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An analysis of factors affecting Thai agricultural exports to ASEAN by pooled mean group

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ABSTRACT

This study aims at the investigation of selected economic factors affecting the export of Thailand's agricultural goods to ASEAN countries, which are Philippines, Malaysia, Vietnam Singapore, and Indonesia. It also examines the long term relationships between selected economic factors and export values. Samples used in this study are selected from agricultural goods which have the highest values of the exports from Thailand to ASEAN countries. They include rubber, rice, cassava, frozen-chilled-dried fruits and corn. The variables under this study include the export values of Thailand's agricultural goods, gross domestic product, ratio of consumer price index, exchange rate, and population. The data are collected annually during 1998-2012 and are estimated by the pooled mean group estimator. The results of this study indicate that gross domestic product and population are directly related to export values. However, the ratio of consumer price index and exchange rate are inversely related with export values of agricultural products.

Keywords: Agricultural sector, export, ASEAN, panel unit root, PMG

JEL Classification: F14, O13, C23

1. Introduction

Due to the volatility of today's global economy, many countries around the world have to launch new measures to boost an economic growth and the expansion of society. In doing so, the international trade plays an important role. As of Thailand, the export values have been rapidly increased for the past 15 years. This is because of human resources and the lower wage rate which gives Thailand the advantages to compete with other countries in the world market. The major trade partners of Thailand are United State of America, EU, Japan, China and ASEAN. The export values of Thai's commodity apt to increase every year. The economy of Thailand relies heavily on export which estimated to be around 63.6 percent out of GPD (in the year 2011).Consequences, the export sector created the push of investment expansion, created the demand for labor, attract foreign investor which leads to a technological change, in turns, reduce the cost of production and increase the value of national resources, and reduce the need of foreign goods and services which leads to an increase in national saving.

A tendency of Thai's export to ASEAN is growing while the export to United of America, EU, and Japan apt to decrease. Hence, ASEAN could be the major trade partner in the near future. The ASEAN community holds trade liberalization rule, that is, a free trade of agricultural products between countries in the ASEAN. In a free trade market, the producer would likely to produce goods and services that have a comparative advantage over the other, as such; Thailand has a comparative advantage in producing agricultural products for the past 7 years which bring about 19,841 million US dollars to the country.

The economic contraction in US and EU bring a negative impact to Thai's export of agricultural product. According to the statistic in the year 2012, the export values of Thai's agricultural products had dropped due to the appreciation of Thai bath and a contraction of global economy. This situation had an impact on agricultural products such as rice, rubber, cassava, and fishery product. If Thai baht rises to 27 baht per US dollar, the value of export would drop by 10 percent. An appreciation of Thai baht leaves Thailand a disadvantage to compete in the world market. Only the monetary policy had been introduced to ease such issue. For these reasons, it leaves a country no choice but to seek a different market. And ASEAN is the answer because of a strong economy in the ASEAN countries. The currencies of the countries in ASEAN also appreciate compare to US dollar and Euro. An appreciation of currency does not have only the down side but also the up side, an appreciation of Thai baht also has a positive impact as the import price is decline. An import of technology and machine for agricultural sector would reduce the price of production in the long run. Additional, the price of world crude oil is relatively cheap for Thai manufacturers (Prachachat newspaper, 2013).

In the year 2012, Thailand had exported agricultural products to 9 countries in ASEAN which estimated to be 3,427 million US dollar, increasing to 48.45 percent compared to the year 2007 which had the value of 2,308 million US dollar. Also, the import value from ASEAN is rising to 981 million baht or 21.91 percent increased compare to the previous year. The value of Thai export and import accounted for 4,408 million baht, 5.12 percent increase from the year 2011. The net export accounted for 2,446 mill US dollar. The trade partners of Thailand in ASEAN are Philippines, Malaysia, Vietnam, Singapore, and Indonesia.

2. Literature review

Suriya (2000) uses pooled times series and cross sectional data to analysis the export growth slowdown problem of Thailand in 1990s. S. Hansuksinwattana (2003) studies the relationship between rubber export growth and economic growth in Thailand. C. Tangsukkheesiri (2007) studies the relationship between total agricultural exports value and the economic growth measured by GDP of Thailand. S. Techanant (2008) studies the impact of real exchange rate on agricultural export value of Thailand. B. Thongpunchang is study impacts of real foreign exchange rate on fruit export of Thailand. And P. Thammawong study the relationships between economic growth of crop sector and export quantity of Hom Mali rice of Thailand. Dechumnouyporn and Suriya (2012) studies the roles of information and communication technology on export competitiveness of Thai small and medium-sized enterprises. While, Fidlizan Muhammad (2012) and Jamilah Mohd Mahyideen (2012) use the same model of Pooled Mean Group to analyze the variables of economics.

3. Methodology

The panel unit root (the stationary testing of valuation) including The LLC Test, IPS Test, Fisher-ADF Test, and PP Test are used in this research. After that, the diagnose of correlation of data is implemented based on the theory from Nazlioglu (2012). The model of the export value is as follow:

$$\ln EXP_{it} = \alpha_0 + \alpha_1 \ln GDP_{it} + \alpha_2 \ln CPI_{it} + \alpha_3 \ln EXR_{it} + \alpha_4 \ln POP_{it} + \varepsilon_{it} \quad (1)$$

Where: t = Time series (t = 1, 2, 3,…, 15) between the year 1998 – 2012

EXP_{it} = The export value of commodity (t) to the trade partner (i)

GDP_{it} = GDP of the trade partner (i)

CPI_{it} = The CPI as a ratio of Thailand and trade partner (i)

EXR_{it} = Yearly average exchange rate between US dollar and a currency of trade partner (i).

POP_{it} = The number of population within the country of trade partner (i)

i = Cross-sectional data (Philippines, Malaysia, Vietnam, Singapore and Indonesia)

Then, the model estimation of an export value of Thai agricultural products using pooled mean group estimator has been implemented. The model of economic factor correlation is as follow:

$$\Delta y_i = \phi_i y_{i,1} + x_i \beta_i^1 + \sum_{j-1}^{p-1} \lambda_{ij}^* \Delta y_{i,t-j} + \sum_{j-0}^{q-1} \Delta x_{i,t-j} \delta_{ij}^* + \varepsilon_i \quad (2)$$

Where: i = Cross-sectional data (Philippines, Malaysia, Vietnam, Singapore and Indonesia)

t = Time series (t = 1, 2, 3,…, 15) between the year 1998 – 2012

j = Period of the lagged dependent variable

ϕ_i = The group specific error-correction coefficients

y_i = An export value of 5 different Thai agricultural products to the trade partners in ASEAN (rice, rubber, cassava, frozen, chilled, and dried fruits, and corn).

x_i = Economic factors that has an impact on export value of Thai agricultural products to the trade partner (i) at time (t)

$y_{i,t-j}$ = The interval regression j of y_i

$x_{i,t-j}$ = The interval regression j of X_i

$\Delta y_{i,t-j}$ = The interval regression j of Δy_i

$\Delta x_{i,t-j}$ = The interval regression j of ΔX_i

Δy_i = $y_i - y_{i,t-1}$

Δx_i = $x_i - x_{i,t-1}$

ε_i = $(\varepsilon_{i1},...,\varepsilon_{it})'$

4. Data

The components of variables in this research included the dependent variables which is 5 different agricultural products that has the highest value of export from Thailand to trade partners in ASEAN. And independent variables which are the Gross domestic product (GDP) of the trade partners, Consumer price index (CPI), yearly average exchange rate between US dollar and a currency of trade partner, and number of population within the country of trade partner.

Dependent variable is a different agricultural products that has the highest value of export (EXP) from Thailand to trade partners in ASEAN, that is, rice, rubber, cassava, frozen, chilled, and dried fruits, and corn. Studying each of components separately one by one. Using US dollar as a unit of export value, interchange into logarithm yields $\ln EXP_{it}$.

$\ln EXP_{it}$ is natural logarithm of export value of Thai's agricultural product.

Independent variable is an economic factor that has an impact on an export value of Thai agricultural products. In this research, there are 4 economic factors that have been put to the study:

1. Gross domestic product (GDP) of Philippines, Malaysia, Vietnam, Singapore, and Indonesia. Using US dollar as a unit of GPD, interchange into logarithm yields $\ln GDP_{it}$.

$\ln GDP_{it}$ is natural logarithm of GDP of trade partners.

2. Consumer price index (CPI) as a ratio of Thailand and trade partners (Philippines, Malaysia, Vietnam, Singapore, and Indonesia). Using US dollar as a unit of CPI, interchange into logarithm yields $\ln CPI_{it}$.

$\ln CPI_{it}$ is natural logarithm of CPI as a ratio of Thailand and trade partners.

3. Yearly average exchange rate between US dollar and a currency of trade partner (EXR) since the year 1998 to 2012.Using US dollar as a unit of EXR, interchange into logarithm yields $\ln EXR_{it}$.

$\ln EXR_{it}$ is natural logarithm of yearly average exchange rate between US dollar and a currency of trade partner.

4. Number of population (POP) within the country of trade partner since the year of 1998 to 2012. These countries included Philippines, Malaysia, Vietnam, Singapore, and Indonesia. Counted as people, interchange into logarithm yields $\ln POP_{it}$.

$\ln POP_{it}$ is natural logarithm of population within the country of trade partner.

5. Results

The results of this research can be divided into 2 parts; the first part is the result of stationary testing on agricultural products data using the LLC Test, IPS Test, Fisher-ADF Test, and PP Test. Such agricultural products are rice, rubber, cassava, frozen, chilled, and dried fruits, and corn. Table 5.1 shows the results of the study.

Table 5.1: Stationary tested results of agricultural products of Thailand

Variables	Stationary test results of each method				Level
	LLC	IPS	PP	ADF	
$\ln EXP_1$	-7.85705*** (0.0000)	-5.25436*** (0.0000)	51.1056*** (0.0000)	42.6276*** (0.0000)	1st different I(1)
$\ln EXP_2$	-6.60284*** (0.0000)	-5.42120*** (0.0000)	63.9667*** (0.0000)	44.5377*** (0.0000)	1st different I(1)
$\ln EXP_3$	-6.78250*** (0.0000)	-6.01095*** (0.0000)	89.3814*** (0.0000)	48.7393*** (0.0000)	1st different I(1)
$\ln EXP_4$	-6.55822*** (0.0000)	-5.66795*** (0.0000)	64.4687*** (0.0000)	46.2385*** (0.0000)	1st different I(1)
$\ln EXP_5$	-2.80680*** (0.0025)	-2.22160** (0.0132)	24.0450*** (0.0075)	24.9226*** (0.0055)	Level I(0)
lnGDP	-6.05800*** (0.0000)	-4.09604*** (0.0000)	39.1084*** (0.0000)	33.8927*** (0.0002)	1st different I(1)
lnCPI	-2.70483*** (0.0034)	-2.17158** (0.0149)	21.9012** (0.0156)	20.1461** (0.0279)	1st different I(1)
lnEXR	-3.06724*** (0.0011)	-3.46111*** (0.0003)	33.6224*** (0.0002)	29.4038*** (0.0011)	1st different I(1)
lnPOP	-8.52502*** (0.0000)	-5.81720*** (0.0000)	68.4219*** (0.0000)	47.2840*** (0.0000)	Level I(0)

Table 5.1 shows the results of stationary testing on agricultural products data using unit root test (4 different ways). The results shows the stationary data at level I(0)when testing with LLC, IPS, PP, and ADF applied to the variables of corn export value and variables of population in trade partner country. And the stationary data at level 1st different or I(1) referred to the rest of the variables. Although, the variables may have different level in stationary testing but still manage to run a model estimation using Pooled mean group (Pesaran, Shin, and Smith, 1998). After that, the testing of data co-integration was implemented.

The second part is the model estimation using Pooled mean group estimators, which is, the group estimation of average data and the results of agricultural products. The focus in this part aim at studying the economic factors in each of the trade partner countries, that is, Philippines, Malaysia, Vietnam, Singapore, and Indonesia. The results are as follow:

Table 5.2**:** Pooled mean group estimators results of rubber

Variables	Long-Run Coefficient	Variables	Short-Run Coefficient				
	All Countries		Philippines	Malaysia	Vietnam	Singapore	Indonesia
$lnGDP_{it-2}$	-1.6385*** (0.0000)	$\Delta lnGDP_{it-1}$	3.6047* (0.0930)	0.4886 (0.6160)	13.5309*** (0.0770)	-1.9739 (0.0050)	-0.5439 (0.7440)
$lnCPI_{it-2}$	-4.8752*** (0.0000)	$\Delta lnCPI_{it-1}$	-8.9291 (0.1410)	1.8498 (0.7440)	7.6770** (0.4420)	11.1443 (0.0000)	-7.2665 (0.0050)
$lnEXR_{it-1}$	-2.4012*** (0.0000)	$\Delta lnEXR_{it-1}$	2.6327 (0.3320)	-1.9753 (0.3620)	6.5450*** (0.4660)	-12.8233 (0.0000)	-3.7729** (0.0230)
$lnPOP_{it-1}$	7.5212*** (0.0000)	$\Delta lnPOP_{it-1}$	-437.31*** (0.0000)	-71.51672 (0.4610)	-406.953* (0.4700)	-10.0136 (0.0000)	-785.52*** (0.0010)
-	-	Cont	6.2401 (0.7480)	2.7033 (0.3910)	7.8805* (0.3500)	8.7522 (0.0090)	14.3560* (0.0500)
-	-	EC_{it-1}	-1.4772*** (0.0000)	-0.2812 (0.1230)	-0.3447*** (0.0420)	-0.6421*** (0.0000)	-0.6831*** (0.0000)

Table 5.2 shows a statistically significant of the equilibrium adaptability in the long runs (EC_{it-1}) applied only to Philippines, Vietnam, Singapore, and Indonesia. In the part of economic factors that has an impact on exported value at equilibrium point in the long runs which shows the negative relationship of variables of rubber export value when run with variables of Gross domestic product (GDP), Consumer price index (CPI), and yearly average exchange rate between US dollar and a currency of trade partner (EXR). That is, when the numbers of these variables increase it will reduce the export value of rubber. But the variable of population shows a positive relationship with the export value of rubber. An increase of population means the higher of exported value.

When compared each of the countries found that Vietnam had the highest EC_{it-1} coefficient. That is Vietnam has the highest adaptability when facing the economic phenomenal that may causes an impact to export value of rubber.

It should be noted that the lagged period shown in Table 5.2 comes from the modification of the variable such that it makes the model fit better to the data. This can be seen by the results of the significance of other variables in the model. For example, when the lagged period is 1 but the model does not fit the data which many variables in the model are insignificant, it

Indicates that the lagged period is not suitable. However, when the model changes the lagged period to be 2 and makes the model fit better to the data; Many more variables become significant. Then the lagged period 2 is more suitable than 1. This is the justification of the lagged period in this study both for the long-run and short run analysis.

Table 5.3: Pooledmean group estimators results of rice

Variables	Long-Run Coefficient	Variables	Short-Run Coefficient				
	All Countries		Philippines	Malaysia	Vietnam	Singapore	Indonesia
$lnGDP_{it-1}$	8.3359*** (0.0000)	$\Delta lnGDP_{it-2}$	1.6474 (0.7700)	-0.7476 (0.4840)	-1.4073 (0.3150)	-0.4944 (0.3300)	-5.6748*** (0.0000)
$lnCPI_{it-1}$	6.6680*** (0.0000)	$\Delta lnCPI_{it-2}$	15.4206 (0.5330)	-3.5871 (0.6440)	-2.2627** (0.1060)	-2.0722 (0.5010)	-6.6564 (0.1380)
$lnEXR_{it-1}$	7.6938*** (0.0000)	$\Delta lnEXR_{it-1}$	7.2526 (0.3130)	-6.0495* (0.0760)	-0.6101 (0.7750)	-4.706*** (0.0010)	-12.490*** (0.0000)
$lnPOP_{it-2}$	-67.845*** (0.0000)	$\Delta lnPOP_{it-1}$	-1549*** (0.0010)	-801.86*** (0.0000)	-489.291** (0.0160)	-0.0470 (0.9880)	-98.7728 (0.6440)
-	-	Cont	375.29*** (0.0000)	194.340*** (0.0000)	382.152*** (0.0000)	1.9663 (0.3190)	330.055*** (0.0000)
-	-	EC_{it-1}	-0.896*** (0.0000)	-0.5888*** (0.0000)	-1.1809*** (0.0000)	-0.0107 (0.2980)	-0.8589*** (0.0000)

Table 5.3 shows a statistically significant of the equilibrium adaptability in the long runs (EC_{it-1})applied only to Philippines, Malaysia, Vietnam, and Indonesia. Also it shows the positive relationship of rice export value when run with variables of Gross domestic product (GDP), Consumer price index (CPI), and yearly average exchange rate between US dollar and a currency of trade partner (EXR). That is, when the numbers of these variables increase it will increase the export value of rice.But the variable of population shows a negative relationship with the export value of rice. An increase of population means the lower of exported value.

When compared each of the countries found that Malaysia had the highest EC_{it-1} coefficient. That is Malaysia has the highest adaptability when facing the economic phenomenal that may causes an impact to export value of rice.

Table 5.4 shows a statistically significant of the equilibrium adaptability in the long runs (EC_{it-1})applied only to Philippines, Vietnam, and Indonesia. Also it shows the positive relationship of cassava's export value when run with variables of Gross domestic product (GDP), and population of trade partner country (POP).That is, when the numbers of these variables increase it will increase the export value of cassava. But the variable of Consumer price index (CPI) and yearly average exchange rate between US dollar and a currency of trade partner (EXR) shows a negative relationship with the export value of cassava. An increase in these variables means the lower of exported value.

Table 5.4: Pooledmean group estimators results of cassava

Variables	Long-Run Coefficient	Variables	Short-Run Coefficient				
	All Countries		Philippines	Malaysia	Vietnam	0.4925** (0.0420)	Indonesia
$lnGDP_{it-1}$	0.4925** (0.0420)	$\Delta lnGDP_{it-2}$	1.1280 (0.1670)	0.9102 (0.1250)	4.7673* (0.0840)	0.5550* (0.0780)	4.5168** (0.0290)
$lnCPI_{it-1}$	-3.2890*** (0.0000)	$\Delta lnCPI_{it-2}$	-10.847*** (0.0000)	1.0440 (0.8450)	4.7819 (0.2280)	4.4740*** (0.0030)	-10.0152 (0.1560)
$lnEXR_{it-2}$	-0.0427 (0.9000)	$\Delta lnEXR_{it-1}$	-1.3895*** (0.0090)	-0.7717 (0.3920)	8.6406*** (0.0100)	-1.5805*** (0.0020)	1.8667 (0.2080)
$lnPOP_{it-1}$	2.3750** (0.0120)	$\Delta lnPOP_{it-1}$	-85.9054** (0.0160)	-9.1341 (0.8670)	4.3689 (0.9840)	6.5665*** (0.0000)	-117.1123 (0.5720)
-	-	Cont	11.3297 (0.1270)	0.7972 (0.7870)	6.9717 (0.2770)	6.3583*** (0.0070)	4.6694 (0.2910)
-	-	EC_{it-1}	-1.4154*** (0.0000)	-0.0579 (0.7710)	-1.1100*** (0.0000)	-0.4856*** (0.0000)	-0.6341*** (0.0050)

When compared each of the countries found that Singapore had the highest EC_{it-1} coefficient. That is Singapore has the highest adaptability when facing the economic phenomenal that may causes an impact to export value of cassava

Table 5.5 shows a statistically significant of the equilibrium adaptability in the long runs (EC_{it-1})applied to every country. Also it shows the positive relationship of frozen, chilled and dried fruit's export value when run with variables of Gross domestic product (GDP). That is, when the numbers of GDP increase it will increase the export value of frozen, chilled and dried fruit.But variables of Consumer price index (CPI),population of trade partner country (POP), and yearly average exchange rate between US dollar and a currency of trade partner (EXR) shows a negative relationship with the export value of frozen, chilled and dried fruit. An increase in these variables means the lower of exported value.

When compared each of the countries found that Vietnam had the highest EC_{it-1} coefficient. That is Vietnam has the highest adaptability when facing the economic phenomenal that may causes an impact to export value of frozen, chilled and dried fruit.

Table 5.5: Pooledmean group estimators results of frozen, chilled and dried fruit

Variables	Long-Run Coefficient	Variables	Short-Run Coefficient				
	All Countries		Philippines	Malaysia	Vietnam	Singapore	Indonesia
$lnGDP_{it-1}$	0.7596*** (0.0000)	$\Delta lnGDP_{it-2}$	-4.3909 (0.4660)	-4.0546*** (0.0000)	-9.8231 (0.4510)	-1.0430** (0.0280)	-0.8263 (0.4500)
$lnCPI_{it-1}$	-3.2869*** (0.0000)	$\Delta lnCPI_{it-1}$	-0.2138 (0.9830)	13.617*** (0.0080)	-19.8208 (0.1160)	3.2984** (0.0250)	-4.9412 (0.1190)
$lnEXR_{it-1}$	-4.9634*** (0.0000)	$\Delta lnEXR_{it-1}$	-8.5547 (0.1970)	-3.2792*** (0.0020)	-9.4735 (0.5560)	-3.5193*** (0.0060)	3.0835** (0.0110)
$lnPOP_{it-2}$	-5.6346*** (0.0000)	$\Delta lnPOP_{it-2}$	-180.9482 (0.5210)	-283.3174 (0.2840)	1744.493* (0.0700)	0.2578 (0.8540)	-684.7369 (0.2140)
-	-	Cont	25.6790* (0.0630)	65.310*** (0.0000)	47.4641** (0.0460)	26.440*** (0.0030)	173.987*** (0.0000)
-	-	EC_{it-1}	-0.3302* (0.0550)	-1.1351*** (0.0000)	-0.4345** (0.0300)	-0.6084*** (0.0000)	-1.5763*** (0.0000)

Table 5.6: Pooledmean group estimators results of corn

Variables	Long-Run Coefficient	Variables	Short-Run Coefficient				
	All Countries		Philippines	Malaysia	Vietnam	Singapore	Indonesia
$lnGDP_{it-1}$	-0.4269 (0.6080)	$\Delta lnGDP_{it-1}$	-2.0407 (0.6630)	2.2325 (0.7500)	-18.275** (0.0130)	-23.2407** (0.0270)	-17.6816*** (0.0020)
$lnCPI_{it-1}$	-6.5994*** (0.0000)	$\Delta lnCPI_{it-1}$	24.9028 (0.1830)	-80.5420** (0.0460)	-14.9662* (0.0920)	24.2024 (0.4950)	6.5959 (0.4540)
$lnEXR_{it-1}$	-1.7015** (0.0450)	$\Delta lnEXR_{it-2}$	0.3244 (0.9620)	-10.6085 (0.4780)	-19.990** (0.0140)	-23.2500 (0.3390)	-13.3367*** (0.0090)
$lnPOP_{it-1}$	12.1227** (0.0290)	$\Delta lnPOP_{it-1}$	225.1632 (0.3170)	383.6151 (0.1820)	-6.9448 (0.9840)	26.1786 (0.4250)	3471.60*** (0.0000)
-	-	Cont	-60.2079 (0.3180)	-31.7854 (0.3700)	10.8013* (0.0720)	-3.0914 (0.7680)	-105.0671 (0.1260)
-	-	EC_{it-1}	-1.6711*** (0.0000)	-1.0632*** (0.0000)	0.2089 (0.3170)	-0.4916 (0.1640)	-1.7086*** (0.0000)

Table 5.6 shows a statistically significant of the equilibrium adaptability in the long runs (EC_{it-1}) applied only to Philippines, Malaysia, and Indonesia. Also it shows the positive relationship of corn's export value when run with variables of population of trade partner country (POP). That is, when the numbers of population variables increase it will increase the export value of corn. But the variable of Gross domestic product (GDP),Consumer price index (CPI), and yearly average exchange rate between US dollar and a currency of trade partner (EXR) shows a negative relationship with the export value of corn. An increase in these variables means the lower of exported value.

When compared each of the countries found that Malaysia had the highest EC_{it-1} coefficient. That is Malaysia has the highest adaptability when facing the economic phenomenal that may causes an impact to export value of corn.

6. Conclusions

The conclusion of this study can be divided into 2 parts:

Part 1, the panel unit root test of every variable both dependent and independent variables. In doing so, the Levin, Lin, and Chu (LLC Test), Im, Pesaran and Shin (IPS Test), PP Test, and Augmented Dickkey-Filler (ADF Test) have been applied to stationary testing of data.

In rubber product, the test result shows the stationary of population in trade partner country variables at level I(0) while the other variables included export value of rubber variables, gross domestic product (GDP) of trade partner variables, The consumer price index (CPI) as a ratio of Thailand and trade partner variables, and yearly average exchange rate between US dollar and a currency of trade partner variables shows the stationary of data at 1^{st} different level or I(1).

In rice product, the test result shows the stationary of population in trade partner country variables at level I(0) while the other variables included export value of rice variables, gross domestic product (GDP) of trade partner variables, The consumer price index (CPI) as a ratio of Thailand and trade partner variables, and yearly average exchange rate between US dollar and a currency of trade partner variables shows the stationary of data at 1^{st} different level or I(1).

In cassava product, the test result shows the stationary of population in trade partner country variables at level I(0) while the other variables included export value of cassava variables, gross domestic product (GDP) of trade partner variables, The consumer price index (CPI) as a ratio of Thailand and trade partner variables, and yearly average exchange rate between US dollar and a currency of trade partner variables shows the stationary of data at 1^{st} different level or I(1).

In frozen, chilled, and dried fruit product, the test result shows the stationary of population in trade partner country variables at level I(0) while the other variables included export value of frozen, chilled, and dried fruit variables, gross domestic product (GDP) of trade partner variables, The consumer price index (CPI) as a ratio of Thailand and trade partner variables, and yearly average exchange rate between US dollar and a currency of trade partner variables shows the stationary of data at 1^{st} different level or I(1).

In corn product, the test result shows the stationary of population in trade partner country variables at level I(0) while the other variables included export value of corn variables, gross domestic product (GDP) of trade partner variables, The consumer price index (CPI) as a ratio of Thailand and trade partner variables, and yearly average exchange rate between US dollar

and a currency of trade partner variables shows the stationary of data at 1st different level or I(1).

From the result of stationary testing using 4 different methods found that the data is stationary. That is, the data is efficiency enough to test with panel co-integration. Even though, the data has different level of stationary but still be able to estimated using pooled mean group estimator (PMGE) which considered being the advantage of using pooled mean group estimators.

Part 2, the results on economic factors using pooled mean group estimator (PMGE).Such economic factors included the export value of agricultural products, gross domestic product (GDP) of trade partner, the consumer price index (CPI) as a ratio of Thailand and trade partner, and yearly average exchange rate between US dollar and a currency of trade partner, and number of population in trade partner country all created an impact to Thai's export value of agricultural products. The results of estimation are as follow:

1. The estimation of rubber export value shows a positive relationship with number of population in trade partner country, that is, the higher in number of population in trade partner country leads to a higher value of rubber exported. But the estimation shows a negative relationship with the consumer price index (CPI) of trade partner meaning an increase in CPI leads to a decrease in value of rubber exported. The export value of rubber is co-integrated with economic factors of Philippines, Vietnam, Singapore, and Indonesia in the long run.

2. The estimation of rice export value shows a positive relationship with gross domestic product (GDP) and yearly average exchange rate between US dollar and a currency of trade partner of trade partner, that is, the higher in number of gross domestic product of trade partner or an appreciation of trade partner's currency leads to a higher value of rice exported. The export value of rice is co-integrated with economic factors of Philippines, Malaysia, Vietnam, and Indonesia in the long run.

3. The estimation of cassava export value shows a positive relationship with gross domestic product (GDP) and number of population in trade partner's country, that is, the higher in number of gross domestic product of trade partner or an increase in number of population leads to a higher value of cassava exported. But the estimation shows a negative relationship with the consumer price index (CPI) of trade partner meaning a decline in CPI causes in increase in cassava export value.The export value of cassava is co-integrated with economic factors of Philippines, Vietnam, Singapore, and Indonesia in the long run.

4. The estimation of frozen, chilled, and dried fruit export value shows a positive relationship with gross domestic product (GDP) of trade partner, that is, the higher in number of gross domestic product of trade partner leads to an increase in value of frozen, chilled, and dried fruit exported. But the estimation shows a negative relationship with the consumer price index (CPI) of trade partner meaning a decrease in CPI causes in increase in frozen, chilled, and dried fruit export value. The export value of frozen, chilled, and dried fruit is co-integrated with economic factors of Philippines, Malaysia, Vietnam, Singapore, and Indonesia in the long run.

5. The estimation of corn export value shows a positive relationship with number of population in trade partner's country, that is, the higher in number of population in trade partner country leads to a higher value of corn exported. But the estimation shows a negative relationship with the consumer price index (CPI) of trade partner meaning an increase in CPI

leads to a decrease in value of corn exported. The export value of corn is co-integrated with economic factors of Philippines, Malaysia, and Indonesia in the long run.

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