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Factors Affecting Export and Import Trade
between Lao PDR and Principle Trade Partners

Thanouxay VOLAVONG



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and Principle Trade Partners**

Thanouxay VOLAVONG

December, 2012

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List of Abbreviations

ADB	:	Asian Development bank
ACMECS	:	Ayeyawady-Chao Phray-Mekong Economic Cooperation Strategy
AFTA	:	ASEAN Free Trade Area
ASEAN	:	Association of South East Asian Nation
BOL	:	Bank of The Lao PDR
CPI	:	Consumer Price Index
FDI	:	Foreign Direct investment
GDP	:	Gross Domestic Product
IMF	:	International Monetary Fun
MINZAS	:	Mekong Institute-New Zealand Ambassador Scholarship
NEER	:	Nominal Effective Exchange Rate
PPP	:	Purchasing Power Parity
REER	:	Real Effective Exchange Rate
WB	:	World Bank
WTO	:	World Trade Organization

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Abstract

The purpose of this study is to analyze factors that have made an impact on export and import between Lao PDR and its three principal trade partners, Thailand, China, and Vietnam from 1990 to 2010. The specific research questions are: 1. What are the main factors affecting trade between Lao PDR and its three principal trade partners? 2. If the exchange rate changes drastically, how will it affect Lao PDR trade?

The theory of international trade law of absolute advantage, comparative advantage, and export supply and import demand concept were reviewed to analyze the trend. Also, the theory of real effective exchange rate was reviewed to arrive at logical concluding of the study.

The data used in this study is gathered from the following: Lao PDR's aggregates export-import, GDP and foreign exchange reserves of Lao PDR, Ministry on Industry and Commerce of Lao PDR, and National Statistic Center of Lao PDR. On the other hand, unit values of Lao PDR's export-import price are collected from international indicator statistics, which is a publication of the Asian Development Bank (ADB), World Bank, etc. To estimate the export and import functions of Lao PDR and its principal partner countries, the Ordinary Least Square Method (OLS) model which is a formula of multiple regression natural log-linear form was applied. The factors affecting Lao PDR's export were observed to be the real gross domestic products of Thailand and foreign direct investment. Other factors are the exchange rates and foreign direct investment. In the case of China, Lao export depended on only the gross domestic product of China, while the factors affecting Lao import, were real gross domestic product of Lao PDR. In the case of Vietnam, factors affecting Lao's exports were real gross domestic product of Vietnam, exchange rates, foreign direct investment.

1. Introduction

International trade is an important element in Lao PDR, especially for its economy. The cooperation of international trade is in goods and services exchange between countries, labor, capital movement, and technology. Lao PDR is one of the least developed countries (LDC) in the world, and the Lao government has set its national goal to graduate from such status by 2020. There are many strategies to achieve that goal such as international trade, which is an essential element in supporting developing countries. Since 1986, Lao PDR has opened its doors to trade with numerous countries, and its trade activities have increased year after year ever since.

Lao trades with many countries especially with bordering countries such as China, Thailand, and Vietnam. Since 1990 to 2010 the values of trade with those countries have been higher than others, with the value of export to Thailand at 29%, China, 4% and Vietnam 18%. As for import from 1990 to 2010, Thailand valued at 59% China, 7% and Vietnam, 8%.

This is the reason why these three countries have been considered “Principal” trade partners of Lao PDR. However, all three countries consist of very different socio-economic features. If one of these countries would suffer any negative economic change such as high inflation and unemployment, how will it affect Lao PDR?

1.1 Research Objective

To study factors that have impacts on export and import between Lao PDR and its three principal trade partner countries, Thailand, Vietnam and China.

1.2 Research Questions

1. What are the main factors affecting trade between Lao PDR and its three principal trade partners?
2. If real effective exchange rate changes, how will it affect Lao PDR's trade?

2. Review of Literature

This chapter examines the theoretical and empirical work related to the subject of how real effective exchange rate affect export and import of Lao PDR. The first part covers the theoretical framework. Then, we take a closer look on the various related empirical studies.

2.1 Theoretical framework

➤ Concept of Import Demand and Export Supply

❖ Import Demand concept

$$M = D - S \quad (1)$$

Where:

D= Demand, Y= Domestic income, P= Price of Goods, S= Supply

Z= Domestic Production Condition

$$M = D(Y, P) - S(P, Z) \quad (2)$$

$$M = M(P, Y, Z) ; M_1 < 0, M_2 > 0, M_3 < 0 \quad (3)$$

$$M_1 = \partial M / \partial P, M_2 = \partial M / \partial Y \text{ and } M_3 = \partial M / \partial Z$$

from formular 2 we can find elasticity of import

$$(P/M) (\partial M / \partial P) = (P/M) (\partial D / \partial P - \partial S / \partial P) \quad (4)$$

when $(P/M) (\partial M / \partial P) =$ Elasticity of import (n_m)

Formular 4 we can rewrite

$$n_m = (P/M) [(D/P) (\partial D / \partial P) (P/D) - (S/P) (\partial S / \partial P) (P/S)] \quad (5)$$

denote by $(\partial D / \partial P) (P/D) =$ Elasticity of Demand (n_d)

$$(\partial S / \partial P) (P/S) = \text{Elasticity of Supply } (e_s)$$

$$\text{so } n_m = (D/M) (n_d) - (S/M) (e_s) \quad (6)$$

so we can rewrite it to:

$$M = M(P_m, P_d, Y) \quad (7)$$

where: M = Import, P_m = Import Price, P_d = Import-Competing Price

❖ Export supply concept

$$X^S = S - D \quad (8)$$

Where: S = Domestic Supply

D = Domestic Demand

- S Depends on Price and Domestic Productin,
- D depends on Price

$$X^S = S(P, Q) - D(P) \quad (9)$$

if formula 9 Multiply price ratio and export. Formula can be

$$e^S = (S/X)(e^S) - (D/X)(n^d) \quad (10)$$

Denote: e^X = Elasticity of Export Supply

e^S = Elasticity of Domestic Supply

n^d = Elasticity of Domestic Demand

$$X^S = S(P_x, P, Q) - D(P) \quad (11)$$

$$(S_1, S_3) > 0, S(S_2, D_1) < 0$$

Where $S_1 = \partial S / \partial P_x, S_2 = \partial S / \partial P, S_3 = \partial S / \partial Q$ and $D_1 = \partial D / \partial P$

$S_2 < 0$ Cause when domestic price increase export supply will decrease. Opposite case of P_x so the formula of 11 is revised as

$$X^S = X^S(P_x, P, Q) \quad (12)$$

where $(X_1, X_3) > 0, (X_2 > or < 0)$

❖ **Real Effective Exchange Rate (REER)**

$$REER_{jt} = \sum_{i=1}^k (NEER_{jit})(P_{it}^* / P_{jt})$$

- where subscripts j, i and t represent country, trading partner and period respectively.
- $NEER_{jit}$ is Nominal Effective Exchange Rate
- P_{jt}^* is the total trade weighted wholesale price index of the trading partners representing the price of tradable,
- P_{jt} is the CPI of the domestic country (a proxy for price of non-tradable).

Nominal Effective Exchange Rate

$$NEER_{jit} = \sum_{i=1}^k w_{it} * E_{it}$$

- W_{it} is the appropriate total trade Weight for each trading partner i (i=1.....k)
- E_{it} is the period average nominal exchange rate between the home country and each trading partner in period t

Weights Price Index

For Exports: $x_{it} = \frac{X_{it}}{\sum_{j=1}^k X_{jt}}$ For Imports: $m_{it} = \frac{X_{it}}{\sum_{j=1}^k M_{jt}}$

For Total trade we have: $w_{it} = \frac{X_{it} + M_{it}}{\sum_{j=1}^k (X_{jt} + M_{jt})}$

- Where $\sum_{j=1}^k X_{jt}$, $\sum_{j=1}^k M_{jt}$, $\sum_{j=1}^k (X_{jt} + M_{jt})$ are total exports from the domestic Country to all the trading partners, total imports of the domestic country from all the trading partners and total trade between the domestic country and all the trading partners respectively.

- X_{it} , M_{it} and $X_{it} + M_{it}$ represent exports to trading partner i by the domestic country, import from trading partner i by domestic country and total between trading partner i and domestic country respectively. The subscript t represents the time period in all definitions

2.2 Empirical Studies

Based econometric view point, the elasticity approach is based on estimating the import and export demand functions. In most studies, export-import volumes are regressed on effective exchange rates, relative export-import price, and world real income, domestic real income. After estimating the export and import demand functions, economic inferences are being made. For instance, a well-known statement in the trade literature, called Marshall-Lerner-(Robinson) Condition says that “a depreciation or devaluation of a country’s currency will improve its current-account balance if the sum of the absolute values of the price elasticities of domestic and foreign demand for imports is greater than unity, provided that trade balance—which is assumed to be equal the current account balance is zero initially. So, in order to see whether devaluation will help improving the trade balance, it is sufficient to estimate the import and export demand function and to check whether the sum of the absolute price elasticities exceeds unity.

Goldstein and Khan (1985) provide a survey of studies on “Income and price effects in foreign trade”, with an excellent discussion of the specification and econometric issues in trade modeling, as well as a summary of various estimates of price and income elasticities and related policy issues.

Khan (1974) has investigated for the period 1951-1969 employing annual data for individual countries using the following model specification:

$$\log M_{it}^d = a_0 + a_1 \log(PM_i/PD_i)_t + a_2 \log Y_{it} + U_t,$$

Is the import demand function, where M_i is the quantity of imports of country i, PM_i is the unit value of imports in country i, PD_i is the domestic price level of country i, Y_i is the real GNP of country i, and U_t is an error term associated with each observation.

$$\log X_{it}^d = b_0 + b_1 \log(PX_i/PW)_t + b_2 \log W_t + V_t,$$

In the export demand function where X_i is the quantity of exports of country i , PX is the unit value of exports of country i , PW is world price level, and W is the real world income (proxied by Organization for Economic Co-operation and Development - *OECD* real GNP). Since each variable is defined in logarithmic terms, the estimated coefficients is the elasticities of imports and exports with respect to the corresponding variables. Having estimated these functions using OLS, Khan reported that the prices did play an important role in the determination of imports and exports of developing countries and Marshall-Lerner Condition is satisfied.

Pheinghathai (1992) conducted a study on “Analyze Trade balance of Thailand”. The purpose of the study was focused on factors that had impact on the trade balance of Thailand. He used the multi regression model of import and export and conducted the study from 1975 to 1990. In this study it was discovered that the factors on supply function is the only significant value of export during the period year. As for import supply, every independent variable is significant except first the world price index. Lastly, it was discovered that the exchange rate has no impact on the import of Thailand. Thivaphon (1997), studied on “The effect of real effective exchange on trade balance of Thailand”, in his Masters degree. The purpose of the study was to compare between the effective exchange rate (EER) and the real effective exchange rate which affect trade balance. The study used secondary data during 1986-1996. Ordinary least of square OLS was used to the effective exchange rate and purchasing power parity theory. The study indicated that the trade balance of Thailand depended on GDP, Economics crisis (Dummy variable) and depends on real effective exchange rate.

The study found that effective exchange rate (EER) is more significant than real effective exchange rate (REER). So when the value of Thailand money decreases, it can actually make balance of trade better. The correlations between EER and REER and balance of trade are changed the same way (when ERR and REER decrease balance of trade it will also decrease and opposite way). And the correlations of GDP, Dummy and trade balance are changed the opposite way.

Chanita (2006), conducted a study on “Factors Affecting Trade between Thailand and the Greater Mekong Sub-regional Economic Cooperation”, for her Master’s degree. The objective of this study was to identify the factors that had a measurable effect on Thai trade with the Greater Mekong Sub-regional Economic Cooperation Countries (GMS-EC), through

an investigation of structural parameters of Thailand's import-export relationships with those nations. The study design was based on the double-log or constant-elasticity model. The annual data for the 15 years period from 1989 to 2003 was analyzed by the EVIEWS.4 program.

The study found that the primary factors influencing Thailand's importation of Chinese goods are the GDP of Thailand, the Bath-US Dollar exchange rate and Thai consumer price index (CPI); conversely, it is China's GDP which influences the level of exports from Thailand to that country. In the case of Myanmar, the primary factors which account for its importation of Thai goods are Thailand's GDP, the Baht-US Dollar exchange rate and the Thai CPI. Similar factors account for Thai exports to Myanmar: Myanmar's GDP, the Kyat-US Dollar exchange rate and the Myanmar CPI. Regarding Vietnam, the two factors that govern trade in both directions are GDP and the CPI; Thailand's figures affect the level of Vietnamese imports while Vietnamese figures most strongly influence its level of exports. Thai bilateral trade with the Lao PDR is also primarily influenced by similar factors: the Lao GDP, CPI and Kip-US Dollar exchange rate affection exports from Lao PDR, and import from Thailand responding to the Thai GDP, CPI and Bath-US Dollar exchange. The Kingdom of Cambodia is a special case because no particular factor accounts for Cambodian exports to Thailand, which remains at a very low level. Thai imports to the country, however, are sensitive to the Thai CPI and the Bath-US Dollar exchange rate. Mariam Camarero and Cecilio Tamarit (2003), "Estimating the Export and Import Demand for Manufactured Goods: The role of FDI", estimates the demand for exports and imports of manufactured goods for a panel containing the majority of the EU countries as well as the US and Japan. The model includes both the traditional determinants of trade and also the stock of foreign direct investment (FDI) as explanatory factors. Panel unit root and co-integration tests were applied, allowing for heterogeneity. Whereas there is no evidence of co-integration when using just the traditional formulation, the results are favorable to the existence of long-run relationships linking the variables of the augmented model. Moreover, the results point mainly to a complementary relationship between trade and FDI.

Idil Bilgic Alpaslan (2012), "Short-Run and Long-Run Dynamics of Trade Balance", observed the Long-run and short-run dynamics of the relation between exchange rates and trade balance. This study analyzes these dynamics for the bilateral trade between Turkey and

her 41 trade partners, chosen from developed and developing countries, using quarterly data over 1998Q1-2011Q3. Long-run and short-run coefficients are estimated with an autoregressive distributed lag model. Evidence in favor of the Marshall-Lerner condition is found for 7 developed and 6 developing trade partners. This finding suggests that the depreciation of the Lira improves the trade balance with these countries in the long-run. Evaluating the long-run and short-run coefficient estimates jointly suggests that the J-curve pattern is supported only for some developing countries but none of the developed partners. Estimates are suitable for policy simulations as the diagnostics support the findings and show that most of the models are auto-correlation free, correctly specifically and have stable residuals.

Mohammed B. Yusoff, studied the topic on “Trade balance and Real exchange rate in Malaysia” This study investigates the long-run relationship between Malaysian trade balance and the real exchange rate using the co-integration technique. The results suggest that real ringgit exchange rate depreciation improves the Malaysian balance of trade in the long run. An error correction model is then estimated to study the short-run dynamics and found that the effects of ringgit real exchange rate depreciation last for about 2 years and exhibit the J-curve phenomenon. Approximately 55 percent of the adjustment to long run equilibrium takes place in the first quarter. M. Uzunoğlu and Y. Ackay (2009) “Factors affecting the import demand of wheat in Turkey” analyzed the factors affecting import demand for wheat during the period 1984-2006 by using double logarithmic-linear function. Turkey’s import demand for wheat was specified as a function of domestic prices, gross national product per capita, Turkish lira-US dollar exchange rate, and lagged import, production value of wheat, domestic demand and trend factor. Data covering 1984-2006 periods were used to carry out the study. The results have been shown that a change of domestic wheat prices is strongly affective on the wheat import demand and Turkish consumers would rather purchase domestic wheat than import wheat gradually.

Mustafa Akal (2010), “Estimating Trade Elasticities of Turkey with OECD Countries: A Panel Approach”, this study estimates income and price elasticities of the export and import of Turkey with OECD countries by employing Parks method for the period of 1993-2007. As a result of estimations, the export relative price elasticity is found slightly less elastic (-.41) than the import relative price elasticity (-0.43) in terms of Turkish domestic prices, however,

income elasticity of import is found more elastic (around 2.24) than income elasticity of export (around 1.99), implying larger contribution of Turkey to the economies of OECD countries than the OECD countries' contribution to the economy of Turkey on the averages, *Ceteris Paribus*. A percentage deterioration in relative Turkish TOT increases import demand 5% more than it increases foreign export demand, and a percentage addition to domestic income by export increases trade deficit of Turkey with OECD countries even deterioration in TOT improves it, *Ceteris Paribus*.

Mehmet Yazici, (2011). Studied on the “Impact of Exchange Rate and Customs Union on Trade Balance of Turkey with EU (15)”, this paper investigates the short-run and long-run impact of real exchange rate changes and Customs Union (CU) agreement on the trade balance of Turkey with European Union (15) countries (EU (15)). In the estimation procedure, the bounds testing approach to the co-integration and the error correction modeling is employed. Unlike the previous papers utilizing this approach, however, in this study a new strategy is adopted in the model selection phase to ensure the selection of a statistically reliable and co-integrated model as the optimal model for estimation. Estimation results based on the quarterly data for 1982-I to 2001-IV period indicate no evidence of J-curve effect and no significant effect of customs union in the short run. In the long run, only domestic income variable has significant and expected negative effect and neither exchange rate nor customs union has any significant effect on the trade balance of Turkey with EU (15).

Sulaiman D Mohammad, (2010). studied on “Determinant of Balance of Trade: Case Study of Pakistan” the core object behind this study is to explore the long run as well as short run determinant of trade deficit with reference to Pakistan by using Johansen co-integration approach and Error correction model (ECM). The finding of this study suggests that foreign income, foreign direct investment, domestic house hold consumption and real effective exchange rate are significantly affecting the trade deficit. To highlight the short run dynamics VECM (Vector Error correction model) was used. The result of VECM pointed out that there is disequilibrium in the short run which will be adjusted within one year.

3. Research Methodology

3.1 Data

Descriptive Analysis

For the econometric analysis, yearly data for 21 years (1990-2010) of the Lao PDR economy have been used for the present study. The data used in this study such as Lao PDR's aggregates export-import, Price index of domestically produced goods, GDP and foreign exchange reserves of Lao PDR are collected from Handbooks of statistics on Lao PDR Economy, a publication of Reserve bank of Lao PDR, Ministry of industry and commerce of Lao PDR and National Statistic Center of Lao PDR. On the other hand, unit values of Lao PDR's export-import price are collected from international indicator statistics, which is a publication of the international organization ADB, World Bank, etc.

Quantitative Analysis

The Ordinary Least Square Method OLS model to estimate the export Supply and import Demand functions of Lao PDR and principle partner countries is applied and formula used is the multiple regression Log-leaner form. Calculation is done by SPSS program. **How to calculate REER.**

Firstly calculation of NEER (Nominal Effective Exchange Rate Index) is done. For the base year of 2002, because Lao economy was quite stable during this year.

NEER (Nominal Effective Exchange Rate)

$$NEER_t = \frac{\prod_{i=1}^n \left(\frac{FC_i}{HC}\right)_t^{w_i}}{\prod_{i=1}^n \left(\frac{FC_i}{HC}\right)_b^{w_i}}$$

$\frac{FC_i}{HC}$ = Units of foreign currency i per home currency

w_i = Trade weight of Country i

t = current year, b = base year

$$w_i = \frac{X_i + M_i}{\sum_{i=1}^n (X_i + M_i)}$$

RPCI (Relative Price Index)

$$RPCI_t = \frac{\left[\frac{CPI_1^{w_1} \times CPI_2^{w_2} \times \dots \times CPI_n^{w_n}}{CPI_H} \right]_t}{\left[\frac{CPI_1^{w_1} \times CPI_2^{w_2} \times \dots \times CPI_n^{w_n}}{CPI_H} \right]_b} \times 100$$

CPI₁, ... CPI_n = Consumer Price index of trade partner countries 1 to n.

w_i = Trade weight of Country i

t = current year, b = base year

CPI_H = Consumer Price index of Home country.

$$REER_t = \frac{NEER_t}{RCPI_t}$$

REER_t = Real Effective Exchange Rate Index

NEER_t = Nominal Effective Exchange Rate Index

RCPI_t = Relative Price Index

3.2 Modeling of This Study

Export Supply's Model

$$EX = (GDP_j, FDI_j, REER, Dummy)$$

Log-linear Form

$$\log(EX) = \beta_0 + \beta_1 \log(GDP_j) + \beta_2 \log(FDI_j) + \beta_3 \log(REER_j) + \beta_4 \log(Dummy) + \varepsilon$$

β_1 to β_4 Co-effience of Independent Variables

ε Error Term

The meaning of dependent and independent variable

	Meaning	Direction	Code
Export (EX)	Lao PDR export to trade partner countries		Dependent variable
(Numeric Variables)			
Gross Domestic Product (GDP _j)	GDP of partner countries j	+	independent variable
Foreign Direct Investment (FDI _j)	Foreign Direct Investment inflow to Lao PDR	+	independent variable
Real Effective Exchange Rate (REER _j)	Real Effective Exchange Rate	+	independent variable
Dummy	Dummy	-	independent variable

➤ **Import Demand's Model**

$$IM_i = (GDP_i, REER, FDI, Dummy)$$

Log-lenair OLS form

$$\log(IM_i) = \beta_0 + \beta_1 \log(GDP) + \beta_2 \log(REER) + \beta_3 \log(FDI) + \beta_4 \log(Dummy) + \varepsilon$$

β_1 to β_4 denote by coeffetciien of Independent Variables and ε Error Term

Dummy is the year that has Asian Crisis

The meaning of dependent and independent variable

	Meaning	Direction	Code
Import (IM _i)	Lao PDR import from partner countries i		Dependent variable
(Numeric Variables)			
Gross Domestic Product (GDP _i)	GDP of Lao PDR	+	Independent variable
Real Effective Exchange Rate (REER)	Real Effective Exchange Rate of Lao PDR	-	Independent variable
Foreign Direct Investment (FDI _j)	Foreign Direct Investment inflow to Lao PDR	-	independent variable
Dummy	Dummy	-	independent variable

4. Explanations for Empirical Results and Discussion

4.1 Export to trade partner countries

Table 4.1 Results of factors effect to export volume to trade partner countries

Dependent Variables	Independent Variables	Coefficient (Standard Error)	t-Statistic (P-value)	R ²	F-statistic (prob)	D.W Statistic
XSTH	Constant	-23.02676 (5.170622)	-4.453384*** (0.0004)	0.912309	41.61454 (0.000)	1.516608
	LNGDPH	2.338806 (0.431318)	5.422459*** (0.0001)			
	LNREER	-0.196637 (0.188517)	-1.043075 ^{ns} 0.3124			
	LNFDI	0.252468 (0.069599)	3.62745*** (0.0023)			
	Dummy	-0.966959 (0.255503)	-3.784534*** (0.0016)			
XSCH	Constant	-21.52509 (13.40929)	-1.605237 ^{ns} (0.1269)	0.561225	7.248065 (0.002433)	1.130132
	LNGDPCH	1.861332 (0.879363)	2.116681** (0.0493)			
	LNREER	-0.665039 (0.597117)	-1.11375 ^{ns} (0.2809)			
	LNFDI	0.181117 (0.373944)	0.484342 ^{ns} (0.6343)			
XSV	Constant	-22.63176	-6.579655***	0.97671	167.7739 (0.000)	1.3334
		-(3.43966)	(0.000)			
	LNGDPV	1.863976	6.13233***			
		-(0.30396)	(0.000)			
	LNREER	1.291903	5.61794***			
-(0.22996)		(0.000)				
LNFDI	0.318384	3.261048***				

Dependent Variables	Independent Variables	Coefficient (Standard Error)	t-Statistic (P-value)	R ²	F-statistic (prob)	D.W Statistic
		-(0.09763)	-(0.0049)			
	Dummy	-5.050373	-24.32443***			
		-(0.20763)	(0.000)			

Source: The author's estimation

Note: Dummy: In case of Thailand year of Asian finance crisis 97 to 99 is 1 other is 0

Dummy: In case of Thailand year of Asian finance crisis 97 is 1 other is 0

***Significant 99%, ** Significant 95%, * Significant 90%, ^{ns} none significant

❖ **Factors export to Thailand**

$$\text{Ln}(X\text{STH}) = -23.02 + 2.33\text{Ln}(\text{GDPTH}) - 1.96\text{Ln}(\text{REER}) + 0.25\text{LN}(\text{FDI}) - 0.96(\text{D3}) \quad (4.1)$$

$$(5.42)^{***} \quad (-1.04)^{\text{ns}} \quad (3.62)^{***} \quad (-3.78)^{***}$$

Note: ()*** t – statistic significant 99%, ()** t – statistic significant 95% , ns - None significant

From equation 4.1 it shows that in the case of Thailand, the key independent variables in the econometrics equation are Gross Domestic Product of Thailand (GDPTH), Real Effective Exchange rate (REER), Foreign Direct Investment (FDI) and Dummy variable of the Asian Financial Crisis in 1997 to 1999 (D3). To explain dependent variable, the export of Lao PDR to Thailand (XSTH) by 91%. The relationship between Lao's exported to Thailand and GDP of Thailand is in the same direction and follows the assumption that keeping other factors unchanged if GDP of Thailand is increased by 1% it can raise total export volume of Lao PDR to Thailand by 2.33% significant by 99%.

The relationship between Lao's export to Thailand and Real effective exchange rate (REER) was in another direction and follows the assumption, because most of the export product of Lao PDR to Thailand includes hydropower, mining and agriculture products and these products do not follow the price mechanism of trade, but follows the buying contract between Lao PDR and Thailand in each year so the relationship between Lao's exported to Thailand and Real effective exchange rate (REER) is in different direction, however REER is not

significant in the export model to Thailand. The relationship between Lao's export to Thailand and Foreign Direct Investment (FDI) is in the same direction and follows the assumption that keeping other factor unchanged if FDI is increased by 1% it can raise total export volume of Lao PDR to Thailand by 0.25% which is significant by 99%. For the relationship between Lao's export to Thailand and Dummy variable (D3) is observed not to be in the same direction and follows the assumption that with other factors remains the same if Dummy increased by 1%, the total export volume of Lao PDR to Thailand will decrease by 0.96% significant by 99%.

In conclusion with other factors remaining the same, the most significant independent variable is the Gross Domestic Product of Thailand (GDPTH) and an increase in underlying variable, GDPTH, by 1% can raise total export volume of Lao PDR to Thailand by 2.33% significant by 99%.

4.1.1 Factors of Export to China

$$\text{Ln}(X\text{SCH}) = -21.52 + 1.86\text{Ln}(\text{GDPCH}) - 0.66\text{Ln}(\text{REER}) + 0.18\text{Ln}(\text{FDI}) \quad (4.2)$$

(2.116)**
(-1.113)^{ns}
(0.484)^{ns}

Note: ()*** t – statistic significant 99%, ()** t – statistic significant 95%, ns - None significant

From equation 4.2 it shows that in the case of China the key independent variables in the econometrics equation are the Gross Domestic Product of China (GDPCH), Real Effective Exchange rate (REER) and Foreign Direct Investment (FDI), can explain dependent variable the export of Lao PDR to China (XSCH), by 56.12%. The relationship between Lao's export to China and GDP of China is in same direction and follows the assumption with other factor remain the same; if GDP of China is increased by 1% can raise total export volume of Lao PDR to China by 1.86% significant by 95%.

The relationship between Lao's exported to China and Real effective exchange rate (REER) went in a different direction and follows the assumption, because the export products of Lao PDR to China include hydropower, mining and agriculture products those products do not follow the price mechanism but follows the buying contract between Lao PDR and China in each year so the relationship between Lao's exported to China and REER went a different direction, however REER is not significant in the export model to China. The relationship

between Lao's exported to China and Foreign Direct Investment (FDI) is in the same direction and follows the assumption but FDI is not significant in the export model to China.

In conclusion assuming other factors remains the same, the most significant independent variable is Gross Domestic of China (GDPCH) and an increase in underlying variable, GPDCH, by 1% can raise total export volume of Lao PDR to China by 1.86% significant by 95%.

4.1.2 Factors of Export to Vietnam

$$\text{Ln}(XSV) = -22.63 + 1.863\text{Ln}(\text{GDPV}) + 1.291\text{Ln}(\text{REER}) + 0.318\text{Ln}(\text{FDI}) - 5.050(\text{D97}) \quad (4.3)$$

(6.13)***
(5.617)***
(3.26)***
(-24.32)***

Note: ()*** t – statistic significant 99%, ()** t – statistic significant 95% , ns - None significant

Equation 4.3 shows that in the case of Vietnam the key independent variables in the econometrics equation are Gross Domestic Product of Vietnam (GDPV), Real Effective Exchange rate (REER), Foreign Direct Investment (FDI) and Dummy variables of the Asian Financial Crisis in 1997 (D97), The dependent variable i.e. the export from Lao PDR to Vietnam (XSV), is 97.67%. The relationship between Lao's exported to Vietnam and GDP of Vietnam goes the same direction and follows the assumption, holding other factors unchanged if GDP of Vietnam increased by 1% can raise total export volume of Lao PDR to Vietnam by 1.86% significant by 99%.

The relationship between Lao's exported to Vietnam and Real effective exchange rate (REER) is in the same direction and follows the assumption, holding other factor unchanged if REER increased by 1% can raise total export volume of Lao PDR to Vietnam by 1.29% significant by 99%.

The relationship between Lao's exported to Vietnam and Foreign Direct Investment (FDI) went the same direction and follows the assumption, holding other factor unchanged if FDI increased by 1% can raise total export volume of Lao PDR to Vietnam by 0.31% significant by 99%.

For the relationship between Lao's exported to Vietnam and Dummy variable (D97) is in different direction and follows the assumption, holding other factor unchanged if Dummy increased by 1%, the total export volume of Lao PDR to Vietnam will decrease by 5.05% significant by 99%.

In conclusion, holding the other factor unchanged and the most significant independent variable is Gross Domestic Product of Vietnam (GDPV) an increase in underlying variable, GDPV, by 1% can raise total export volume of Lao PDR to Vietnam by 1.86%.

4.2 Import from trade partner countries

Table 4.2 Results of factors effect to import volume from trade partner countries

Dependent Variables	Independent Variables	Coefficient (Standard Error)	t-Statistic (P-value)	R ²	F-statistic (prob).	D.W Statistic
LNMDTH	Constant	-10.53345 (0.816672)	-12.89*** (0.000)	0.985923	280.1458 (0.000)	1.626075
	LNGDPL	2.035291 (0.101897)	19.97*** (0.000)			
	LNREER	0.147585 (0.047533)	3.104*** 0.0068			
	LNFDI	0.111762 (0.023738)	4.708*** (0.0002)			
	Dummy	0.059753 (0.062646)	0.9538 ^{ns} (0.3544)			
LNMDCH	Constant	-16.94729 (4.155652)	-4.078*** (0.0008)	0.847346	31.45429 (0.000)	1.742401
	LNGDPL	2.931877 (0.44807)	6.543*** (0.000)			
	LNREER	-0.223997 (0.283141)	-0.791 ^{ns} (0.4398)			
	LNFDI	-0.120446 (0.136817)	-0.880 ^{ns} (0.3909)			

Dependent Variables	Independent Variables	Coefficient (Standard Error)	t-Statistic (P-value)	R ²	F-statistic (prob).	D.W Statistic
LNMDV	Constant	-17.96379 (1.959038)	-9.169*** (0.000)	0.913263	42.11626 (0.000)	2.10672
	LNGDPL	2.428852 (0.255921)	9.490*** (0.000)			
	LNREER	0.837078 (0.182927)	4.576*** (0.0003)			
	LNFDI	-0.122522 (0.080093)	-1.529 ^{ns} (0.1456)			
	Dummy	0.242737 (0.156361)	1.55242 ^{ns} (0.1401)			

Source: The author's estimation

Note: Dummy: In case of Thailand year of Asian finance crisis 97 to 99 is 1 other is 0

Dummy: In case of Thailand year of Asian finance crisis 97 is 1 other is 0

***Significant 99%, ** Significant 95%, * Significant 90%, ^{ns} none significant

4.2.1 Factors of import from Thailand

$$\ln(\text{MDTH}) = -10.53 + 2.035\ln(\text{GDPL}) + 0.147\ln(\text{REER}) + 0.111\ln(\text{FDI}) + 0.059(\text{D3}) \quad (4.4)$$

(19.97) ***
(3.104) ***
(4.708) ***
(0.953) ^{ns}

Note: ()*** t – statistic significant 99%, ()** t – statistic significant 95%, ns - None significant

Equation 4.4 shows that in case of Thailand the key independent variables in the econometrics equation are Gross Domestic Product of Lao PDR (GDPL), Real Effective Exchange rate (REER), Foreign Direct Investment (FDI) and Dummy variable of the Asian Financial Crisis in 1997 to 1999 (D3) to explain dependent variable the import of Lao PDR from Thailand (MDTH) by 98.59%. The relationship between Lao's imported from Thailand and GDP of Lao PDR is in the same direction and follows the assumption, holding other

factor unchanged if GDP of Lao PDR increased by 1% it can raise total import volume of Lao PDR from Thailand by 2.03% significant by 99%.

The relationship between Lao's imported from Thailand and Real effective exchange rate (REER) is in the same direction and follows the assumption, because Thailand is major import country of Lao PDR and the import products of Lao PDR from Thailand were essential consumption product, capital product, raw material used for industrial and other product that Lao PDR can't produce, however REER increased Lao PDR still import from Thailand so the relation between (REER) is in the same direction, holding other factor unchanged if REER increased by 1% Lao PDR will import from Thailand increased by 0.14% significant by 99%.

The relationship between Lao's imports from Thailand and Foreign Direct Investment (FDI) is in the same direction and follows the assumption, because Lao PDR imports raw material products used in project and industries such as machine and other capital products, so import from Thailand and FDI are in the same direction, holding other factors unchanged if FDI increased by 1% Lao PDR will import from Thailand increase by 0.11% significant by 99%. For the relationship between Lao's imported from Thailand and Dummy variable (D3) is in the same direction and follows the assumption, and none significant in the import model from Thailand.

In conclusion holding other factor unchanged. The most significant independent variable is Gross Domestic Product of Lao PDR (GDPL) an increase in underlying variable, GDPL, by 1% Lao PDR will import from Thailand increased by 2.03% significant by 99%.

4.2.2 Factors of Import from China

$$\ln(\text{MDCH}) = -16.94 + 2.93 \ln(\text{GDPL}) - 0.223 \ln(\text{REER}) - 0.120 \ln(\text{FDI}) \quad (4.5)$$

(6.54) ***
(-0.79) ^{ns}
(-0.88) ^{ns}

Note: ()*** t – statistic significant 99%, ()** t – statistic significant 95%, ns - None significant

From equation 4.5 were shows that in case of China the key independent variables in the econometrics equation are Gross Domestic Product of Lao PDR (GDPL), Real Effective Exchange rate (REER) and Foreign Direct Investment (FDI), can explain dependent variable

the import of Lao PDR from China (MDCH), by 84.73%. The relationship between Lao's imports from China and GDP of Lao PDR is in the same direction and follows the assumption, holding other factor unchanged if GDP of Lao PDR increased by 1% Lao PDR will import from China increased by 2.93% significant by 99%.

The relationship between Lao's imported from China and real effective exchange rate (REER) is in the difference direction and follows the assumption but none significant in this model and the relationship between Lao's imported from China and Foreign Direct Investment (FDI) is in the difference direction and follows the assumption and FDI none significant in this model.

In conclusion, assuming other factor unchanged, the most significant independent variable is GDPL an increase in underlying variable, GDPL, by 1% Lao PDR will import from China increased by 2.93% significant by 99%

4.2.3 Factors of Import from Vietnam

$$\text{Ln(MDV)} = -17.96 + 2.42\text{Ln(GDPL)} + 0.83\text{Ln(REER)} - 0.12\text{LN(FDI)} + 0.24(\text{D1}) \quad (4.6)$$

(9.49) ***
(4.57) ***
(-1.52)^{ns}
(1.55)^{ns}

Note: ()*** t – statistic significant 99%, ()** t – statistic significant 95%, ns - None significant

From equation 4.6 was shows that in case of Vietnam the key independent variables in the econometrics equation are Gross Domestic Product of Lao PDR (GDPL), Real Effective Exchange rate (REER), Foreign Direct Investment (FDI) and Dummy variable of the Asian Financial Crisis in 1997 (D97), explain dependent variable the import of Lao PDR from Vietnam (MDV), by 91.32%. The relationship between Lao's imports from Vietnam and GDP of Lao PDR is in the same direction and follows the assumption, holding other factor unchanged if GDP of Lao PDR increased by 1% Lao PDR will import from Vietnam increased by 2.42% significant by 99%

The relationship between Lao's imported from Vietnam and Real effective exchange rate (REER) is in the same direction and follows the assumption, because Vietnam is second major import country of Lao PDR and the import products of Lao PDR from Vietnam were essential consumption product, capital product and other products that Lao PDR can't

produce, however REER increased Lao PDR still import from Vietnam so the relation between (REER) is in the same direction, holding other factor unchanged if REER increased by 1% it Lao PDR will import from Vietnam increased by 0.83% significant by 99%.

The relationship between Lao's imported from Vietnam and Foreign Direct Investment (FDI) is in different direction and follows the assumption but not significant in this model and the relationship between Lao's imported from Vietnam and Dummy variable is in the different direction and follows the assumption but Dummy is significant in this model.

In conclusion assuming other factor unchanged, the most significant independent variable is Gross Domestic Product of Lao PDR (GDPL); an increase in underlying variable, GDPL, by 1% Lao PDR will import from Vietnam increased by 2.42% . For FDI and Dummy can be significant 90% if we test by one trail distribution.

5. Conclusions

The main purpose of empirical studies in this paper is to study factors that have impact on export and import between Lao PDR and ITS principal trade partner countries included Thailand, Vietnam and China, from the period year 1990 to 2010.

The empirical results indicate that most of the variables in the model use multiple regressions to estimate the main factors for the export and import of Lao PDR with major trade partner countries. There are the four variables included in the export model namely Lao's export to the major trade partner countries Thailand, Vietnam and China (EX), Real effective Exchange Rate (REER), Gross Domestic Product of major trade partner counties (GDP_j), Foreign direct investment (FDI) and Dummy. For import model there are four variables, in the model namely, Import of Lao PDR from trade partner (IM_i), Gross Domestic Product of Lao PDR (GDP_L), real effective Exchange Rate (REER), foreign direct investment (FDI) and Dummy. The major finding of this paper is that the major exported goods classify by sectors of Lao PDR are hydroelectricity power, mining, wood product and agriculture product and the major imported goods of Lao PDR are consumption goods, gasoline, investment goods, raw material used for industries. In case of Thailand, it was found that the factors affecting Lao PDR's export were real gross domestic product of Thai, foreign direct investment and dummy variable. The study also revealed that factors affecting Lao's import from Thailand were real gross domestic product of Lao PDR, real effective exchange rate and foreign direct investment. In case of China, Lao PDR export depended on the gross domestic product of China. The factors affecting Lao import, on the other hand, were real gross domestic product of Lao PDR. In case of Vietnam, factor affecting on Lao's export were real gross domestic product of Vietnam, real effective exchange rate, foreign direct investment and dummy variable. It was also founded that Lao's import depended on real gross domestic product of Lao PDR and real effective exchange rate. The most significant variable that impacted on export of Lao PDR to trade partners is real GDP's trade partners. When compared the coefficient of real GDP's trade partner it found that if real GDP's trade partner is increased by 1%; Lao will export to Thailand increased 2.33% and the most significant variable that impacted on import of Lao PDR from trade partners is real GDP of Lao PDR. When compared the coefficient of real GDP of Lao PDR it found that when real GDP of Lao PDR is increased by 1%; Lao PDR will import from China increased 2.93%.

In order to improve overall, the positive effect on export and import of Lao, Lao needs to pay more attention to improving productivity, promoting commodities as well as increasing their value added in agriculture sector due to many Lao's export products are still processing products and did not make highest value added simultaneously. The government will also need to promote industrial sector and service sector in order to increase additional capital from foreign market.

The government has to quickly adjust the government policies to pave way for convenience to increase investors. Lao will need to make much more efforts in liberalizing trade and improving the better investment climate such as reducing income tax, improving infrastructure, and limited access to finance and so on. Moreover, Lao needs to promote growth in other sectors than mining and hydropower for ensuring stable growth in the long run.

Due to the fact that the adjustment towards equilibrium of trade balance is rapid, the government should improve policy with respect to trade balance, such as exchange rate policy as trade regimes.

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