Demand for Thai Tourism by Major Countries: Determinants and Stochastic Simulation

Bundit Chaivichayachat

Department of Economics, Kasetsart University, Bangkok, Thailand

Abstract: Tourism has been introduced as a potential sector to promote economic growth in Thailand since 2004. A significance of government budget was allocated for tourism purpose. Tourism revenues and tourists have been increased following the period of tourism promotion especially for foreign tourists. This paper aims to find the determinants of demand for Thai's tourism in order to forecast and to simulate the impacts of government budget allocated for promoting tourism on foreign tourists. Then, the demand function will be set up for 13 major countries including China, Malaysia, Japan, Korea, Russia, Laos, India, United Kingdom, Australia, Singapore, United States, Germany and Others. By using the quarter data during 2009 to 2016, the LS technique and stochastic simulation will be integrated (1) to simulate the number of foreign tourists of 13 countries in 2017 and (2) to evaluate the impacts of changing government budget for tourism purpose on the number of foreign tourists in 2017. The estimated equations suggested that each individual country determined by the different set of variables with the different behaviors. Then, the policy for promoting tourism should be focused on the individual group of foreign tourists not in broad target. This result give an alternative choice for tourism promoting campaign which lower cost than quantitative measure such as the qualitative measures; visa fee exemption or tax refund. Moreover, the policy to promote the new attractive destination for example Thailand's 12 hidden gems or Thai-licious, should be considered for promoting tourism plan. In summarized, the policy to tourism sector should not be focuses only to promote tourism sector and to initiate the demand but also to promote the strength of supply of tourism and to enhance the sustainable of the tourism sector as well.

Keywords: Forecasting Demand for Tourism, Thai Tourism, Policy for Tourism

1. INTRODUCTION

Tourism has been introduced as a potential sector to promote economic growth in Thailand since 2004. A significance of government budget was allocated for tourism purpose as shown in Figure 1.1. As a result, the size of tourism sector has been grown continuously. Tourism revenues and tourists have been increased

following the period of tourism promotion especially for foreign tourists (Table 1.1). Chaivichayachat (2016b) brought the evidence that policy promoting tourism generated a significance impact on tourism demand and GDP expansion in Thailand.
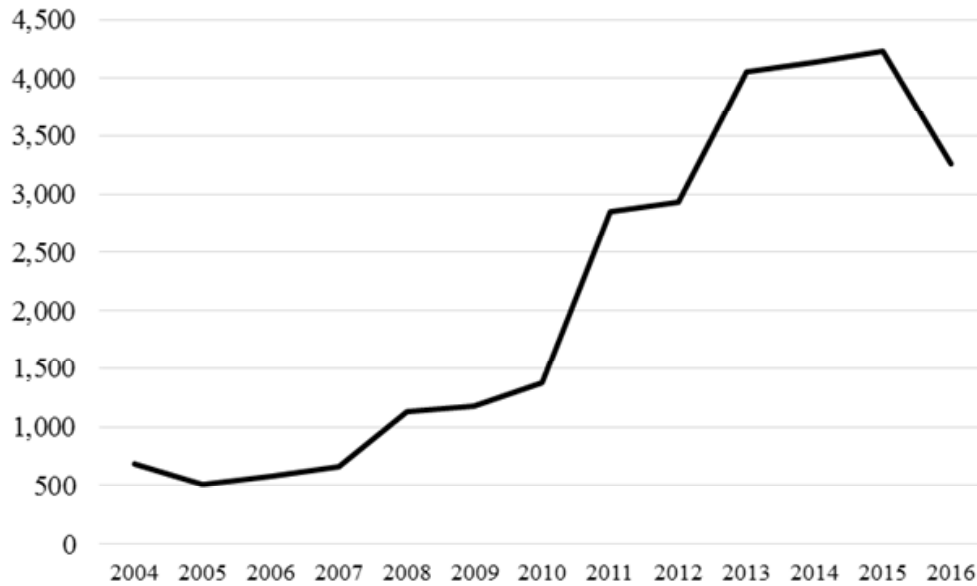

Figure 1.1: Government Budget for Tourism Purpose

Source: Ministry of Finance

Table 1.1
Tourism Revenues and Tourist

	Tourism Revenues (million baht)			Tourists (thousand person)		
	Total	*Foreign*	*Thai*	*Total*	*Foreign*	*Thai*
2005	706.38	371.66	334.72	41.47	11.52	29.95
2006	849.67	484.39	365.28	47.01	13.82	33.18
2007	930.67	550.26	380.42	51.96	12.27	39.68
2008	992.46	576.69	415.76	46.93	14.58	32.34
2009	914.72	512.14	402.57	52.32	14.15	38.17
2010	992.09	594.99	397.11	57.19	15.94	41.25
2011	1,263.77	780.54	483.22	64.54	19.23	45.31
2012	1,564.42	986.42	578.00	69.99	22.35	47.64
2013	1,869.86	1,209.15	660.71	77.06	26.55	50.51
2014	1,881.30	1,177.64	703.66	74.52	24.85	49.67

Source: Ministry of Tourism and Sports

Song and Fei (2004) setup an empirical model, based on the demand theory and least squares estimator, for forecast the number of major foreign tourists in China. They found that the tourist's income, consumer price index in China and nominal exchange rate determine the number of tourists significantly. The model can do the ex pose forecast with low error. Song and Wiit (2006) forecasted tourists in Macau during 2003

to 2008. They found that demand theory can be applied to forecast the number of foreign tourists. Song and Li (2009) summarized the methods for forecasting the number of tourists. They found more than 25 types of econometrics models which can be applied for forecasting. Paudyal (2009) also applied demand theory and least squares estimator to forecast foreign tourist in Nepal. Saudi, Scaccivaillani and Ali (2010) forecasted the foreign tourists in Dubai. For Thailand, Chaivichayachat (2016a) employs the demand theory to simulate the impacts of Bangkok Bomb on tourism sector and economics variables by employed the stochastic simulation techinque. In Chaivichayachat (2015), the foreign tourism revenue was estimated and calculated the impacts of changing in foreign tourism revenue on secotal output.

This paper aims to find the determinants of demand for Thai's tourism in order to forecast and to simulate the impacts of government budget allocated for promoting tourism on foreign tourists. Then, the demand function will be set up for 13 major countries including China, Malaysia, Japan, Korea, Russia, Laos, India, United Kingdom, Australia, Singapore, United States, Germany and Others. By using the quarter data during 2009 to 2016, the LS technique and stochastic simulation will be integrated (1) to simulate the number of foreign tourists of 13 countries in 2017 and (2) to evaluate the impacts of changing government budget for tourism purpose on the number of foreign tourists in 2017. The results can be used to organize the effective policy to promote tourism in Thailand.

2. MODEL, DATA AND METHODOLOGY

The demand for tourism will be employed for explain the behavior of foreign tourists. According to the maximized utility behavior, the demand for tourism usually determined by tourism price and tourist's income. Moreover, the recent empirical works agree that there many economic variables will be effected the demand for tourism including 3 groups: push factors, pull factor and seasonal factors. Therefore, the demand for tourism can be organized as following:

$$FN_i = f\ (YM_{it}, PM_{it}, ER_{it}, UN_{it}, PO_t, YTH_t, HG_t, HS_t, RT_t, TB_t, CR_t, PS_t, Q1, Q2, Q3)$$

where FN_i is the number of foreign tourist from country i, YM_i is the per capita income for tourist from country i (adjusted in term of PPP), ER_i is the nominal exchange in country i in term of US dollar, UN_i is unemployment rate in country i, PO_i is the average price of the major competitor countries of Thai tourism including Malaysia, Laos, Vietnam, and Myanmar. YTH is the nominal GDP in Thailand, HG is the number of hotels and guest houses in Thailand, HS is the number of hospitals, TB is the government budget to promote tourism, CR is the crime rate, PO is dummy variable for economic and political instability in Thailand; PO = 1 when the economic and political instability was found and PO = 0 otherwise, Q1, Q2 and Q3 are dummy variables represent the different season in Thailand, and i = 1, 2, …, 13 for China, Malaysia, Japan, Korea, Russia, Laos, India, United Kingdom, Australia, Singapore, United States, Germany and Others, respectively.

Quarterly data during 2009 to 2016 organized by using various data sources. Foreign tourists are collected from Ministry of Tourism and Sports (MOTS). International data including per capita income, consumer price index exchange rate and unemployment rate collected from international financial statistic (IFS), World Economic Outlook database (WEO) and World Bank. For Data in Thailand, the database of Bank of Thailand (BOT), Ministry of Finance (MOF), National Statistical Office of Thailand (NSO) and Office of the National Economic and Social Development Board (NESDB) were applied.

For the methodology, after the demand for Thai tourism function of each major country were organized, the least squares (LS) technique will applied and developed the estimated results following the concept of general-to-specific. Each estimated equation will be used to construct an estimated model for simulation purposes. The stochastic simulation method will be introduced for ex pose and ex ante simulation to forecast the number of foreign tourists in 2017.

3. RESULTS

By using the quarterly data during 2009 to 2016, the estimated demand function were represented in Table 3.1. The results finding that only Germany tourists who did not response to the group of push factors. For the pull factors, all estimated equations were determined by them. Moreover, all foreign tourists were depended on seasonality expect Chinese tourists.

Table 3.1
Estimated demand for Thai Tourism by Major Countries

		China	Malaysia	Japan	Korea	Russia	Laos	India	UK	Australia	Singapore	US	Germany	Others
Push Factors	YM_i					1293.8		2119.887	126.6727			873.8578		
	t-stat.					12.44		2.84	5.81			8.31		
	PM_i	-203719	-1360561	-131253	-104584		-27677.8	-116366	-15679.7	-194692		-47899.5		-169674.6
	t-stat.	-1.93	-6.81	-3.49	-4.53		-1.94	-3.62	-2.82	-29.76		-4.06		-4.74
	ER_i		9519794	85495.05	8399.361	416854.8		527621.7			4989578			
	t-stat.		7.16	2.73	3.63	6.89		2.89			3.09			
	UN_i					-738306					-58783.4	-317331		-2742511
	t-stat.					-10.11					-2.75	-6.26		-3.42
Pull Factors	PO		302965.7	49915.15			45587.88	109216.3			19995.87	58241.1		
	t-stat.		5.89	4.09			2.83	4.06			10.57	5.35		
	YTH		1377.836						100.5551	163.0968		657.9698		
	t-stat.		5.69						4.39	6.49		7.15		
	HG	236.2755	388.5529		50.57			120.8411	32.34986		19.67407	15.49562	7.223558	118.1874
	t-stat.	4.23	7.62		9.82			3.09	7.25		6.76	2.22	8.04	2.43
	HS			297.1338	350.4802	721.4465			120.4607	85.15647	136.0337	240.8422	86.4759	1069.358
	t-stat.			3.41	11.75	4.23			6.54	14.17	5.71	4.33	2.71	2.85
	RT					380921.4					239442.1			1803492
	t-stat.					2.85					6.45			3.31
	TB	337.7317						62.81851						
	t-stat.	3.93						5.17						
	CR				-1.8743		-0.72172		-0.64634			-1.04734	-0.40423	
	t-stat.				-15.53		-3.09		-4.01			-4.99	-2.04	
	PS			19858.45										100620.9
	t-stat.			1.72										2.42
Seasonality	Q1				14941.13	252830.9	-26074.3		46520.07	-30680.6		51686.3	104149.9	517620.2
	t-stat.				9.38	5.15	-3.8		14.77	-4.73		14.14	18.52	8.96
	Q2			-71490.6	-62788.6		-24888.7	56905.47		-16634.2			-10207.9	
	t-stat.			-6.39	-50.25		2.63	29.99		-2.69			-1.83	
	Q4		97025.39	-32861.3		267119.8	-28620.5		49213.76		50156.42	55517.14	71720.75	259735.2
	t-stat.		2.81	-2.87		-3.89	-2.94		15.75		3.91	13.43	12.41	4.65
	C	3666293	23728398	-2194.26	1929168	-7794569	-281322	-1089552	1285321	569330.3	-909498	4544712	205374.8	10602039
	t-stat.	1.54	6.49	-0.03	2.02	-12.37	-4.9	-2.81	7.24	14.17	-2.49	8.42	3.99	-4.55
	R-squared	0.962413	0.920176	0.877226	0.996527	0.977297	0.917796	0.897783	0.965023	0.954539	0.920591	0.971916	0.969287	0.96854
	F Stat.	160.0303	36.22931	22.45577	430.4572	86.09478	42.79	17.57	58.24593	41.99367	44.43978	53.48518	120.9791	58.49334

Note: All of independent are statistically significance

All of the estimated equation were organized into the estimated model with the following identity:

$$NF_t = NF_{1t} + NF_{2t} + NF_{3t} + NF_{4t} + NF_{5t} + NF_{6t} + NF_{7t} + NF_{8t} + NF_{9t} + NF_{10t} + NF_{11t} + NF_{12t} + NF_{13t}$$

where NF is total foreign tourist.

The estimated model will be employed to perform the stochastic simulation technique for ex pose simulation during 2014 to 2016. The results of ex pose simulation were shown in Figure 3.1. The fitted lines are move with same pattern as the actual line. In order to evaluate the performance of the estimated model, Theil's inequality coefficient (U) will be invited. Theil's inequality coefficient measures the difference between the actual foreign tourists and simulated foreign tourists. It lies between zero and one, the higher U means the lower performance of the estimated model. Table 3.2 reports the U statistic according to the ex pose simulation. The range of U for each estimated equation is 0.006 to 0.061. In average, the estimated model can used for simulation the number of foreign tourists with 2.7 percent of error. Then, the estimated model will be used for ex ante simulation with high predictability performance.
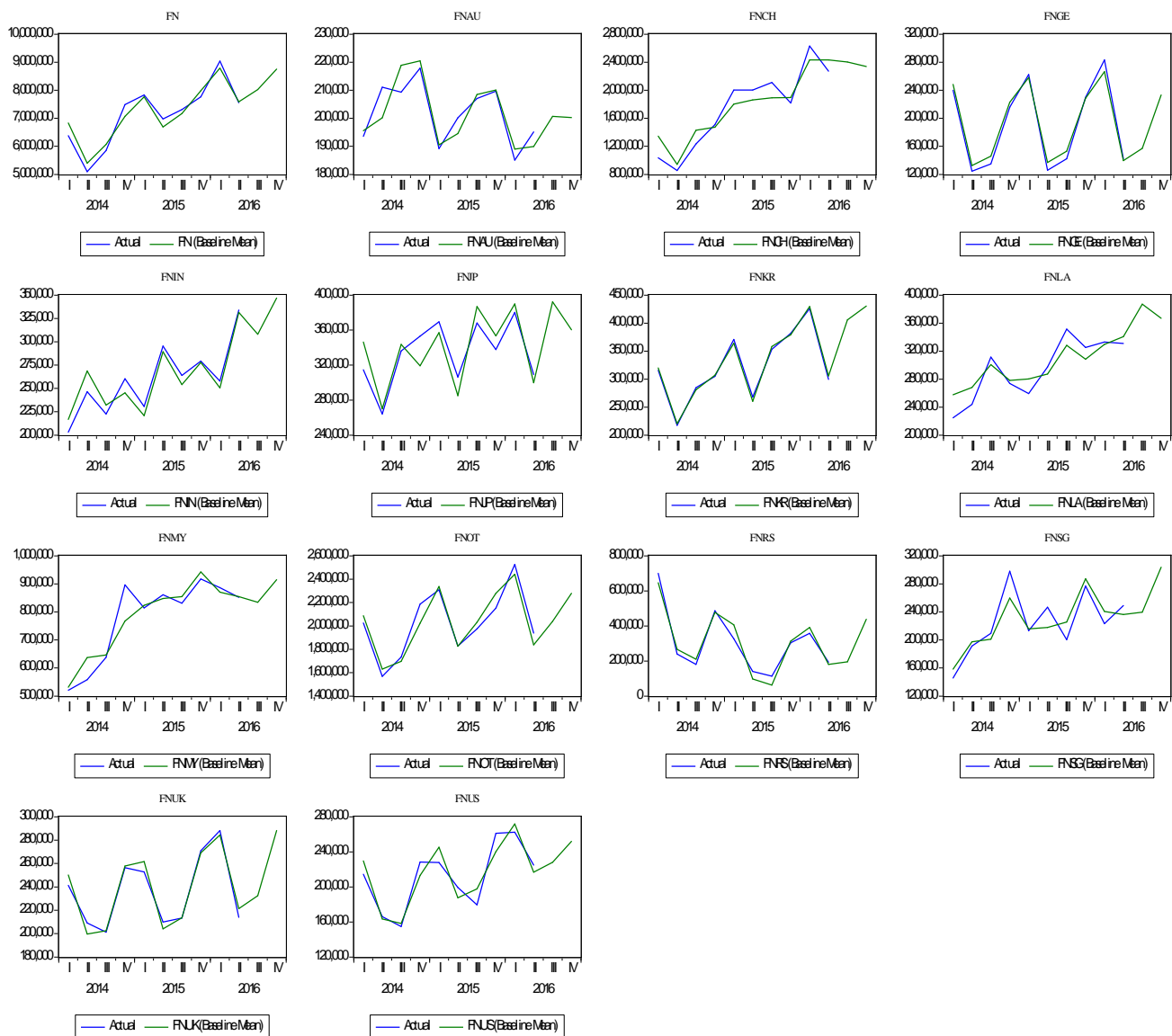

Figure 3.1: Ex pose stochastic simulation

Table 3.3
Ex Pose Simulation: Theil's Inequality Coefficients (U)

Foreign Tourist	U	% of error
China	0.035	3.5
Malaysia	0.032	3.2
Japan	0.028	2.8
Korea	0.006	0.6
Russian	0.061	6.1
Laos	0.031	3.1
India	0.022	2.2
United Kingdom	0.012	1.2
Australia	0.013	1.3
Singapore	0.038	3.8
United States	0.031	3.1
Germany	0.023	2.3
Others	0.021	2.1
Average	0.027	2.7

For the ex ante simulation, the estimated model will be used to simulate the nearly future in 2017. There are two assumptions of ex ante simulation. First assumption for the ex ante is called baseline. In this case, all exogenous variables are assumed to change in the same rate in 2014 to 2016. For the government budget to promote tourism sector was assumed to increase for 5 percent from 2016 which is the normal growth rate of budget for tourism promoting purposes. Then, the government budget in 2017 for this assumption is equal to 1,580.86 billion bath. The results based on the stochastic simulation for baseline ex ante simulation in 2017 organized in Table 3.3. In 2017, the foreign tourists will grow 2.56 percent comparing with 2016. The total number of foreign tourists will equal to 32,468,386 person.

Table 3.3
Baseline Ex Ante Simulation of 2017

Person

	Australia	China	Germany	India	Japan	Korea	Laos
2017.1	219,089	2,192,806	296,666	283,035	443,540	447,640	349,182
2017.2	208,820	2,138,623	170,349	371,829	337,008	289,292	366,481
2017.3	224,259	1,991,922	189,480	355,122	399,932	388,328	410,725
2017.4	214,949	1,837,950	269,929	389,034	388,372	411,532	389,199
2017	867,117	8,161,302	926,424	1,337,601	1,568,852	1,536,792	1,515,587

	Malaysia	Russia	Singapore	UK	US	Others	Total
2017.1	951,198	299,544	263,332	314,256	298,976	2,779,453	9,138,717
2017.2	934,094	193,391	240,005	245,439	248,831	2,074,960	7,819,121
2017.3	916,689	230,067	244,492	260,911	256,861	2,134,023	8,002,810
2017.4	999,541	453,295	313,493	305,018	260,020	2,515,990	8,748,323
2017	3,801,522	1,176,297	1,061,322	1,125,623	1,064,688	9,504,425	33,708,971

The second assumption donates for simulate the impacts of government budget for promoting tourism. Then, the government budget will add up for 10 percent and 15 percent from 2016. The ex ante simulation calculated of 10 percent and 15 percent increasing in government budget represented in Table 3.4 and Table 3.5. Following Table 3.1, the increasing in government budget induces the demand for foreign tourists in two major countries: India and China. The tourists from China and India will increase in response to the increasing in government budget.

The total foreign tourists in 2017 will increase to 33,708.971 persons and 34,340,838 persons in the case that increased government budget for 10 percent and 15 percent. Table 3.7 summarized the impact on increasing in government budget to promote tourism. The increasing in government budget to promote tourism for 10 percent (158.09 billion bath) will induce foreign tourist increased for 3.82 percent (408,062 persons) and for 15 percent (1,039,929 billion baht) will induce foreign tourist increased for 5.77 percent (237.13 persons). The average cost per tourist is 2,581.2 baht and 4,385.48 baht in the case of 10 percent and 15 percent increase in government budget, respectively.

Table 3.4
Ex Ante Simulation of 2017: Increasing in Government Budget for 10 percent

							Person
	Australia	*China*	*Germany*	*India*	*Japan*	*Korea*	*Laos*
2017.1	219,089	2,137,713	296,666	272,400	443,540	447,640	349,182
2017.2	208,820	2,085,770	170,349	361,359	337,008	289,292	366,481
2017.3	224,259	1,953,621	189,480	349,021	399,932	388,328	410,725
2017.4	214,949	1,810,876	269,929	385,531	388,372	411,532	389,199
2017	867,117	7,987,981	926,424	1,337,601	1,568,852	1,536,792	1,515,587

	Malaysia	*Russia*	*Singapore*	*UK*	*US*	*Others*	*Total*
2017.1	951,198	299,544	263,332	314,256	298,976	2,779,453	9,072,989
2017.2	934,094	193,391	240,005	245,439	248,831	2,074,960	7,755,797
2017.3	916,689	230,067	244,492	260,911	256,861	2,134,023	7,958,408
2017.4	999,541	453,295	313,493	305,018	260,020	2,515,990	8,717,746
2017	3,801,522	1,176,297	1,061,322	1,125,623	1,064,688	9,504,425	33,504,940

Table 3.5
Ex Ante Simulation of 2017: Increasing in Government Budget for 15 percent

							Person
	Australia	*China*	*Germany*	*India*	*Japan*	*Korea*	*Laos*
2017.1	219,089	2,247,899	296,666	427,044	443,540	447,640	349,182
2017.2	208,820	2,191,476	170,349	509,447	337,008	289,292	366,481
2017.3	224,259	2,030,223	189,480	457,822	399,932	388,328	410,725
2017.4	214,949	1,865,025	269,929	463,253	388,372	411,532	389,199
2017	867,117	8,334,624	926,424	1,337,601	1,568,852	1,536,792	1,515,587

	Malaysia	*Russia*	*Singapore*	*UK*	*US*	*Others*	*Total*
2017.1	951,198	299,544	263,332	314,256	298,976	2,779,453	9,337,820
2017.2	934,094	193,391	240,005	245,439	248,831	2,074,960	8,009,591
2017.3	916,689	230,067	244,492	260,911	256,861	2,134,023	8,143,811
2017.4	999,541	453,295	313,493	305,018	260,020	2,515,990	8,849,616
2017	3,801,522	1,176,297	1,061,322	1,125,623	1,064,688	9,504,425	34,340,838

Table 3.6
Summarized the Impact of Increasing in Government Budget to Promote Tourism

	Foreign Tourists (person)	*Comparing with baseline (person)*	*% percent change from 2016*	*Gov.Budget Increasing (billion)*
2016	32,468,386			
2017 Baseline (increasing gov.budget for 5%)	33,504,940	1,036,554	3.19	79.04
2017 increasing gov.budget for 10%	33,708,971	1,240,585	3.82	158.09
2018 increasing gov.budget for 15%	34,340,838	1,872,452	5.77	237.13

4. CONCLUSION AND POLICY RECOMMENDATION

Thailand has been engaged tourism sector to enhance economic growth for a decade. As a result, tourism sector in present day is one of the major sector in Thailand. The expansion of tourism sector has been expanded not only in term of revenue but also in term of tourists. The results indicate that the number of foreign tourists for each major sector were determined by push factors, pull factors and seasonality. However, each individual country determined by the different set of variables with the different behaviors.

Then, the policy for promoting tourism should be focused on the individual group of foreign tourists not in broad target. The results found that only Indian and Chinese tourists react to the government budget spending of tourism promotion campaign while the other tourists do not react. The government budget can induce the foreign tourists but the cost is high. This result give an alternative choice for tourism promoting campaign which lower cost than quantitative measure such as the qualitative measures; visa fee exemption or tax refund. Moreover, the policy to promote the new attractive destination for example Thailand's 12 hidden gems or Thai-licious, should be considered for promoting tourism plan. Moreover, the result also explores the robustness of Thai's tourism sector. Foreign tourists from 12 major countries has not been response to the instability of the political and economic environments. According to this finding, MOTs should pay attention on supply side of tourism in order to sustain the development of tourism sector. In summarized, the policy to tourism sector should not be focuses only to promote tourism sector and to initiate the demand but also to promote the strength of supply of tourism and to enhance the sustainable of the tourism sector as well.

REFERENCES

Chaivichayachat, Bundit (2016a), "Evaluation of Bangkok Bomb by Long-run Macroeconomic Model, *Social Sciences,* 11 (21): 5275-5279.

Chaivichayachat, Bundit (2016b), "Policy Promoting Tourism, Foreign Tourism Revenue and Economic Growth in Thailand: Causality and Response Patterns," *International Journal of Applied Business and Economic Research,* 14 (6): 3937-3957.

Chaivichayachat, Bundit (2015), "Impacts of Changing in Macroeconomic Factors on Foreign Tourism Revenue and Sectoral Output in Thailand," *International Journal of Business and Management Study*, Vol.2: 65-66.

Song, H. and S.F.Witt (2000), "Tourism Modelling and Forecasting: Modern Econometric Approaches," Pergamon: Cambridge.

Song, H. and S.F.Witt (2003), "Tourism Forecasting: The General-to-Specific Approach," *Journal of Travel Research,* 42: 65-74.

Song, H. and S.F.Witt (2006), "Forecasting International Tourist Flows to Macau," *Tourism Management,* 27: 214-224.

Song, H., S.F.Witt, and G.Li (2003), "Modelling and Forecasting the Demand for Thai Tourism," *Tourism Economics,* 9: 363-387.

Song, H.Y. and G.Li (2009) "UK Tourism Demand Modelling and Forecasting – a Review of Recent Research," *Tourism Management,* 29 (2): 203-220.