

# Economic Factors Affecting Rice Export of Thailand

Sompoom Sawaengkun

**Abstract**—The purpose of this study was primarily assessing how important economic factors namely: The Thai export price of white rice, the exchange rate, and the world rice consumption affect the overall Thai white rice export, using historical data during the period 1989-2013 from the Thai Rice Exporters Association, and Food and Agricultural Organization of the United Nations. The co-integration method, regression analysis, and error correction model were applied to investigate the econometric model. The findings indicated that in the long-run, the world rice consumption, the exchange rate, and the Thai export price of white rice were the important factors affecting the export quantity of Thai white rice respectively, as indicated by their significant coefficients. Meanwhile, the rice export price was an important factor affecting the export quantity of Thai white rice in the short-run. This information is useful in the business, export opportunities, price competitiveness, and policymaker in Thailand.

**Keywords**—Economic Factors, Rice Export, White Rice.

## I. INTRODUCTION

RICE production has long played a vital role in Thailand's socio-economic development, making the country the world's largest rice exporter in the last three decades [1]. However, in 2012, as Fig. 1 indicates, Thailand lost its three-decades-old title as the world's top rice exporter, falling behind India and Vietnam. By means of, India exported around 10.2 million tons in 2012, ahead of Thailand, which exported about 6.94 million tons of rice, and Vietnam which exported about 7.7 million tons of rice in the year [2].

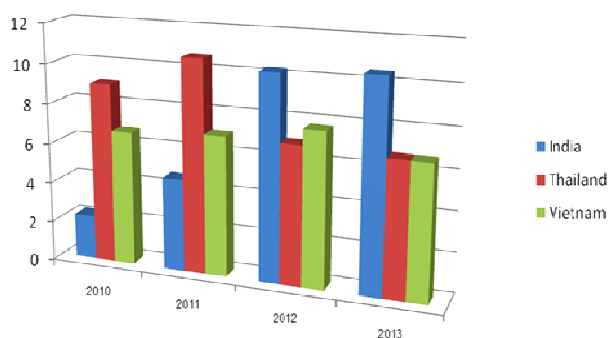


Fig. 1 Top Rice Exporters (2010-2013)

With regard to the Thai rice exporting situation, the fall in export quantity of Thai rice might primitive pressure caused by the influence of fierce competition from other rice exporting countries, Vietnam and India, whose rice appears to be very close substitutes, as revealed by Mahathanaseth I. [3].

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Furthermore, an increase in uncertainty about Thai rice exporting in general was partly due to the downtrend of global rice market. It has been projected in research papers [4], [5] that global rice consumption will increase slowly in the next 10 years (2011-2022), and after that, it will decrease, mainly due to the deceleration of population growth in Asia, the rural-urban migration, the increase of per capita income of Asian countries that consume rice and the reduction of rice per capita consumption due to the fact that Asian people start to consume other products instead of rice. In addition, rice trade will be reduced because major importing countries start to grow rice for domestic consumption. Because of this, rice price in the global market is expected to be reduced in the next 10-20 years. Hence, the available evidences pointed out that the external economic phenomena of Thailand are important factors affecting the rice export of Thailand. However, it is still unclear whether these economic factors and the export quantities of Thai rice have the relationship in the long-run. Accordingly, other things being equal, such external economic factors may be beneficial or detrimental to a country's prospects for quantity of Thai export rice.

Consequently, this study aimed to investigate the relationship between the overall export quantity of Thai rice and important economic factors namely: the Thai rice price, the exchange rate (price of currency), and the world rice consumption during the period 1989-2013 by employing the co-integration method, regression analysis, and error correction model techniques. The information obtained from this study should be helpful for the business, export opportunities, price competitiveness, and policymaker in Thailand.

## II. LITERATURE REVIEW

Thailand is a rice civilization for more than 5,500 years [6] and rice agriculture is truly at the foundation of Thailand's economy and industrial growth and is still playing a major role in global rice market more than three decades. However, as the Thai economy has become more developed, the role and significance of rice exporting have been gradually declining, indicating by the declining share of rice in agricultural exports [1]. Currently, as seen in the Table I, data obtained from TREA [7] showed that of the total export of 6.6 million metric tons of total rice export quantity in 2013, the highest share was white rice, followed by parboiled rice; and Thai Hom Mali rice, respectively. By contrast, of the total rice export value of 133 billion baht, Hom Mali rice had the highest share, followed by white rice; and parboiled rice, respectively. It implied that Thai white rice was competed in low-quality market, but Thai Hom Mali rice was played in high-quality market, as indicated by the price difference. As compared to

major competitor, by quality (grade), Vietnam shipped less in high quality white rice (5 percent, 15 percent), but more in low quality (25 percent) in 2013 [8], indicating that Vietnam concentrated more on producing lower value rice for export as well as Thai rice exports.

TABLE I  
 THAI RICE EXPORTS BY MAJOR VARIETIES IN 2013

Item	Quantity (Metric Ton)	Value (Million Baht)
Total rice exports	6,612,620	133,852
(1) White rice	2,647,817	39,896
(2) Thai Hom Mali rice	1,477,869	51,616
(3) Broken rice	632,735	10,659
(4) Glutinous rice	137,451	3,609
(5) Parboiled rice	1,650,832	26,423
(6) Husked (brown) rice	65,906	1,648
(7) Other rice	9	1

Another competitor, although India has emerged as the world's leading exporter of rice in 2012, a major export buyer was Iran, which preferred Basmati rice. Aromatic rice varieties, such as Jasmine and Basmati rice, belong to the long grain category, but were usually mentioned separately due to their distinctiveness and commercial importance. When properly cooked, most long grain rice has dry, fluffy kernels [9]. Basmati rice has a distinctive odor; grains are double their length after cooking and remain separate. Basmati rice is preferred in India, Pakistan, and the Middle East. Jasmine rice, which is preferred in some Asian countries, is soft, moist, and clingy after cooking [10]. Therefore, Vietnam is a major competitor of Thailand in the next races, especially the white rice market. However, several previous studies [4], [5] pointed out that an exporting of low quality rice, particularly white rice, will confront with a loss since a production and marketing cost in current situation are already high and a major competitor, who has lower cost, can sell rice in lower price than Thailand.

However, in long-run period, the expansion of rice exporting is high related to macroeconomic conditions. For the global rice expectation, it is uncertainty about the rice consumption and the rice price in general, leading unclear to the patterns of rice competition in the next decade. In our literature review, we did not find any previous study which investigated the relationship between the overall of rice export quantity of a major variety, Thai white rice and external economic factors namely: the Thai export price of white rice, the exchange rate (price of currency), and the world rice consumption. Additionally, because of uncertainty in foreign rice export market in general, it is still unclear about the direction of these variables both in the short-run and long-run relationships. It is for these reasons that this study was conducted and employed the co-integration and error correction model techniques in our analysis.

### III. RESEARCH METHODOLOGY

#### A. Analytical Method

The analytical method for this study can be divided into three steps. Firstly, Augmented Dickey Fuller unit root test

(ADF test) is used to analyze whether the variables are stationary. Secondly, if the unit root test indicates that the variables are non-stationary, the Engle and Granger [11] co-integration test will be used to examine whether there exists a meaningful long-term relationship among these non-stationary variables.

If the non-stationary variables are co-integrated, the Ordinary Least Square (OLS) will be employed to analyze the long-run influence of the independent variables on the export quantity of Thai rice. The regression equation is expressed as follows:

$$EXP\_WRICE_t = \beta_0 + \beta_1 WPRICE_t + \beta_2 EXCHANGE_t + \beta_3 CONSUMP_t \quad (1)$$

where

$EXP\_WRICE_t$  = the export quantity of Thai white rice (Metric Tons),

$WPRICE_t$  = the export price of Thai white rice (US\$/Ton),

$EXCHANGE_t$  = the exchange rate (baht/US\$),

$CONSUMP_t$  = the world rice consumption (Metric Tons),

$\beta$  = the regression coefficients of the independent variables, indicating a change in the dependent variable when the proportion of the independent variables change by 1 percent.

Finally, the short-run dynamic relationship among variables is estimated with an error correction model (ECM). The short-run disequilibrium relationship between them can be expressed as (2):

$$\Delta EXP\_WRICE_t = \alpha_0 + \alpha_1 (ECM_{t-1}) + \sum_{i=1}^p \gamma_{1i} \Delta WPRICE_{t-i} + \sum_{i=1}^p \gamma_{2i} \Delta EXCHANGE_{t-i} + \sum_{i=1}^p \gamma_{3i} \Delta CONSUMP_{t-i} \quad (2)$$

where ECM represents the error correction term:

$$ECM_t = EXP\_WRICE_t - \beta_0 - \beta_1 WPRICE_t - \beta_2 EXCHANGE_t - \beta_3 CONSUMP_t \quad (3)$$

The short-run dynamics (2) describe the way in which the system adjusts or corrects back to the long-run equilibrium. The coefficient on the  $ECM_{t-1}$  in (2),  $\alpha_1$ , indicates the speed of adjustment.

#### B. Data and Source of Data

Secondary time series data in annual format are obtained from the Thai Rice Exporters Association, and Food and Agricultural Organization of the United Nations (FAO) over the period 1989 – 2013. Data analyzed in this study are composed of (1) total export quantity of white rice by general exporters and government [12]; (2) average of export price of Thai white rice (Thailand, 100% B, 2nd grade, White rice broken, Bangkok, f.o.b., (Wednesday)) [13]; (3) exchange rate (baht/US\$) [14]; and (4) world rice consumption (milled rice) [15].

### IV. FINDINGS

Starting with change in the export quantity of Thai white rice during the period 1988-2009, as seen in Fig. 2, the expansion of the export quantity was relatively fluctuated with

the rice export price and the exchange rate, particularly after the period of Asian financial crisis; the export quantity of white rice registered an uncertainty movement over the period 2000-2013. In contrast, the extension of global rice consumption tended to be more stable.

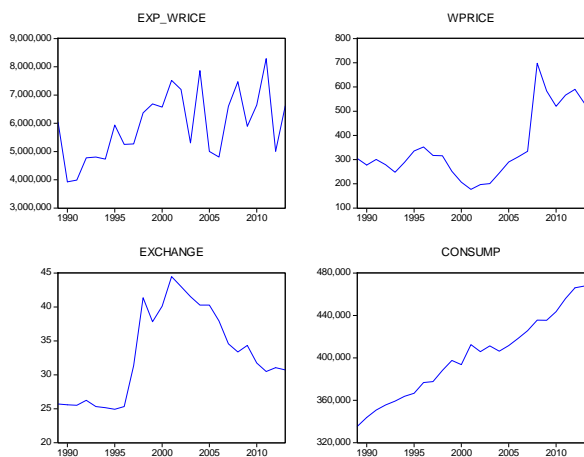


Fig. 2 Movements of export quantity of Thai white rice (*EXP\_WRICE*), export price of Thai white rice (*WPRICE*), exchange rate (*EXCHANGE*), and world rice consumption (*CONSUMP*) during 1989-2013

To examine the influence of these external economic factors on the export quantity of Thai white rice, the regression analyses were performed separately for short-run and long-run periods. First of all, the augmented Dickey-Fuller (ADF) unit root test was employed to test the existence of unit roots in the individual time series. The results obtained from the ADF test are shown in Table II.

TABLE II  
ADF UNIT ROOT TESTS

Variables	Level			Second Difference
	Constant without trend	Constant with trend	None	None
<i>LnEXP_WRICE</i>	-2.448(1)	-3.021(1)	0.413(1)	-9.971(1)**
<i>LnWPRICE</i>	-1.043(1)	-1.598(1)	0.563(1)	-6.015(1)**
<i>LnEXCHANGE</i>	-1.646(1)	-1.188(1)	0.249(1)	-6.892(1)**
<i>LnCONSUMP</i>	-0.079(1)	-1.800(1)	5.418(1)	-6.730(1)**

Note: Figures in parentheses indicate number of lag structures.  
\*\* Statistically significant at 1 percent level.

The findings indicate that all variables are obviously non-stationary in the analysis. On the other hand, the ADF tests have shown that these variables have the same order of integration, with an I(2) process in model without constant and trend.

As a next step of the analysis, the Engle and Granger co-integration test was used to examine the long-term movement of the variables. Results of the co-integration test based on the residuals from the regression were verified whether the series of residuals are stationary. As seen in the Table III, we state that the dependent variable and the independent variables are co-integrated. The findings reveal that the estimated residuals

are stationary with an I(0) process. Hence, there existed a co-integrating relationship, meaning that these variables have the relationship in the long-run.

TABLE III  
STATISTICAL RESULTS FROM THE REGRESSION ANALYSES AND CO-INTEGRATION TEST

Variables	Coefficient	Std. Error	Adj. R-square	F-stat.	ADF Stat. of Regression Residuals
<i>Co-integration Model (D.W.= 2.319)</i>					
Constant	-22.211	12.768	0.706		-4.499**
<i>LnWPRICE</i>	0.408*	0.144		11.099**	
<i>LnWPRICE(-1)</i>	-0.306*	0.139			
<i>LnEXCHANGE</i>	0.551*	0.260			
<i>LnCONSUMP</i>	1.788*	0.727			
<i>AR(2)</i>	-0.496**	0.143			
<i>Error Correction Model (ECM): (D.W.= 2.288)</i>					
Constant	0.022	0.013	0.642		
$\Delta$ <i>LnWPRICE</i>	0.412**	0.089		6.976*	
$\Delta$ <i>LnWPRICE(-1)</i>	0.240*	0.087			
$\Delta$ <i>LnEXCHANGE</i>	0.035	0.126			
$\Delta$ <i>LnCONSUMP</i>	-0.205	1.038			
<i>ECM</i>	-0.159E-07**	2.78E-08			
<i>AR(2)</i>	-0.895**	0.213			

Note: The dependent variable is natural log of the export quantity of Thai white rice (*LnEXP\_WRICE*);

\*\* Statistically significant at 1 percent level.  
\* Statistically significant at 5 percent level.

The Ordinary Least Square (OLS) was employed to analyze the long-run influence of the independent variables on the export quantity of Thai white rice. According to the findings in Table III, A long-run equilibrium equation indicates that a percentage change in world rice consumption will, on average, increase in a 1.788% in export quantity of Thai white rice. As expected, an increase in exchange rate will also lead to a 0.551% rise in the export quantity. The Thai export price of white rice also establishes interesting results. The impact of export price on the quantity is positive as a whole. However, this factor produces mixed results on different period of the time. The estimates suggest that an increase in actual price induces the export quantity at the present, but this is offset by its effect on last period in the opposite direction.

Finally, based on another regression analysis presented in Table III, when short-run dynamics are involved, the coefficient of adjustment is small or is not statistically different from zero, implying that the deviation from long-run equilibrium is corrected back spending much more period of time. In addition, the findings revealed that the rice export prices were only one important factor affecting the export quantity of Thai white rice in the short-run, as indicated by statistically significant influences.

Consequently, it seems clear that the incremental change in Thai export price of white rice appears to be one of the important drivers of overall white rice export of Thailand both in short-run and long-run.

## V. CONCLUSION AND RECOMMENDATION

The findings of this study revealed the importance of the changing of export price to the extension of quantity of Thai white rice both in short-term and long-term. Our findings suggested that an increase in the export price would lead to increase the magnitude of the export quantity of Thai white rice as a whole.

However, to our knowledge, it seems clear that rice price in the global market is expected to be reduced in the next 10-20 years. Moreover, a major competitor, Vietnam has lower cost, can sell rice in lower price than Thailand, putting pressure on the Thai export to maintain market share. Fortunately, an exporting of Thai Hom Mali and parboiled rice in the world market still had an increasing trend since they still be the products that foreigners will consume more when their income increase. (Thai Hom Mali rice is Thailand's unique rice specialty, which sold at a higher price and with fewer competitors due to its unique flavor and texture. It is produced from Khao Dowk Mali 105 (KDML 105) and Kor Kho 15 (RD15) varieties [10].) Accordingly, the business in the country should focus on producing and selling quality rice or a rice which has higher price, for instance, producing better quality of Hom Mali rice, exporting parboiled rice which can sell at higher price than white rice and producing products made from rice. Turing to the policy recommendation, the government should strictly control quality. Maintaining the image of premium Hom Mali rice is an important long term strategy. This should be done through occasional trade promotion and marketing activities for high quality brands.

Finally, the further study should focus on the in-depth study into each foreign market in order to find the way to improve the business strategies in line with the dynamic changed in consumer behavior.

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## REFERENCES

- [1] Asian Development Bank (ADB), "The Rice Situation in Thailand," *Technical Assistance Consultant's Report*, January 2012.
- [2] Thailand Rice Exporters Association (TREA), *World Rice Trade: Exporters*. [http://www.thairiceexporters.or.th/statistic\\_2013.html](http://www.thairiceexporters.or.th/statistic_2013.html), 2014.
- [3] I. Mahathanaseth, *The Degree of Competition in Thai Rice Export Market*. Bangkok: The Thailand Research Fund, 2013.
- [4] N. Poapongsakorn et al., *Rice Strategies, Rice Research and Development, and Outlook*. Bangkok: The Thailand Research Fund, 2013.
- [5] Timmer, C. Peter, Steven Block and David Dawe, "Long-run Dynamics of Rice Consumption, 1960-2050a," chapter 1.6 in Sushil Pandey, Derek Byerlee, David Dawe, Achim Dobermann, Samarendu Mohanty, Scott Rozelle, and Bill Hardy, editors. *Rice in the Global Economy: Strategic research and policy issues for food security*. Los Banos (Philippines): International Rice Research Institute, 2010, pp.139-174].

- [6] Thailand Rice Exporters Association (TREA), *Rice Exporting Handbook*. <http://www.thairiceexporters.or.th/Frameset-information.htm>, 2014.
- [7] Thailand Rice Exporters Association (TREA), *Thai Rice Exports by major varieties*. [http://www.thairiceexporters.or.th/statistic\\_2013.html](http://www.thairiceexporters.or.th/statistic_2013.html), 2014.
- [8] U.S. Department of Agriculture (USDA), "Vietnam Grain and Feed Annual 2014," *Gain Report*, April 2014.
- [9] Scarpa, J., "Rice," *Restaurant Business*, 91(10), 1992, p.92.
- [10] P. Suwannaporn, *Production and Market Feasibility Study of Thailand Rice Products for Export*. Bangkok: The Thailand Research Fund and The Commission on Higher Education, 2008.
- [11] Engle, R. F. and Granger, C.W.J., "Cointegration and Error Correction Representation, Estimation, and Testing," *Econometrica* 55, March 1987.
- [12] Thailand Rice Exporters Association (TREA), *Total Export Quantity of White Rice by General Exporters and Government*. [http://www.thairiceexporters.or.th/statistic\\_2013.html](http://www.thairiceexporters.or.th/statistic_2013.html), 2014.
- [13] Food and Agricultural Organization of the United Nations (FAO), *Rice (Thailand, 100% B, 2nd grade, White rice broken, Bangkok, f.o.b., (Wednesday))*. <http://www.fao.org/economic/est/prices?lang=en&ccode=2311>, 2014.
- [14] Thailand Rice Exporters Association (TREA), *Rates of Exchange of Commercial Banks in Bangkok Metropolis*. <http://www.thairiceexporters.or.th/exchange%20rate.htm>, 2014
- [15] Thailand Rice Exporters Association (TREA), *World rice consumption (milled rice)*. [http://www.thairiceexporters.or.th/world%20rice%20prod\\_cons\\_ends.htm](http://www.thairiceexporters.or.th/world%20rice%20prod_cons_ends.htm), 2014