

# Analyzing the effect of AFTA on Lao economy\*

~Macroeconomic model approach~

Phouphet KYOPHILAVONG\*\*

Faculty of Economic and Management

National University of Laos

*Phouphet2000@yahoo.co.jp*

## **Abstract**

This paper attempts to build the macroeconomic model to analyze the effect of AFTA on Lao economy. Joining ASEN Free Trade Area (AFTA) by reducing tariff has had the effect of decreasing general prices, and increasing export to Thailand and other countries. It increases the import from Thailand and other countries too. The effect of AFTA on imports is bigger than exports. It indicated that Laos is facing a larger trade deficit by joining AFTA. On the other hand, AFTA is lowering the general price thereby increasing real consumption, investment, etc. real macroeconomic variables, and therefore the GDP also is increasing, but its effect is small. It indicates that Laos will gain few benefits by joining AFTA.

*Keyword: AFTA, tariff, Macroeconomic model, import price, general price, export, import and GDP.*

## **1. Introduction**

Lao PDR participated in ASEAN in July 1997 and joined AFTA in 1998. According to the AFTA agreement, Lao PDR has to reduce tariffs to 0-5% by 2008. The Lao government is expecting to gain benefits such as; increased export, increased foreign direct investment (FDI), etc from joining AFTA. Beside the benefits from AFTA, there are serious issues as follows.

---

**\* This paper was prepared for the ESRI Asia Workshop on Economic Modeling on Deepening Interrelationships among Asian Countries, held on November 30, 2004 in Bangkok, Thailand.**

\*\* Author is lecture at National University of Laos, the Faculty of Economic and Management. These papers are one part of author's Ph.D dissertation. I would like to express my deeply thank to Prof. TOYODA Toshihisa, Prof. OUTA Hiroshi, Prof. NISHISAWA Nobuyoshi for supporting and comprehensive comments. Prof. MATSUNAGA Nobuaki, Prof. HAMAOUZU Tessuo for encouragement and support.

In the ASEAN-AFTA meeting, English was used for communicating, but the English abilities of Lao officers are limited. In addition, human resources in economics, international law, international relationship, etc are limited.

Old ASEAN members<sup>1</sup> are further along in development, but new ASEAN members<sup>2</sup> are underdeveloped countries experiencing transitional economy periods. Therefore, there is a big economic development gap between old and new ASEAN members. By reducing tariff in joining AFTA, import prices will decrease, and imports will therefore increase. As a result, it will lead to Lao PDR a bigger trade deficit<sup>3</sup>. It will ruin small and medium enterprises (SMEs) due to inability to compete with import goods.

Now, Lao PDR is facing serious budget deficit<sup>4</sup>. By reducing tariff in joining AFTA, the government revenue will decrease. In 1996, tariffs had accounted for 2.5% of GDP and 20% of total government revenue. As a result, by joining AFTA, the Lao government will lose 20% of its revenue.

The law and framework of Lao PRD doesn't comply with ASEAN's standards. Therefore, it will be detrimental to increase FDI in the short and long run.

As a result, it is difficult for Lao PDR to gain benefits from joining AFTA without solving the above problems. However, due to limited research on this issue, the effect of AFTA to Lao economy is still not clear. Therefore, it is vital to analyze this issue in order to form an appropriate policy to gain the maximum benefit from joining AFTA. Therefore, the main purpose of this paper is to building a macroeconomic model to analyze the effect of AFTA on Lao economy.

This paper consists of 4 sections. Section1 discusses the issues of joining AFTA.

---

<sup>1</sup> Old ASEAN members is Thailand, Singapore, Malaysia, Indonesia, Brunei and Philippines

<sup>2</sup> New ASEAN members refer to Laos, Cambodia, Myanmar, and Vietnam.

<sup>3</sup> In 2000s, import was 591 million US\$, but export was only 393 million US\$. It indicates that Laos is facing huge trade deficit.

<sup>4</sup> In 2000s, government expenditure was 2512.6 billion US\$, but government revenue was only 1691.3 US\$, it indicated that Laos is facing huge budget deficit.

Section 2 describes the characteristics of the Lao macroeconomic model. Section 3 analyzes the effect of AFTA on Lao economy. Section 4 is the conclusion and policy suggestion.

## **2. Building a macroeconomic model of Laos.**

In building a socio-economic plan, it is necessary to have a macro econometric model to analyze the impact of the economic policies. Because there has been a lack of interest in building a macroeconomic model and data are limited. There are a few research papers with such model. As far as I know, there have been two models. Keola built a two-sector model in 1998. This model has 6 estimate equations and 2 definitions. The period of estimation was from 1985 to 1995. Another one was built by Aotsu in 2000. This model is a demand side model that consists of 8 estimate equations and 1 definition equation. The period of estimation was from 1988 to 1997. Because of lack of data and the few number of equations in the two models. it has less power to analyze the effects of economic policies clearly. In addition, the two models were not published. Based on the issues mentioned previously, this paper attempts to build a model to analyze economic policies and the effect of AFTA.

### **2.1. Characteristic of model**

The difficulties of building this model are as follows:

First, Lack of data. Second, theoretical problems (market oriented communist system). Third, The economy structure changed in 1986 and a limited amount of data is available.

The a key distinguishing feature of model are as follows:

1) To building this model, the most important hypothesis are time series data and the market economy mechanism. Laos continues to induce a market economy into a communist system. So event though the economic structure is different from the economic structure of capitalist countries. I assume that Lao economy has basically the same structure as capitalism countries.

2) As mentioned above, the economic structure of Laos is different from capitalist countries. Therefore, the data system is also different. I assume that Lao data system is nearly the same as System National Account (SNA) in capitalist countries. I used data

after inducing the New Economic Mechanism (NEM) from 1989 to 2000 to analyze in the model.

3) Current Lao economy is facing supply side issues, because the capital and national income are low. On the other hand, Lao economy also faced demand side issues such as: high inflation and the devaluation of kip. Therefore, the building of Lao model must focus on demand and supply side issues. The ratio of supply side GDP and demand side GDP determine general price function. On the other hand, demand and supply are adjusted by general price mechanism.

4) Lao is an agricultural county. From this point I divide the supply side GDP into agricultural GDP and non-agricultural GDP to analyze the agricultural structure change. In addition, the trade sector of Laos mainly depends upon Thailand. To analyze the trade structure change, I divide trade sector into trade with Thailand and trade with non-Thailand.

5) This model consists of 15 structural equations and 17 definitions. The main policy variable is government investment, foreign direct investment, money supply, and exchange rate. The main target variable are GDP, general price, private consumption, domestic investment, export, and import. I used the ordinary least square method to estimate structural equations and used the Newton method to simulate the model. The flowchart of this model is shown in Figure2-1.

## **2.1.Data**

To build the Lao model, there are not only theoretical problems, but also data problems. In this section, I discuss the current economic data of Laos and how to modify them.

### **(1) The current economic data**

Currently, Lao National Statistic Center is trying to improve data system to become NSA. But some of data have no been published. Therefore, the use of data in this model is basically based on data from IMF, World Bank and ADB. Data sources are shown in Table2-1.

## (2) Modified data

As mentioned above, the macroeconomic data are limited. To overcome this problem, I attempt to modify data by using various method as follows:

**Table2-1: Main variables and sources**

	Code	Unit	Variables	Sources
Government consumption	CG	Bill. Kips	Endogenous	2001 World Development Indicators CD-ROM
Private consumption	CP	Bill. Kips	Endogenous	2001 World Development Indicators CD-ROM
Export to another country	EXA	Bill. Kips	Endogenous	2001 International Financial Statistics CD-ROM
Export to Thai	EXT	Bill. Kips	Endogenous	2001 International Financial Statistics CD-ROM
Import from another country	IMA	Bill. Kips	Endogenous	2001 International Financial Statistics CD-ROM
Import from Thai	IMT	Bill. Kips	Endogenous	2001 International Financial Statistics CD-ROM
General Price	PL	1995=100	Endogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Thai price	PT	1995=100	Exogenous	2001 International Financial Statistics CD-ROM
Thai GDP	TY	1995=100	Exogenous	2001 International Financial Statistics CD-ROM
Non-tax revenue	NOTAX	Bill. Kips	Exogenous	Bank of The Lao PDR, Annual Report, Various Issues
Exchange rate (Kip/Bath)	RATET	Kip/Bath	Exogenous	Bank of The Lao PDR, Annual Report, Various Issues
Exchange rate (Kip/Dollar)	RATEU	Kip/Dollar	Exogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Government revenue	REV	Bill. Kips	Endogenous	Bank of The Lao PDR, Annual Report, Various Issues
lending rate	RISI	Percent	Exogenous	Bank of The Lao PDR, Annual Report, Various Issues
Direct tax	DTAX	Bill. Kips	Endogenous	IMF Staff Country Report Various Issues
Indirect tax	ITAX	Bill. Kips	Endogenous	IMF Staff Country Report Various Issues
Foreign direct investment	FDI	Bill. Kips	Exogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Gross domestic product	GDP	Bill. Kips	Endogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Potential Non-Agriculture GDP	GDPNS	Bill. Kips	Endogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Potential Agriculture GDP	GDPAS	Bill. Kips	Endogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
government investment	IG	Bill. Kips	Exogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Agriculture population	LA	Thousand persons	Exogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Non-agriculture population	LN	Thousand persons	Endogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Money supply	MONP	Bill. Kips	Exogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Total population	NP	Thousand persons	Endogenous	Key Indicators Of Developing Asian And Pacific Countries 2001
Agriculture area	HPA	Thousand Hectare	Exogenous	Basic Statistic of The Lao PDR 75-2000
Capital stock	K	Bill. Kips	Endogenous	Calculation
Domestic investment	DI	Bill. Kips	Exogenous	IMF estimated

### Private investment

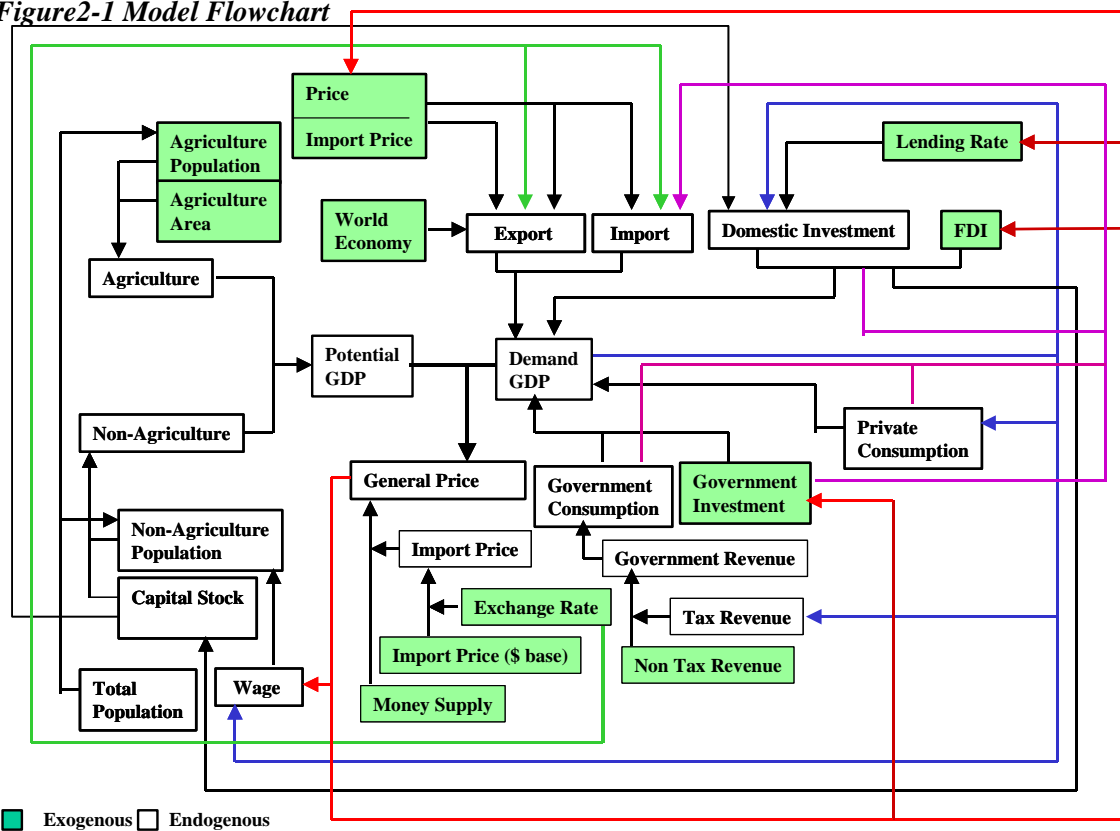
There are no time series investment data in Laos. Therefore, I used private investment data estimated by IMF<sup>5</sup>.

### *Non-agricultural population*

There are no time series non-agricultural data in Laos. To solve this problem, the author assumed that the population living in urban areas is a non-agricultural population and the rest is the agricultural population. The author used data from World Bank (World Development Indicator 2001) to estimate it.

<sup>5</sup> National Statistical Center (1995), p.42.

Figure2-1 Model Flowchart



### Wage

The labor sector in Laos is incomplete. There are no time series wage data in Laos. The main incomes of Lao people mainly come from wage income. As a result, the author assumed that wage is the same as national income.

### Capital stock

To estimate the GDP function, time series capital stock data is vital. Unfortunately, there are no such data in Laos. Therefore, the author is trying to estimate capital stock data that based on assumption as follows:

First, the capital stock in the initial year (1988) is proportional to the level of GDP in that year that specified as follows:

$$K_{88} = k * Y_{88} \tag{2-1}$$

$K_{88}$  = Capital stock in the year of 1988       $Y_{88}$  = GDP in the year of 1988  
 $K$  = Capital-output ratio

Secondly, there are no depreciation data. To make it simpler, the author assumed that there is no depreciation. So the author defined the relation of capital stock and investment as follows:

$$K_t = K_{t-1} + I_t \quad (2-2)$$

$K_t$  = Capital stock in year t (for example in 1989)

$K_{t-1}$  = Capital stock in year t-1 (for example in 1988)

$I_t$  = Total investment in year t (for example in 1989)

~

Thirdly, the author assumed capital-output ratio based on Le Thanh, N (1988) who estimated capital-output ratio of Asian countries (see **Table2-2**). The results are shown in **Table2-3**. After NEM was implemented in 1986, the inefficient state owned enterprise (SOEs) were reconstructed and changed into efficient private enterprise or joint ventures. Lao economy seems to be better. By considering the Lao economic situation in the past and capital-output ratio of Asian countries, the author assumed that capital-output ratio of Laos in 1988 was 1.

**Table2-2 Result of estimated capital output ratio**

Country	k	Country	k
Myanmar	0.82	Thailand	1.49
Sri Lanka	0.81	Hong Kong	1.36
Malaysia	1.15	South Korea	1.86
Singapore	1.26	Japan	2.56
Philippines	1.38		

Resources : Le Thanh (1988) pp.32~33.

As assumed above, the author can estimate capital stock from 1988 to 2000. The results are shown in **Table2-3**.

### ***Import price and export price***

There are no time series import price data in Laos. The imports of Laos mainly depend upon Thailand. Therefore, the author used general price of Thailand as the substitution of

import price. In addition, there are no time series export price data in Laos. The author used general price as the substitution of export price.

***Deflator and dummy variable***

There is no deflator of each macroeconomic variable. To make data be real value, the author used the consumer price index (CPI) as the substitution of deflator of each macroeconomic variable.

The author used some dummy variables to consider the economic structure change since the Asian crisis and the economic policies of the government as follows:

Table2-3 Estimated capital stock

Year	Capital stock
1988	700.07
1989	974.86
1990	1235.81
1991	1499.2
1992	1792.4
1993	2128.75
1994	2546.36
1995	2973.81
1996	3511.84
1997	3950.88
1998	4348.87
1999	4696.45
2000	4982.85

Notes: real value

DD1 is the Asian crisis dummy variable in 1997. The author defined dummy variable from 1997 to 2000 as 1 and another year as 0.

DD2 expresses the effect of the exclusion Generalized System Preferences (GSP) from EU in 1996. The rate of garment export to EU is high<sup>6</sup>. Therefore, the exclusion of GSP had strongly effected on Lao exports. The author defined the dummy variable of 1996 as 1 and another year as 0.

---

<sup>6</sup> Menon, J.(1999), p.344.

DD3 is the dummy variable for the trade liberalization policy in 1990<sup>7</sup>. The author defined that dummy variable from 1990 to 1991 as 1 and for the other years as 0.

## **2.2. Structural equations and definition.**

The structural equation and definition in this model are defined as follows:

### ***Income and product***

Real gross domestic product (GDP) is defined as:

$$\text{GDP} = \text{CP} + \text{I} + \text{G} + \text{EX} - \text{IM} \quad (2-3)$$

CP = Real private investment	EX = Real export
I = Total real investment	IM = Real import
G = Real government expenditure	

Nominal GDP (GDPP) is defined as:

$$\text{GDPP} = \text{GDP} * \text{PL} / 100 \quad (2-4)$$

PL = General prices

Real gross national product (GNP) is defined as

$$\text{GNP} = \text{GDP} + \text{IFA} \quad (2-5)$$

IFA = Real net income from abroad

There are no time series depreciation data in Laos. To make it simpler, The author assumed no depreciation. Therefore, real net national income is equal to real gross national product (GNP). As a consequence, real national income (NI) is specified as follows:

$$\text{NI} = \text{GDP} - \text{ITAX} \quad (2-6)$$

NI = Real national income
ITAX = Real indirect tax

---

<sup>7</sup> Hosaka (1994), P.178.

And personal disposable income (PDI) is specified as follows:

$$PDI = NI - DTAX \quad (2-7)$$

DTAX = Real direct tax

***Potential production function***

The author assumed that potential production (GDPS) has the estimated value of real GDP which determined by capital stock lag one year and labor. In developing countries, it is common to divide potential production function into agriculture and non-agriculture sectors. In Laos, the agriculture sector is important sector. Therefore, the author divided potential production function into agriculture and non-agriculture sector as follows:

$$GDPS = GDPAS + GDPNS \quad (2-7)$$

GDPAS = Real potential agriculture production

GDPNS = Real potential non-agriculture production

Basically, GDPAS is determined from agricultural capital stock and agricultural population. But there are no agricultural capital stock data. Therefore, the author assumed that GDPAS is determined from agriculture area (HPA) and agriculture population (LA). And GDPAS was assumed as the homogeneous Cobb-Douglas production function. GDPAS is defined as follows:

$$\ln(GDPAS/LA) = f ( (+)\ln(HPA/LA) ) \quad (2-8)$$

LA = Agriculture population

HPA = Agriculture area

In addition, GDPNS is determined from non-agricultural capital stock lag one year  $K(-1)$  and non-agriculture population (LN). GDPNS is also assumed as the homogeneous Cobb-Douglas production function. GDPNS is defined as follows:

$$\ln(GDPNS/LN) = f ( (+) \ln ( K(-1) / LN ) ) \quad (2-9)$$

LN = Non-agriculture population

$K(-1)$  = Non-agriculture capital stock lag one year

***Demand pressure definition (DS)***

The demand pressure defined as the ratio of demand side GDP and supply side GDP. The demand pressure is defined as follows:

$$DS = (GDP/GDPS) * 100 \quad (2-10)$$

DS = Demand pressure                      GDP = Potential GDP  
 GDP = Real gross domestic product

***Private consumption function***

To make it simple, the author followed Keynes' theory which consumption is determined only by income. In general, private consumption is determined by personal disposable income. But income tax is a small percentage of tax revenue. Therefore, the author assumed that only real national income is determined by real private consumption as follows:

$$CP = f ( (+) NI , (+) CP(-1) ) \quad (2-11)$$

CPI (-1) = Real private consumption lag one year  
 NI = Real national income

***Investment function and capital stock***

The real investment function (DI) is based on the capital stock adjustment principle by Jorgenson, D. W as follows:

$$DI = f ( (+) GDP, (+) K(-1), (+) RISI/PL, (+) DI(-1) ) \quad (2-12)$$

K(-1) = Real capital stock lag one year    PL = General prices  
 RISI = Nominal lending rate              DI(-1) = Real investment lag one year

Real foreign direct investment (FDI) is defined as follows:

$$FDI = FDIP/PL * 100 \quad (2-13)$$

FDIP = Nominal foreign direct investment (Exogenous)  
 PL = General prices

Real government investment (IG) is defined as follows:

$$IG = IGP/PL * 100 \quad (2-14)$$

IGP = Nominal government investment (Exogenous)

Total real investment (I) is defined as follows:

$$I = DI + FDI + IG \quad (2-15)$$

DI = Real private investment                      G = Real government investment

FDI = Real foreign direct investment

And the definition of capital stock can be expressed as follows:

$$K = K(-1) + I \quad (2-16)$$

K(-1) = Real capital stock lag one year                      I = Total investment

### ***Wage function (WAGE)***

In general, wage can be explained by unemployment rate and general price. Due to an incomplete labor market in Laos, the author assumed that unemployment does not strongly effect wage. In addition, there are no time series wage data in Laos. Therefore, the author assumed that real wage is determined from real GDP, general price, and lag one year of itself as follows:

$$WAGE = f( (+) GDP, (+) PL, (+) WAGE(-1) ) \quad (2-17)$$

GDP = Real GDP                      WAGE(-1) = Real wage lag one year

PL = General prices

### ***Tax***

The author divides tax into direct tax and indirect tax. The function is specified as follows:

$$DTAX = f( (+) PDI, (+) DTAX(-1) ) \quad (2-18)$$

PDI = Real personal disposable income                      DTAX = Real direct tax

DTAX(-1) = Real direct tax lag one year

$$ITAX = f( (+)NI, (+)ITAX(-1) ) \quad (2-19)$$

ITAX = Real indirect tax                      ITAX(-1) = Real indirect tax lag one year

NI = Real national income

Total real tax is defined as follows:

$$TAX = ITAX + DTAX \quad (2-20)$$

TAX = Total real tax                      ITAX = Real indirect tax

DTAX = Real direct tax

### ***Government expenditure and government revenue***

In general, government expenditure is divided into government consumption and government investment. Government expenditure is defined as follows:

$$G = IG + CG \quad (2-21)$$

G = Total real government expenditure                      IG = Real government investment

CG = Real government consumption                      (Exogenous)

Total real government revenue is defined as follows:

$$REV = TAX + NOTAX \quad (2-22)$$

REV = Total real government revenue                      NOTAX = Non-tax revenue

TAX = Tax revenue

Real government consumption function is specified as follows:

$$CG = f( (+)REV, (+)CG(-1) ) \quad (2-23)$$

CG = Real government consumption                      CG(-1) = Real government consumption

REV = Real government revenue                      lag one year

### ***Export***

To consider the export structure change between Thailand and Non-Thailand, the author divided export function into export to Thailand and Non-Thailand as follows:

$$EX = EXT + EXA \quad (2-24)$$

EX = Total real export

EXA = Real export to Non-Thailand

EXT = Real export to Thailand

Basically, export to Thailand is determined by the real GNP of Thailand, relative price between general price and Thai price and nominal exchange rate between Kip and Thai Bath as follows:

$$EXT = f( (+) TY, (-) PL/PT * RATET, (+) RATET, (+) EXT(-1) ) \quad (2-25)$$

EXT = Real export to Thailand

RATET = Nominal exchange rate between

TY = Real GDP of Thailand (Bath base)

(Kip/Bath)

PL = General prices

EXT(-1) = Real export to Thailand lag one

PT = General prices of Thailand

year

By considering the export to Thailand function, the export to Non-Thailand can be defined as follows:

$$EXA = f( (+) WY, (+) PL/PW * RATEU, (+) EXA(-1) ) \quad (2-26)$$

EXA = Real export to Non-Thailand

RATEU = Nominal exchange rate between

WY = Real GDP of United State

(Kip/US\$)

(Dollar base)

EXA(-1) = Real export to Non-Thailand lag

PL = General prices

one yea

PW = General prices of United State

### **Import**

As for the export function, to consider the import structure change between Thailand and Non-Thailand, the author divided import to Thailand and Non-Thailand as follows:

$$IM = IMT + IMA \quad (2-27)$$

IM = Total real import

IMA = Real import form Non-Thailand

IMT = Real import from Thailand

Basically, the imports are determined by real GDP of Laos and relative price between general price and import price. The import from Thailand is defined as follows:

$$IMT = f( (+)ABS, (+) PL/TIP, (-) RATET, (+)IMT(-1) ) \quad (2-28)$$

IMT = Real import from Thailand  
 RATET= Nominal exchange rate  
 PL = General prices between (Kip/Bath)  
 TIP = Import price from Thailand  
 IMT(-1)= Real import from  
 ASB = Real domestic absorption (Total investment and total consumption) Thailand lag one year

And the import from Non-Thailand function is defined as follows:

$$IMA = f( (+)ABS, (+) PL/WIP, (-) RATEU, (+)IMA(-1) ) \quad (2-29)$$

IMA = Real import form NonThailand State  
 ASB = Real domestic absorption RATEU= Nominal exchange rate  
 (Total investment and total (Kip/US\$)  
 consumption) IMA = Real import form Non-  
 PL = General prices Thailand lag one year  
 WIP = Import prices form United

### ***General prices***

High inflation is not a serious problem in developed countries, as well as in developing countries. Because monetary sector of Laos being incomplete, the circle of wage and price cycle cannot explain inflation. According to previous studies of macroeconomic model in developing countries, the author used the quantity theory of money to explain inflation. Therefore, general price function is defined as follows:

$$PL = f( (+) DS, (+) MONE/GDP, (+) IP, (+) PL(-1) ) \quad (2-30)$$

PL = General prices  
 GDP = Real gross domestic product  
 DS = Demand pressure  
 IP = Import prices  
 MONE= Money supply  
 PL = General prices lag one year

Import price is defined as follows:



**Table2-4: Result of RMSE in total test**

Variables	RMSE	Variables	RMSE
GDP	2.47	WAGE	2.19
PL	12.38	LN	0.29
CP	3.6	NP	0.06
CG	8.93	DTAX	16.41
EXT	14.47	ITAX	10.4
EXA	12.5	TAX	5.04
EX	8.71	REV	3.8
IMT	20.05	DI	15.26
IMA	11.83	IG	12.08
IM	10.2	FDI	12.08
GDPP	10.58	I	8.39
GNP	2.5	K	1.56
NI	2.49	GDPNS	0.08
PDI	2.37	GDPS	0.03
GDPAS	0		

**Table2-5: The result of U in total test**

Variables	U	Variables	U
GDP	0.0233	WAGE	0.0209
PL	0.0756	LN	0.0028
GDPP	0.0544	DTAX	0.1134
CP	0.0339	ITAX	0.0891
CG	0.0775	TAX	0.0941
EXT	0.8149	REV	0.0748
EXA	0.0835	DI	0.0933
EX	0.0586	IG	0.1184
IMT	0.4097	FDI	0.0655
IMA	0.1006	I	0.0745
IM	0.0784	K	0.0085
GNP	0.0236	GDPAS	4.882D-08
NI	0.0224	GDPNS	0.000817
PDI	0.0217	GDPS	0.0003

### 3. Analyzing the effect of AFTA.

Lao PDR has rich natural resources and wage is low, therefore the Lao government expects to gain benefit from joining AFTA by increasing export and FDI. However, it will decrease government revenue, increase the trade deficit and damage to Small Medium Enterprises (SMEs). This section will discuss the hypothesis and method of analyzing the effect of AFTA by using a macroeconomic model.

#### 3.1 Hypothesis and method

Joining AFTA will effect on the government budget, FDI, trade, domestic SMEs, etc. But, in this paper, the author will focus on the effect of AFTA on the whole Lao economy through changing general price by using a macroeconomic model.

Since the export and import functions in the model do not consist of the tariff rate, it is impossible to analyze the effect of AFTA by reduced tariffs. Therefore, in this paper the author assume that the effect of AFTA by deduced tariff have the same effect by decreasing import price by 5%. By decreasing import price, it can make clear the effect of AFTA on general price, trade, GDP, etc. The effect of AFTA on the whole Lao economy can be shown as follows:

- 1) The effect to general price

2) The effect to export and import

3) The effect to GDP

The effect of AFTA on Lao economy can be expressed by the equation as follows:

$$IP = IPB * RATE_T \quad (3-1)$$

IP = Import price

RATE = Exchange rate (Kip/Bath)

IPB = Import price (Bath base)

$$PL = f \{ (+) GDP/GDPS, (+) MON/GDP, (+) IP \} \quad (3-2)$$

PL = General price

MON = Money supply

GDP = Demand side GDP

IP = Import price

GDPS = Potential GDP

$$EXT = f \{ (+) TY, (+) PL/PT * RATE_T, (+) RATE_T \} \quad (3-3)$$

EXT = Real export to Thailand

PT = General price of Thailand

TY = Real GDP of Thailand

RATE\_T = Exchange rate (kip/Bath)

PL = General price

$$EXA = f \{ (+) WY, (+) PL/PW * RATE_{EU}, (+) RATE_{EU} \} \quad (3-4)$$

EXA = Real export to Non-Thailand

PW = General price of USA

WY = Real GDP of USA

RATE\_{EU} = Exchange rate (Kip/US

PL = General price

dollar)

$$IMT = f \{ (+) ASOB, (+) PL/IP, (+) RATE_T \} \quad (3-5)$$

IMT = Real import from Thailand

IP = Import price

ASOB = Real domestic absorption

RATE\_T = Exchange rate (Kip/Bath)

PL = General price

$$IMA = f \{ (+) ASOB, (+) PL/IP, (+) RATE_{EU} \} \quad (3-6)$$

IMA = Real import from Non-Thailand

IP = Import price

ASOB = Real domestic absorption

RATE\_{EU} = Exchange rate (Kip/US

PL = General price

dollar)

By decreasing import price (Bath based) (TIPB) 5% every year gradually, import price (IP) will increase in equation (3-1), then import price (IP) effects general price (PL) in equation (3-2), then import price (IP) and general price (PL) will have an effect on export (EX) and import (IM) in equation (3-3)~(3-6). According to relationship of equations, the author can make clear that the effect of AFTA on the whole Lao economy.

There was no chocked in simulation period (1988~2000), it called **Base Case (B)**. As the author assume above, the effect of AFTA from 1997 to 2000 remains constant decreasing import price (Bath base) (IPB) by 5% in every year gradually, **Chock Case (C)**. The effect of AFTA on the GDP, consumption, investment, export, import, and etc is the gap between base case and chock case<sup>10</sup>.

### 3.2. Simulation result

**Table3-1** shows the simulation result of the effect of AFTA to Lao economy. The detail of the effect of AFTA can be explained as follows:

#### *The effect on general price (PL)*

The author fond that AFTA has effects on decreasing general price (PL), the average of its effect is more than 1% which shows that it is a small effect. Due to general price decrease, it leads to an increase in all real macroeconomic variables in the whole Lao economy.

#### *The effect on export (EX)*

The author fond that export to Thailand (EXT) slightly increases, but the average is only 0.03%, Because Lao export goods have a small comparative advantage to Thai products. Another reason is that Lao PDR shares a long border with Thailand which provides a large opportunity for informal trade. As a result, trade data do not reflect to that issue.

---

<sup>10</sup> The effect of AFTA = (C-B)\*100/B

**Table3-1 Simulation results**

	1997	1998	1999	2000		1997	1998	1999	2000
PLC	137.39	336.9	580.14	782.34	IMTC	303.73	477.37	500.51	417.96
PLB	139.18	341.32	587.43	790.81	IMTB	304.33	476.91	497.49	416.04
Effect(%)	-1.28	-1.3	-1.24	-1.07	Effect(%)	-0.2	0.1	0.61	0.46
EXTC	35.5	42.11	45.21	78.17	IMAC	210.09	147.67	89.83	165.5
EXTB	35.49	42.1	45.18	78.14	IMAB	205.5	143.55	84.61	158.92
Effect(%)	0	0.03	0.06	0.04	Effect(%)	2.24	2.87	6.17	4.14
EXAC	247.11	346.19	371.61	324.47	IMC	513.83	625.04	590.35	583.45
EXAB	246.83	344.41	365.44	316.75	IMB	509.83	620.46	582.11	574.96
Effect(%)	0.11	0.52	1.69	2.44	Effect(%)	0.78	0.74	1.42	1.48
EXC	282.61	388.3	416.82	402.64	GDPC	1496.2	1478.7	1694.2	1699.2
EXB	282.33	386.51	410.62	394.89	GDPB	1497.3	1477.5	1687	1691.5
Effect(%)	0.1	0.46	1.51	1.96	Effect(%)	-0.08	0.08	0.43	0.45

On the other hand, the author found out that export to Non-Thailand (EXA) increases at an average 1.19%, a relatively small rate. Joining AFTA will increase Lao exports. But the export to Non-Thailand (EXA) is bigger than export to Thailand (EXT).

### ***The effect on import (IM)***

The author found that the joining AFTA has positive effect on imports from Thailand (IMT): the average effect is 0.97%, a small effect. It may be due to informal trade in the Laos-Thai border; so the data is not faithful. Another reason is the relative price between general price of Laos and general price of Thailand in estimated import from Thailand (IMT) function is different from theory.

As for the effect of AFTA on imports from Non-Thailand (IMA), the author found that imports from Non-Thailand increased. The average of effect is large, 7.71%. Before Laos joined AFTA, Lao government put trade barriers on imports from Non-Thailand. After joining AFTA, the import price of Non-Thailand's goods decreased and the demand for Non-Thailand's goods is high. As a result, the import from Non-Thailand increased.

As a result, the author found that the effect of AFTA on imports from Non-Thailand (IMA) is bigger than on imports from Thailand (IMT). AFTA has the effect of increasing export by 1.22%, and it has effect of increasing imports by 8.66%. It indicated that Laos is facing a bigger trade deficit by joining AFTA.

### ***The effect to GDP***

The effect of AFTA on the GDP comes from the changing general price (PL) throughout all the macroeconomic variables. The author found that the effect of AFTA on the GDP are small, the average of its effect is only 0.44%. This shows that Laos gains few benefits by joining AFTA<sup>11</sup>.

## **4. Conclusion and suggestion**

This paper attempts to make clear the effect of AFTA on the Lao economy by using a Macroeconomic model simulation.

### **4.1. Conclusion**

The conclusion of this paper can be summarized as follows:

- 1) Joining AFTA has the effect of decreasing import price and general price.
- 2) AFTA has the effect of increasing export to Thailand and Non-Thailand, but the export to Non-Thailand is bigger than to Thailand. In addition, it increases the import from Thailand and Non-Thailand. But the increased of import from Non-Thailand is bigger than from Thailand. The import increasing effect of AFTA is larger than that of export. It becomes clear that Laos will face a larger trade deficit by joining AFTA.
- 3) The effect on the AFTA to GDP is decreased of general price and the increase in all real macroeconomic variables. The result shows that the effect of AFTA on GDP is very small. Laos will gain few benefits by joining AFTA.

### **4.2. Policy suggestion**

According to conclusion of the simulation results. The author has a suggestion as follows:

---

<sup>11</sup> The effect of AFTA to GDP will be negative if we consider the lost of government revenues from tariff.

- 1) It is difficult to prevent increased import by joining AFTA. It is important for the Lao government to promote and support small and medium enterprise (SMEs) for increasing exports.
- 2) Instead of inducing turn overtax and excise tax to prevent losing government revenue in the short run, it is vital for the Lao government to revise the investment law and provide more incentives to increase foreign direct investment (FDI) in the long run and increase export.
- 3) Lao government should move the Temporary Excluding List (TEL) which has 1724 goods items in 2001 to the Including List (IL) faster in order to increase export to ASEAN members by AFTA tariff.
- 4) Because the law and framework of Laos doesn't meet ASEAN's standards. It is important to revise and built it as soon as possible to increasing FDI and export.

## Appendix1: Estimated structural equations

### *Potential agriculture production function (GDPAS)*

$$\text{Ln}(\text{GDPPAS}/\text{LA}) = -0.44 + 0.13*\text{Ln}(\text{HPA}/\text{LA}) - 0.007*\text{DD1}$$

$$\text{R-SQ}= 1.00 \quad \text{SD}=0.03 \quad \text{DW}= 1.76$$

### *Potential non-agriculture production function (GDPNS)*

$$\text{Ln}(\text{GDPNS}/\text{LN}) = -0.62 + 0.71*\text{Ln}(\text{K}(-1)/\text{LN}) - 0.005*\text{DD}$$

$$\text{R-SQ}= 1.00 \quad \text{SD}=0.03 \quad \text{DW}= 2.03$$

### *Private consumption function (CP)*

$$\text{CP}= 181.44 + 0.84*\text{NI} + 0.67*\text{CP}(-1) - 30.93*\text{DD1}$$

$$(0.83) \quad (1.14) \quad (2.42)^A \quad (-0.55)$$

$$\text{R-SQ}= 0.91 \quad \text{SD}=222.51 \quad \text{DW}= 2.39 \quad \text{F}= 40.98$$

### *Government consumption function (CP)*

$$\text{CG}= 16.13 + 0.16*\text{REV} + 0.72*\text{CG}(-1) - 32.02*\text{DD1}$$

$$(0.72) \quad (1.68)^C \quad (4.84)^A \quad (-3.92)^A$$

$$\text{R-SQ}= 0.75 \quad \text{SD}=24.62 \quad \text{DW}= 2.49 \quad \text{F}=12.51$$

### *Domestic investment function (DI)*

$$\text{DI}= -297.77 + 0.33*\text{GDP} - 0.06*\text{K}(-1) + 1.29*\text{RISI} +$$

$$(-1.17) \quad (1.01) \quad (-0.81) \quad (0.47)$$

$$0.90*\text{DI}(-1) - 16.33*\text{DD1} + 2.83*\text{DD4}$$

$$(4.33)^A \quad (-0.47) \quad (0.11)$$

$$\text{R-SQ}=0.86 \quad \text{SD}=61.45 \quad \text{DW}= 2.19 \quad \text{F}= 13.20$$

### *Wage function (WAGE)*

$$\text{WAGE}= 130.02 + 0.81*\text{GDP} + 0.05*\text{PL} - 0.02*\text{WAGE}(-1) + 43.14*\text{DD}$$

$$(5.77)^A \quad (12.63)^A \quad (2.85)^A \quad (-0.29) \quad (5.63)$$

$$\text{R-SQ}= 0.99 \quad \text{SD}=221.72 \quad \text{DW}= 2.90 \quad \text{F}= 1637.45$$

### *Direct tax function (DTAX)*

$$\text{DTAX}= -33.71 + 0.05*\text{PDI} - 0.12*\text{DTAX}(-1) + 5.95*\text{DD1}$$

$$(-2.12)^C \quad (2.75)^A \quad (-0.37) \quad (1.39)^B$$

$$\text{R-SQ}= 0.85 \quad \text{SD}=13.32 \quad \text{DW}= 2.52 \quad \text{F}= 22.41$$

### *Indirect tax (ITAX)*

$$\text{ITAX}= -76.57 + 0.10*\text{NI} + 0.49*\text{ITAX}(-1) - 56.53*\text{DD1}$$

$$(-3.50)^A \quad (6.63)^A \quad (3.19)^A \quad (-5.98)^A$$

$$\text{R-SQ}= 0.84 \quad \text{SD}=28.22 \quad \text{DW}= 2.90 \quad \text{F}= 48.52$$

**Export to Thailand (EXT)**

$$\begin{aligned} \text{EXT} = & 46.30 + 0.42*\text{TY} - 0.002*\text{PL}/\text{PT}*\text{RATET} + 0.07*\text{RATET} \\ & (1.22) \quad (0.41) \quad (-0.05) \quad (0.22) \\ & - 33.32*\text{DD1} - 20.00*\text{DD2} \\ & (-2.68)^{\text{C}} \quad (-2.32)^{\text{C}} \end{aligned}$$

$$\text{R-SQ} = 0.57 \quad \text{SD} = 15.87 \quad \text{DW} = 2.76 \quad \text{F} = 4.01$$

**Export to Non-Thailand (EXA)**

$$\begin{aligned} \text{EXA} = & - 1101.64 + 0.17*\text{WY} - 0.01*\text{PL}/\text{PW}*\text{RATEU} + 0.10*\text{RATEU} \\ & (-6.66)^{\text{A}} \quad (6.79)^{\text{A}} \quad (-4.39)^{\text{A}} \quad (4.52)^{\text{A}} \\ & - 0.34*\text{EXA}(-1) - 40.2*\text{DD1} - 61.09*\text{DD2} - 50.34*\text{DD3} \\ & (-1.48)^{\text{C}} \quad (-1.56)^{\text{C}} \quad (-3.19)^{\text{B}} \quad (-2.33)^{\text{A}} \end{aligned}$$

$$\text{R-SQ} = 0.97 \quad \text{SD} = 115.91 \quad \text{DW} = 3.19 \quad \text{F} = 69.70$$

**Import from Thailand (IMT)**

$$\begin{aligned} \text{IMT} = & - 388.48 + 0.51*\text{ABSO} - 1856.14*\text{PL}/\text{TIP} + 2.83*\text{RATET} \\ & (-2.43)^{\text{A}} \quad (4.74)^{\text{A}} \quad (-0.61)^{\text{C}} \quad (4.50)^{\text{A}} \\ & - 1.32*\text{IMT}(-1) + 52.78*\text{DD1} - 28.31*\text{DD2} \\ & (-3.04)^{\text{A}} \quad (2.13)^{\text{B}} \quad (-1.26)^{\text{C}} \end{aligned}$$

$$\text{R-SQ} = 0.97 \quad \text{SD} = 153.66 \quad \text{DW} = 1.70 \quad \text{F} = 77.19$$

**Import from Non-Thailand (IMA)**

$$\begin{aligned} \text{IMA} = & - 119.17 + 0.14*\text{ABSO} - 0.017*\text{RATEU} + 4081.30*\text{PL}/\text{WIP} + \\ & (-1.09) \quad (1.25) \quad (-1.27) \quad (1.11) \\ & 0.18*\text{IMT}(-1) - 59.92*\text{DD1} - 64.61*\text{DD2} \\ & (0.49) \quad (-2.09)^{\text{C}} \quad (-2.26)^{\text{A}} \end{aligned}$$

$$\text{R-SQ} = 0.92 \quad \text{SD} = 65.78 \quad \text{DW} = 2.88 \quad \text{F} = 9.78$$

**Non-agriculture population (LN)**

$$\begin{aligned} \text{LN} = & 10.56 + 0.017*\text{WAGE} - 1.01*\text{LN}(-1) - 0.04*\text{DD} \\ & (1.56)^{\text{B}} \quad (0.37) \quad (16.34)^{\text{A}} \quad (-0.12) \end{aligned}$$

$$\text{R-SQ} = 0.99 \quad \text{SD} = 175.10 \quad \text{DW} = 1.87 \quad \text{F} = 10352.$$

**General price (PL)**

$$\begin{aligned} \text{PL} = & - 480.00 + 8.61*\text{GDP}/\text{GDPS} + 522.96*\text{MONE}/\text{GDP} + 0.003*\text{TIP} \\ & (-1.75)^{\text{A}} \quad (1.80)^{\text{A}} \quad (4.32)^{\text{A}} \quad (1.00) \end{aligned}$$

$$\text{R-SQ} = 0.98 \quad \text{SD} = 244.95 \quad \text{DW} = 2.42 \quad \text{F} = 196.28$$

Note:<sup>A</sup>=1 percent level of significance

<sup>B</sup>=5 percent level of significance

<sup>C</sup>=10 percent level of significance

## Reference:

- Abe, S. (1994). 'Malaysia Model II.' In *Econometric Models of Asian-Pacific Countries*, (ed. S. Ichimura. and Y. Matsumoto). Springer-Verlag, pp.341-355.
- Adelman, I. (1968). 'An Econometric Model of Socio-Economic and Political Change in Underdeveloped Countries.' *American Economic Review*, Vol. 58, No.5, Part 1, pp. 1184-1218.
- Anderson, K. (1999). *Lao Economic Reform and WTO Accession – Implication for Agriculture and Rural Development*. Singapore: Institute of Southeast Asian Studies
- Ball B. J. (1973). *The International Linkage of National Economic Models*. North-Holland/American Elsevier.
- Behrman, J. R. and Klein, L. R. (1970). 'Econometric Growth Models for the Developing Economy' In *Induction Growth and Trade*, (ed. W. A. Elfis, M. F. Scott. and J. N. Wolfe). Clarendon Press, pp. 167-187.
- Cheong, K. C. (1976). 'A Macroeconomic Model for West Malaysia, 1948-68.' *Developing Economies*, Vol. 14, No. 1, pp. 47-71.
- Evens, M. L. K. (1970). 'An Econometric Model Of The Israel Economy 1952-1965.' *Econometrica*, Vol. 38, No.5. pp. 624-659.
- Ezaki, M. (1985). 'Singapore Model.' In *Econometric Models of Asian Link*, (ed. S. Ichimura. and M. Ezaki). Springer-Verlag, pp.127-129.
- Hosaka, S. (1994). 'Transition to market economies in Asia/ Chapter 3 Lao P.D.R.' *The Economic Analysis* No.137, pp.174-199.
- K. Phouphet (2004), 'Analyzing the Lao economy by using macroeconomic model'. Faculty of Economic& Management, NOUL, JICA
- Klein, L. R. (1970). 'Econometric Growth Models for the Developing Economy.' In *Induction, Growth and Trade*, (ed. M. F. G. Scott. and J. N. Wolfe). Clarendon Press, pp. 167-187.
- Le Thanh, N. (1988). 'Sources of World Economic Growth.' *IDCJ Working Paper Series*, No.44.
- National Statistical Center. (1995). *Revised Minimum Standard Model (RMSM)*. Vientiane.
- Menon, J. (1998). 'Lao in the ASEAN Free Trade Area: Trade, Revenue and Investment Implications.' Pacific Economic Paper No.276. Australia-Japan Research Center.
- Menon, J. (1999). 'Transitional Economies in Free Trade Areas –Lao PDR in the ASEAN Free Trade Area.' *Journal of the Asia Pacific Economy*, pp. 340-364.
- 今川健(1980)『開発途上経済のモデル分析』中央大学出版部。↵
- 青木健(2001)『AFTA(ASEAN自由貿易地域) – ASEAN経済統合の実状と展望 –』日本貿易振興会。↵
- 堂本健二(1997)「ラオスのASEAN加盟に関わる諸問題」『カンボジア・ラオスのASEAN加盟に伴う諸問題』日本国際問題研究所。↵
- 鈴木基義(2000)「ラオスではAFTAに成功しない理由(上)」『世界経済評論』12月号、pp. 52-55.↵
- 鈴木基義(2001)「ラオスではAFTAに成功しない理由(下)」『世界経済評論』1月号、pp. 60-64.↵
- 福井清一(2001)「AFTA – CEPTとラオスの農業開発」社団法人国際農業交流・食糧支援基金『平成12年度海外食料農業情報分析検討、アジア地域・食料農業情報調査分析事業実施報告書』。↵