TOURISM AND ECONOMIC GROWTH OF THAILAND TESTING: NEW EVIDENCE FROM ARDL AND ROLLING WINDOW APPROACHES

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Abstract: This paper examines the causal relationship between the number of international tourist arrivals and economic growth in Thailand. Employing annual data from 1971-2012, the result confirms that the number of international tourist arrivals and economic growth are cointegrated as well as the number of international tourist arrivals has an effect on economic growth. The rolling window estimation result is explained that the numbers of international tourist arrivals positively impact on economic growth except a few years. The causality analysis reveals that there is long-run causality running from tourism to economic growth only. The findings of this study can imply that the number of international tourist arrivals can create tourism sector and expand to another sector of GDP. I suggest that Thailand should concentrate on shock such as political instability, flood management in the short-term and continuously expand new tourism products for holding the number of international tourist arrivals in the long-term. These are led to enhance economic growth sustainability in Thailand.

Keywords: Regional Tourism; Thai Tourism; Economic Growth; Tourism Development; Sustainable Tourism; Rolling Window Approach

JEL Classification: F2, R1, O1, O2

1. INTRODUCTION

Tourism has grown colossal as a result of the globalization process. Tourism is described as a movement in the direction of increasing economic integration through the reduction of natural and human barriers to exchange and increase international flows of capital and labor. Hence, tourism has become the revenue source for each country in the world.

World Tourism Barometer (2013) reported that international tourist arrivals are increasing since the 1990s and international tourism was $1075 million in 2012. This growth is equal to the 4% increase in international tourist arrivals which reached 1035 million in 2012. These data showed that the world demand for tourism is encouraging. Although, in 2012, world international tourist arrivals and international receipts decreased due to the volatility of world economy and shocks, such as financial crisis, natural disaster from global warming, and political instable etc. It is clear that uncertainly of world economy and shocks are highly affecting the tourism industry.

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According to the World Tourism Barometer (2010), 880 million tourists who travelled world-wide in 2009 have generated $852 billion revenue to the tourism industry. The top 5 most visited cities in the Southeast Asia are 1st Singapore, 2nd Kuala Lumpur and Bangkok is ranked the third in 2009. These cities have ability and competitiveness in the tourism industry. Moreover, the travel and tourism competitiveness index (TTCI) in 2013 is a measurement of factors that make it attractive to develop business in the travel and tourism industry in 140 countries. TTCI of Thailand was ranked 3rd in Southeast Asia (Blanke and Chiesa, 2013).

Tourism contributes largely to the economy, especially provides job opportunity to direct and indirect employment. Thailand's tourism contributes 16.6% to GDP in 2012. In addition, Thailand's direct tourism industry jobs account for 12.4% of total employment in 2012 and the average 12.6% of the total employment during 2006-2012 (Table 1). The contribution of tourism to the tourism export is clearly reflected the total export of Thailand. Therefore, tourism can be a viable economic growth strategy for bringing jobs and income to Thailand.

Table 1
Tourism as Percentage of GDP, Total Employment and Exports in
Thailand 2006-2012

Years	Tourism GDP (% of National GDP)	Tourism Jobs (% of total employment)	Tourism Exports (% of total exports)
2006	17.3	13.5	10.8
2007	16.9	13.4	10.5
2008	17.2	13.7	10.6
2009	16.2	13.0	10.9
2010	14.4	11.2	10.4
2011	16.1	11.3	11.3
2012	16.6	12.4	12.1
Average	16.4	12.6	10.9

Source: World Tourism Council (2013)

Ministry of Tourism and Sport of Thailand is the highest authority to manage tourism development activities and programs in the successful of 'Amazing Thailand' have brought 14 million international tourists to Thailand in 2007. However, the political instability in 2008-2009 decreased of international visitors of 16% over the first six months of 2009. A new marketing slogan "Amazing Thailand, Amazing Value" adopted in 2010 to stimulate international tourists visit to Thailand (Mekong Tourism Coordinating office, 2013).

As mention above, tourism is important for economic growth of Thailand however, there are many studies on tourism and economic growth but the tourism and economic growth in Thailand has never been conducted except Chancharat and Chancharat (2010) found that tourism is not cointegrated with economic growth in Thailand. Moreover, Chancharat and Chancharat (2010) looked at the aggregate

data in 1979-2007 by using Gregory and Hansen (1996) testing. However, this paper strives to fill the gap of research with an examination between tourism and economic growth by using the autoregressive distributed lag (ARDL) and rolling window approaches. It is conducted for the tourism development policy and policy recommendations to respond the country. The next section of the paper reviews the relevant literature; section 3 describes the data and methodology, section 4 presents the empirical results and section 5 concludes.

2. LITERATURE REVIEW

There are many studies regarding the causal relationship between tourism and growth. The study of tourism development and economic growth utilize the traditional sources using estimation methods that are based on investigating the casual relationship between tourism and growth for examples Oh (2005) and Lee and Chang (2008). Likewise, Chancharat (2011) reviewed previous studies relating to tourism development and economic growth. Chancharat (2011) found that researchers argue that tourism development not only stimulates the growth of the industry, but also triggers overall economic growth. As a result, most developing countries use promotion of the tourism industry as an important economic development strategy to enhance economic growth. Therefore, a number of previous studies have focused on examining the relationships between tourism development and economic growth in various countries.

Furthermore, Hye and Khan (2013) estimated the long-run relationship between income from tourism and the economic growth in Pakistan by using the Johansen Juselius cointegration, autoregressive distributed lag model (ARDL) and rolling windows bounds testing approach to check the stability of the model for confirming the long-run relationship between income from tourism and economic growth in Pakistan. The result found that income from tourism has led economic growth. On the other hand, the autoregressive distributed lag (ARDL) testing approach was used analysis causal relationship between exports and economic growth in Zimbabwe by Tsaurai and Odhiambo (2012). They found that there is a distinct causal flow from export growth to economic growth in Zimbabwe - both in the short and long runs.

The tourism and economic growth study in Thailand that Chang et al. (2009) evaluated changes in tourism trend by using Box–Jenkins ARIMA models to obtain information on inbound trips and the trends in foreign tourist arrivals from six major countries in East Asia to Thailand. Wattakuljarus and Conhead (2008) documented that Thailand's tourism growth should improve income distribution by expanding demand for relatively low-skilled labor. The results indicated that tourism growth is not a panacea for other goals of development of Thailand.

Moreover, Chancharat and Chancharat (2010) investigated the co-movements and casual relationships among real GDP, tourism development and the real

exchange rate in Thailand. The result is consistent with the previous study because there is no cointegration between tourism development and economic growth as well as Chancharat (2011) presented previous studies relating to tourism development and economic growth in Thailand. Despite of the Thai tourism industry contributes to the Thai economy because tourism creates for millions of jobs and a substantial fraction of export earnings and a wide range of other industries. However, there has been no previous study exploring the effect of the tourism sector on economic expansion in the Thai context.

As mentioned above, there scant of evidence in Thailand to confirm the causal relationships between tourism and economic development are cointegrated. The research in Thailand by using the autoregressive distributed lag (ARDL) proposed by Pesaran and others (2001) and rolling window approach have not done with this issue. Moreover, the casual causality both short and long runs by the Granger causality test are missing in the literature.

3.   DATA AND METHODOLOGY

3.1. Data

The data of this research use annual data from 1971 to 2012 which covers 43 observations. The details of variables are as follows:

(i)   International tourist arrivals: T The number of international tourist arrivals to Thailand which is collected by tourism department of Thailand.

(ii) Economic growth: Y The gross domestic product (GDP) at the base year 2000 denotes economic growth variable which is collected from the Office of National Economic and Social Development Board.

In addition, all data are transformed to natural logarithms before the analysis. This study will conduct the unit root test, cointegration test by using the ARDL model, testing the stability of model by rolling window approach and Granger causality test, respectively.

3.2. Methodology

The model of tourism Income tourists and economic growth is as follows:

$$\ln Y_i = \alpha_i + \beta_1 T_{it} + \varepsilon_i \tag{1}$$

$$\ln T_i = \delta_i + \beta_2 Y_{it} + u_i \tag{2}$$

From equations 1 and 2, the expected signs for coefficients of explanatory variables are β_1 and $\beta_2 > 0$. The long- run relationship of the variables is tested by ARDL approach proposed by Pesaran *et al.* (2001). The ARDL model can be specified in an unrestricted error correction model (UECM)

$$\Delta \ln Y_t = \alpha_1 + \beta_1 \ln Y_{t-1} + \beta_2 \ln T_{t-1} + \sum_{i=1}^{p} \beta_3 \Delta \ln Y_{t-i} + \sum_{i=0}^{q} \beta_4 \Delta \ln T_{t-i} + \varepsilon_t \tag{3}$$

$$\Delta \ln T_t = \alpha_2 + \beta_5 \ln T_{t-1} + \beta_6 \ln Y_{t-1} + \sum_{i=1}^{p} \beta_7 \Delta \ln T_{t-i} + \sum_{i=0}^{q} \beta_8 \Delta \ln Y_{t-i} + \varepsilon_t \tag{4}$$

The *F* test is used for testing the existence of a long–run relationship. The *F* test indicates which variable should be normalized when a long-run relationship exist. The null hypothesis of no cointegration among variables is *Ho:* $\beta_1 = \beta_2 = 0$ (equation 3) and *Ho:* $\beta_5 = \beta_6 = 0$ (equation 4) against the alternative hypothesis *Ha:* $\beta_1 \neq \beta_2 \neq 0$ (equation 3) and *Ha:* $\beta_5 \neq \beta_6 \neq 0$ (equation 4). Given the small size of 43 observations for analysis, the critical value used are reported by Narayan (2005) in case V (unrestricted intercept intercept and unrestricted trend).

If the computed *F*-statistic is larger than the critical values, the null hypothesis can be rejected and this infers that the variables are cointegrated. If the variables are cointegrated, there is evidence of long–run relationship among the variables and the result is tested the stability by rolling window approach. The rolling regression model is used to evaluate the ARDL model regression in the sample size (Pesaran and Timmermann, 2012). Thus, we can estimate the coefficient of each observation of the sample by setting the rolling window size. The window sized is employed at 6. If the economic indicator is the change over time that this approach capture this instability. Following Narayan (2005), the long–run model is written as follows:

$$\ln Y_t = \alpha_1 + \sum_{i=1}^{p} \kappa_1 \Delta \ln Y_{t-i} + \sum_{i=0}^{q} \kappa_2 \Delta \ln T_{t-i} + \varepsilon_{1t} \tag{5}$$

$$\ln T_t = \alpha_2 + \sum_{i=1}^{p} \kappa_3 \Delta \ln T_{t-i} + \sum_{i=0}^{q} \kappa_4 \Delta \ln Y_{t-i} + \varepsilon_{2t} \tag{6}$$

Next, we consider the direction of the causal links between tourism income (*T*) and economic growth (*Y*). According to identify the cause of each variable, the relationships are estimated using a vector error correction model (VECM) and the two-step procedure of Granger causality test by Engle and Granger (1987) with a dynamic error correction term. The VECM is augmented with a one period lagged error correction term which is obtained from the cointegrated model. The number of lags (*k*) is determined by Schwarts Information Criterion (SIC). However, when the series are not panel cointegrated, an unrestricted vector autoregressive (VAR) based Granger causality test is used in which all variables are placed as endogenous. The number of lags is also determined by SIC.

$$\Delta \ln Y_t = \lambda_1 + \sum_{i=1}^{p} \chi_1 \Delta \ln Y_{t-i} + \sum_{i=0}^{q} \chi_2 \Delta \ln T_{t-i} + \chi_3 ECM_{1t-1} + \nu_{1t} \tag{7}$$

$$\Delta \ln T_t = \lambda_2 + \sum_{i=1}^{p} \chi_4 \Delta \ln T_{t-i} + \sum_{i=0}^{q} \chi_5 \Delta \ln Y_{t-i} + \chi_6 ECM_{2t-1} + \nu_{2t} \tag{8}$$

Where Δ denotes the first differences, v_1 and v_2 are the disturbance term, ECM_{1t-1} and ECM_{2t-1} denote the lagged error correction term generated from the long-run relationship from equations 5 and 6.

$$ECM_{1t} = \ln Y_t - \alpha_1 - \sum_{i=1}^{p} \kappa_1 \Delta \ln Y_{t-i} - \sum_{i=0}^{q} \kappa_2 \Delta \ln T_{t-i} \qquad (9)$$

$$ECM_{2t} = \ln T_t - \alpha_2 - \sum_{i=1}^{p} \kappa_3 \Delta \ln T_{t-i} - \sum_{i=0}^{q} \kappa_4 \Delta \ln Y_{t-i} \qquad (10)$$

4. EMPIRICAL RESULTS

Prior to cointegration test, all variables are tested with unit root tests by ADF and PP-test. The results from the panel unit root test are presented in Table 2. All variables are tested both in levels and first difference with a constant and without a trend. According to a number of international tourist arrivals (ln T) and economic growth (ln Y), the unit root hypothesis cannot be rejected when the variables are taken in level. In contrast, when all variables are tested with first difference, the hypothesis of non-stationary is rejected at 1% level of significance. These results is concluded that the series are characterized as I (1) process for all variables and it can implement a test for cointegration by ARDL approach.

Table 2
Unit Root Test

Variables	ADF test		PP test	
	Level	*Difference*	*Level*	*Difference*
ln T	-1.50	-5.34***	-2.33	-6.41***
ln Y	-2.03	-3.67***	-2.03	-3.68***

Note: *** denotes significant at 1% level of significance respectively.

Next, this study employs the autoregressive distributed lag (ARDL) based long run causality test. The Long run causality decision is taken with the help of following rules. If the computed F-statistic greater than upper bound critical values, this indicates the long run causality or a long run relationship. If the test statistics are below the upper critical value, this indicates the no long run causality or no long run relationship between the variables. Table 3 shows ARDL (1, 1) the best model with F–statistics = 10.96 inferring that there is a long–run relationship (Eq. 3). However, the second model (Eq.4), ARDL (1, 0) is not cointegrated because F–statistics = 0.01. Hence, the equation 4 is not cointegrated in the long run. The long–run coefficients are presented in Table 3.

The result is found that the number of international tourist arrivals is positive related to economic growth at a 5% significant level. However, the economic

growth is not related to number of international tourist arrivals statistically significant.

Table 3
Long Run Coefficients

Models	Independent Variables	
$\ln Y \mid \ln T$	$\ln T$	Constant
ARDL(1,1)	1.53	0.93
	(2.33)**	(0.21)
$\ln T \mid \ln Y$	$\ln Y$	Constant
ARDL(1,0)	0.41	23.85
	(-0.15)	(0.25)

Note: t-statistic is in the parentheses. The asterisk ** denotes significance at 5 percent level.

To confirm the robustness of cointegration by ARDL approach result, the rolling window estimation is presented in Figure 1 that is shown the rolling window results. The black tick line represents the coefficients and light black upper and lower band represents at 5% level. Moreover, Figure 1 shows the graph of intercept that shows it remains positive over the sample size.

Figure 2 shows the impact of international tourist arrivals on economic growth has fluctuated in the sample period. The coefficient elasticity for economic growth with respect to number of international tourist arrivals is sharply increased from 2005 to 2008 and decline from 2009 to 2011. However, the sample has positively related to economic growth and remains positive over the sample size.

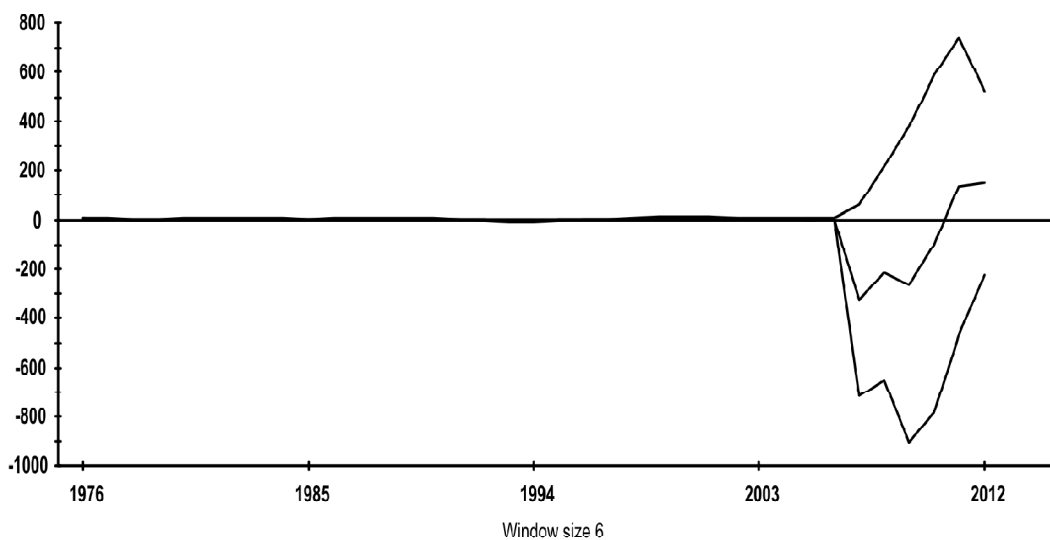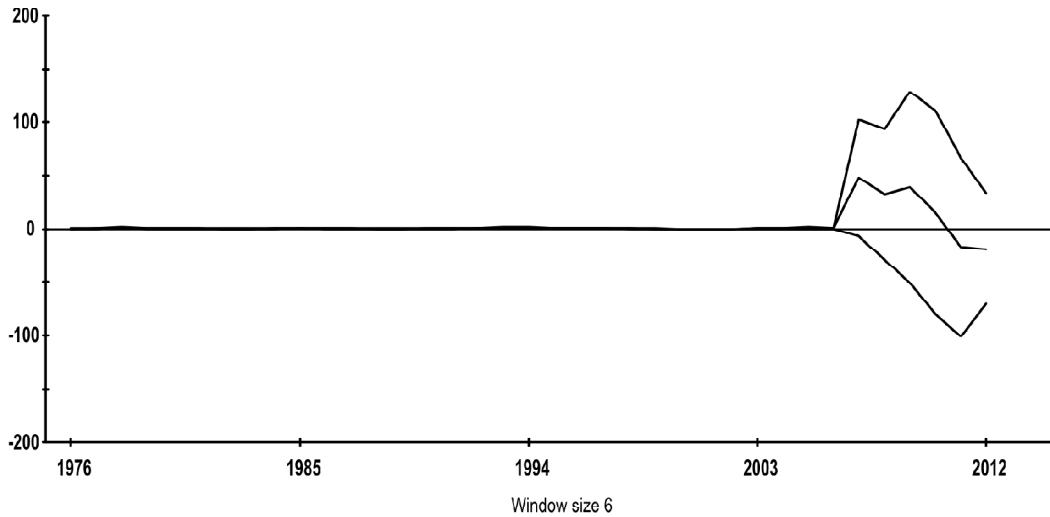**Figure 1: Coefficient of Constant Term and its two *S. E. Bands based on Rolling OLS**

Window size 6

Figure 2: Coefficient of LnT and its two*S. E. Bands based on Rolling OLS

Window size 6

Furthermore, Table 4 shows the short-run and long-run Granger causality results. The long-run causality result is unidirectional running from the number of international tourist arrivals to economic growth at 5% significance level. The economic growth of Thailand deviates from the equilibrium to return to the long-run equilibrium is approximately 17%. However, the Granger causality results in the short run is not unidirectional running statistically significant.

Table 4
Granger Causality Test Results

Dependent Variables	Lag	Short Run (χ^2 - stats)		Long Run (t - stats)
		Independent Variable		ECM_{t-1}
		$\Delta \ln Y$	$\Delta \ln T$	
$\Delta \ln Y$	1	-	-0.01	-0.17**
$\Delta \ln T$	1	0.08	-	-

Note: *** and ** denote significant at 1% and 5% levels of significance respectively.

4. CONCLUSIONS

This paper examines the cointegration and causal relationships between the number of international tourist arrivals to Thailand and economic growth. Unit root test, cointegration test by using ARDL, rolling window regression and Granger causality test is employed in the approaches.

The empirical results can be confirmed that the tourism and economic growth are cointegrated for long run relationship over the study period of 1971-2012 that is contrasted Chancharat and Chancharat (2013) found that tourism and economic

growth are not cointegrated. Hence, the result is indicated that tourism has an effect on economic growth.

The rolling window regression result explains that the numbing of international tourist arrivals positively impacts on economic growth except few years especially in 2010 – 2011 because Thailand was affected by political instability and floods in many provinces of Thailand. However, the instability results from rolling window estimation are short-period.

The causality analysis reveals that feedback hypothesis exist between a number of international tourist arrivals and economic growth that there is long-run causality running from tourism for economic growth only.

The findings of this paper are important implications for tourism policy decision-making in Thailand because the economic growth in Thailand is affected by the number of international tourist arrivals in the long-run. It can imply that the number of international tourist arrivals can create tourism sector and expand to another sector of GDP. I suggest that Thailand should concentrate on shock management for examples political instability, flood management in the short-term and continuously expands new tourism products for holding the number of international tourist arrivals in the long-term. These are led to enhance economic growth sustainability in Thailand.

References

Blanke, J. and Chiesa, T. (2013), "The Travel and Tourism Competitiveness Report 2013." Retrieved from *http://reports.weforum.org/travel-and-tourism- competitiveness-report-2013.*

Chancharat, S. and Chancharat, N. (2010), "Tourism Development and Economic Growth: Evidence from Thailand." *International Journal of Applied Business and Economic Research*, 8(1), pp. 65-77.

Chancharat, S. (2011), "Thai Tourism and Economic Development: The Current State of Research." *Kasetsart Journal (Social Sciences)*, 32, pp. 340-351.

Chang, C. L., Sriboonchitta, S. and Wiboonpongse, A. (2009), "Modelling and Forecasting Tourism from East Asia to Thailand under Temporal and Spatial Aggregation." *Mathematics and Computers in Simulation*, 79(5), pp. 1730-1744.

Engle, R. F. and Granger, C. J. (1987), "Cointegration and Error Correction: Representation, Estimation and Testing." *Econometrica*, 55, pp. 251-276.

Hye, Q. M. A. and Khan, R. E. A. (2013), "Tourism-led Growth Hypothesis: A Case Study of Pakistan." *Asia Pacific Journal of Tourism Research*, 18(4), pp. 303-313.

Lee, C. C. and Chang, C. P. (2008), "Tourism Development and Economic Growth: A Closer Look at Panels." *Tourism Management*, 29, pp. 180-192.

Mekong Tourism Coordinating office. (2013), "Tourism Statistics." Retrieved from *http://mekongtourism.org/website.*

Nayaran, P. K. (2005), "The Saving and Investment Nexus for China: Evidence from Cointegration Tests." *Applied Economics*, 37, pp. 1979-1990.

Oh, C. O. (2005), "The Contribution of Tourism Development to Economic Growth in the Korean Economy." *Tourism Management*, 26, pp. 39-44.

Pesaran, H. M. and Shin, Y. and Smith, R. J. (2001), "Bound Testing Approaches to the Analysis of Level Relationship." *Journal of Applied Econometrics*, 16, pp. 289-326.

Pesaran, M. H. and Timmermann, A. (2012), "Market Timing and Return Prediction under Model Instability." *Journal of Empirical Finance*, 9, pp. 495-510.

Tsaurai, K. and Odhiambo, N. M. (2012), "A Dynamic Causality Test of Exports and Economic Growth in Zimbabwe." *International Journal of Economic Policy in Emerging Economies*, 5(3), pp. 231-242.

Wattanakuljarus, A., Coxhead, I. (2008), "Is Tourism-based Development Good for the Poor? A General Equilibrium Analysis for Thailand." *Journal of Policy Modeling*, 30 (6), pp. 929-955.

World Tourism Barometer (2010), "UNTWO World Tourism Barometer Interim Update." Retrieved from *http://aboutourism.wordpress.com/2010/05/04/unwto-world-tourism-barometer-interim-update-april-2010*.

World Tourism Barometer (2013), "International Tourism Receipts Grew by 4% in 2012. Retrieved from *http://media.unwto.org/en/press-release/2013-05-15/international-tourism- receipts-grew-4-2012*

World Tourism Council. (2013), "Economic Impact Research." Retrieved from *http://www.wttc.org/research/economic-data-search-tool.*