

The impact of subsidy policy on export of latex industry in Thailand

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Abstract: Applying quantitative research, this paper analyzes the impact of government subsidy on Thai natural rubber export. The result shows that the increase of Thai government subsidy to rubber farmers in September 2013 did not have significant impact on promoting rubber export. In the econometric model established in this paper, government subsidy policy factor is not statistically significant suggesting that the policy does not achieve desired outcome of increasing rubber export. Thai rubber export could be affected by other factors including international rubber prices, Thai rubber production and the behavior of competitors.

Key Word: Natural Rubber Export, Industrial Subsidy Policy

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I. Introduction

1.1 Foreign trade situation of Thailand latex industry

As a material with good elasticity, insulation and sealing, rubber products are widely used in automobile tires, modern factories and daily necessities. Since World War II, global natural rubber production and demand have been rising. Because of rubber importance as industrial raw material, the price elasticity of demand for natural rubber is relatively low. At the same time, the short-term supply price elasticity of natural rubber is also low due to its agricultural product characteristics (UNCTAD, 1997), which means that the producing countries of natural rubber have monopoly power to a certain extent.

Growing rubber requires specific natural conditions in which Southeast Asian countries have comparative advantages over other countries on climate and soil environment. In the first three quarters of 2017, total output of natural rubber in Southeast Asia accounted for 91.2% of the world's total output. Among Southeast Asian countries, Thailand is the largest exporter of natural rubber as more than 85% of Thai rubber production is exported to other countries. According to figure 1, Thailand is the largest exporter since 1991. In 2017, Thai rubber export accounted for 1.6% of total gross domestic product.

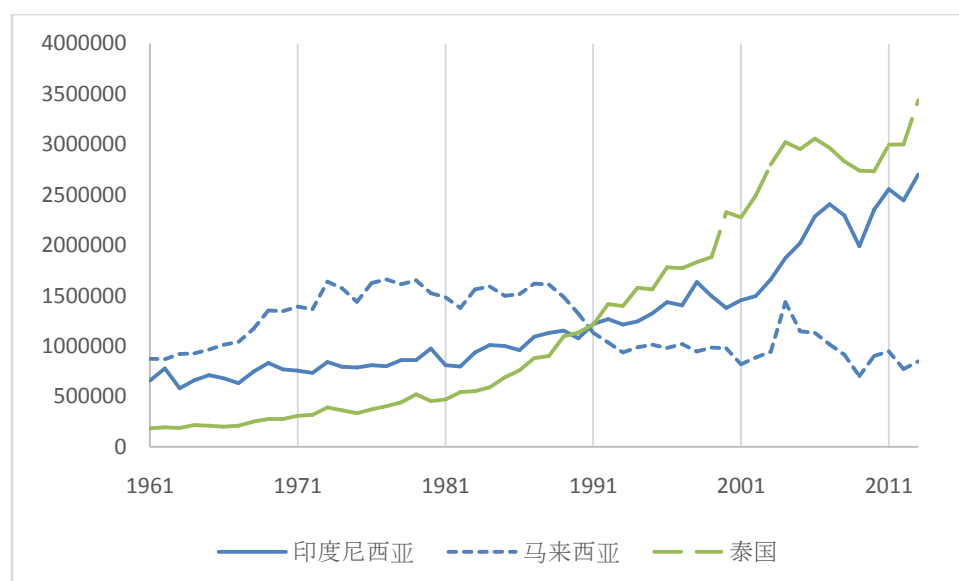


Figure 1 - 1961-2016 exports of three major natural rubber producing countries (Unit: ton)

Thailand has a very important role in the international rubber market due to its largest exporter status. Though Thailand receives considerable foreign exchange from rubber export, large fluctuation of export income

which has been influenced from decline in rubber price in recent years has raised doubts about future growth potential and sustainability of the Thai rubber industry.

After peaking in 2011, the average price of rubber has fallen for five consecutive years, reaching a 10-year low in 2016. According to Figure 2, monthly average wholesale price declined consecutively to 37 Thai Baht per kg in February 2016. However, even if price is far below the level required for break-even, Thailand rubber exports in 2016 is still growing at 7% compared to 2015.

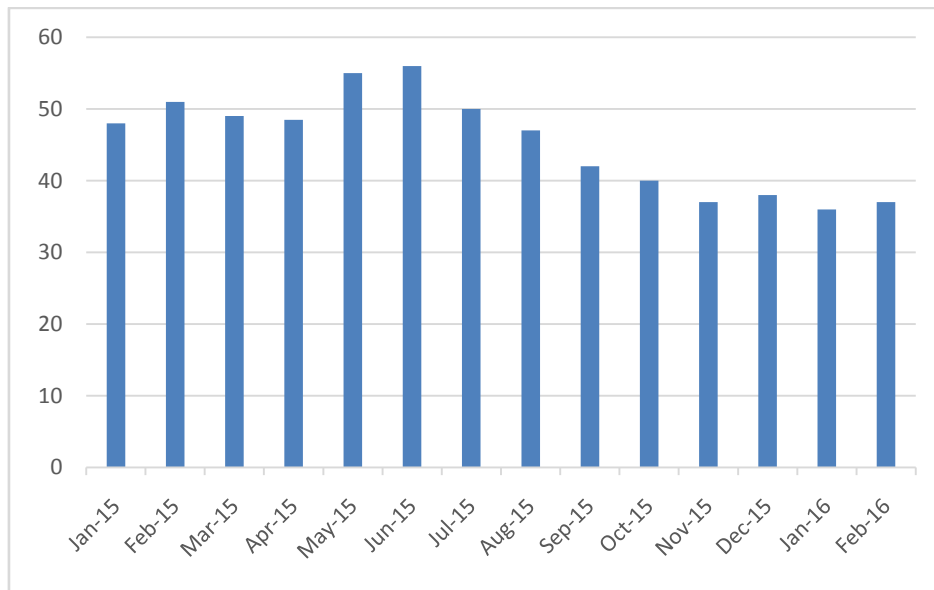


Figure 2 - 2015-2016 Thailand local natural latex monthly average wholesale price (Unit: Thai baht / kg)
Data sources: Thai Rubber Association

At present, the competition among rubber exporting countries is becoming increasingly fierce. With the increasing trade liberalization, Vietnam, India, and China have also occupied an increasing share of the rubber export market in recent years. In order to increase rubber output, the government of Thailand is promoting the expansion of rubber planting area, encouraging strategic alliances with the downstream tire industry and educating small farmers on advanced rubber planting knowledge. These initiatives are expected to help Thailand rubber industry to enhance its international competitiveness. Signs of various free trade agreements (FTAs) will also represent additional opportunity for rubber industry in Thailand.

1.2 Subsidy policy for rubber industry in Thailand

Since more than 85% of Thai rubber production is mainly exported to other countries, rubber farmers are highly dependent on volatile export markets. Rational subsidy policy is important to promote sound development of rubber industry and protect the interests of rubber farmers. However, neither elected government during 2011 to 2014 nor the military government which came to power in May 2014 had done much to help the rubber industry.

During the period from 2011 to 2013 Thailand was led by the Pheu Thai Party, its main supporters were northern farmers who produced rice, while the southern rubber producers were supporters of the opposition party, the Democratic Party. Government subsidies during that period were aimed to support northern region through support of main rice crop. However, the loss from subsidies attracted lots of criticism because of corruption. Meanwhile, lack of price support for the rubber industry led to rising anti-government sentiment in the southern opposition areas.

Because of the large time difference between supply and demand decision-making of agricultural products, the imbalance between supply and demand of agricultural products market normally occurs. Thai rubber farmers are mainly small individual households which cannot achieve large-scale operation, their income can only reach the basic level of food and clothing. Having said that, total number of rubber farmers is still huge and their political influence cannot be ignored. Therefore, most governments of main rubber producing countries are inclined to pay attention to support their rubber industry. When the international price of rubber falls or natural disasters such as floods and droughts occur, the government will generally introduce various subsidies to help stabilize income of rubber farmers. In September 2013, Thai government introduced the policy of doubling the scale of the subsidy for rubber farmers, which was a major policy change in recent years. Although this policy did not exert great pressure on government finance, it led only to a sharp increase in natural

rubber stocks of Thai government but fail to influence rubber price. The international rubber price continued to fall, and standard of living of rubber farmers did not significantly improve.

After military government took power in 2014, rubber farmers in southern Thailand frequently protested government lack of support. Actually, the military government occasionally provides assistance to rubber farmers, but those supports were considered insufficient at the time especially if compared to support on rice farmers of previous elected government which offered to buy rice at price higher than market.

The subsidy policies on rubber industry in Thailand generally have following characteristics. Firstly, Thai government subsidizes rubber farmers according to their planting area, rather than their yields. To obtain this subsidy, rubber farmers need to only submit necessary registration documents, including title deeds and land tax certificates. Therefore, this subsidy reduces fixed cost of rubber farmers which improve income of rubber farmers in the short term. However, there is no incentive for rubber farmers to improve their productivity. Secondly, Thai government has not artificially intervened in the price of rubber market although rubber farmers want the government to fix price of natural rubber at 95 baht per kilogram. Thus, price of rubber remained at low level. Finally, compared with rice farmers, Thai rubber producers receive less public policy benefits, mainly due to political factors. Rice farmers in northern Thailand have always been strong supporters of the Pheu Thai Party which normally elected as government, while rubber farmers in southern area are supporters of the opposition party, Democratic Party. There are more than 4 million households producing rubber in Thailand, almost as many families as rice plants. However, they are mainly concentrated in the less populated South region which has fewer seats in Parliament than larger north and northeast regions, thus their political influence is limited.

II. Methodology

This chapter will empirically analyze the impact of the rubber industry subsidy policy introduced by Thai government in September 2013 on export volume. Firstly, we will summarize some important factors that affect Thai rubber export and make a preliminary judgment on how these factors affect Thai rubber export in economic theory. Then, selecting appropriate variables to characterize these factors. On this basis, through the establishment of multiple linear regression model, this paper focuses to understand whether the government subsidy policy on rubber market effectively affected Thai rubber export volume after launching this policy on September 2013.

2.1 Analysis of influencing factors and variable selection

This paper chooses the monthly export quota of Thai rubber from January 2010 to December 2017 as the dependent variable to reflect the export behavior of Thai rubber. Thai rubber monthly export data can be found in the United Nations Commodity and Services Trade Database (UN Comtrade). Taking September 2013 as the critical point, the Thai government can divide the sample into two stages. The first stage is from January 2010 to September 2013, and the second stage is from October 2013 to December 2017. In addition to the impact of policies, there are many fundamental factors that affect the export of rubber in Thailand. This section outlines some other factors affecting export based on economic theory and identifies appropriate variable to characterize these factors.

1. Price factor

The price of rubber in the international market will clearly affect the export volume in positive relationship. The increase in price will encourage farmers to produce and export more. Conversely, if price of rubber decreases, the export volume will decline. However, rubber price elasticity of demand is low suggesting that percentage change in export volume will be less than percentage change in rubber price.

At present, among four natural rubber futures exchanges in the world, the Tokyo Industrial Products Exchange is the most recognized market with the largest trading volume. Its price trend represents the general level of the world rubber price. Therefore, this paper chooses the spot price from Tokyo Industrial Products Exchange as the explanatory variable, because it can represent the price level in the current international market. To avoid the data distortion caused by daily price fluctuation, this paper takes the average closing price of each trading day in the month as the price of the current month, instead of simply using the price at the end of the month as the price of the current month. These prices can be downloaded from the Tokyo industrial exchange website.

2. Demand factor

China rapid industrialization made China domestic rubber production far insufficient to meet domestic demand. As a result, China rubber import had been on the rise and surpassed the United States as the world largest rubber importer in 2003. Also, main rubber export destination of Thailand is China. Therefore, China monthly rubber import can be used as a demand-side variable affecting Thai rubber exports. According to the

simple law of demand, the greater the demand, the greater the import. Thus, the export volume of Thai rubber should be increased when China monthly rubber import increase, given other factors remain unchanged. Conversely, export volume of Thai rubber should be decreased when China monthly rubber import decrease. China monthly rubber import data can be obtained from the website of the Customs General Administration of China.

3. Supply factor

In addition to demand variables, Thai rubber export is also affected by domestic supply in Thailand. This paper chooses total monthly output of Thai rubber as the supply-side variable. Under the condition of stable domestic demand, when the total output increases, the export volume will increase accordingly. The monthly output data can be obtained from Thailand Rubber Association's official website.

4. Competitive factor

Apart from demand and supply factors, competitive factors also affect export volume. As previously analyzed, Thai natural rubber is facing strong challenges from Indonesia and Malaysia in the world market. For this reason, monthly export data of Malaysia is selected as the indicator variables of competitive factor. As rubber is a commodity, there is a certain substitutability among products of each country, that is, the substitution effect. Therefore, under the condition of constant aggregate demand, the increase of one country's rubber export will cause the decline of another country's rubber export.

5. Government policy

Due to lack of local rubber demand in Thailand, more than 85% of Thailand rubber is exported to other countries. Thailand government rubber subsidy policy inevitably has an impact on export. With other conditions remain constant, the increase of subsidy reduces production cost of rubber farmers and increase the competitiveness of Thai rubber in the international market. Thus, increase in government subsidy will positively affect export volume.

2.2 Establishment of theoretical model

As pointed out earlier, the Thai government dramatically adjusted the existing rubber industry subsidy policy in September 2013, doubling the original subsidy. The original intention of this subsidy is to subsidize the production cost of rubber farmers and increase the income of rubber farmers when the price of rubber falls. As 80% of Thai rubber production is exported, this policy inevitably has an impact on rubber export volume. To quantitatively examine the numerical extent of this impact, the monthly export volume of Thai rubber is the dependent variable of the model established in this paper. Among the explanatory variables, the government policy factor is the most important one that we would like to understand its impact in this study. According to the research ideas described above, September 2013 will be used as the dividing point to divide the sample period into pre-policy period and policy period. In the latter two stages, when establishing the model, we will assign a value of 0 to 45 sample points before September 2013 and 1 to those from October 2013 to December 2017 by establishing dummy variable.

In addition to government policy variable, other explanatory variables shall be incorporated in this model to reflect other important factors affecting rubber export. The control variables selected in this paper include spot price of rubber on the Tokyo Industrial Exchange, monthly import volume of rubber from China to represent demand factor, monthly rubber output in Thailand on behalf of supply factor, and monthly rubber export volume in Malaysia on behalf of competition factor (Table I).

Table I - List of variables in theoretical models

Variable name	Reflection factors	Variable symbol	Data sources
Dependent variable			
Monthly rubber exports in Thailand	—	EX	United Nations commodity service trade database
Explanatory variable			
Dummy variable of rubber industry policy	Policy factors	DUM	Before September 2013, the value was 0, and then the value was 1.
Tokyo industrial exchange's spot price of rubber	Price factors	P	Tokyo industrial exchange website
Monthly import of rubber in China (10000 tons)	Demand factors	VOL	Website of Customs General Administration of China
China's monthly rubber imports	Demand factors	IM	Website of Customs General Administration of China
Monthly rubber output in Thailand	Supply factors	PROD	Thai Rubber Association
Monthly rubber exports in Malaysia	Competitive factors	MAL	United Nations commodity service trade database

In the process of establishing the theoretical model, we should also pay attention to the functional form of variables. Generally, in economic models, the natural logarithm of variables is often used, not the horizontal value of variables itself. The advantage of this method is that in logarithmic linear model, the coefficients in front of the explanatory variables reflect the elastic value of their influence on the dependent variable, that is, when the explanatory variables change by 1%, the percentage of the dependent variable will change equal to coefficient value. In this way, the economic significance of regression coefficient is more obvious. Among the variables selected in this paper, all variables except virtual variables should take natural logarithm. In summary, the following theoretical models can be established at the end of this paper:

$$\ln(\text{EX}) = a + b * \text{DUM} + c * \ln(\text{P}) + d * \ln(\text{VOL}) + e * \ln(\text{IM}) + f * \ln(\text{PROD}) + g * \ln(\text{MAL}) + \varepsilon$$

Among them, the definitions of variables are shown in Table I, and epsilon represents the random error term of the model, which reflects the impact of factors that have not appeared in the model on Thai rubber exports.

III. Empirical Analysis of The Impact of Thai Government’s Rubber Policy on Export

In this section, we will use regression analysis, export volume as the dependent variable, and policy factor, price factor, demand factor, supply factor and competition factor mentioned in Section 2 as explanatory variables. We establish a linear regression model and estimate it by ordinary least squares method. Because there are too many explanatory variables, to simplify the model, this paper first estimates a model that contains all explanatory variables, then gradually eliminates the insignificant explanatory variables from the model using adjusted decision coefficient (adjusted R²) as the reference basis. This process will help us to obtain a simpler and higher significance model. Adjust the R² side model. Table II shows the regression results of the two best models obtained by this strategy.

Table II – Least squares regression model for rubber export in Thailand ¹

	Model 1	Model 2	Model 3
Constant term	4.252319* (1.97)	1.073050 (0.45)	5.516494** (2.41)
Ln(P)	0.547624*** (5.12)	0.145840** (2.22)	0.352171*** (3.69)
Ln(VOL)	Drop	0.820038*** (5.10)	Drop
Ln(IM)	0.589920*** (4.96)	0.418643*** (5.41)	0.452783*** (3.77)
Ln(PROD)	0.236058*** (5.59)	0.242521*** (4.88)	0.254957*** (5.65)
Ln(MAL)	0.379073*** (3.02)	Drop	0.374783*** (2.77)
DUM	0.113014*** (3.24)	0.042095 (1.16)	Drop
R squared	0.855	0.804	0.827
Adjusted R squared	0.842	0.787	0.815
F statistics	66.11***	46.11***	68.57***
DW statistics	1.845	1.777	1.659

The difference between model 1 and model 2 is that model 1 excludes Chinese imports while model 2 excludes Malaysian exports. From the point of view of the adjusted R-square, there is little difference between the two models. The adjusted R-square of model 1 is higher, so model 1 is better in terms of the overall explanatory ability. The DW statistics of the two models are close to 2, which shows that the autocorrelation of the models is weak, and the autocorrelation of the error items need not be further considered.

The economic significance which two models show is different. In model 1, the coefficients of virtual variables are 0.11 and significant at 1% significance level, but in model 2, the coefficients of virtual variables are 0.042, and are not significant at 10% significance level. Model 1 shows that, after controlling the influence of other factors, Thailand rubber export volume increased by 0.11% after the introduction of the new rubber subsidy policy by the Thai government in September 2013 while model 2 shows that the new subsidy policy can only increase rubber export by 0.04%. This shows that the change of government policy on Thai rubber exports is insignificant.

¹ The standard error in parentheses is the coefficient estimator. The * after the coefficient estimator is significant at the 10% significance level, ** is significant at the 5% significance level and *** is significant at the 1% significance level.

To further test the impact of policy factors on rubber export volume, model 3 removes the dummy variables representing government subsidy policy factor. After calculating the new model and remove the variable of China's import volume in the optimized model. The result obtained are much better than model 2 as adjusted R-square of model 3 is higher than model 2 but still lower than result of model 1. To sum up, although Thai government doubled the production subsidy of rubber farmers in September 2013, the impact of this policy on promoting rubber exports in Thailand is not particularly significant. Even though the impact in model 1 is statistically significant, but the impact of 0.11% is not significant in the economic sense. Therefore, it can be said that the subsidy policy for rubber farmers has little effect on export volume.

As model 1 has the highest adjusted R-square, we shall use other coefficient of explanatory variables in this model to explain its impact on export volume. In addition to government policies, changes in price do have a significant impact on export because higher rubber price will induce farmers to produce and export more. From the estimation results from model 1, for every 1% increase in the price of rubber on the Tokyo Industrial Exchange, Thai rubber export will increase by 0.54%. In addition, the impact of China rubber import on Thailand rubber export is more significant. When China import increases by 1%, Thai rubber export increases by 0.58%, which is also significant in statistical sense. In economic sense, among all variables, the coefficient value of China import on Thai rubber export is the highest, which shows that the pull effect of Chinese rubber demand on Thai rubber export is important. China import have been excluded from model 1 and model 3, which shows that compared with imports, China's imports have a weaker impact on Thailand's exports.

In three regression models, the rubber production also has a significant impact on the export volume. The elasticity of the export volume to the rubber output is about 0.24, which means that the supply factors also affect the Thai rubber export to a certain extent. In the international rubber market, the interaction between demand and supply determines a country's rubber export. According to the evidence provided in Table II, during 2010 – 2015, the impact of demand on export volume is greater than the impact of supply because the elasticity of export volume to demand factor is higher, which also conforms to the characteristic of rubber product. Rubber supply cannot change significantly in the short term, the change of demand will have a greater impact on export volume. In addition, the impact of Malaysian export on Thai export is also significant. From the elasticity value, the elasticity of Thai rubber exports on Malaysian exports is about 0.37%. The positive elasticity contradicts with the model assumption that increase in competition from competitor export will negatively affect Thai export volume. This can be interpreted that the "substitution effect" from competition is low and there are other common factors which positively affect both countries export, for example, higher demand from china import.

IV. Conclusions

Based on qualitative research on Thai natural rubber export and government industry subsidy policy, this paper empirically analyzed the impact of government subsidy policy on Thai natural rubber export. The result show that although the Thai government doubled the production subsidy of rubber farmers in September 2013, the impact of this policy on promoting rubber exports in Thailand is insignificant. In the econometric model established in this paper, the impact of government policy factors is not significance in the economic sense. Therefore, it can be said that the subsidy policy for rubber farmers has little effect on export. The factors which impact Thai rubber export volume are change in international rubber price, China Import, Thai rubber production and the behavior of competitors.

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