations in southern and southeastern Asia (including Indonesia, Malaysia, and Sri Lanka), as well as western Africa.)life, n.d.(.

Rubber is the primary commodity, it is an agricultural commodity that is the raw material that is the basis of industrial production. Currently, most of the manufacturing countries are developing countries such as Thailand, Indonesia, and Malaysia, etc. Which is produced and exported to more industrial countries for use in the country. This is because there is insufficient capacity to produce natural rubber as a finished product. Due to the need of advanced production technology which cannot be invented, it is necessary to import a lot of foreign technology.

Thailand is the number one natural rubber producer in the world, mostly for export. The production volume is about 2.8 million tons per year, which accounts for 90% of total

production. The remaining 10% is used as raw material for domestic industry. Major trading partners in the world market are Japan, China, USA, South Korea, and France.

RESEARCH OBJECTIVE

1. How does the influence of export of rubber to Rubber price (the price of Thailand) in the period of 1st January 2011 to 31st December 2016?
2. How does the influence of exchange rate Thai bath to US dollar to Rubber price (the price of Thailand) in the period of 1st January 2011 to 31st December 2016?
3. How does the influence of Rubber Production to Rubber price (the price of Thailand) in the period of 1st January 2011 to 31st December 2016?

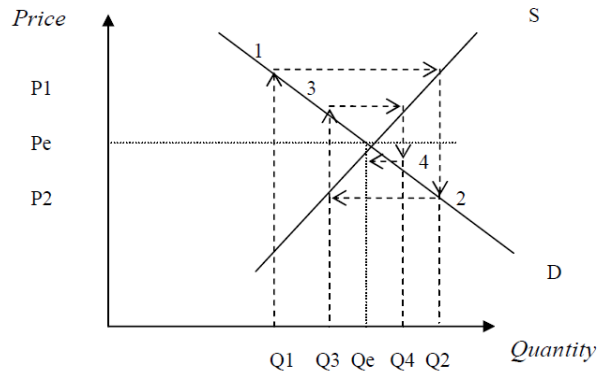
THEORITICLE FRAMEWORK

1. Rubber Price

According to Pisitsupakul (2016), she said that the factors determining the movement of the price of rubber in the country will be consistent with the economic situation. And it depends on the factors and actions, such as the underlying demand in the rubber stock. The increase in rubber stocks both domestically and internationally is a negative impact on the price of rubber in Thailand. This is due to the demand for synthetic rubber which is a replacement for natural rubber. When the price of synthetic rubber is much higher. Synthetic rubber users are increasingly turning to natural rubber, resulting in higher prices for NR rubber. Part of this is due to supply fundamentals, due to production policy. The main producers are Thailand, Indonesia, and Malaysia. The purpose is to reduce the amount of natural rubber in the world market. To increase world rubber prices (Pisitsupakul, 2016).

a. Cobweb Theory

Prices of some goods, especially agricultural and livestock products show certain fluctuations from season to season. One of the reasons for the fluctuations is the price late reaction from the producer to the price (Boediono, Ekonomi Mikro, 1993).



Source: (Boediono, Ekonomi Mikro, 1993)

Cobweb Theory

The figure 2.1 shows the graph of Cobweb Theory on demand conditions which is more elastic than supply. If in season 1 the number of harvests and offered to the market is Q_1 . Because the harvest cannot be stored for too long, then the amount must be sold out during the season. With demand curve D , then the price that occurs in the market in season 1 is P_1 .

Furthermore, at current prices the producers plan their production for the season 2 (P_1 price is considered by the producer to remain in effect at season 2). On the basis of its curve, at a price as high as P_1 the amount of production to be offered is Q_2 . Assume the planned output can always be achieved appropriately. So in season 2 there will be an output of Q_2 and this sum will be offered at the market price occurring in season 2 is P_2 (the intersection between the D curve and the vertical line of Q_2).

With the P_2 price then the producers plan their production for season 3, and this means plotting output as much as Q_3 . In season 3 the output of Q_3 is harvested and everything is sold to the market. This will give rise to the P_3 price level (intersection between the D curves) and make it the basis for the production plan of season 4, and so on. If this process continues to run then eventually the price will reach the equilibrium point that is P_e . This process is called the Cobweb process (Boediono, 1993).

According to Nuchra Rakkandi (2003) discuss the Cobweb Theory that studies the nature of pricing for the agricultural market, importance of agricultural price changes. Especially of rubber the nature of the cycle. So, shows the cyclical or unstable price movement, no direction, predict difficulties, and flexibility depends

on supply and demand. In the production of agricultural products, Farmers will use current price as determinants or incentives to produce agricultural products. But because the production of goods takes time to season, it may take several month or years to produce. Therefore, the decision to produce most agricultural products will be in the higher price range. At some time, it will yield a lot, as result agricultural products are lower. And when the agricultural price drops, in this case the price will increase. This is because the price of agricultural products is changing according to the demand and supply in the market. The Cobweb theories are divided into 3 types such as Elasticity of demand over supply, and the elasticity of demand is less than supply and act (Rakkandi, 2003).

2. Export

Export is the activity of selling and sending goods from the origin country to other countries. These activities can bring the flow of expenditure will be flowed into the enterprise sector. Furthermore, the aggregate expenditure will increase; this is because the export activities of goods and services, and therefore the national income will also increase. If net exports in a positive state, the aggregate expenditure will also increase. Then this will increase the national income and employment (Sadono, 2013).

Exports are one of the components in aggregate spending on the open-economy. Aggregate expenditure in an open economy means that the household expenditure on domestic production, investment, government spending, spending on import goods and foreigner who spend the export goods. The aggregate expenditure can be expressed by this following formula:

$$AE = C_{dn} + I + G + (X-M)$$

Another theory that is used in the export is the basic theory of export. The basic theory is that the economic basis that is developing from the basis export becomes the city basis. Form all of the theories, all are stressing on demand from external sides. On the city theory, there is a division which is its environment and external.

In export theory, it can be described as the autonomic factor. It means that export is a factor to increase the income and economic growth directly. To reach the high export level, then it needs the strategy to increase the appropriate export value and appropriate investment with the high technology to be implemented punctually (Rahardjo, 2013).

a. International Trade Theory

The Mercantilists believed that a nation could gain in international trade only at the expense of other nations. As a result, they advocated restrictions on imports, incentives for export, and strict government regulation of all economic activities.

According to Adam Smith, trade between two nations is based on absolute advantage. When one nation is more efficient than (or has an absolute advantage over) another in the production of one commodity but is less efficient than (or has an absolute disadvantage with respect to) the other nation in producing a second commodity, then both nation can gain by each specializing in the output with the other nation for the commodity or its absolute disadvantage. By this process, resources are utilized in the most efficient way and the output of both commodities will rise. This increase in the output of both commodities measures the gains from specialization in production available to be divided between the two nations through trade. (Salvatore D.)

According to David Ricardo introduced the law of comparative advantage. This postulates that even if one nations is less efficient than the other nation in the production of both commodities, there is still a basis for mutually beneficial trade (as long as the absolute disadvantage that the first nation has with respect to the commodities). The less efficient nation should specialize in the production and export of the commodity in which its absolute disadvantage is smaller. (This is the commodity of its comparative advantage.) Ricardo, however, explained the law of comparative advantage in terms of the labor theory of value, which is unacceptable.

According to Gottfried Haberler came to the “rescue” by explaining the law of comparative advantage in terms of the opportunity cost theory. This states

that the cost of a commodity is the amount of a second commodity that must be given up to release just enough resources to produce one additional unit of the first commodity. The opportunity cost of a commodity is equal to the relative price of that commodity and is given by the (absolute) slope of the production possibility frontier. A straight-line production possibility frontier reflects constant opportunity cost.

3. Exchange Rate

Exchange rates are the amount of one currency you can exchange for another (Amadeo, 2017). According to Gary R. Evans, *exchange rates* define the rate or ratio of which one of these currencies can be exchanged for any other at any given point in time (Evans, 2014).

a. According to the book from Mankiw (2007), he distinguishes the exchange rate by two types, namely;

- Nominal exchange rate defines as the respective price of domestic currency against the foreign country, or commonly known as the exchange rate.
- Real exchange rate defines as the respective price of domestic goods comparing to foreign goods.

b. According to the book from Dominick Salvatore, he examines the purchasing-power parity (PPP) theory and evaluates its usefulness in explaining exchange rates. The purchasing-power parity (PPP) theory was elaborated and brought back into use by the Swedish economist Gustav Cassel in order to estimate the equilibrium exchange rates at which nations could return to the gold standard after the disruption of international trade and the large changes in relative commodity prices in the various nations caused by World War I. There is an absolute and a relative version of the PPP theory; These will be examined in turn.

- Absolute Purchasing-Power Parity Theory postulates that the exchange rate between two currencies is equal to the ratio of the price level in the two countries. Specifically:

$$R = \frac{P}{P^*}$$

When R is the exchange rate or spot rate and P and P^* are, respectively, the general price level in the home nation and in the foreign nation. So that a given commodity has the same price in both countries when expressed in terms of the same currency (the law of one price).

- Relative Purchasing-Power parity Theory, postulates that the change in the exchange rate over a period of time should be proportional to the relative change in the price levels in the two nations over the same time period. Specifically, if we let the subscript 0 refer to the base period and subscript 1 to a subsequent period, the relative PPP theory postulates that

$$R_1 = \frac{P_1/P_0}{P^*_1/P^*_0} \cdot R_0$$

Where R_1 and R_0 are respectively, the exchange rates in period 1 and in the base period. (Salvatore D.)

4. Production

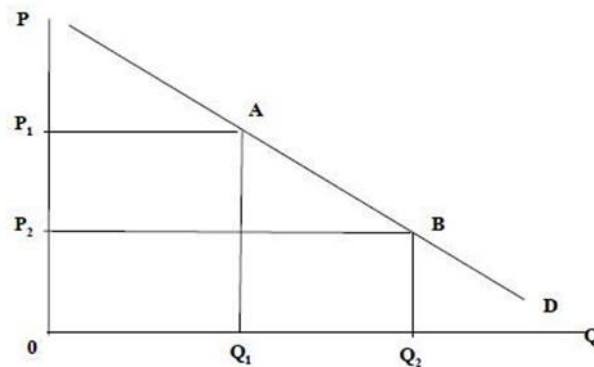
Production refers to the process of changing production factors into outputs. From the definition of production, it can be seen that the inputs referred to our land, capital, labor, and entrepreneurs. It also refers to all raw materials and intermediate goods that enter into the process of production. The output is not only the final product that can be consumed but also includes Intermediate Products the Intermediate Product will have to go through the production process again to get the final product. And the output also means services such as transportation, storage of goods to eat every. A factor of production is an economic term that describes the inputs that are used in the production of goods or services in order to make an economic profit. The factors of production include land, labor, capital, and entrepreneurship. These production factors are also known as management, machines, materials and labor, and knowledge has recently been talked about as a potential new factor of production.)Invertopedia, n.d.(

a. Demand Supply and Equilibrium Theory

Demand and supply are related to rubber prices. Changes in demand, supply and equilibrium can cause price volatility of rubber.

1) Demand Theory

Demand is need for goods or services of consumers at any one time. Consumers have the power to buy and meet that need. The types of demand are effective demand, potential demand, direct demand, derived demand, individual demand, market demand, and firm demand. Each type of demand is different, depending on the consumer.

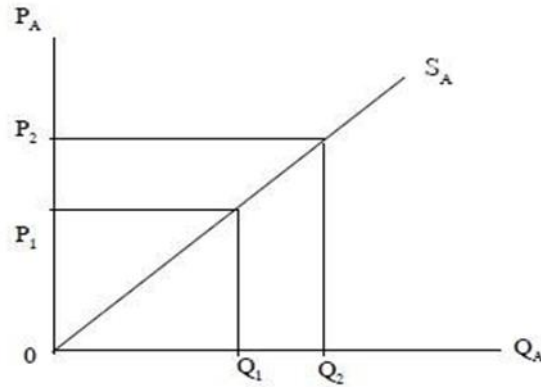


Demand curve

Demand is a rule that discusses the relationship between price levels and demand levels that must be correlated in the opposite direction, ie, if the price level rises. As a result, the demand for goods and services is reduced, called the Law of Demand. Demand will be determined by factors such as Direct Determinant and Indirect Determinant.

2) Supply Theory

Supply is the quantity demanded to sell at one price level over a certain period of time. Supply has rules that deal with price levels and the quantity of products and services that need to be related in the same direction: if the price level rises, the volume of goods and services is increased. It's called the law of supply.



Supply curve

The supply function equation shows the relationship between the demand for product and service offering and the determinant of the demand quantity.

$$S_A = f(P_A)$$

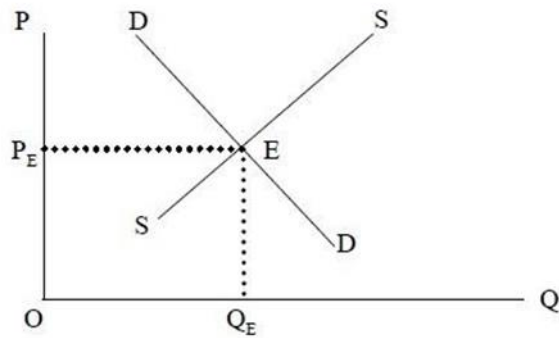
The deterministic factor can be written as a demand function.

$$S_A = f(P_A, P_B, C, T, W)$$

Based on the above equation, the demand for product and service offerings depends on Product price, factor Cost of production, technology and other relevant factors.

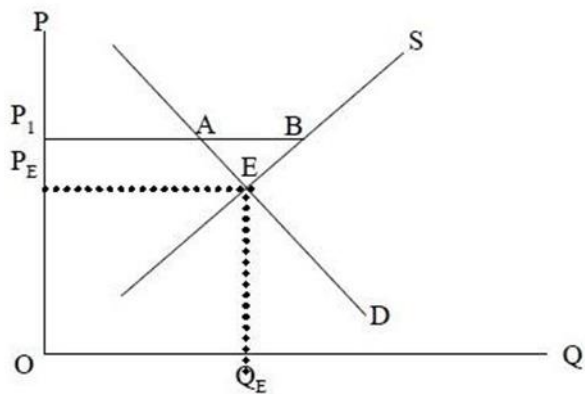
3) Equilibrium Theory

Equilibrium is the point at which buyers and sellers agree to trade at the same price and quantity without change is called the equilibrium, which is the intersection of supply and demand. And the price that buyers and sellers are willing to trade is called equilibrium and equilibrium prices and equilibrium prices at the price level agreed between buyers and sellers, and the quantity offered is equal to the quantity offered for sale, called market equilibrium.



Market Equilibrium curve

The point at which buyers and sellers agree to trade at the same price and quantity without change is called the equilibrium, which is the intersection of demand and supply lines, and the price at which buyers and sellers are willing to trade is called equilibrium price (OPE). And the volume of goods at the level that the offer volume is equal to the offer volume is the equilibrium (OQE). In some cases, there is no difference in the quantity offered for sale and offering. That is, the price level is higher than the equilibrium price.

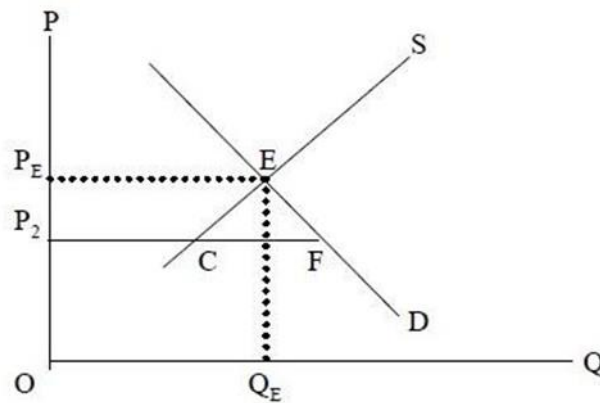


Excess Supply curve

At the price level (OP_1), the quantity offered (P_1A) and the quantity offered (P_1B). The demand for sales is more than the demand for purchase as AB . So, AB is the amount of residual goods sold, also known as excess supply. If prices are allowed to work fully when excess supply is reached, some producers will be forced to lower prices. This makes some consumers decide to buy more.

Excess supply will be reduced, respectively, until the excess supply is lost. The quantity offered is equal to the quantity offered or in equilibrium.

In some cases, if the quantity offered for sale and offering is not the same, the price level is below the equilibrium price.



Excess Demand curve

At the price level (OP_2), the quantity of offer purchase (P_2F) and the quantity of offer sale (P_2C). Demand for purchase is more than the demand for sale CF . So, CF is excess demand. when demand exceeds demand, some consumers are willing to buy at higher prices, and some sellers are willing to sell more because of higher prices. As a result, the demand for excess surged and fell into equilibrium.

RESEARCH METHODOLOGY

The method which performed in this study is quantitative method. There are three independent variables and one dependent variable. The dependent variable is Rubber price while the independent variables are Export of rubber, Exchange rate Thai bath to US dollar, and Rubber production. This study uses time series data in the form of annual data with an observation period from January 2011 to December 2016 is performed in this research.

RESEARCH FINDING

A. The Results of Data Analysis

1. The Results of Classical Assumption Test

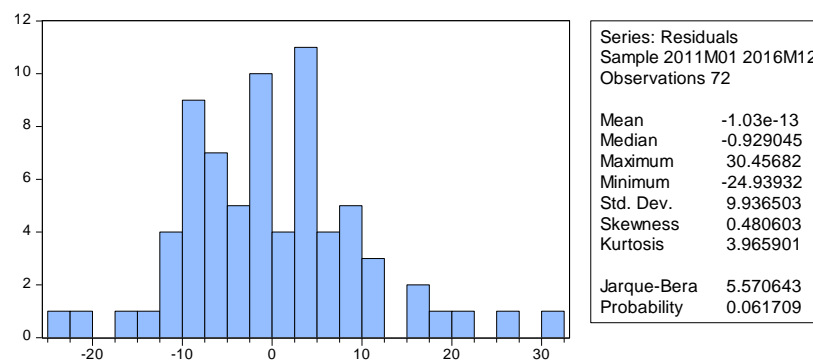
Before we do multiple linear regression analysis test then that must be done is to test data to be analyzed so that data valid bias and is requirement, hence used classical test. The explanation of the classical assumption test is as follows.

a) The Results of Normality Test

Normality testing is performed to test whether in a research model, the dependent variable and the independent variable or both have a normal distribution or not. A good model is normally distributed or near normal. Identify whether or not the problem of normality is done by looking at the value of Jarque-Bera.

To see distributed data normal or not, if the value of Jarque-Bera $\times 2$, then the data is normally distributed vice versa if Jarque-Bera \times then the data is not normal. if the value of Jarque-Bera $\times 2$, then the data is normally distributed. As well as otherwise if Jarque-Bera \times then the data is not normal.

After the data is processed using application eviws 9, then seen the result as follows.



Source: Secondary data process

The result of Normality Test

From the figure 4.2 above shows the result the probability value is $0.061709 > 0.05$ so it can be said that the probability value of this model is normally distributed, while based on normality test results can be seen from the probability value Jarque-Bera (JB), if the probability > 0.05 , then the model in normal state, based on this parameter is known that the value of

probability value at JB is 0.061709 greater than the value of 0.05. Thus it can be concluded that the regression model meets the assumption of normality.

b) The Result of Multicollinearity Test

Multicollinearity test aims to determine whether there is a relationship between independent variables. The multicollinearity test is a state in which one or more independent variables are expressed as linear conditions with other variables.

A good regression model should not be a correlation between independent variables. The result of this test can be seen from the Variance Inflation Factor (VIF) with the VIF equation = $1/\text{tolerance}$. If the value of VIF is less than 10 there is no multicollinearity.

The result of Multicollinearity Test

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
Export	5.08E-09	290.6064	2.590886
Exchange rate	0.572081	418.9406	1.560818
Production	4.68E-09	379.8642	3.454696

Source: Secondary data process

Based on the table above, it shows that the data results of multicollinearity test in Centered VIF the values for Export of rubber, Exchange rate, and Rubber production variables are 2.590886, 1.560818, and 3.454696. It means that the Centered VIF value of the three variables is no greater than 10. Then it can be said that there is no multicollinearity in the dependent variable.

c) The Result of Autocorrelation Test

The result from the data processing of autocorrelation, then consider the output of linear regression with views 9 which looks are as follows:

The result of Autocorelation Test

Variable	Coefficient	t-statistic	Prob.
AR(1)	0.761470	9.577185	0.0000
SIGMASQ	49.76766	7.139607	0.0000
Durbin-Watson			2.037412

Source: Secondary data process

From the table above, the authors perform healing on the disorder by using the AR test (1) on the data. And the table above shows the results of correlation test that has been improved by using model AR(1) there is a DW value is 2.037412 means that the value of DW is between the value of dU (1.54) and dL (2.46) then according to the DW test in this case data is no autocorrelation.

d) The Result of Heteroskedasticity Test

Heteroskedasticity test was conducted to test whether the variant of two observations in the same study (homogeneous) for all the dependent variable with the independent variable so that the estimation result is not biased. The identification of whether or not heteroscedasticity problem is done through White Heteroskedasticity test.

The result of Heteroscedasticity Test

Breusch-Pagan-Godfrey Heteroscedasticity			
F-statistic	1.163280	Prob.F(3,68)	0.3302
Obs*R-squared	3.514743	Prob. Chi-square(3)	0.3189
Scaled explained	4.649145	Prob. Chi-square(3)	0.1994

Source: Secondary data process

Base on the table above shows that the value of Obs*R-squared can be seen from the probability of Chi-Square. From the test results using this

Breusch-Pagan-Godfrey probability value is $0.3189 > 0.05$, then there is no heteroskedasticity.

B. The Result of Regression Estimate

Estimate the relationship between variables that meet the price of rubber in Thailand is done through the OLS approach in the following:

The Result of Regression Estimate

	Coefficients	T-test	Prob.
Constanta	566.7017	26.15561	0.0000
Export of rubber	-0.000264	-3.710298	0.0004
Exchange rate	-5.868380	-7.770943	0.0000
Rubber production	-0.000634	-9.263717	0.0000
R-Squared	0.922020		
F-Statistic	268.0060		
Prob. F-stat	0.000000		

Source: Secondary data process

Based on the table above, shows that the export rubber variable has the value significant is 0.0004, in this research alpha used is 5% (0, 05) then the value $0.0004 < 0,05$. Because of that the value significant less than the alpha (0,05) then the export rubber variable has significant effect on Rubber price (the price of Thailand). The Exchange rate variable has the value significant is 0.0000; in this research alpha used is 5% (0, 05). Exchange rate variable has the less value than the alpha ($0.0000 < 0,05$). Then the exchange rate variable has significant effect on Rubber price (the price of Thailand). And Rubber production variable has the value significant is 0.0000, in this research alpha used is 5% (0, 05) then the value $0.0000 < 0,05$. Because of that the value significant less than the alpha (0,05) then the Rubber production variable has significant effect on Rubber price (the price of Thailand).

This research using multiple linear regression analysis, the model of this research is:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + e$$

$$\text{Rubber price} = b_0 + b_1 \text{Export} + b_2 \text{exchange rate} + b_3 \text{production} + ut$$

Explanation: Y = Rubber price

a = constants

e = error

β = regression coefficient

X_1 = Export of rubber

X_2 = Exchange Rate

X_3 = Rubber Production

$$Y = 589.2607 - 0.000264 X_1 - 5.868380 X_2 - 0.000634 X_3 + e$$

Based on the estimation of regression, the dependent variable in this research is Rubber price (the price of Thailand), and the independent variables are Export rubber, Exchange rate, and Rubber production. Based on the table 4.5, it can be seen that Export rubber Exchange rate bath to US dollar, and Rubber production are significantly affecting to Rubber price (the price of Thailand) in January, 2011 – December, 2016.

C. Statistic Test

1. F-test

This objective is to see if there is a significant influence between variable X to variable Y simultaneously. In the context of this research, the simultaneous test would like to see whether the variables such as export of rubber, rubber production, and exchange rate Thai bath to US dollar influence to rubber price (the price of Thailand) or not.

To see whether or not there is influence between independent variable to dependent variable seen from its significant value. If the value of sig. < alpha, then there is a significant influence between the independent variables on the dependent variable, which implies that there is a significant influence between variables such as export of rubber, rubber production, and exchange rate influence to rubber prices (the price of Thailand). Otherwise, If the value of sig. > alpha, then there is no significant influence between the independent variables on the dependent variable. It's mean; the independent variables in this research are export rubber, rubber

production, and exchange rate does not influence to the dependent variable, which is rubber price (the price of Thailand).

The Result of F-test

F-statistic	268.0060
Prob. F-stat	0.000000

Source: Secondary data process

After testing using the software eviws 9. From the table 4.9 above, the results F-test in this study has a result of 268.0060 with (Prob. F-stat) of 0.000000 the value of sig. < alpha, that is $0.0000 < 0.05$, which means that the independent variables (export of rubber, rubber production, and exchange rate) has effect on rubber price (the price of Thailand) from January 2011 to December 2016.

2. T-test

T-Test is used to determine the influence of each independent variable partially. T-Test basically shows how far the influence of the independent variables in explaining the dependent variable)Ghozali, 2009(.

In this research use E-views 9.0 to estimate the results of multiple linear regression outputs as follows:

The Result of T-test

Variables	Regression		
	Coefficeient	T-test	Prob.
Constanta	566.7017	26.15561	0.0000
Export of rubber	-0.000264	-3.710293	0.0004
Exchange rate	-5.868380	-7.70943	0.0000
Rubber production	-0.000634	-9.263717	0.0000

Source: Secondary data process

a) The testing t-test of variable X_1 (Export of rubber)

This test is used to determine whether the regression model can be used to influence the rubber price (the price of Thailand) simultaneously or not, with significant level of testing criteria ($\alpha = 0.05$).

The test for this test is if the prob. (sig) $<$ alpha then there is a significant influence between the X_1 (export of rubber) variable to the Y variable (rubber price). Otherwise, if the prob. (sig) $>$ alpha then there is no significant influence between variable X_1 (export of rubber) to variable Y (rubber price).

From the table 4.7 show that, we can that the value significant of variable X_1 (export of rubber) is $0.0004 < 0.05$, then it can be said that there is significant influence between variable X_1 (export of rubber) to rubber price.

b) The testing t-test of variable X_2 (Exchange rate)

The test for this test is if the prob. (sig) $<$ alpha then there is a significant influence between the X_2 (exchange rate) variable to the Y variable (rubber price). Otherwise, if the prob. (sig) $>$ alpha then there is no significant influence between variable X_2 (exchange rate) to variable Y (rubber price).

From the table 4.7 show that, we can that the value significant of variable X_2 (exchange rate) is $0.0000 < 0.05$, then it can be said that there is significant influence between variable X_2 (exchange rate) to rubber price (the price of Thailand).

c) The testing t-test of variable X_3 (Rubber production)

The test for this test is if the prob. (sig) $<$ alpha then there is a significant influence between the X_3 (rubber production) variable to the Y variable (rubber price). Otherwise, if the prob. (sig) $>$ alpha then there is no significant influence between variable X_3 (rubber production) to variable Y (rubber price).

From the table 4.7 show that, we can that the value significant of variable X_3 (rubber production) is $0.0.0000 < 0.05$, then it can be said that there is significant influence between variable X_3 (rubber production) to rubber price (the price of Thailand).

3. R-square

R^2 test is a value that show how much the independent variable will explain the variable dependent variable, R^2 in the regression equation is susceptible to the addition of independent variables, where more independent variables are

involved then the value of R^2 will be greater because that is the use of R^2 adjusted on multiple linear regression analysis)Prawoto, 2016(.

Based on the results of regression table 4.5 above, show that R-square obtained from the estimation model between export of rubber, rubber production, and exchange rate on Rubber price (the price of Thailand) of 0.922020 or amounted 92.2% rubber price (the price of Thailand) influence by export of rubber, rubber production, and exchange rate. While 7.8% rubber price (the price in Thailand) explained by variable outside research variable.

DISCUSSTION

1. The influence of Export of rubber on Rubber price (the price of Thailand)

The result of this test shows that the export of rubber has a negative direction, because the value of export of rubber coefficient is -0.000264 and export of rubber has a significant effect on Rubber price (the price of Thailand), because it has a probability of 0.0004 which mean is below $\alpha = 0,05$. This means that if there is an increase of 1% export of rubber, Rubber price (the price of Thailand) will decrease about 0.000264%, assuming other variables are constant. Therefore, the regression results are in accordance with hypothesis in this research.

Export of rubber has influence to Rubber price (the price of Thailand). Thailand is an agricultural country that produces and exports agricultural products without any further processing. So when the rubber processing industry in foreign countries reduces production or turn to grow rubber itself. This will reduce the demand for rubber while increasing production, resulting in a further drop in rubber prices. As China is the most importing country of rubber from Thailand. At the same time, China is currently reducing imports because of the global economic slowdown. China has a role to play as a producer, it started growing rubber and invested in Vietnam, Laos, and Cambodia. This is consistent with international trade theory by Adam Smith; trade between two nations is based on absolute advantage. When one nation is more efficient than another in the production of one commodity but it less efficient than the other nation in producing a second commodity, then both nations can gain by each specializing in the output with the other nation for the commodity or its absolute disadvantage.

According to Sadali (2013) this paper will investigate the determinant that make natural rubber price volatile, first of all, Malaysia is the third largest producer of natural rubber after Thailand and Indonesia. In this research paper the researcher will determine factor that will affect volatility natural rubber (latex) price in Malaysia. Whereby, the dependent variables for this study are Volatility natural rubber price in Malaysia, while the independent variables are crude oil petroleum price, inflation, export and import. The result of this research It shows the three independent variables which is inflation, export and Crude oil have significant relationship to Volatility natural rubber price in Malaysia but one of the independent variables which is import have no significant relationship to volatility natural rubber price.

According to Phisitsuppakul (2015) he said the many constraints in reducing or increasing natural rubber yields in the world market, the impact on the price of rubber. And cause uncertainty in the income of exporters. Also according to Supanpak (2007) Study Demand for Export of Rubber to China, it found that the export of rubber in Thailand has an effect on the change of the export of rubber to Thailand.

From the test results means rubber production are negative and has significant influence on Rubber price (the price of Thailand) in 1st January 2011 to 31st December 2016. This is evident in the core of demand. In fact, the decision is purchase or import goods of various countries. The decision is based on the price of the product from the exporting country. It is not determined by the price of a particular country, for example if the price of rubber in that period is increase, the demand for rubber from abroad will decrease, and it will result in export of rubber is decrease. Consistent with demand theory is an economic principle referring to a consumer's desire and willingness to pay a price for a specific good or service. Generally, it is used to express the relationship between quantity and price. Demand is correlated in the opposite direction to price level. When price levels increase, demand for this type of product will decrease.

2. The influence of Exchange rate on Rubber price (the price of Thailand)

The result of this test shows that the exchange rate has a negative direction, because the regression coefficient value of exchange rate of -5.868380. And exchange rate has a significant effect on Rubber price (the price of Thailand), because it has a probability of 0.0000 which mean is a less than $\alpha = 0,05$. This means that this result indicates when the exchange rate of Thai bath to US dollar increase (appreciation) about 1% then the probability of Rubber price (the price of Thailand) will decrease about 5.868380%, Therefore, the regression results are in accordance with hypothesis in this research.

The accordance to) Mulyana, 2016(the exchange rate has negative and significant to rubber export in the lag time. Indonesia earned substantial foreign exchange from crumb rubber export. However, major fluctuations in the export earnings have raised concern about the country's future growth potentials and self-sustainability.

Seeing from another view point that is the exchange rate system adopted by Thailand at this time is a free-floating exchange rate system (pure) wherein this exchange rate system is determined by the market mechanism. It means that the demand and supply of rubber for US dollar and also another economic activity using US dollar will influence the value of exchange rate itself. Market mechanism which also includes the use of dollars in rubber trading.

3. The influence of Rubber production on Rubber price (the price of Thailand)

The result of this test show that the rubber production has a negative direction, because the value of rubber production coefficient is -0.000634 which means that if there is an increase of 1% the probability Rubber price (the price of Thailand) will decrease by 0.000634%. And has a significant effect on Rubber price (the price of Thailand), because it has a probability of 0.0000 which mean is below $\alpha = 0,05$. Therefore, the regression results are in accordance with hypothesis in this research.

According to Nuchra Rakkandi (2003) she said that studies the nature of pricing for the agricultural market, importance of agricultural price changes. Especially of the nature rubber of the cycle, shows the cyclical or unstable price movement, no direction, predict difficulties, and flexibility depends on supply and demand. In the production of agricultural products, farmers will use current price as determinants or incentives to produce agricultural products. For example, rubber plantation if the farmers are

motivated to plant rubber trees in the high price range. Do not forget that it takes many years to grow rubber. In the case when most gardeners turn to rubber for each household in the same period. When it comes to harvesting, it will overproduction of rubber in the market and will result in lower prices of rubber.

This study is accordance to the research conduct by Padungseriwit K. (2010) this result of research, the relationship of crop production index and the export of rubber in Thailand found that the rubber crop production index has affect to export of rubber in Thailand.

From the test results means rubber production are negative and has significant influence on Rubber price (the price of Thailand) in 1st January 2011 to 31st December 2016. It means that if the production exceeds the needs of the user, then the price of rubber decrease. On the other hand, if the rubber production is less than the demand, the rubber prices will increase in accordance with the price mechanism.

CONCLUSION

Based on the test result and analysis on the effect of Export of rubber, Exchange rate, and Rubber production on Rubber price (the price of Thailand) it can conclude that:

1. Export of rubber has a negative and significant influence on Rubber price (the price of Thailand). There result can show that the negative relationship between exports of rubber brings a negative impact on rubber price (the price of Thailand).
2. Exchange rate Thai bath to US dollar has a negative and significant influence on Rubber price (the price of Thailand). There result can show that the negative relationship between exchange rate Thai bath to US dollar brings a negative impact on rubber price (the price of Thailand).
3. Rubber production has a negative and significant influence on Rubber price (the price of Thailand). There result can show that the negative relationship between rubber productions brings a negative impact on rubber price (the price of Thailand).

SUGGESTION

- This study only uses export of rubber, Exchange rate Thai bath to US dollar, and rubber production as a factor affecting to rubber price (the price of Thailand). Therefore, further research may add other factors such as: inflation, import of rubber, interest rate, or manufacturing production index factors also may affect to rubber price (the price of Thailand).
- Thai government should provide appropriate responsive measures and set production plan in accordance with the estimated future price trend.

RESEARCH LIMITATION

1. This study is limited only about Rubber price (the price of Thailand) and the variables studied including Rubber price (the price of Thailand), Export rubber, Exchange rate Thai Bath to US dollar, and Rubber Production.
2. The data used are annual time series data from 1st January 2011 to 31st December 2016.
3. The research is analyzed using Multiple Linear Regression with OLS method.

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