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THE IMPACT OF THAI TOURISM ON THE ECONOMIC GROWTH OF TOURISM IN LAO PDR: A HIERARCHICAL APPROACH

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This study examines the relationship between the economic growth of tourism in Lao PDR, and the number of Thai tourists visiting Lao PDR, international trade and the exchange rate by employing a hierarchical model using quarterly data from Q1 2000 – Q1 2012. It was found that the number of Thai tourists visiting Lao PDR has both short and long run causality on the GDP of tourism. This result shows that Thai tourists are important and has a causal relationship with the economic growth of tourism in Lao PDR. This study suggests that Lao PDR should maintain Thai tourist groups and create new tourism products to encourage Thai tourists to visit Lao PDR, which would contribute to the economic development of Lao PDR.

Keywords: *Thai Tourists, Tourism, Economic Growth, Lao PDR Tourism, Hierarchical Approach*

JEL Classification: *L83, M1, O1*

INTRODUCTION

From the process of globalization, tourism has grown enormously. Tourism is part of a movement in the direction of increasing world economic integration through the reduction of natural and human barriers to exchange and increase international flows of capital and labour (Chang et al., 2009). Therefore, tourism has become a main sector for many countries in the world. According to the World Tourism Organization (2012) reported in the World Tourism Barometer publication in 2011, international tourist arrivals have gradually increased from 1995 to 2011 and international tourism receipts have increased to U$1.03 trillion in 2011 or about a 3.8% increase from 2010. In 2009, the world international tourist arrivals and international tourism receipts decreased because of the

effect of financial and economic volatility (such as the financial crisis, the hamburger crisis, and money inflation from the supply side), global warming, influenza H5NI, and the unstable political situation. Based on these events, it seems that world tourism depends on the world economy and shocks

Considering international tourists data, tourism in Lao PDR has become an important sector. From table 1, tourism contributed 18.0 percent to the national Gross Domestic Product (GDP); furthermore, tourism exports and jobs shared more than 20 percent of the total exports and 15.7 percent of total employment respectively (see Table 1). Furthermore, the Committee for Planning and Investment (2006) reported that the tourism investment and promotion of Lao PDR had increased because the Lao Government had encouraged tourism as the main policy in the Lao Socio-Economic Development Plan 2006-2010. Consequently, Lao PDR has achieved sustainable economic growth and has reduced poverty based on the development plan that emphasized tourism.

Table 1. The Percentage of Tourism GDP, Tourism Exports and Total Employment in Lao PDR 2006 -2012

Year	Tourism GDP (% of National GDP)	Tourism Exports (% of total exports)	Tourism Jobs (% of total employment)
2006	12.4	12.4	10.8
2007	13.5	12.5	11.7
2008	14.5	16.0	12.6
2009	15.1	18.7	13.2
2010	18.1	19.8	15.7
2011	18.1	21.5	15.8
2012	18.0	20.4	15.7

Source: World Tourism Council (2013)

Thailand and Lao PDR share a very long border of 1,810 kilometres and they are linked geographically, economically and culturally (Nonthapot and Lean, 2013). Considering the tourism situation in Lao PDR, the Lao National Tourism Administration (2011) reported that 2.72 million tourists visited Lao PDR in 2011 and the revenue from international tourists was about 406.2 million USD. The number of Thai tourist visitors to Lao PDR increased from 0.2 million people in 1995 to 1.58 million people in 2011. This increase is highly related to tourist expansion in Lao PDR. This is an indicator that the number of Thai tourists visiting Lao PDR is strong and is an opportunity for Lao PDR's

tourism economic expansion. In terms of nations that visit Lao PDR, Thai tourism represents a major market share in Lao PDR's tourism industry and is a major revenue contributor to Lao. In 2012, World Tourism Council (2013) also stated that Thai tourists represent a major market share in Lao PDR's tourism industry with 58 percent of total tourist arrivals to Lao PDR (see Table2). Because of the development plan strategies, there may be variable effects on the confidence of Thai tourists to visit Lao PDR; moreover, there are many reasons why Thai tourists are the largest group in the tourism of Lao PDR, such as transportation modes between Thailand and Lao PDR, the similar culture of two countries (especially language), the good relationship between Thai and Laotian people, and the long relationship between the Thai and Lao governments.

Table 2. Top 5 source countries of international tourist arrivals in Lao PDR (2011)

Rank	Country	Number	Share (%)
1	Thailand	1,579,941	58
2	Vietnam	561,586	21
3	China	150.791	6
4	USA	50,092	2
5	France	44,399	2

Source: Lao National Administration (2012)

LIERATURE REVIEW

In many tourism development and economic growth studies, the main objective was to investigate the casual relationship between tourism and growth. The tourism development and economic growth studies have established the impact of tourism on long-run economic growth by using Engle and Granger causality tests based on Error Correction Models; and also, international tourism receipts and economic growth have been found to support both tourism and economic growth. For example, Oh (2005) studied the contribution of tourism development on economic growth in the Korean economy by using the Augmented Dickey-Fuller (ADF) technique for unit root, the Johanson and Juselius (JJ) technique for co-integration and the Granger causality test for causality relations between tourism earnings and economic growth. Lee and Chang (2008) re-investigated long run co-movements and the casual relationship between tourism development and the economic growth of OECD and non OECD countries including Asia, Latin America and Sub-Sahara Africa for the

1990 – 2002 period. The results determined that tourism development has a greater impact on GDP in non OECD countries. Moreover, the real effective exchange rate has significant effects on economic growth and in the long run, the study suggests a unidirectional causal relationship between tourism development and economic growth in OECD countries, bidirectional relationships in non – OECD countries but only week relationships in Asia.

Kadir and Jusoff (2010) employed co-integration and causality tests to test the relationship between tourism and trade in Malaysia. The result of the unit root tests indicated that all the variables are stationary in first – difference, but all models are not co-integrated in the long run. However, the causality test show a one-way casual effect running from imports to international tourist receipts at a 5% significance level, and total trade to international tourism receipts at a 10% significance level. Therefore, an increase in total trade, exports and imports will lead to growth in the tourism sector, which means that most tourist arrivals are related to the business sector. In contrast, Chancharat and Chancharat (2010) investigated the co-movements and casual relationships among real GDP, tourism development and the real exchange rate in a multivariate model. The results are no co-integration between tourism development and economic growth and shows that this issue still deserves further attention from researchers for comparative purposes for Thailand. In addition, Brida et al., (2010) presented causality testing between tourism growth, relative prices and economic expansion for the Trentino-Alto Adige (a region of northeast Italy bordering Switzerland and Austria). The results showed unidirectional causality running from international tourism expenditure to the Trentino-Alto Adige economy. It means that tourism expenditure has a fast positive effect on growth in Trentino-Alto Adige.

Most previous empirical studies focused on the relationships between tourism and economic development which depend on country selection or regional analysis based on a bi-variated co-integrated model. However, this study not only used a multi-variated co-integrated model, but also added a hierarchical model to show the relationship between tourism and economic development, which has never been studied in developing countries before. Consequently, the hierarchical model is used in this research paper.

METHODOLOGY

Data Sources

This paper focuses on quarterly data from Q1 2000 – Q1 2012. Details of data sources are shown in Table 3. Moreover, a dummy variable which is Asian Development assistant policy, is incorporated in the model.

Table 3. Data sources

Variable	Data sources
Tourism GDP	World Tourism Council
Thai tourist arrivals	Lao National Tourism Administration
Exchange rate	Bank of Thailand
International Trade	World Bank

The model

The impact of Thai tourists on tourism growth in Lao PDR is determined from tourism and growth economic models; the models were linked by hierarchical functions which are used to estimate tourism growth in this study. The hierarchical model, which generically consists of 2 equations, can be written in a mathematically arbitrary form showing the economic growth of tourism in Lao PDR as follows:

$$\ln Y_i = \alpha_0 + \alpha_1 \ln T_i + \varepsilon_i \quad (1)$$

$$\ln Y_i = \beta_0 + \alpha_2 \ln T_i + \beta_1 \ln XM_i + \beta_2 \ln ER + \mu_i \quad (2)$$

Where Y is defined as Lao PDR's tourism Gross Domestic Product (tourism GDP), T_i is Thai tourists visiting Lao PDR. XM and ER are defined as economic volume of international trade and the exchange rate between Lao PDR and Thailand respectively. Moreover, ε_i and u_i are error term disturbances.

Estimation Methods

The estimation process was separated into three stages as follows: the unit root test in the first stage, a hierarchical regression, a cointegration test in the second stage, and finally a causality test After setting the equations by using a hierarchical model to explore the fundamental estimation problems, we tested the unit root with structural break unit root variables using Saikkonen and Lütkepohl (2002), and Lanne et al (2002). The variables in equations 1 and 2 are as follows:

$$y = \mu_0 + \mu_{1t} + f_t^{'}(\theta)\gamma + x_t \qquad (3)$$

Where $f_t^{'}(\theta)\gamma$ is defined as a shift function, θ and γ are unknown parameters or parameter vectors; the error x_t are generated by AR(p) process with possible unit root. We use a simple shift dummy variable with shift date

$$T_B \cdot f_t' = d_{1t} := \begin{cases} o, t < T_B \\ 1, \geq T_B \end{cases} \qquad (4)$$

The function does not involve any parameter θ. *I*n the shift term $f_t^{'}\gamma$, the parameter γ is scalar. Differencing this shift function leads to an impulse dummy. Moreover, the second shift function is presented which is based on the exponential distribution function. It allows for nonlinear gradual shift to a new level starting at time T_B.

$$f''(\theta) = \begin{cases} 0, & t < T_B \\ 1, -\exp\{-\theta(t - T_B + 1)\}, & t \geq T_B \end{cases} \qquad (5)$$

In the shift term $f_t^{''}(\theta)\gamma$, both parameter θ and γ are scalar, from equation five; the first one is confirmed to the positive real line $(\theta > 0)$ and the second one may assume any value. Furthermore, the dates of structural breaks have been determined by following Lanne et al. (2001) who recommended choosing a reasonably large Autoregressive (AR) order in the first step. Then, picking the break date that minimizes the GLS objective function is used to estimate the parameters of the deterministic part. Hence, after testing the unit root test of all variables, they have to be integrated in the same order.

In the second stage, the hierarchical model of tourism economic growth in Lao PDR that is expressed in equation 1 and 2 are estimated by employing the Stepwise regression analysis method. Thereafter, the estimate result has to be examined by using the cointegration test of Saikkonen and Lütkepohl (2000 a, b, c). Thus, equations 1 and 2 are tested by employing a co-integration test which is based on the general model as follows:

$$y_t = D_t + x_t \tag{6}$$

Where y_t is a K – dimensional vector of observation variables, D_t is a deterministic term, and x_t is a VAR (ρ) process with the Vector Error Correction Model (VECM) representation

$$\Delta x_t = \prod x_{t-1} + \sum_{j=1}^{p-1} \Gamma j \Delta x_{t-j} + u_t \tag{7}$$

Here u_t is a vector white noise process with $u_t \sim (0, \Sigma)$. The rank of $\prod$ is the cointegrating rank of x_t and hence of y_t. Moreover, Saikkonen and Lutkepoh (2000 a,b,c) method is applied to tests the pair of hypotheses as follows:

$$H_0(r_0): rk(\Pi) = r_0 \tag{8}$$

$$H_1(r_1): rk(\Pi) > r_0; r_o = o,..., K-1 \tag{9}$$

When the VAR order ρ has to be specific and the model selection criteria are offered to help in the decision on the VAR order both equations (Eq. 8-9) proceed by estimating the deterministic term D_t first, subtracting it from the observations and applying a Johansen type test to the adjusted series. In other words, the test is based on a reduced rank regression of the system

$$\Delta \tilde{x}_t = \prod \tilde{x}_{t-1} + \sum_{j=1}^{p-1} \Gamma j \Delta \tilde{x}_{t-j} + \tilde{u}_t \tag{10}$$

Where $\tilde{x}_t = y_t - \tilde{D}_t$ and $\tilde{D}_t$ is the estimate deterministic term, the procedure for the estimation the parameters deterministic term is proposed by Saikkonen and Lutkepoh (SL) The critical values depend on the kind of deterministic term included. Nevertheless, a constant, a linear and trend orthogonal to the counteraction relations and seasonal dummy variables are possible options because of the possible options of the SL

procedure as in Johansen. There is a constant, a linear trend term, or a linear trend orthogonal to the cointegration relations. In this methodology, the critical values depend on the kind of the above-mentioned deterministic trend that is included in the model. More interestingly, in SL, the critical values remain valid of a shift dummy variable included in the model, while in the Johansen test; the critical values are available only if there is no shift dummy variable in the model. In addition, the SL approach can be adopted with any number of (linearly independent) dummies in the model. It is also possible to exclude the trend term from the model. In the following section, we have applied SL tests for the co-integration rank of a system in the presence of structural breaks. However, the limitation of this co-integration test is that trend breaks are ignored.

In addition, when we get results from the cointegration test, the hierarchical model of tourism economic growth in Lao PDR is expressed in equation 1 and 2. Both equations are tested by employing the Granger causality test. This study follows the concept of Granger causality, '*X* causes *Y*' if and only if the past values of *X* help to predict the changes of *Y*. While, '*Y* causes *X*' if and only if the past values of *Y* help to predict the changes of *X*. Granger (1988) stated that a set of variables are co-integrated, meaning that they contained short-run and long-run Granger causality information. Thus, if tourism Gross Domestic Product of Lao PDR, Thai tourists visiting Lao PDR, international trade and the exchange rate between Lao PDR and Thailand are co-integrated, we implement the Granger causality test with the VECM framework as follows:

For equation 1 can express to Granger causality to equations 11 and 12

$$\Delta \ln Y_t = \alpha_1 + \sum_{k=1}^{q} \beta_i \Delta \ln Y_{t-k} + \sum_{k=1}^{q} \lambda_i \Delta \ln TT_{t-k} + \theta_i EC_{t-1} + \mu_{1t} \quad (11)$$

$$\Delta \ln TT_t = \alpha_2 + \sum_{k=1}^{q} \lambda_i \Delta \ln TT_{t-k} + \sum_{k=1}^{q} \beta_i \Delta \ln Y_{t-k} + \theta_i EC_{t-1} + \mu_{2t} \quad (12)$$

Moreover, equation 2 can express Granger causality for equations 13 to 15

$$\Delta \ln Y_t = \alpha_3 + \sum_{k=1}^{q} \beta_i \Delta \ln Y_{t-k} + \sum_{k=1}^{q} \lambda_i \Delta \ln TT_{t-k} + \sum_{k=1}^{q} \kappa_i \Delta \ln XM_{t-k} + \sum_{k=1}^{q} \eta_i \Delta \ln ER_{t-k} + \theta_i EC_{t-1} + \mu_{3t} \quad (13)$$

$$\Delta \ln XM_t = \alpha_4 + \sum_{k=1}^{q} \beta_i \Delta \ln XM_{t-k} + \sum_{k=1}^{q} \lambda_i \Delta \ln TT_{t-k} + \sum_{k=1}^{q} \chi_i \Delta \ln Y_{t-k} + \sum_{k=1}^{q} \lambda_i \Delta \ln ER_{t-k} + \theta_i EC_{t-1} + \mu_{4t} \quad (14)$$

$$\Delta \ln ER_t = \alpha 5 + \sum_{k=1}^{q} \beta_i \Delta \ln ER_{t-k} + \sum_{k=1}^{q} \lambda_i \Delta \ln TT_{t-k} + \sum_{k=1}^{q} \beta_i \Delta \ln XM_{t-k} + \sum_{k=1}^{q} \vartheta_i \Delta \ln Y_{t-k} + \theta_i EC_{t-1} + \mu_{5t} \quad (15)$$

When Δ is the first difference operator, ln is the natural logarithm, the residuals $\mu_{1t} \ldots \mu_{5t}$ are assumed to be normally distributed and white noise. EC_{t-1} is the one period lagged error correction term derived from the hierarchical model regression analysis. The EC_{t-1} variable will be excluded from that model if the variables are not co-integrated. The optimal lag length *p* is determined by the Akaike Information Criterion (AIC) with a maximum lag of four because it has a superior performance in a small sample (Lütkepohl, 2005). The chi-square statistics are then applied to ascertain the direction of Granger causality between the variables of interest. In this study, we test the following hypotheses:

1. $H_{01} : \lambda_1 = \lambda_2 = \ldots = \lambda_q = 0$, implying that $\ln TT$ does not Granger-cause $\ln Y$
2. $H_{02} : \beta_1 = \beta_2 = \ldots = \beta_q = 0$, implying that $\ln Y$ does not Granger-cause $\ln TT$
3. $H_{03} : \kappa_1 = \kappa_2 = \ldots = \kappa_q = 0$, implying that $\ln XM$ does not Granger-cause $\ln Y$

4. $H_{04}: \eta_1 = \eta_2 = ... = \eta_q = 0$, implying that $\ln ER$ does not Granger-cause $\ln Y$
5. $H_{05}: \chi_1 = \chi_2 = ... = \chi_q = 0$, implying that $\ln Y$ does not Granger-cause $\ln XM$
6. $H_{06}: \vartheta_1 = \vartheta_2 = ... = \vartheta_q = 0$, implying that $\ln Y$ does not Granger-cause $\ln ER$

RESULTS

The Table 4 shows evidence that all variables, using an impulse dummy model and a shift dummy model, are non-stationary at a 5 percentage level of significance in their level form. Furthermore, all series are transformed into first difference form and unit root analysis has been conducted for the transformed series. The results show that all variables are stationary. This implies that all variables are stationary at first difference or I(1); therefore, we can proceed for cointegration analysis.

Table4. SL Unit root test

Variables	Lag	Models			
		Impulse dummy		Shift dummy	
Brake date		2001 Q2	2011 Q3	2001 Q2	2011 Q3
$\ln Y$	2	0.2280	0.2119	0.1338	-0.0879
$\ln TT$	1	-0.9885	-0.9845	-1.0350	-0.7372
$\ln XM$	1	-0.1682	-0.1512	-0.3240	-0.2734
$\ln ER$	2	-1.9442	-1.9044	-1.9326	-1.9059

Note: 1. The critical values -3.55 and -3.03 are obtained from Lanne et al. (2002) at 1%, 5% respectively 2. The lag length is computed by Schwarts Information Criterion (SIC) with a maximum of four
Source: JMulti's calculation

In the secondary stage, before the cointegration test, a hierarchical model of the economic growth in tourism in Lao PDR (equation1 and 2) was estimated by employing a step wise regression analysis method. The result found that Thai tourist arrivals to Lao PDR are positively related to

the tourism GDP of Lao PDR at a 1% level (equation 1). In addition, Thai tourist arrivals to Lao PDR and the volume of international trade are positive related to the tourism GDP of Lao PDR at a 1% level (equation 2). Moreover, the result from the regression analysis shows that the exchange rate between Lao PDR and Thailand is eliminated from equation 2 (see Table 5).

Table5. Estimation Results of the Hierarchical model using Regression Analysis

Equation	Dependent: lnY / In dependent variables	Coefficients	t-statistics	$\overline{R}^2$
1	Constant	-0.418	-1.057	
	lnTT	0.577	17.760***	0.888
2	Constant	1.128	2.500***	
	lnTT	0.259	3.705***	0.911
	lnXM	0.354	4.921***	

Note: t- statistics is in the parentheses. The asterisk * denotes significance at 1 percent level

From the hierarchical model estimation, two equations are examined by employing a cointegration test, which is presented in Table 6. It was found that both equations are co-integrated with one cointegrating vector. It means that equation 1 and 2 can explain that the long run estimation result in each equation has 1 dependent variable. Therefore, the results of the hierarchical model estimation have to be tested with a cointegration test. The co-integration test results are presented in Table 6.

Table6. Saikkonen and Lütkepohl (2000a,b,c) Cointegration test results

Equation	Trace test	Constant		Constant and trend		Orthogonal trend	
		LR	P-value	LR	P-value	LR	P-value
1. (ln$Y$, lnTT)	0	8.70	0.1896	12.62	0.1539	13.13	0.0118
	1	0.31	0.6379	0.98	0.7974	-	-

2.	0	25.24	0.0359	26.42	0.0911	18.38	0.1087
(ln*Y*,	1	3.98	0.7130	6.55	0.7147	5.07	0.3282
ln*TT*,	2	0.20	0.7119	0.37	0.9492	-	-
ln*EX*)							

Source: JMulti's calculation

In the third stage of the causality test, both equations are directly tested by employing the Granger causality test for equations 11 – 14 which means testing 4 hypotheses from H_{o1} - H_{o3} *and* H_{o5} (equation 15, H_{o4} *and* H_{o6} have not been tested because the exchange rate between Lao PDR and Thailand factor has been eliminated from the regression process). In most studies, the existence of co-integrating variables suggests that there must be Granger causality in at least one direction. This research not only focuses on two directions in the short-run (see table 7 and table 8) but also considers the long-run Granger causality based the Vector Error-Correction Model.

The results in the short-run are tested by χ^2 -statistics and in the long-run are tested by t-test. From Table 7, we find that the number of Thai tourists visiting Lao PDR is related to Lao PDR's tourism GDP in the short run and the long run, and the tourism GDP of Lao PDR deviates from the equilibrium and returns to the long-run equilibrium by an approximate 6.21% level of significance. Moreover, from Table 8, Thai tourists visiting Lao PDR and international trade have long run causality on the tourism GDP of Lao PDR, and they deviate from the equilibrium and return to the long-run equilibrium at about a 5.82% level of significance; however, Thai tourists visiting Lao PDR is related to the tourism GDP of Lao PDR only in the short-run.

Table7. The results of Granger causality test (equation 1)

Dependent variable	Lag	Type of causality		
		Short run		Long -run
		χ^2 statistics (p-values)		t - statistics
		$\sum \Delta \ln Y_{t-1}$	$\sum \Delta \ln TT_{t-1}$	EC_{t-1}
$\sum \Delta \ln Y_{t-1}$	1	-	6.1208*** (0.0134)	-0.0621 (-2.3705)***

$\sum \Delta \ln TT_{t-1}$	1	3.2411 (0.0718)	-	0.4625[a] (2.5519)**

Note: a, cannot be accepted because the error correction factor is a positive value
The asterisk *** and ** denotes the significance at 1% and 5% level respectively.

Table8. The results of Granger causality test (equation 2)

Dependent variable	Lag	Type of causality			
		Short run			Long -run
		χ^2 statistics (p-values)			t - statistics
		$\sum \Delta \ln Y_{t-1}$	$\sum \Delta \ln TT_{t-1}$	$\sum \Delta \ln XM_{t-1}$	EC_{t-1}
$\sum \Delta \ln Y_{t-1}$	1	-	5.7038** (0.0161)	0.4784 (0.4891)	-0.0582*** (-1.7981)
$\sum \Delta \ln XM_{t-1}$	1	0.1294 (0.7191)	1.078 (0.2991)	-	

Note: The asterisk *** and ** denotes the significance at 1% and 5% level respectively.

CONCLUSIONS

The objective of the study is to examine the relationships between the economic growth of tourism in Lao PDR, number of Thai tourists visiting Lao PDR, international trade and the exchange rate by using a hierarchical model. Quarterly data were provided to test for unit roots; a stepwise method for the hierarchical model; a co-integration test and Granger causality. We conclude that there is new tourism economic growth in Lao PDR because the bivariate regression test shows the number of Thai tourists visiting Lao PDR affects the economic growth of tourism in Lao PDR in both the short run and the long run. Moreover, this study created a multivariate regression model, and the results show that Thai tourists visiting Lao PDR and international trade have long run causality with tourism GDP; corresponding with this, Thai tourists visiting Lao PDR also affects the tourism GDP of Lao PDR. The findings of this paper have provided new evidence in Lao PDR because the number of Thai tourists visiting Lao PDR is a strong factor and it is a cause of economic growth in tourism in Lao PDR. Therefore, Thai

tourists are important to encourage economic development in Lao PDR, which represents 10% of GDP. We suggest that Lao PDR should encourage Thai tourists and create new tourism products in Lao PDR to persuade Thai tourists to visit Lao PDR many times to contribute to the economic development of Lao PDR.

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