APPENDICES

APPENDIX A

Modeling the Demand for Malaysian and Japanese Tourists to Thailand

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Modeling the Demand for Malaysian and Japanese Tourists to Thailand

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ABSTRACT

International tourism plays an important role for Thailand in generating income, employment and tax revenues, and in contributing to regional and economic development. Tourism also contributes to the economies of developing countries that are heavily engaged in such tourism activities. For Thailand, careful planning of the tourism sector is critical as capital costs can be very high and investment decisions can have long term consequences. Solving the problem related to the balance of payments is critical issue for Thailand, as a result of heavy borrowing combined with poor investment decisions. Thus, an understanding of the nature of tourism demand is critical for the formulation of the national tourism development program. It is also important for many underdeveloped countries, where tourism is a significant source of export revenues.

Thailand's inbound tourism market is heavily dependent on Asia. In particular, Malaysia and Japan have been and remain the two major sources of Thailand's international visitors. Therefore, a careful analysis of the demand of Malaysian and Japanese tourists is crucial to enhance Thailand's tourism policy. Various time series models will be used to construct univariate and multivariate tourism demand models for Malaysian and Japanese tourists to Thailand.

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1. Rational backgrounds and hypotheses of the research

1.1 Rational backgrounds

Tourism has become an important sector in many countries, as growing sources of foreign exchange earnings. This has arisen from the rapid expansion of international tourism, which is mainly attributed to high growth rates of income in developed and newly industrialized countries, and from the substantial decrease in real transportation costs between countries. Besides generating foreign exchange earnings and alleviating the balance of payments problem encountered in many countries, international tourism also creates employment. As a labor-intensive industry, it absorbs an increasing percentage of the workforce released from the agricultural and the manufacturing industries, and then prevents large – scaled unemployment. Other benefits contributed by international tourism include increasing income, saving, investment and economic growth. (Lim, 1997, 835)

Many small countries without precious natural resources and raw material to support export sector, such as Hong Kong, Taiwan and Singapore, have a positive balance of payment of current account surplus because they have a surplus in foreign currencies inflow from international visitors from other countries.

In Thailand, the government has also perceived the potential contribution of tourism to the economy, as witnessed by the inclusion of tourism promotion in every (national) economic and social development plan which devoted an entirely separate section for tourism development. (National Economic and Social Development Board, 1976 cited in Bang-ornrat Rojwanasin, 1982, 2)

Resulting from the economic crisis Thailand has faced, there are 2 main policies that Thai government has used to bring in foreign currencies. One is the export promotion. The other is the tourist promotion. Tourist promotion is regarded as the fastest and most effective way to increase foreign currencies. Therefore; revenue from tourism is one of the two main categories the government gains foreign currencies. Many countries such as Malaysia and Korea have followed Thailand's path and put an emphasis on the tourism industry.

We could launch an investigation into each destination in Table 1, East Asia in particular.

Table 1: Number of international tourism arrivals to Thailand and length of stay 2005 - 2007

Destination	Number of tourists			Length of stay		
East Asia	7,942,143	6,692,982	+18.66	5.70	5.81	-0.11
-Asian	3,556,395	3,099,569	+14.74	5.26	4.01	+1.25
Europe	3,321,795	2,686,567	+23.64	14.30	13.45	+0.85
America	825,118	739,707	+11.55	13.07	11.40	+1.67
South Asia	605,236	518,878	+16.64	7.10	5.82	+1.28
Oceania	627,246	501,882	+24.98	11.01	9.23	+1.78
Middle East	405,856	304,047	+33.48	8.62	9.28	-0.66
Africa	94,408	72,873	+29.55	8.83	6.74	+2.09
Total	13,821,802	11,516,936	+20.01	8.62	8.20	+0.42

Source: Tourism Authority of Thailand

East Asia

In 2006, East Asia recovered from the tsunami. With more visitors than in 2005, there were international tourist arrivals to Thailand in a total amount of 7,942,143. Particularly in the first quarter, the Chinese New Year Festival stimulated more inbound Chinese tourists. Besides, many airlines such as Korean Air, Asiana Airlines, Air China, and charter flights to Phuket which used

to be cancelled resumed their flights to the province, which is expected to revitalize Thai tourism. However, other factors such as the political chaos and disturbances in the 3 southern provinces should be taken into consideration because they are still important factors in decision-making for some groups of tourists, especially those first-time visitors to Thailand.

1.1.1 The Scientific problem

1.1.1.1 Overall situation

International tourism receipts

The calculation of international tourism receipts is made by multiplying the total number of international tourists by the average length of stay and by the average expenditure per person per day.

In 2006 Thailand experienced International tourism receipts of 482,319 million baht or 12,726.10 million dollar. The highest came from UK 42,577.76 million baht or 1,123.42 million dollar. Japan came second with 39,388.10 million baht or 1,039.26 million dollar. Korea came third with 32,464.35 million baht or 856.58 million dollar and Malaysia came fourth with 30,905.00 million baht or 815.44 million dollar, respectively. (Table 2)

International tourist arrivals: In 2007 Thailand expanded with a high growth rate. Most tourists are first-time visitors coming from East Asia, Europe and The Middle East. However, Thailand could still retain a satisfactory growth rate of tourist from previous markets (ASEAN). (Table 3)

In this study we focus on the tourist group from East Asia, that is the biggest group by sharing of international tourist arrivals to Thailand at 52.63 % in 2007.

Overall the number of international tourist arrivals in Thailand rose from 13,821,802 in 2006 to 14,464,228 in 2007 or 4.65%. As for the tourism situation of overall market in 2007, Malaysia still had the highest arrivals of 1,540,080, Japan came second with 1,277,638, Korea came third with 1,083,652 and China came fourth with 907,117.

Even though Korea remained the important tourism market for Thailand, we still ignored Korea as it was not of the most market shares and not of the majority of international tourist arrivals in Thailand.

Malaysian tourist situations and characteristics: In 2007 the number of Malaysian tourists also had fallen down because of the disturbance in 3 southern provinces.

Categories of Malaysian tourists: In 2006 the private tour increased for 26% and the group tour increased for 3%. Most of them were merchants, executive managers and housewives. (Marketing Database Group. Tourism Authority of Thailand, 2007)

Trend of Malaysian outbound travel: Half of 2005 by survey on Personal Travel we found that 50% of Malaysian respondents who had made personal trips in the past 12 months considered international personal travel as important to their lifestyles, and 48% said it was somewhat important. Singapore (36%) was the most frequently visited regional destination for personal travel followed by Hong Kong (27%) and Thailand (22%) respectively. 96% of Malaysian travelers stated that they would make at least one personal trip on a commercial airline to an international destination in the next 12 months. Main reasons for their personal travels abroad were 'To see new places' (69%), 'Rest and relaxation' (64%) and 'For change of scenery/weather' (51%). Malaysia Airlines (52%) was the most preferred airline for personal travel followed by Singapore Airlines (14%) and Cathay Pacific (11%).

And when we survey on Business Travel we found that 46% of business travelers said that in the past 12 months, they had made more trips intra-regionally compared to outside Asia/Pacific; 35% said the split was about the same; and 19% had made more trips outside the region. Singapore (31%) was the most frequently visited Asia/Pacific destination, followed by China (28%). Malaysia Airlines (61%) was the most preferred airline for business travel, followed by Cathay Pacific (13%) and Singapore Airlines (10%).

Japanese tourist situations and characteristics: In 2007 Japanese tourists market had fallen down because of the bomb in Bangkok last year, resulting in a lack of direct flights to major tourism destinations such as Phuket, Koh Samui etc.

Categories of Japanese tourists: In 2006 the private tour increased in 10.37% and the group tour increased in 7.98%. Most of them were employees, businessman and executive manager. (Marketing Database Group, Tourism Authority of Thailand, 2007)

Reason for the growth in outbound tourism in Japan. (Consumer Behavior in Tourism, 2006)

Table 2 Tourism receipts from international tourist arrivals : January – December 2006

Country of Residence	No. of Arrivals	Length of Stay (Days)	Per Capita Spending		Tourism Receipts	
			Baht/Day	$US/Day	Mil. Baht	Mil. US
East Asia	**7,942,143**	**5.70**	**4,285.46**	**113.1**	**194,003.71**	**5,118.83**
Asean	**3,556,395**	5.26	**3,835.27**	**101.2**	**71,744.85**	**1,893.00**
Brunei	12,662	5.80	4,047.42	106.79	297.24	7.84
Cambodia	125,336	4.75	3,172.68	83.71	1,888.85	49.84
Indonesia	218,167	4.88	4,168.91	110.00	4,438.46	117.11
Laos	282,239	4.53	3,194.06	84.28	4,083.74	107.75
Malaysia	1,578,632	5.27	3,714.82	98.02	30,905.00	815.44
Myanmar	67,054	5.17	3,678.13	97.05	1,275.10	33.64
Philippines	202,305	6.96	3,975.62	104.90	5,597.84	147.70
Singapore	818,162	5.12	4,352.43	114.84	18,232.30	481.06
Vietnam	251,838	5.72	3,489.26	92.06	5,026.32	132.62
China	1,033,305	5.75	4,525.83	119.42	26,890.26	709.51
Hong Kong	463,339	4.82	4,816.06	127.07	10,755.69	283.79
Japan	1,293,313	6.63	4,593.55	121.20	39,388.10	1,039.26
Korea	1,101,525	6.25	4,715.54	124.42	32,464.35	856.58
Taiwan	472,851	5.99	4,298.37	113.41	12,174.60	321.23
Others	21,415	6.52	4,195.93	110.71	585.86	15.46
Europe	**3,321,795**	**14.30**	**3,704.64**	**97.75**	**175,976.60**	**4,643.18**
Austria	76,698	12.80	3,916.12	103.33	3,844.58	101.44
Belgium	66,835	14.16	3,528.26	93.09	3,339.10	88.10
Denmark	124,151	12.53	3,952.07	104.28	6,147.88	162.21
Finland	112,006	13.27	4,036.90	106.51	6,000.15	158.32
France	319,910	14.32	3,828.92	101.03	17,540.77	462.82
Germany	507,942	14.69	3,598.99	94.96	26,854.48	708.56
Italy	143,343	12.73	3,523.01	92.96	6,428.63	169.62
Netherlands	174,266	14.78	3,967.29	104.68	10,218.35	269.61
Norway	101,920	14.21	3,844.74	101.44	5,568.27	146.92
Russia	190,834	11.37	3,813.64	100.62	8,274.75	218.33
Spain	73,820	13.09	3,569.49	94.18	3,449.21	91.01
Sweden	307,284	14.81	3,488.34	92.04	15,874.99	418.87
Switzerland	145,647	14.95	3,463.93	91.40	7,542.41	199.01
UK	745,525	15.63	3,653.94	96.41	42,577.76	1,123.42
East Europe	95,312	12.36	3,884.68	102.50	4,576.36	120.75
Others	136,302	14.24	3,987.20	105.20	7,738.91	204.19

Source of data: Immigration Bureau, Police Department

Table 2 Tourism receipts from international tourist arrivals (Continue) January - December 2006

Country of Residence	No. of Arrivals	Length of Stay (Days)	Per Capita Spending		Tourism Receipts	
			Baht/Day	$US/Day	Mil. Baht	Mil. $US
The Americas	**825,118**	**13.07**	**4,292.81**	**113.27**	**46,294.90**	**1,221.50**
Argentina	3,814	7.88	4,378.41	115.53	131.59	3.47
Brazil	8,926	7.39	3,972.06	104.80	262.01	6.91
Canada	149,924	13.27	4,213.45	111.17	8,382.61	221.18
U.S.A.	640,674	13.31	4,323.76	114.08	36,870.40	972.83
Others	21,780	7.69	3,870.66	102.13	648.29	17.11
South Asia	**605,236**	**7.10**	**4,435.74**	**117.04**	**19,061.16**	**502.93**
Bangladesh	44,081	6.02	4,237.14	111.80	1,124.40	29.67
India	429,732	7.50	4,627.48	122.10	14,914.33	393.52
Nepal	23,205	5.90	3,402.83	89.78	465.88	12.29
Pakistan	45,122	6.03	3,335.06	88.00	907.42	23.94
Sri Lanka	47,448	5.97	4,487.54	118.40	1,271.16	33.54
Others	15,648	7.19	3,359.46	88.64	377.97	9.97
Oceania	**627,246**	**11.01**	**4,245.87**	**112.03**	**29,321.91**	**773.67**
Australia	538,490	11.22	4,293.27	113.28	25,939.32	684.41
New Zealand	86,703	9.78	3,918.92	103.40	3,323.06	87.68
Others	2,053	8.34	3,476.81	91.74	59.53	1.57
Middle East	**405,856**	**8.62**	**4,092.87**	**107.99**	**14,318.79**	**377.80**
Egypt	11,546	6.83	4,381.49	115.61	345.52	9.12
Israel	117,649	11.45	3,712.30	97.95	5,000.78	131.95
Kuwait	38,885	7.08	4,359.44	115.02	1,200.18	31.67
Saudi Arabia	23,870	8.31	4,527.47	119.46	898.07	23.70
U.A.E.	87,006	7.19	4,441.84	117.20	2,778.69	73.32
Others	126,900	7.66	4,213.30	111.17	4,095.55	108.06
Africa	**94,408**	**8.83**	**4,009.13**	**105.78**	**3,342.10**	**88.18**
South Africa	43,444	9.83	4,346.69	114.69	1,856.27	48.98
Others	50,964	7.99	3,648.88	96.28	1,485.83	39.20
Grand Total	**13,821,802**	**8.62**	**4,048.22**	**106.81**	**482,319.17**	**12,726.10**

Note : 1$US = 37.90 Baht

Source of data: Immigration Bureau, Police Department

Table 3 International tourist arrivals to Thailand (Jan-Dec)

Country of Nationality	2007 Number	2007 % Share	2006 Number	2006 % Share	% 07/06	Air	Land	Sea
East Asia	**7,611,931**	**52.63**	**7,622,244**	**55.15**	**- 0.14**	**5,525,455**	**1,934,819**	**151,657**
Asean	**3,520,051**	**24.34**	**3,389,342**	**24.52**	**+ 3.86**	**1,573,134**	**1,821,778**	**125,139**
Brunei	8,987	0.06	9,418	0.07	- 4.58	8,324	558	105
Cambodia	99,945	0.69	117,100	0.85	- 14.65	31,717	64,695	3,533
Indonesia	237,592	1.64	219,783	1.59	+ 8.10	155,174	69,763	12,655
Laos	513,701	3.55	276,207	2.00	+ 85.98	14,667	484,677	14,357
Malaysia	1,540,080	10.65	1,591,328	11.51	- 3.22	490,529	1,010,213	39,338
Myanmar	72,205	0.50	62,769	0.45	+ 15.03	71,166	763	276
Philippines	205,266	1.42	198,443	1.44	+ 3.44	159,470	36,759	9,037
Singapore	604,603	4.18	687,160	4.97	- 12.01	538,737	39,698	26,168
Vietnam	237,672	1.64	227,134	1.64	+ 4.64	103,350	114,652	19,670
China	907,117	6.27	949,117	6.87	- 4.43	877,902	19,168	10,047
Hong Kong	367,862	2.54	376,636	2.72	- 2.33	364,449	2,207	1,206
Japan	1,277,638	8.83	1,311,987	9.49	- 2.62	1,237,318	29,253	11,067
Korea	1,083,652	7.49	1,092,783	7.91	- 0.84	1,022,303	58,752	2,597
Taiwan	427,474	2.96	475,117	3.44	- 10.03	423,119	2,866	1,489
Others	28,137	0.19	27,262	0.20	+ 3.21	27,230	795	112
Europe	**3,905,271**	**27.00**	**3,490,779**	**25.26**	**+ 11.87**	**3,667,257**	**175,176**	**62,838**
Austria	81,391	0.56	76,106	0.55	+ 6.94	77,583	2,598	1,210
Belgium	72,018	0.50	68,617	0.50	+ 4.96	66,163	4,278	1,577
Denmark	141,110	0.98	128,037	0.93	+ 10.21	135,436	4,341	1,333
Finland	143,266	0.99	110,502	0.80	+ 29.65	138,563	3,705	998
France	373,090	2.58	321,278	2.32	+ 16.13	336,024	29,066	8,000
Germany	544,495	3.76	516,659	3.74	+ 5.39	511,782	22,587	10,126
Ireland	73,734	0.51	68,198	0.49	+ 8.12	67,454	5,168	1,112
Italy	171,328	1.18	150,420	1.09	+ 13.90	161,561	6,900	2,867
Netherlands	194,434	1.34	180,830	1.31	+ 7.52	175,797	13,711	4,926
Norway	108,941	0.75	106,314	0.77	+ 2.47	103,535	4,151	1,255
Russian	277,503	1.92	187,658	1.36	+ 47.88	271,727	4,795	981
Spain	82,111	0.57	69,658	0.50	+ 17.88	78,980	2,234	897
Sweden	378,387	2.62	306,085	2.21	+ 23.62	360,511	12,413	5,463
Switzerland	146,511	1.01	140,741	1.02	+ 4.10	136,849	7,352	2,310
United Kingdom	859,010	5.94	850,685	6.15	+ 0.98	798,154	43,530	17,326
East Europe	148,302	1.03	110,113	0.80	+ 34.68	141,276	5,353	1,673
Others	109,640	0.76	98,878	0.72	+ 10.88	105,862	2,994	784
The Americas	**920,366**	**6.36**	**923,382**	**6.68**	**- 0.33**	**849,629**	**49,176**	**21,561**
Argentina	6,704	0.05	4,327	0.03	+ 54.93	6,051	448	205
Brazil	15,056	0.10	11,841	0.09	+ 27.15	14,462	429	165

Source of data: Immigration Bureau, Police Department

Table 3 International tourist arrivals to Thailand (January – December) (Continue)

Country of Nationality	2007		2006		%Change	Air	Land	Sea
	Number	% Share	Number	% Share	07/06			
Canada	183,440	1.27	183,094	1.32	+ 0.19	164,964	13,168	5,308
U.S.A.	681,972	4.71	694,258	5.02	- 1.77	632,862	33,737	15,373
Others	33,194	0.23	29,862	0.22	+ 11.16	31,290	1,394	510
South Asia	**709,811**	**4.91**	**631,208**	**4.57**	**+ 12.45**	**680,622**	**9,941**	**19,248**
Bangladesh	44,789	0.31	40,281	0.29	+ 11.19	44,441	320	28
India	536,356	3.71	459,795	3.33	+ 16.65	509,309	8,608	18,439
Nepal	19,546	0.14	21,180	0.15	- 7.71	19,278	152	116
Pakistan	46,656	0.32	46,367	0.34	+ 0.62	45,704	570	382
Sri Lanka	44,327	0.31	46,557	0.34	- 4.79	43,848	201	278
Others	18,137	0.13	17,028	0.12	+ 6.51	18,042	90	5
Oceania	**764,072**	**5.28**	**651,262**	**4.71**	**+ 17.32**	**715,976**	**27,524**	**20,572**
Australia	658,148	4.55	549,547	3.98	+ 19.76	617,046	22,656	18,446
New Zealand	104,195	0.72	98,786	0.71	+ 5.48	97,236	4,844	2,115
Others	1,729	0.01	2,929	0.02	- 40.97	1,694	24	11
Middle East	**436,100**	**3.02**	**392,416**	**2.84**	**+ 11.13**	**426,958**	**7,017**	**2,125**
Egypt	13,037	0.09	11,882	0.09	+ 9.72	12,797	99	141
Israel	128,674	0.89	121,508	0.88	+ 5.90	123,118	4,857	699
Kuwait	31,910	0.22	33,934	0.25	- 5.96	31,413	378	119
Saudi Arabia	22,483	0.16	20,804	0.15	+ 8.07	22,125	237	121
U.A.E.	74,957	0.52	69,509	0.50	+ 7.84	74,708	145	104
Others	165,039	1.14	134,779	0.98	+ 22.45	162,797	1,301	941
Africa	**116,677**	**0.81**	**110,511**	**0.80**	**+ 5.58**	**109,595**	**5,036**	**2,046**
S. Africa	52,788	0.36	47,228	0.34	+ 11.77	50,472	1,110	1,206
Others	63,889	0.44	63,283	0.46	+ 0.96	59,123	3,926	840
Grand Total	**14,464,228**	**100.00**	**13,821,802**	**100.00**	**+ 4.65**	**11,975,492**	**2,208,689**	**280,047**

Source of data : Immigration Bureau, Police Department

1. Steady population growth since 1980 with bulges in the 25-29 and 50-54 age groups

2. Hard work Japanese propensity has fuelled income growth

3. Increase in demand to go abroad

4. Increase in air capacity

5. Increase in business travel

6. Increased interest in Asia as tourism destination

Different categories of Japanese tourists:

1. Working soldiers, who are male aged 30 - 50, have difficulty in finding time for a vacation because of their work commitments. They want to enjoy meaningful experiences rather than visual tours (Beecham, quoted in Dace, 1995)

2. The Silver Greys, those fifty to sixty years of age, influenced by growing up in the era of post – war austerity in Japan. They live in a frugal lives. Whenever they are on vacation, they like to let themselves go. However, they want the familiarity when on holiday, including Japanese food and tour guide who speaks their language.

3. The Full Mooners. They are mature married couples who prefer to take single centre holidays, and are very quality–conscious.

4. Technical Visit and Old Study Tours. Many Japanese companies use work related study tours as a way of recruiting and rewarding staff. Most such tourists are men and many such trips are combined with leisure pursuits such as golf.

5. Student Travel. School, college and university student generally take short-duration trips, most popular in February. They tend to book flight and accommodation only by packages.

6. The Young Affluent. This is a twenty to thirty years old segment which has grown up in a period of affluence in Japan. They like to flaunt their money and they are independent-minded. They rarely take package vacations and are major participants in the short break and activity holiday market.

7. The Office Ladies. These are unmarried women in their early twenties. They have high disposable income and they tend to live at home with their parent. They like travelling and enjoy visiting capital cities, such as Paris and London, and shopping in western countries. They like organized tours, although there is a trend towards more independent travel.

8. The Honeymooners. These groups are segment defined by the fact that they go overseas for honeymoon. This is true for as many as 95% of Japanese couples (Beecham, quoted in Dace, 1995) who choose Asian destination, European, cities or places in the USA.

The Japanese market does have a controversial characteristic in terms of the demand of some Japanese tourists that their destinations should offer Japanese food, service, guides, and so on.

From table 4, it can be seen that China is the first tourist destination for Japanese tourists. And Thailand is the fifth tourist destination. A large proportion of tourist trips are from leisure-purposed, with business travel being of secondary importance.

Considering the number of tourist arrivals and Thailand international tourism receipts, it was found that the majority of tourists come to Thailand are from Malaysia and Japan. This study can be used to compare with U.S.A and UK market for making policy because of the difference in tourist behaviors.

Table 4: Japanese Outbound travel by purpose of visit and leading destination

Japanese Arrivals (2005)	Number	Share
1.China	3,390,000	19.5%
2.U.S.A.	2,929,000	16.8%
3.Korea	2,440,000	14.0%
4.Hong Kong	1,211,000	7.0%
5.Thailand	1,197,000	6.9%
6. Taiwan	1,127,000	6.5%
7.Guam	955,000	5.5%
8.Australia	686,000	3.9%
9.France	667,000	3.8%

Source: UNWTO, 2006

1.2 Research question and hypotheses

(1) how best to estimate elasticity of demand for Malaysian and Japanese tourists such as income, own-price or relative price elasticity of demand compared with U.K tourists and U.S.A tourists?

(2) How best to measure reaction and satisfactions of Malaysian and Japanese tourists by considering various factors compared with U.K tourists and U.S.A tourists (i.e. GDP per capita, relative price etc)?

(3) How best to distinguish behaviors between Malaysian or Japanese or UK or USA tourists in terms of short haul, medium haul and long haul?

Therefore, the hypotheses of the research are set up as:

Hypo 1. Malaysian and Japanese tourists demand respond spontaneously to changes in GDP per capita compared with U.K tourists and U.S.A tourists.

Hypo 2. Malaysian and Japanese tourists demand respond spontaneously to changes in relative price compared with U.K tourists and U.S.A tourists.

Hypo 3. Malaysian and Japanese tourists demand respond spontaneously to changes in relative price with the respect to the price level observed in competing countries (Singapore, Indonesia and Philippines) compared with U.K tourists and U.S.A tourists.

Hypo 4. Malaysian and Japanese tourists demand respond spontaneously to changes in nominal exchange rate compared with U.K tourists and U.S.A tourists.

Hypo 5. Malaysian and Japanese tourists demand respond spontaneously to changes in occupancy rate compared with U.K tourists and U.S.A tourists.

2. Research methodology and literature review

2.1 Conceptual Framework

2.1.1 Tourism Demand

Empirical models of tourism demand borrowed heavily from consumer theory which predicts that the optimal consumption level depends on the consumer's income level, the price of the goods, the prices of related goods (substitutes and complements goods) and other demand shifter.

For our tourism model, we use the number of tourist arrivals as the dependent variable because high frequency expenditure data is unavailable.

The model: the theory of demand suggests that for an individual location, the demand for tourism will be expressed as.

N = N (GDP, RP, CP, EX, OC, ξ_i) (1)

Where

N = Number of Malaysian or Japanese tourist arrivals to Thailand

GDP = GDP per capita of Malaysian and Japanese tourists.

RP = Relative price of tourist goods and services in Thailand compared with the price level measured of Malaysia and Japan.

$$= \frac{CPI_{thailand}}{CPI_{japan} ER_{japan/thailand}} \text{ and } \frac{CPI_{thailand}}{CPI_{malaysia} ER_{malaysia/thailand}}$$

CP = Relative price of tourist goods and services in Thailand with respect to the price level observed in competing countries (Singapore, Indonesia and Philippines).

$$= \frac{weighted\ CPI_{\sin g, indo, phillip}}{CPI_{japan}ER_{japan} / weighted\ \sin g, indo, phillip}$$

and

$$\frac{weighted\ CPI_{\sin g, indo, phillip}}{CPI_{malaysia}ER_{malaysia} / weighted\ \sin g, indo, phillip}$$

EX = Nominal exchange rate, express is the price of Thailand currency in Malaysia currency unit and Japan currency unit.

OC = Occupancy rate of Malaysian and Japanese tourists.

Favorable natural and climate condition and/or rich cultural heritage do not automatically guarantee the choice of destination. To assure client loyalty, tourism operators must guarantee an adequate infrastructure and most important hospitality. The Thailand tourist package is essentially composed of accommodation and transport. Hotel capacity or occupancy rate is an important component of the tourist supply. It may affect the potential demand in two ways (i) it reflects the product's quality and expresses the destination's notoriety; and (ii) the quality and the quantity of this variable can be divided by the tourism professionals and managed according to tourist expectation.

ξ_i, = Other relevant factors pertaining to Thailand.

The following derivatives are expected to apply: Income elasticity of demand (ε_{GDP}), Own- price elasticity of demand (ε_{PR}), Cross-price elasticity of demand (ε_{CP}), Nominal exchange rate elasticity of demand (ε_{EX}) and Occupancy rate elasticity of demand (ε_{OC}).

Assuming constant elasticity within the empirically relevant range, we may suppose that the functional form is log-linear. We can construct the tourism demand model which comprises demand determinants as follows:

$$NOM = \alpha_0 + \alpha_1 GDPM + \alpha_2 RPM + \alpha_3 CPM + \alpha_4 EXM + \alpha_5 OCM + \varepsilon_M \quad (2)$$

$$NOJ = \beta_0 + \beta_1 GDPJ + \beta_2 RPJ + \beta_3 CPJ + \beta_4 EXJ + B_5 OCJ + \varepsilon_J \quad (3)$$

Including UK and USA tourists demand model

$$NOU = \gamma_0 + \gamma_1 GDPU + \gamma_2 RPU + \gamma_3 CPU + \gamma_4 EXU + \gamma_5 OCU + \varepsilon_U \quad (4)$$

$$NOUS = \phi_0 + \phi_1 GDPUS + \phi_2 RPUS + \phi_3 CPUS + \phi_4 EXUS + \phi_5 OCUS + \varepsilon_{US} \quad (5)$$

In log-form

$$LNOM = \alpha_0 + \alpha_1 LGDPM + \alpha_2 LRPM + \alpha_3 LCPM + \alpha_4 LEXM + \alpha_5 LOCM + \varepsilon_M \quad (6)$$

$$LNOJ = \beta_0 + \beta_1 LGDPJ + \beta_2 LRPJ + \beta_3 LCPJ + \beta_4 LEXJ + B_5 LOCJ + \varepsilon_J \quad (7)$$

$$LNOU = \gamma_0 + \gamma_1 LGDPU + \gamma_2 LRPU + \gamma_3 LCPU + \gamma_4 LEXU + \gamma_5 LOCU + \varepsilon_U \quad (8)$$

$$LNOUS = \phi_0 + \phi_1 LGDPUS + \phi_2 LRPUS + \phi_3 LCPUS + \phi_4 LEXUS + \phi_5 LOCUS + \varepsilon_{US} \quad (9)$$

2.2 Econometrics Framework

For analyzing the elasticity of demand, we use econometrics frameworks as follows:

2.2.1 Unit root test

2.2.1.1 Augmented dickey and fuller tests

To test for the long run frequency, Dickey and Fuller (1979) proposes procedure based on the following auxiliary regression:

$$\Delta y_t = \alpha + \beta t + \delta y_{t-1} + \sum_{j=1}^{k} \gamma_j \Delta y_{t-k} + \varepsilon_t$$

(10)

Where $\Delta y_t = (1-L)$ designates the first different filter, ε_t is the error term and α, β and δ are the parameters to be estimated.

2.2.1.2 Seasonal unit root test

There are several alternative ways to treat seasonality in a non-stationary sequence.

2.2.1.2.1 HEGY tests. The seasonal pattern of a series can change over time. Hence, the series exhibit non-stationary seasonality. A simple model that can describe the variation of the series is the seasonal random walk model given by $y_t = y_{t-s} + \varepsilon_t$

This model assumes s unit roots at seasonal frequencies. The series y_t is then an integrated seasonal prices at then an integrated seasonal process at the correspondent frequency $\omega_j = 2\pi_{j/s}, j = 1,.....,s/2,$ noted $I_{\omega j}(1)$ where s is the number of time periods in a year. If s = 4, then the series has four unit roots with modulus one : one at a zero frequency, one at π (two cycles per year) and $\pi/2$ (one cycle per year). Evidence of unit roots at seasonal frequencies implies that the stochastic seasonality is non-stationary. Hylleberg, Engle, Granger, and Yoo (1990) proposed a strategy that tests for unit roots in monthly data. (i.e., to deduce the appropriate different operator that must be applied to the series to achieve stationary)

The test equation for the presence of seasonal unit roots given by

$$(1-L^4)y_t = \gamma_1 y_{1t-1} - \gamma_2 y_{2t-1}$$

$$+\gamma_5 y_{3t-1} - \gamma_6 y_{3t-2} + \mu_t + \varepsilon_t,$$

(11)

where for quarterly data form the following variables:

$y_{1t-1} = (1+L+L^2+L^3)y_{t-1} = y_{t-1}+y_{t-2}+y_{t-3}+y_{t-4}$

$y_{2t-1} = (1-L+L^2-L^3)y_{t-1} = y_{t-1}-y_{t-2}+y_{t-3}-y_{t-4}$

$y_{3t-1} = (1-L^2)y_{t-1} = y_{t-1} - y_{t-3}$ so that

$y_{3t-2} = y_{t-2} - y_{t-4}$

The deterministic component μ_t includes seasonal dummies, a trend and a constant term, and ε_t is a normally and independently distributed error term with zero mean and constant variance.

Testing for unit roots implies testing the significance of the estimated γ_t. Form the t-statistics for the null hypothesis $\gamma_1 = 0$; the appropriate critical values are reported in Hylleberg, et al.(1990). If you do not reject the hypothesis $\gamma_1 = 0$; conclude that a_1=1 so that there is a nonseasonal unit root. Next form the t-test for the hypothesis $\gamma_2 = 0$. If you do not reject the null hypothesis, conclude that a_2=1 and there is root with a semiannual frequency. Finally, perform the F-test for the hypothesis $\gamma_5 = \gamma_6 = 0$. If the calculated value less than the critical value reported in Hylleberg, et al.(1990), conclude that γ_5 and/or γ_6 is zero so that there is a seasonal unit root. Be aware that the three null hypotheses are not the alternative; a series may have nonseasonal, semi-annual, and a seasonal unit root.

At the 5 percent significance level, Hylleberg, et al.(1990) report that the critical values using 100 observations are:

	$\gamma_1 = 0$	$\gamma_2 = 0$	$\gamma_5 = \gamma_6 = 0$
Intercept	-2.88	-1.95	3.08
Intercept plus Seasonal Dummies	-2.95	-2.94	6.57
Intercept plus Seasonal Dummies plus time	-3.53	-2.94	6.60

2.3 Literature review

Luis Delfim Santos and Margarida Macedo (1988) Transfer function models make a useful combination between causal and non causal methods; based on ARIMA models (Box-Jenkins models), they allow the use of one or more series related to the one which is being forecasted, thus permitting the explicit consideration of explanatory variables in the model. Univariate ARIMA models deal with a single time series, forecasted on the basis of its own past values (and a white noise); transfer function models extend this analysis to multiple time series, therefore the forecast of one variable being also affected by past values of the other (explanatory) variables.

Maria De Mello, Alan Pack and M.Thea Sinclair (2001) The AIDS model give the importance of France, Spain and Portugal as destinations, in world and European terms, and the prominence of the UK demand for tourism in these three countries, it is interesting to investigate the determinants of the UK demand. The AIDS model is particularly useful as it can be used to test some of the assumptions about consumer demand behavior and can provide important information about tourism demand through the estimates of the sensitivity of demand to changes in expenditure and in prices in the destination and competing countries, known as expenditure and own-price and cross-price elasticities. A summary of the theoretical model will now be given in order to provide a set of equations which can be used to estimate the expenditure and price elasticities which are key inputs for tourism policy making. A more detailed derivation of the model is given in the Appendix; (see, also, Deaton and Muellbauer, 1980). An explanation of the way in which the model is applied to the case of UK demand for tourism in France, Spain and Portugal is provided in the following section, where the variables in the model are discussed.

Christine Lim and Michael McAleer (2003) The methodological approach involved in estimating forecast errors or generating forecasts is to extrapolate from the time paths of the variables of interest and to fit their current and past values into a particular model or class of models. Some studies use autoregressive moving average (ARMA) models to project the growth in tourist flows beyond the sample period or to use them as a benchmark to compare the forecast accuracy as generated by other univariate models. However, few studies have attempted to analyze or accommodate trending behavior in their analyses.

3. Objectives of this study

The objectives of this study are:

1.To Identify and determine what factors significantly explain Malaysian and Japanese tourists' demand for Thailand.

2.To estimate an equation of the demand for Malaysian and Japanese tourism in order to analyze the different variables that influence the number of tourist arrivals and the other key behavioral decisions, income per capita, the relative price, the relative price with respect to the price level observed in competing countries, nominal exchange rate and occupancy rate in Thailand.

3.To estimates elasticity of the Malaysian and Japanese tourism demand for the formulation of efficient tourism policies.

4. Data collection

Based on the above methodology we can divide data collection as follows: we used the secondary data using data for years between 1985 to 2007, we obtain 92 observations quarterly for analyzing elasticity of demand. The data used to measure the independent and dependent variables are from the Tourism Authority of Thailand (TAT), the Bank of Thailand (BOT), Immigration Bureau (Police Department) etc.

Note the three important dips in the tourist activity for the periods 1991, 1997 and 2005, respectively. The first period is due to the negative impact of the Gulf war during the period 1991. The second is due to the "Tomyumkung" economics crisis in during 1997 where the Asian tourists market seemed to be the most affected. The third period is due to the circumstance of Tsunami disaster in during 2005.

5. Modeling the Malaysian and Japanese tourists demand

The literature on tourism demand analysis can be divided into two main groups. The first group focuses on the non-causal (mainly time series) modeling approach while the second group is based on causal (econometrics) methods. The forecasting based on non-causal modeling approaches "extrapolates the historic trends into the future without considering the underlying causes of the trend" (e.g. Box-Jenkins ARIMA model and the exponential smoothing method) (Song et., 2003, 437). Causal forecasting models include the factors that influence tourism demand, so that they can be used by decision made for policy evaluation purposes. Furthermore, the tourist demand model must be taken into account the time path of the tourist's decision-making process (Song & Witt, 2000, 28).

Regarding the Malaysian tourists demand, the results show the LNOM (logarithm of number of Malaysian tourist arrivals) can be explained by the LGDPM (logarithm of Malaysia's GDP per capita), LGRPM (logarithm of relative price), LCPM (logarithm of relative price with respect to the price level observed in competing countries), LEXM (logarithm of nominal exchange rate) and LOCM (logarithm of Malaysian tourists' occupancy rate) :

$$LNOM = \underset{(6.2564)}{5.3013} + \underset{(8.9403)}{0.8949}LGDPM^{*} - \underset{(-1.5124)}{0.5553}LRPM$$

$$+ \underset{(1.6585)}{0.11371}LCPM^{***} - \underset{(-1.3319)}{0.6372}LEXM + \underset{(2.9368)}{0.3208}LOCM^{*}$$

$$R^2 = 0.72 \qquad DW = 1.76$$

$$AIC = -1.015 \qquad SBC = -0.819$$

Note: * = significance at 1% level, ** = significance at 5% level, *** = significance at 10% level, respectively

Malaysian tourists are "short haul" tourists. From Malaysian tourism demand model, there are 3 positive and significant determinant factors. Firstly, it is found that LGDPM is positive and significant. Its value is 0.89. It shows that the growth of GDP per capita of Malaysian tourists increase 1%, the growth of Malaysian tourist arrivals will increase 0.89%. According to the income elasticity concept, it is inelastic demand. Secondly, LCPM is positive and significant. It is found that Malaysian tourism is substitute goods. Thirdly, LOCM is also positive and significant.

Regarding the Japanese tourists demand is estimated as follows:

$$LNOJ = \underset{(-2.7516)}{-10.0895} + \underset{(5.9312)}{1.3919} LGDPJ^{*} + \underset{(4.5612)}{0.8552} LRPJ^{*}$$
$$- \underset{(-1.5587)}{0.1775} LCPJ + \underset{(3.2042)}{0.9449} LEXJ^{*} + \underset{(5.2986)}{0.5078} LOCJ^{*}$$
$$R^2 = 0.90 \qquad DW = 2.22$$
$$AIC = -1.015 \quad SBC = -0.473$$

Japanese tourists are "medium haul" tourists. From Japanese tourism demand model, there are 4 positive and significant determinant factors. Firstly, it is found that LGDPJ is positive and significant, its value is 1.39. It shows that the growth of GDP per capita of Japanese tourists increase 1%, the growth of Japanese tourist arrivals will increase 1.39%. According to income elasticity concept, it is elastic demand. Secondly, LRPJ is positive and significant. Thirdly, LEXJ is positive and significant. Fourthly, LOCJ is also positive and significant.

The United Kingdom tourists demand is estimated as follows:

$$LNOU = \underset{(-3.7589)}{-2.8414} + \underset{(13.6770)}{1.6647} LGDPU^{*} - \underset{(-0.4892)}{0.1493} LRPU$$
$$- \underset{(-1.4764)}{0.1408} LCPU - \underset{(-1.0244)}{0.3844} LEXU + \underset{(5.7408)}{0.4685} LOCU^{*}$$
$$R^2 = 0.95 \qquad DW = 1.69$$
$$AIC = -0.978 \qquad SBC = -0.8133$$

U.K tourists are "long haul" tourists. From U.K tourists demand model, there are 2 positive and significant determinant factors. Firstly, it is found that LGDPU is positive and significant. Its value is 1.67. It shows that the growth of GDP per capita of U.K tourists increase 1%, the growth of U.K tourist arrivals will increase 1.67%. According to the income elasticity concept, it is elastic demand. Secondly, LOCU is also positive and significant.

The last demand model is the U.S.A tourists demand, which is estimated as follows:

$$LNOUS = \underset{(-2.5483)}{-3.4828} + \underset{(9.4093)}{1.378} LGDPUS^{*} - \underset{(-0.1758)}{0.0585} LRPUS$$

$$- \underset{(-2.3730)}{0.2302} LCPUS^{**} - \underset{(-1.3300)}{0.5021} LEXUS + \underset{(5.2236)}{0.3994} LOCU^{*}$$

$$R^2 = 0.90 \qquad DW = 1.75$$

$$AIC = -1.067 \quad SBC = -0.903$$

U.S.A tourists are also "long haul" tourists. From U.S.A tourists demand model, there are 3 significant determinant factors. Firstly, it is found that LGDPUS is positive and significant. Its value is 1.38. It shows that the growth of GDP per capita of U.S.A tourists increase 1%, the growth of U.S.A tourist arrivals will increase 1.38%. According to the income elasticity concept, it is elastic demand. But income elasticity of demand is not different from Japanese tourists, who are "medium haul" tourists because of substitution effects. Secondly, LCPUS is negative and significant. It is found that U.S.A tourism is complementary. Thirdly, LOCUS is also positive and significant.

5.1 Unit root test:

(Table 5) Using Augmented Dickey-Fuller test statistical to test unit root test, it is found that all determinant factors are stationary.

5.2 Seasonal Unit Roots Test:

5.2.1 HEGY tests

The test equation for the presence of seasonal unit roots given by

$$(1-L^4)y_t = \gamma_1 y_{1t-1} - \gamma_2 y_{2t-1} + \gamma_5 y_{3t-1} - \gamma_6 y_{3t-2} + \mu_t + \varepsilon_t,$$

where for quarterly data form the following variables:

$$y_{1t-1} = (1+L+L^2+L^3)y_{t-1} = y_{t-1} + y_{t-2} + y_{t-3} + y_{t-4}$$
$$y_{2t-1} = (1-L+L^2-L^3)y_{t-1} = y_{t-1} - y_{t-2} + y_{t-3} - y_{t-4}$$
$y_{3t-1} = (1-L^2)y_{t-1} = y_{t-1} - y_{t-3}$ so that

$$y_{3t-2} = y_{t-2} - y_{t-4}$$

The deterministic component μ_t includes seasonal dummies, a trend and a constant term, and ε_t is a normally and independently distributed error term with zero mean and constant variance.

Consider the following regression in each market:

(Table 6) Malaysian tourists market:

$$(1-L^4)y_t = \underset{(0.903)}{9.454} - \underset{(-0.922)}{0.193} y_{t-1} - \underset{(-3.016)}{0.663} y_{2t-1}$$

$$+ \underset{(4.453)}{0.479} y_{3t-1} - \underset{(-2.109)}{0.859} y_{3t-2} + \varepsilon_t$$

where y_t is the logarithm of Malaysian tourist arrivals.

The coefficient on y_{t-1} has t-statistic of -0.922. Given the 5 percent critical value, we cannot reject the null hypothesis of a nonseasonal unit root. The next coefficient on y_{2t-1} has t-statistic of -3.016. Given the 5 percent critical value, we can reject the null hypothesis of a seasonal unit root test. The sample F-statistic for the null hypothesis that the coefficient on y_{3t-1} and y_{3t-2} jointly equal zero is 12.96. Hence, there are not unit root at the semi-annual and the annual frequency, hence, they are stationary. In the same way the rest determinant factors, they are also nonseasonal unit root. In conclusion, all of the determinant factors are stationary.

(Table 7) Japanese tourists market:

$$(1-L^4)y_t = \underset{(0.923)}{3.13} - \underset{(-0.960)}{0.067 y_{t-1}} - \underset{(-4.936)}{0.540 y_{2t-1}} + \underset{(5.265)}{0.485 y_{3t-1}} - \underset{(-3.936)}{0.630 y_{3t-2}} + \varepsilon_t$$

where y_t is the logarithm of Japanese tourist arrivals.

The coefficient on y_{t-1} has t-statistic of -0.960. Given the 5 percent critical value, we cannot reject the null hypothesis of a nonseasonal unit root. The next coefficient on y_{2t-1} has t-statistic of -4.936. Given the 5 percent critical value, we can reject the null hypothesis of a seasonal unit root test. The sample F-statistic for the null hypothesis that the coefficient on y_{3t-1} and y_{3t-2} jointly equal zero is 27.568. Hence, there are not unit root at the semi-annual and the annual frequency, hence, they are stationary. In the same way the rest of determinant factors, they are also nonseasonal unit root. In conclusion, all of the determinant factors are stationary.

(Table 8) U.K tourists market:

$$(1-L^4)y_t = \underset{(1.489)}{3.651} - \underset{(-1.538)}{0.084 y_{t-1}} - \underset{(-5.667)}{0.573 y_{2t-1}} + \underset{(5.031)}{0.457 y_{3t-1}} - \underset{(-4.990)}{0.659 y_{3t-2}} + \varepsilon_t$$

where y_t is the logarithm of U.K tourist arrivals.

The coefficient on y_{t-1} has t-statistic of -1.538. Given the 5 percent critical value, we cannot reject the null hypothesis of a nonseasonal unit root. The next coefficient on y_{2t-1} has t-statistic of -5.667. Given the 5 percent critical value, we can reject the null hypothesis of a seasonal unit root test. The sample F-statistic for the null hypothesis that the coefficient on y_{3t-1} and y_{3t-2} jointly equal zero is 33.61. Hence, there are not seasonal unit root at the semi-annual and the annual frequency, hence, they are stationary. In the same way the rest of determinant factors, they are also nonseasonal unit root. In conclusion, all of the determinant factors are stationary.

(Table 9) U.S.A tourists market:

$$(1-L^4)y_t = \underset{(9.47)}{5.546} - \underset{(-1.509)}{0.125}y_{t-1} - \underset{(-5.230)}{0.600}y_{2t-1} + \underset{(5.118)}{0.466}y_{3t-1} - \underset{(-4.197)}{0.742}y_{3t-2} + \varepsilon_t$$

where y_t is the logarithm of U.S.A tourist arrivals.

The coefficient on y_{t-1} has t-statistic of -1.509. Given the 5 percent critical value, we cannot reject the null hypothesis of a nonseasonal unit root. The next coefficient on y_{2t-1} has t-statistic of

-5.230. Given the 5 percent critical value, we can reject the null hypothesis of a seasonal unit root test. The sample F-statistic for the null hypothesis that the coefficient on y_{3t-1} and y_{3t-2} jointly equal zero is 26.74. Hence, there are not unit root at the semi-annual and the annual frequency, hence, they are stationary. In the same way the rest of determinant factors, they are also nonseasonal unit root. In conclusion, all of the determinant factors are stationary.

Table 5: The unit root test results

Determinants	Malaysian tourists	Japanese tourists	UK tourists	USA tourists
LNO	I(1)	I(2)	I(1)	I(1)
LGDP	I(2)	I(2)	I(2)	I(1)
LRP	I(1)	I(0)	I(1)	I(1)
LCP	I(1)	I(1)	I(1)	I(1)
LEX	I(1)	I(1)	I(1)	I(1)
LOC	I(0)	I(0)	I(0)	I(0)

Table 6: The coefficient of y_t with intercept for Malaysian tourists market

Determinants	Intercept	y_{t-1}	y_{2t-1}	y_{3t-1}	y_{3t-2}
LNO	9.454 (0.903)	-0.193 (-0.922)	-0.663 (-3.016)	0.479 (4.453)	-0.859 (-2.109) (12.968)*
LGDP	6.298 (1.757)	-0.198 (-1.791)	-0.662 (-4.657)	0.466 (4.375)	-0.85 (-3.738) (22.358)*
LRP	0.651 (0.534)	0.065 (0.505)	-0.405 (-2.494)	0.477 (4.355)	-0.384 (-1.360) (10.565)*
LCP	-1.25 (-0.943)	-0.054 (-4.627)	0.540 (-4.627)	0.481 (4.458)	-0.596 (-4.087) (25.54)*
LEX	0.095 (0.079)	-0.013 (-0.108)	-0.494 (-3.043)	0.495 (4.541)	-0.529 (-1.919) (13.44)*
LOC	-0.682 (-1.154)	0.06 (1.076)	-0.418 (-3.349)	0.518 (4.887)	-0.322 (-2.100) (17.32)*

Note: * is F-statistics

Table 7: The coefficient of y_t with intercept for Japanese tourists market

Determinants	Intercept	y_{t-1}	y_{2t-1}	y_{3t-1}	y_{3t-2}
LNO	3.13 (0.923)	-0.067 (-0.960)	-0.540 (-4.936)	0.485 (5.265)	-0.630 (-3.936) (27.568)*
LGDP	16.75 (0.817)	-0.279 (-0.825)	-0.771 (-2.222)	0.491 (5.319)	-1.051 (-1.545) (16.24)*
LRP	0.298 (2.179)	-0.065 (-2.330)	-0.521 (-5.669)	0.483 (5.324)	-0.562 (-5.701) (47.94)*
LCP	-0.175 (-1.448)	-0.020 (-1.594)	-0.532 (-5.77)	0.468 (5.114)	-0.535 (-5.791) (45.18)*
LEX	-0.008 (-0.132)	-0.005 (-0.526)	-0.515 (-5.329)	0.530 (5.81)	-0.438 (-4.723) (41.05)*
LOC	0.215 (0.714)	-0.025 (-0.792)	-0.529 (-5.627)	0.402 (4.512)	-0.543 (-5.214) (31.12)*

Note: * is F-statistics

Table 8: The coefficient of y_t with intercept for UK tourists market

Determinants	Intercept	y_{t-1}	y_{2t-1}	y_{3t-1}	y_{3t-2}
LNO	3.651 (1.489	-0.084 (-1.538)	-0.573 (-5.667)	0.457 (5.031)	-0.659 (-4.990) (33.61)*
LGDP	3.396 (1.571)	-0.107 (-1.611)	-0.588 (-5.452)	0.481 (5.251)	-0.695 (-4.511) (32.87)*
LRP	-1.24 (1.419)	-0.080 (-1.468)	-0.564 (-5.511)	0.483 (5.263)	-0.645 (-4.747) (34.96)*
LCP	-1.274 (-1.381)	-0.0446 (-1.462)	-0.527 (-5.607)	0.487 (5.294)	-0.573 (-5.439) (43.06)*
LEX	1.603 (1.348)	-0.066 (-1.405)	-0.553 (-5.541)	0.485 (5.286)	-0.617 (-4.903) (39.983)*
LOC	0.190 (1.749)	-0.054 (-1.949)	-0.487 (-5.609)	0.369 (4.296)	-0.509 (-5.723) (34.59)*

Note: * is F-statistics

Table 9: The coefficient of y_t with intercept for USA tourists market

Determinants	Intercept	y_{t-1}	y_{2t-1}	y_{3t-1}	y_{3t-2}
LNO	5.546 (5.546)	-0.125 (-1.509)	-0.600 (-5.23)	0.466 (5.118)	-0.742 (-4.197) (26.74)*
LGDP	7.847 (1.715)	-0.194 (-1.739)	-0.672 (-4.926)	0.478 (5.229)	-0.864 (-3.736) (26.44)*
LRP	-0.361 (-0.437)	-0.028 (-0.484)	-0.519 (-4.829)	0.493 (5.324)	-0.557 (-3.76) (27.101)*
LCP	-0.979 (-1.155)	-0.037 (-1.238)	-0.529 (-5.570)	0.488 (5.302)	-0.561 (-5.294) (41.47)*
LEX	0.045 (0.674)	-0.032 (-0.736)	-0.526 (-5.219)	0.497 (5.368)	-0.559 (-4.458) (33.55)*
LOC	0.029 (0.327)	-0.012 (-0.639)	-0.474 (-5.39)	0.353 (4.102)	-0.465 (-5.29) (29.11)*

Note: * is F-statistics

6. Conclusion

Quarterly number of international tourist arrivals to Thailand and their associated growth rates are analyzed for the period 1985-2007. The main purpose is to analyze elasticity of demand for majority tourists of Thailand such as Malaysian tourists, Japanese tourists including UK tourists and USA tourists to compare between groups of tourists.

That is we can divided the tourists into 3 groups (1) short haul such as Malaysian tourists (2) medium haul such as Japanese tourists (3) long haul such as U.K. tourists and U.S.A. tourists.

Malaysian tourists are "short haul" tourists. From Malaysian tourism demand model, there are 3 positive and significant determinant factors. Firstly, it is found that LGDPM is positive and significant. Its value is 0.89. It shows that the growth of GDP per capita of Malaysian tourists increase 1%, the growth of Malaysian tourist arrivals will increase 0.89%. According to the income elasticity concept, it is inelastic demand. Secondly, LCPM is positive and significant. It is found that Malaysian tourism is substitute goods. Thirdly, LOCM is also positive and significant.

Japanese tourists are "medium haul" tourists. From Japanese tourism demand model, there are 4 positive and significant determinant factors. Firstly, it was found that LGDPJ is positive and significant, its value is 1.39. It shows that the growth of GDP per capita of Japanese tourists increase 1%, the growth of Japanese tourist arrivals will increase 1.39%. According to income elasticity concept, it is elastic demand. Secondly, LRPJ is positive and significant. Thirdly, LEXJ is positive and significant. Fourthly, LOCJ is also positive and significant.

UK tourists are "long haul" tourists. From UK tourists demand model, there are 2 positive and significant determinant factors. Firstly, it is found that LGDPU is positive and significant. Its value is 1.67. It shows that the growth of GDP per capita of UK tourists increase 1%, the growth of UK tourist arrivals will increase 1.67%. According to the income elasticity concept, it is elastic demand. Secondly, LOCU is also positive and significant.

USA tourists are also “long haul” tourists. From USA tourists demand model, there are 3 significant determinant factors. Firstly, it is found that LGDPUS is positive and significant. Its value is 1.38. It shows that the growth of GDP per capita of USA tourists increase 1%, the growth of U.S.A tourist arrivals will increase 1.38%. According to the income elasticity concept, it is elastic demand. But income elasticity of demand is not different from Japanese tourists, who are “medium haul” tourists because of substitution effects. Secondly, LCPUS is negative and significant. It is found that USA tourism is complementary. Thirdly, LOCUS is also positive and significant.

Finally, the main points for private and public institutions should be considered from the elasticity of demand:

(1) Medium and long haul tourism are elastic demand. If there is world economic crisis, the number of tourist arrivals will decrease inevitably. Therefore; the government should seek for new potential market such as Chinese tourists market or Indian tourists market.

(2) Long haul tourism is complimentary. These tourists travel not only in Thailand but also travelling in other countries nearby. Therefore; we should connect or link tourism destinations with countries nearby as a travel hub by infrastructure build i.e. constructing roads.

(3) There should be more good hotels and resorts in Thailand for serving international tourism.

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APPENDIX B

Value at Risk of International Tourist Arrivals to Thailand

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Value at Risk of International Tourist Arrivals to Thailand

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ABSTRACT

This paper examines Value at Risk (VaR) of International Tourist Arrivals to Thailand using monthly time series data for the period 1976-2009. As Thailand has been a significant source of a substantial number of tourists, international tourist arrivals to Thailand needs to be analyzed and estimated for future planning. Being a major foreign exchange earner and an important source of job creation for Thailand, tourism is an important industry.

In this study we will consider the volatility of international tourist arrivals to Thailand by employing a VaR model. VaR is widely used to manage the risk exposure of financial institutions and is the requirement of the Basel Capital Accord. The central idea underlying VaR is that, by forecasting the worst possible return for each day, institutions can prepare for the worst case scenario. Forecasted VaR figures can be used to estimate the level of reserves required to sustain desired long-term government projects and foreign exchange reserves.

International tourists are divided into three types which are short haul, medium haul and long haul. Malaysian tourists represent short haul tourists. Japanese tourists represent medium haul tourists. And British and American tourists represent long haul tourists.

Finally, we can conclude that the VaR of short haul tourists are higher than medium haul and long haul tourists. And hence tourism tax revenue of short haul and medium haul tourists are higher than long haul tourists.

1. Rational backgrounds and research question

1.1 Rational backgrounds

(see Table 1.1) The World Tourism Organization (WTO) estimated that the average growth of international tourists in 2005 would be 5.5% (lower than in 2004, when the growth of world tourism experienced a 10% expansion), with 808 million international tourists. However, the tourism industry saw a slowdown as a result of the world economic downturn. The region which was expected to grow at a higher rate was Asia Pacific (+10%) owing to the fact that tourists paid more attention to finding new attractions in this region, especially in Cambodia, Vietnam, India and China, where there was high growth in the number of visitors. Other regions at the lower ranks were Africa

(+7%), the Americas (+6%), Europe (+4%), and the Middle East (+3%), respectively. (Tourism Authority of Thailand, 2007)

In Thailand, the tsunami and disturbance in the three southern provinces, as well as the increased market competition in new destinations (Vietnam, China, India) and tourism product creation (Japan, Hong Kong, and Korea) were key factors of Thailand's slow tourism growth in 2005, with 11.52 million inbound visitors, a 1.15 % decrease from the previous year. However, this slowdown is not that severe due to the attempt by the public and private sectors to stimulate markets and rebuild the tourist attractions affected by the disaster as fast as possible. This resulted in an only slight impact of the above-mentioned factors on the Thai tourism industry.

Considering the number of tourist arrivals and Thailand international tourism receipts, it was found that the majority of tourists are from Malaysia and Japan. This study can be used to compare with the USA and the UK for making policy because of the difference in tourism volatility. The sustainable tourism is also considered with regards to the policy for Thailand tourism future development.

Note: Malaysian tourists are "short haul" tourists, Japanese tourists are "medium haul" tourists as well as UK and American tourists are "long haul" tourists.

Table 1.1: Number of International tourist arrivals to Thailand 1997-2006

Year	International						
	Tourist		Average	Average Expenditure		Revenue	
	Number	Change	Length of Stay	/person/day	Change	Million	Change
	(Million)	(%)	(Days)	(Baht)	(%)	(Baht)	(%)
1997/1	7.22	+0.41	8.33	3,671.87	-0.92	220,754	+0.63
1998/1	7.76	+7.53	8.40	3,712.93	+1.12	242l177	+9.70
1999/1	8.58	+10.50	7.96	3,704.54	-0.23	253,018	+4.48
2000/1	9.51	+10.82	7.77	3,861.19	+4.23	285,272	+12.75
2001/1	10.06	+5.82	7.93	3,748.00	-2.93	299,047	+4.83
2002/1	10.80	+7.33	7.98	3,753.74	+0.15	323,484	+8.17
2003/1	10.00	-7.36	8.19	3,774.50	+0.55	309,269	-4.39
2004/1	11.65	+16.46	8.13	4,057.85	+7.51	384,360	+24.28
2005/1	11.52	-1.51	8.20	3,890.13	-4.13	367,380	-4.42
2006/1	13.82	+20.01	8.62	4,048.22	+4.06	482,319	+31.29

Source : Tourism Authority of Thailand: 19 December 2007
Note:/1 = actual

1.2 Research question

How the volatility of long haul, medium haul and short haul tourism affects the environment (eco-tourism) and determines tourism taxes.

2. Research methodology and literature review

2.1 Unit root tests

2.1.1 Augmented Dickey and Fuller tests

To test for the long run frequency, Dickey and Fuller (1979) proposed a procedure based on the following auxiliary regression:

$$\Delta y_t = \alpha + \beta t + \delta y_{t-1} + \sum_{j=1}^{k} \gamma_j \Delta y_{t-k} + \varepsilon_t \quad (1.1)$$

where $\Delta y_t = (1 - L)$ designates the first different filter, ε_t is the error term and α, β and δ are the parameters to be estimated.

2.1.2 Phillips and Perron tests

The Phillips-Perron test is a unit root test. It is used in time series analysis to test the null hypothesis that a time series is I (1). It builds on the Dickey-Fuller test, but unlike the Augmented Dickey-Fuller test, which extends the Dickey-Fuller test by including additional lagged variables as regressors in the model on which the test is based, the Phillips-Perron test makes a non-parametric correction to the t-test statistic to capture the effect of autocorrelation present when the underlying autocorrelation process is not AR(1) and the error terms are not homoscedastic.

For analyzing the volatility, we use econometrics as follows:

2.2 Volatility Analysis

For analyzing the volatility, we use econometrics as follows:

2.2.1 Conditional Mean Model

The conditional mean model is to the autoregressive moving average, or ARMA (p, q) model that is proposed by Box-Jenkins (1970) combining the AR (p) and MA (q). Such a model states that the current value of some series y depends linearly on its own previous values plus a combination of current and previous values of a white noise error term. The model could be written:

$$\beta(L) y_t = \mu + \theta(L) \mu_t \quad (1.2)$$

where
$\beta(L) = 1 - \beta_1 L - \beta_2 L^2 - \cdots - \beta_p L^p$ and
$\theta(L) = 1 + \theta_1 L + \theta_2 L^2 + \cdots + \theta_q L^q$
or

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \cdots + \beta_p y_{t-p} + \mu_t + \theta_1 \mu_{t-1} + \theta_2 \mu_{t-2} + \cdots + \theta_q \mu_{t-q}, \quad (1.3)$$

with
$E(\mu_t) = 0$; $E(\mu_t{}^2) = \sigma^2$; $E(\mu_t \mu_s) = 0, t \neq s$

where $y_t, y_{t-1}, \ldots, y_{t-p}$ represent the current and lagged growth rate of tourist arrivals, p is the lag length of the AR error term, and q is the lag length of the MA error term.

If there are the seasonal effects, it will be the seasonal autoregressive moving average, or SARMA$(P,Q)_T$, model is given below:

$$y_t = \alpha + \beta_T y_{t-T} + \beta_{2T} y_{t-2T} + \cdots + \beta_{PT} y_{t-PT} + \mu_t + \theta_T \mu_{t-T} + \theta_{2T} \mu_{t-2T} + \cdots + \theta_{QT} \mu_{t-QT}, (1.4)$$

where $y_t, y_{t-T}, \ldots, y_{t-PT}$ represent the current and lagged growth rate of tourist arrivals, P is the lag length of the SAR error term, and Q is the lag length of the SMA error term.

The series is described by an AR integrated MA model or ARIMA (p,d,q) when y_t is replaced by $\Delta_1^d y_t$ and an SAR integrated SMA model or SARIMA $(P,D,Q)_T$ when y_t is replaced by $\Delta_1^D y_t$.

When we already construct the conditional mean model, after that we will construct the conditional volatility model latter.

2.2.2 Conditional Volatility Model

We use value at risk (VaR) to measure risks from the growth in number of tourist arrivals that affect the environment. In this paper, the symmetric Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model of Bollerslev (1986), and the asymmetric GJR model of Glosten, Jagannathan and Runkle (1992), which discriminates between positive and negative shocks to the tourist arrivals series will be used to forecast the required conditional volatilities.

The GARCH (p, q) model is given as (i) $Y_t = E(Y_t | F_{t-1}) + \varepsilon_t$ where

(ii) $\varepsilon_t = h^{1/2}\eta_t$,

$$(iii)\ h_{it} = \omega_i + \sum_{l=1}^{p} \alpha_i \varepsilon_{i,t-1}^2 + \sum_{l=1}^{q} \beta_i h_{i,t-1} \quad (1.5)$$

The GJR (p, q) model is given as (i) $Y_t = E(Y_t | F_{t-1}) + \varepsilon_t$ where

(ii) $\varepsilon_t = h^{1/2}\eta_t$,

$$(iii)\ h_{it} = \omega_i + \sum_{l=1}^{p} (\alpha_i \varepsilon_{i,t-1}^2 + \gamma I(\eta_{i,t}) \varepsilon_{i,t-1}^2) + \sum_{l=1}^{q} \beta_i h_{i,t-1} \quad (1.6)$$

$$(iv)\ I(\eta_{i,t}) = 1, \varepsilon_{i,t} \le 0 \quad and \quad = 0, \varepsilon_{i,t} > 0$$

where F_t is the information set variable to time t, and $\eta : iid(0,1)$. The four equations in the model state the following : (i) the growth in tourist arrivals depends on its own past values; (ii) the shock to tourist arrivals has a predictable conditional variance component, h_t, and an unpredictable component, η_t; (iii) the conditional variance depends on its own past values and the recent shocks to the growth in the tourist arrivals series; and (iv) the conditional variance is affected differently by positive and negative shocks to the growth in tourist arrivals.

For the GARCH (1, 1) to be stationary, we need

$$\alpha_1 + \beta_1 < 1 \quad (1.7)$$

For the GJR (1, 1) to be stationary, we need

$$\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1 \quad (1.8)$$

In equations (1.5) and (1.6), the parameters are typically estimated by the maximum likelihood method to obtain Quasi-Maximum Likelihood Estimators (QMLE) in the absence of normality of η_t, the conditional shocks (or standardized residuals). The conditional log-likelihood function is given as follows:

$$\sum_{t=1}^{n} \ell_t = -\frac{1}{2} \sum_{t=1}^{n} \left(\log h_t + \frac{\varepsilon_t^2}{h_t} \right)$$

The QMLE is efficient only if η_t is normal, in which case it is the MLE. When η_t is not normal, the adaptive estimation can be used to obtain efficient estimators, although this can be computationally intensive. Ling and McAleer (2003b) investigated the properties of adaptive estimators for univariate non-stationary ARMA models with GARCH (*r, s*) errors. The extension to multivariate processes is complicated.

Value-at-Risk and tourism: Value-at-Risk is a procedure designed to forecast the maximum expected negative return over a target horizon given a confidence limit. VaR measures an extraordinary loss on an ordinary day. VaR is widely used to manage the risk exposure of financial institutions and is the requirement of the Basel Capital Accord. The central idea underlying VaR is that by forecasting the worst possible return for each day, institutions can prepare for the worst case scenario. In the case of Thailand where tourism revenue is a major source of income and foreign exchange reserve, it is important to understand the risk associated with this particular source of income and to implement adequate risk management policies to ensure economic stability and sustained growth. Forecasted VaR figures can be used to estimate the level of reserves required to sustain desired long term government projects and foreign exchange reserves. Moreover, an understanding of the variability of tourist arrivals and tourism related revenue is critical for any investor planning to invest in or lend fund to supply side.

Normally, a VaR threshold is the lower bound of a confidence interval in terms of the mean. For example, suppose interest lies in modeling the random variable Y_t, which can be decomposed as $Y_t = E(Y_t|F_{t-1}) + \varepsilon_t$ .This decomposition suggests that Y_t is comprised of a predictable component, $E(Y_t|F_{t-1})$, which is the conditional mean, and a random component, ε_t. The variability of Y_t, and therefore its distribution, is determined entirely by the variability of ε_t. If it is assumed that ε_t follows distribution such that $\varepsilon_t : D(\mu_t, \sigma_t)$ where μ_t and σ_t are the unconditional mean and standard deviation of ε_t, respectively, these can be estimated using numerous parametric and/or non-parametric procedures. Therefore, the VaR threshold for Y_t can be calculated as $VaR_t = \mu_i - \alpha\sigma_i$ where α is the critical value from the distribution of ε_t that gives the correct confidence level.

2.3 Literature Review

In volatility analysis, Michael McAleer, Riaz Shareef and Bernardo da Veiga (2005) studied a risk management framework of daily tourist tax revenues for the Maldives, which was a unique SITE (Small Island Tourism Economies) because it relied almost entirely on tourism for its economic and social development. Daily international arrivals to Maldives and their associated growth rates were analyzed for the period 1994-2003. This seemed to be the first analysis of daily tourism arrivals and growth rates data in the tourism research literature.

The primary purpose for analyzing volatility was to model and forecast the Value-at-Risk (VaR) thresholds for the number of tourist arrivals and their growth rates. This would seemed to be the first attempt in the tourism research literature to apply the VaR portfolio management approach to manage the risks associated with tourism revenues. The empirical results based on two widely-used conditional volatility models showed that volatility was affected asymmetrically by positive and negative shocks, with negative shocks to the growth in tourist arrivals having a greater impact on volatility than previous positive shocks of a similar magnitude. The forecasted VaR threshold represented the maximum expected negative growth rate that could be expected given a specific confidence level. Both conditional volatility models led to the same average VaR at -6.59%, which meant that the lowest possible growth rate in daily tourists in residence, and hence in tourist tax revenues, was expected to be -6.59% at the 99% level of confidence. This should be useful information for the Maldivian government and private tourism service providers in the Maldives.

Riaz Shareef and Michael McAleer (2007) showed how the GARCH(1,1) model and the GJR (1,1) model could be used to measure the conditional volatility in monthly international tourist arrivals to six SITEs, namely Barbados, Cyprus, Dominica, Fiji, Maldives and Seychelles, and to appraise the implications of conditional volatility of SITEs for modeling tourist arrivals. For the logarithm of monthly international tourist arrivals, the estimates of the conditional volatility using GARCH (1, 1) and GJR (1, 1) were highly satisfactory. The sufficient conditions to ensure positivity of the conditional variance were met for all six SITEs, except for Maldives. It was worth noting that the empirical log-moment and second moment conditions were satisfied for both models and all six SITEs, which indicated model adequacy for policy analysis and formulation. The asymmetric effects were generally satisfactory, with the exception of Dominica. This implies that the effect of positive shocks on conditional volatility was greater than negative shocks in the short and long run. Thus, the results for Dominica suggested that an unexpected fall in monthly international tourist arrivals decreases the uncertainty about future monthly international tourist arrivals, which was contrary to the results for the other five SITEs.

For volatility analysis, Michael McAleer et al. (2005) studied a risk management framework of daily tourist tax revenues for the Maldives using value at risk (VaR) to measure the risk from growth of the number of tourist arrivals affecting the environment. The GARCH (1, 1) and the GJR (1, 1) were used to forecast the required conditional volatilities. Riaz Shareef, et al. (2007) showed how the GARCH (1, 1) model and the GJR (1, 1) model could be used to measure the conditional volatility in monthly international tourist arrivals to six SITEs. Their results also show that the GARCH (1, 1) and the asymmetric GJR (1, 1) models provide an accurate measure of risk.

In studies from literature reviews we will estimate and forecast by using the GARCH (1, 1) and the asymmetric GJR (1, 1) in the conditional volatility model.

3. Objective of this Study

To analyze the volatility from the growth of the number of tourist arrivals that affects the environment (eco-tourism) and determines tourism taxes.

4. Data Collection

Based on the above methodology we can divide data collection as follows: we used the secondary data from 1976 to 2009. The data used to measure the independent and dependent variables are from the Tourism Authority of Thailand (TAT), the Bank of Thailand (BOT), and Immigration Bureau (Police Department).

Note the three important dips in the tourist activity for the periods 1991, 1997 and 2005, respectively. The first period is due to the negative impact of the Gulf War of 1991.The second is due to the "Tomyumkung" economics crisis of 1997 in which the Asian tourist market seemed to be the most affected. The third period is due to the Tsunami disaster of 2004.

Moreover, there exists a direct relationship between the monthly total tourist arrivals by residence and the government policy to keep tourism taxes in case of higher number of tourists exceed the maximum limit by using the outcome from VaR (Value at Risk), GARCH and GJR to find out the answer for the government to launch the direct tourism policy for earning the best results.

5. Unit Root Tests

Standard unit root test based on the methods of Augmented Dickey-Fuller (1979) and Phillips and Perron (1988) are reported in Table 1.2.

The ADF tests for a unit root are used for logarithmic variable series over the full sample period. Note that the ADF tests of the unit root null hypothesis correspond to the following one-sided test:

$$H_0 : \delta = 0$$
$$H_1 : \delta < 0$$

The ADF test results are confirmed by the Phillip-Perron test and the coefficient is significant at the 5% level. The results of the ADF unit root tests are that when the ADF test statistics are compared with the critical values from the nonstandard Dickey-Fuller distribution, the former for all of variable series are less than the critical value at 5% significance level. Thus, the null hypothesis of a unit root is rejected at the 5% level, implying that the series are stationary. By taking first differences of the logarithm of variables, the ADF tests show that the null hypothesis of a unit root is clearly rejected. The ADF statistics for the series are less than the critical value at the 5% significance level. Thus, the first differences of the logarithmic variables are stationary. These empirical results allow the use of this data to estimate conditional mean and conditional volatility model.

Table 1.2: the result of unit root tests

Variable	ADF Without trend		PP Without trend	
	level	1st difference	level	1st difference
DTN	-7.6671***	-14.9299***	-33.4911***	-30.6096***
DNM	-4.9960***	-12.9948***	-37.5955***	-277.6326***
DNJ	-5.8683***	-16.9183***	-31.2189***	-108.3260***
DNUK	-3.8053***	-13.1170***	-20.9481***	-61.4773***
DNUS	-4.4828***	-20.5141***	-31.2214***	-77.3335***

Notes:
1. DTN denotes the growth rate of total number of tourist arrivals, DNM denotes Malaysian tourist arrivals, DNJ denotes the growth rate of Japanese tourist arrivals, DNUK denotes the growth rate of United Kingdom tourist arrivals, and DNUS denotes the growth rate of American tourist arrivals
2. *** denotes the null hypothesis of a unit root is rejected at the 1% level.

6. Volatility Model

The number and graph for total monthly tourist arrivals, monthly Malaysian tourist arrivals, monthly Japanese tourist arrivals, monthly UK tourist arrivals, and monthly American tourist arrivals are given in figure 1.1-1.5 and table 1.3-1.5, respectively. All data displays degrees of variability and seasonality. The highest levels of tourism arrivals to Thailand occur during the winter season in East Asia, Europe and North America, while the lowest levels occur during the summer season in East Asia, Europe and North America. The descriptive statistics are given in table 1.4. The total amount of tourist arrivals have a mean of 498,513.9 arrivals per month, a maximum of 1,521,816 arrivals per month, and a low minimum of 74,611 arrivals per month. Furthermore, the monthly Japanese tourist arrivals display the greatest variability with the mean of 59,159.07 arrivals per month, a maximum of 127,334 arrivals per month, and a low minimum of 13,117 arrivals per month. The monthly Japanese tourist arrivals have a standard deviation of 33,953.08, which is the highest standard deviation of all.

As the focus of this paper is not concerned with behavior of international tourist arrivals to Thailand, but is on managing the risk associated with the variability in tourist arrivals and the policy to collect tourist taxes. The paper focuses on modeling the growth rate, namely the return in tourist arrivals. The graph for the returns in total monthly tourist arrivals, Malaysian tourist arrivals, Japanese tourist arrivals, UK tourist arrivals and American tourist arrivals are given in figures 1.6-

1.10, respectively. The descriptive statistics for the growth rates are given in table 1.5. Total monthly tourist arrivals display the variability, with the standard deviation of 13.15%, a maximum of 46.12%, and a minimum of -45.32%. Furthermore, monthly Malaysian tourist arrivals display the greatest variability, with a standard deviation 29.24%, a maximum of 126.61%, and a minimum of -59.65%. Each of the data is found to be non-normal distributed, based on the Jaque-Bera Lagrange multiplier statistics for normality.

Table 1.3: Accumulation of the number of tourist arrivals to Thailand

Accumulation of total number of tourist arrivals by residence (1976-2009)	Accumulation of Malaysian tourist arrivals (1979-2009)	Accumulation of Japanese tourist arrivals (1979-2009)	Accumulation of United Kingdom tourist arrivals (1979 -2009)	Accumulation of American tourist arrivals (1979-2009)
191,429,339	25,975,942	20,587,357	8,793,307	9,140,592

Table 1.4: Descriptive Statistics (monthly arrivals)

Statistics	Total number tourist arrivals (1976-2009)	Malaysian (1979-2009)	Japanese (1979-2009)	United Kingdom (1979-2009)	American (1979-2009)
Mean	1.5984	4.6727	2.5511	2.5459	2.3475
Median	2.3579	1.1012	2.5478	1.7017	-0.9065
Maximum	46.1240	126.6085	69.5582	69.9248	103.4871
Minimum	-45.316	-59.6502	-44.2007	-48.0263	-40.8867
Std. Dev.	13.1450	29.2423	20.5580	18.9440	19.5069
Skewness	-0.1465	0.7733	0.2195	0.5731	1.4645
Kurtosis	2.8757	4.1532	3.0172	3.6419	7.0056
Jarque-Bera	0.6180	53.8135	2.7900	24.9524	356.0243
Probability	0.4452	0.0000	0.2478	0.0000	0.0000

Table 1.5: Descriptive Statistics for Growth Rate (monthly arrivals)

Statistics	Total number of tourist arrivals (1976-2009)	Malaysian (1979-2009)	Japanese (1979-2009)	UK (1979-2009)	American (1979-2009)
Mean	498,513.90	74,643.51	59,159.07	25,268.12	26,266.07
Median	444,007.00	70,933.50	54,765.50	21,083.50	24,014.50
Maximum	1,521,816	182,982	127,334	86,210	67,176
Minimum	74,611	11,465	13,117	2,958	5,927
Std. Dev.	332,358.20	32,983.87	33,953.08	18,968.30	14,399.76
Skewness	0.6648	0.5073	0.2621	0.8530	0.6653
Kurtosis	2.5176	3.1577	1.7428	2.8465	2.5916
Jarque Bera	32.0079	15.3127	26.9021	42.5431	28.0913
Probability	0.0000	0.000473	0.00001	0.0000	0.000001

Figure 1.1: Total monthly international tourist arrivals from 1976-2009

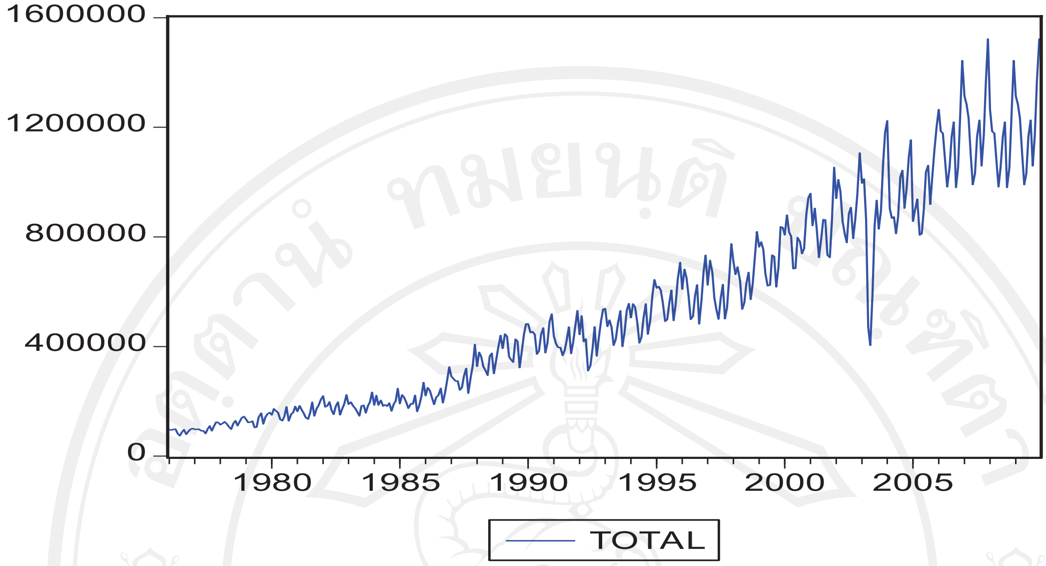


Figure 1.2: Monthly Malaysian tourist arrivals from 1979-2009

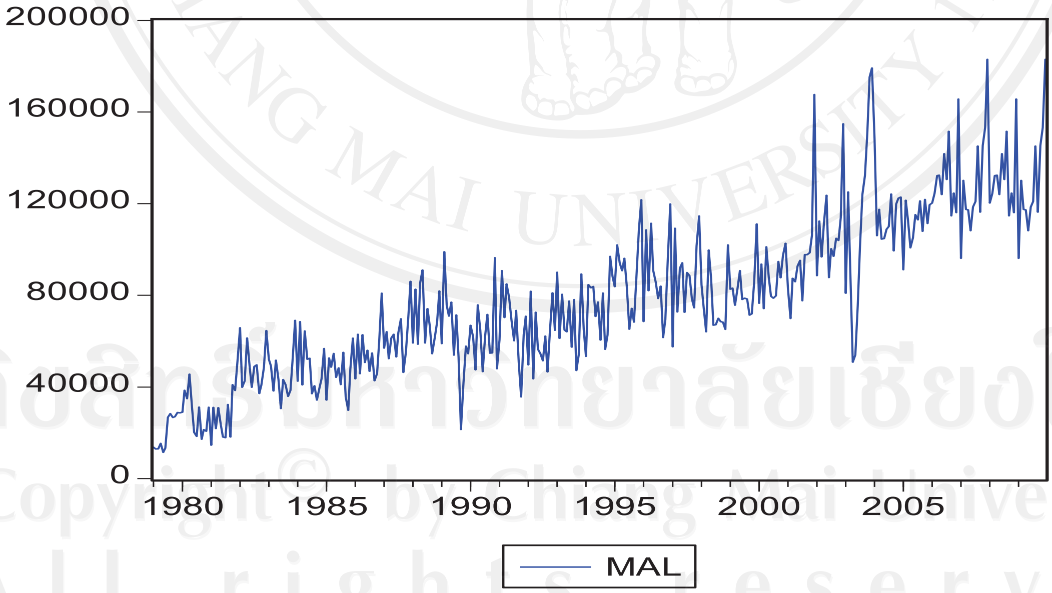


Figure 1.3: Monthly Japanese tourist arrivals from 1979-2009

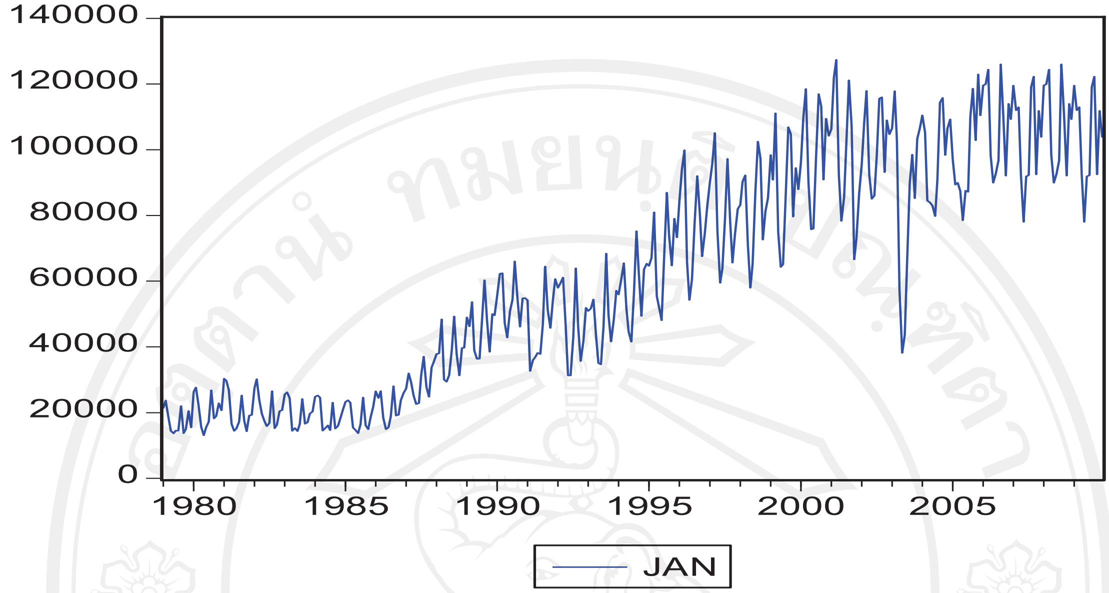


Figure 1.4: Monthly UK tourist arrivals from 1979-2009

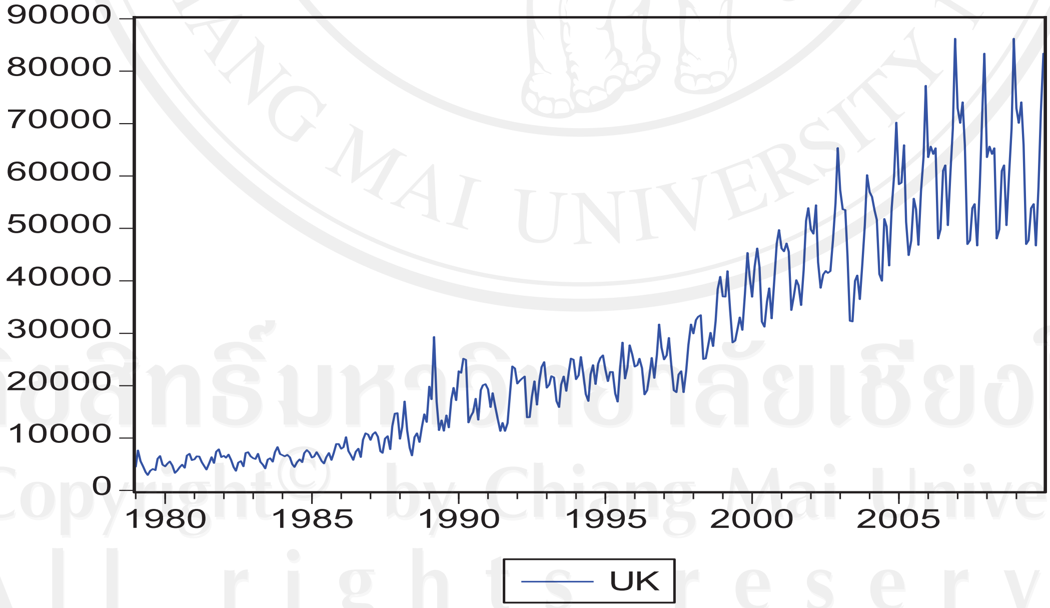


Figure 1.5: Monthly American tourist arrivals from 1979-2009

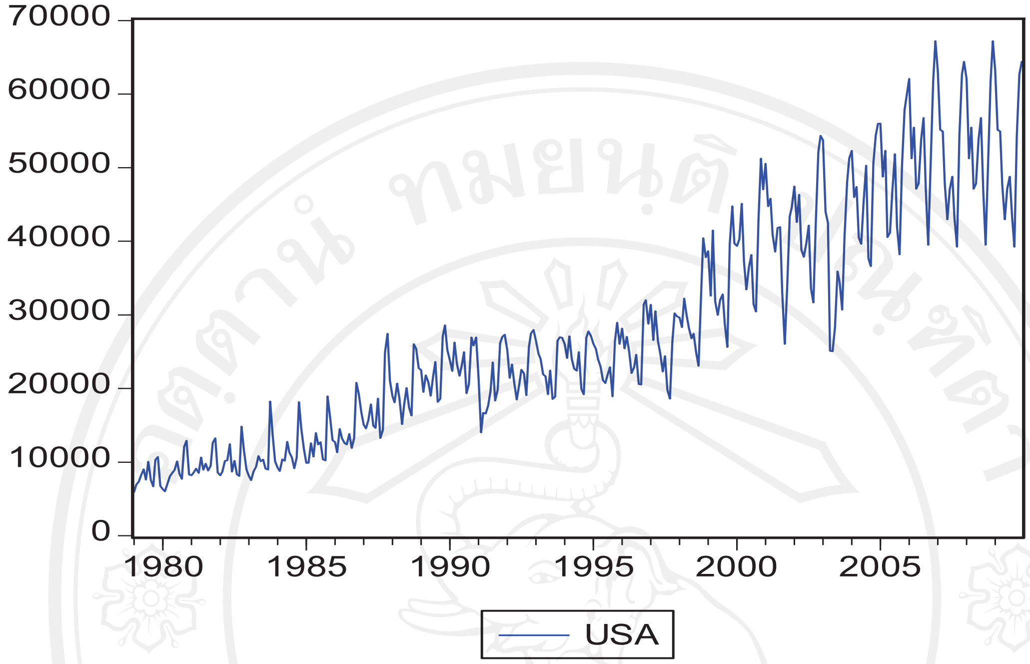


Figure 1.6: Total monthly tourist arrival growth rates from 1976-2009

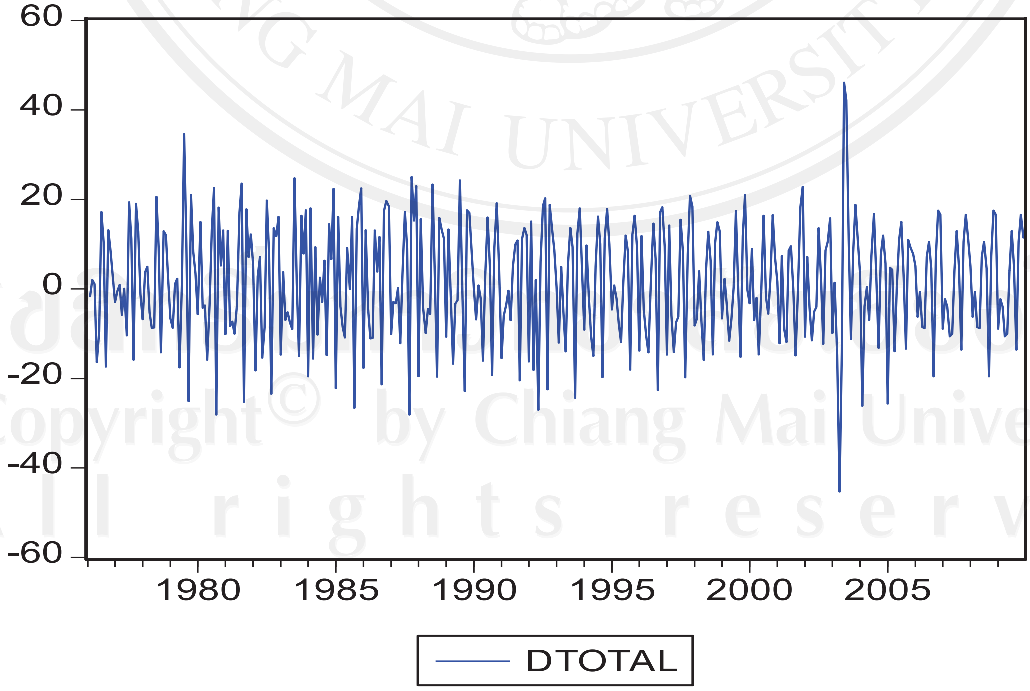


Figure 1.7: Monthly Malaysian tourist arrival growth rates from 1979-2009

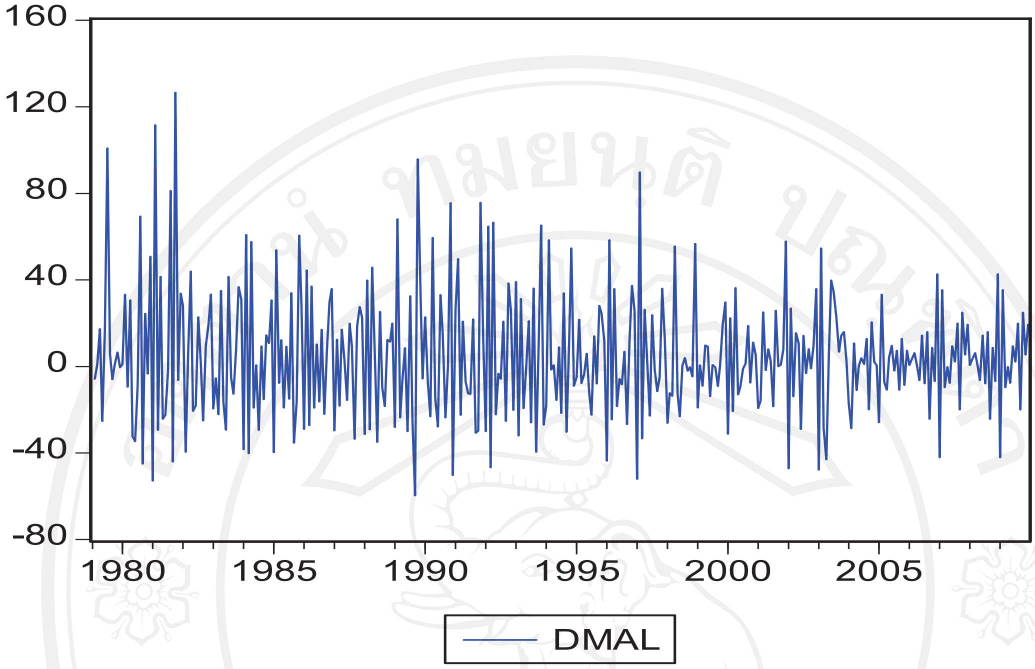


Figure 1.8: Monthly Japanese tourist arrival growth rates from 1979-2009

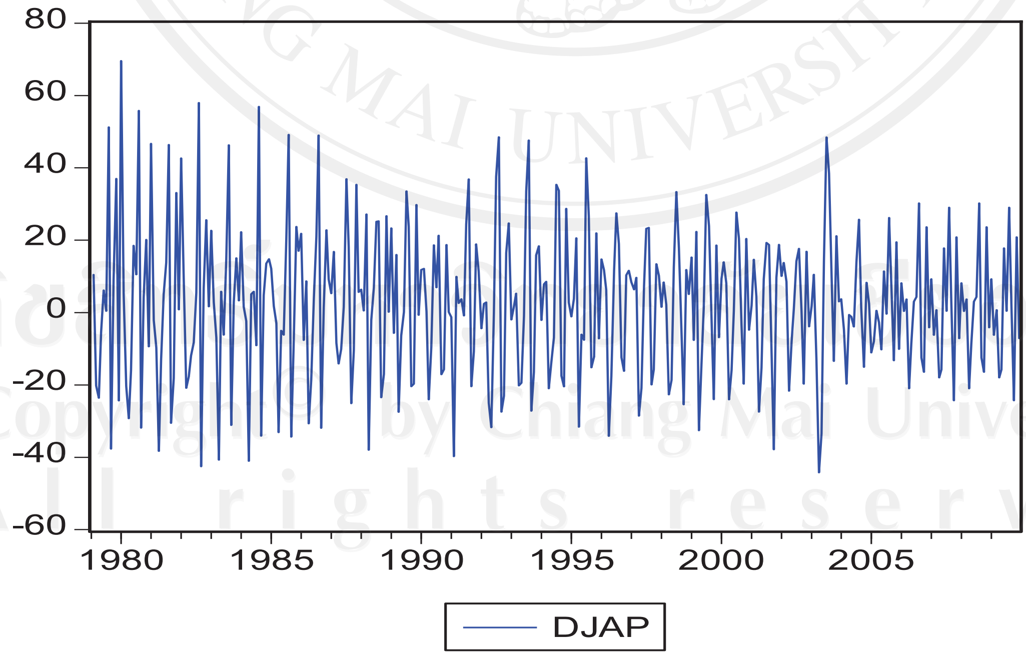


Figure 1.9: Monthly UK tourist arrival growth rates from 1979-2009

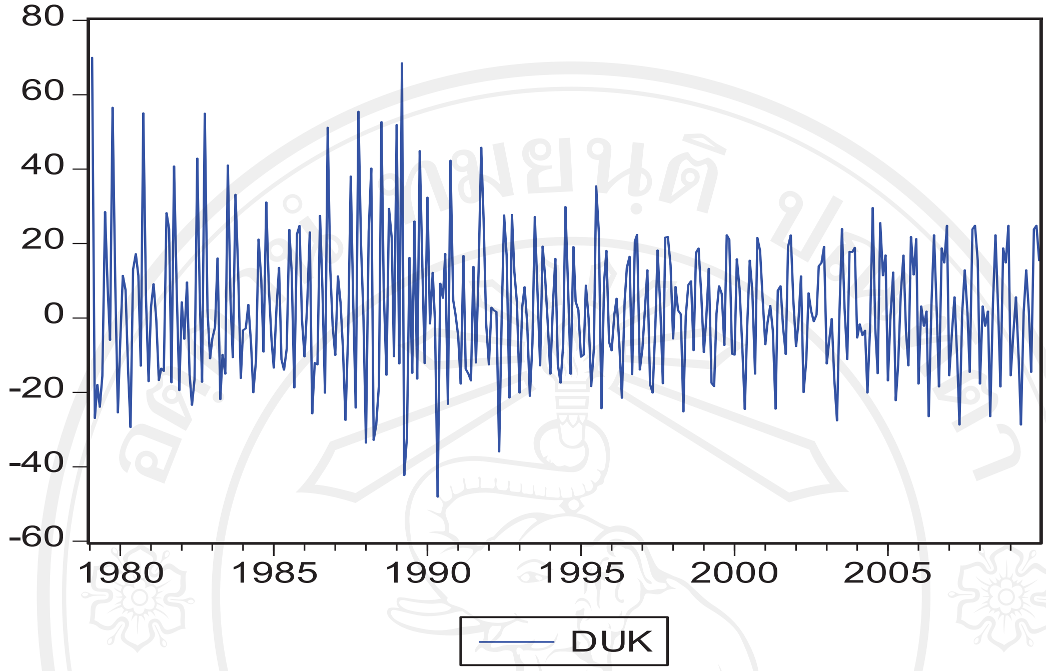
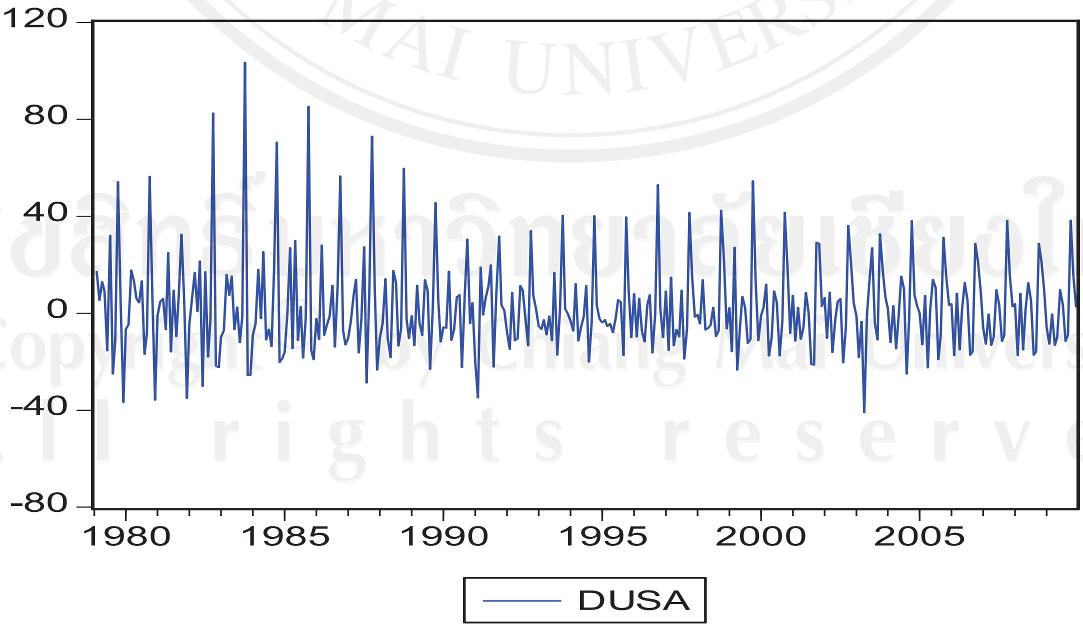


Figure 1.10: Monthly American tourist arrival growth rates from 1979-2009



7. SARMA models for conditional mean model

Since the ADF test procedures show that the tourist arrival growth rate series are integrated of order zero, $I(0)$ the latter is used to estimate the Box-Jenkins models. The autoregressive moving average, or ARMA (p,q) model and the seasonal autoregressive moving average, or SARMA $(P,Q)_T$ are used in conditional mean estimation.

Table 1.6 presents the results of the SARMA model for total tourist arrival growth rates, model is given below:

Table 1.6: SARMA model for growth rates in total monthly tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	1.660	1.103	AIC=7.241	F=1.282
AR(1)	-0.190	-3.694	BIC=7.273	p=0.076
SAR(12)	0.739	20.913		

Table 1.7 presents the results of the SARMA model for Malaysian tourist arrival growth rates, model is given below:

Table 1.8 presents the results of the SARMA model for Japanese tourist arrival growth rates, model is given below:

Table 1.7: SARMA model for growth rates in monthly Malaysian tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	4.252	2.983	AIC=9.170	F=2.473
AR(1)	-0.474	-9.805	BIC=9.204	p=0.062
SAR(12)	0.385	7.818		

Table 1.8: SARMA model for growth rates in monthly Japanese tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	0.098	0.025	AIC=7.461	F=3.303
AR(1)	-0.173	-3.181	BIC=7.506	p=0.070
SAR(12)	0.958	86.397		
MA(12)	-0.676	-16.551		

Table 1.9 presents the results of SARMA model for UK tourist arrival growth rates, model is given below:

Table 1.10 presents the results of SARMA model for American tourist arrival growth rates, model is given below:

Table 1.9: SARMA model for growth rates in monthly UK tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	2.423	6.005	AIC=8.282	*F*=1.217
AR(1)	-0.275	-5.285	BIC=8.315	*p*=0.125
SAR(6)	-0.596	-13.675		

Table 1.10: SARMA model for growth rates in monthly American tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	2.078	0.711	AIC=7.418	*F*=1.689
AR(1)	-0.276	-5.241	BIC=7.452	*p*=0.075
SAR(12)	0.856	31.625		

We use the two most commonly model selection criteria are the Akaike Information Criterion (AIC) and the Schwarz Baysian Criterion (BIC), with the decision to base the model choice being to select the model for which the appropriate criterion smallest.

For ensuring that the estimated residuals do not have serial correlation at the 5% significance level, we use the Breusch-Godfrey Lagrange multiplier test of serial correlation, LM (SC). It can be used to test for higher-order ARMA or SARMA errors, and is applicable in the presence of lagged dependent variables. Using the Lagrange multiplier test, if the computed F statistic exceeds the critical value at 5% level, this leads to the rejection of the null hypothesis of no serial correlation.

Furthermore, the computed F statistics for the LM (SC) test are all less than the critical value. Thus, the null hypothesis of no serial correlation is not being rejected for these models.

8. GARCH and GJR for conditional volatility model

The variable of interest for the Thailand government is the number of tourist arrivals at any given month as this figure is directly related to tourism revenue. In this section, the tourist arrivals are used to estimate the GARCH (1, 1) and GJR (1, 1) model. All estimation was conducted using Eviews 5.1. The models are estimated using QMLE for the case p=q=1 in Table 1.11-1.12.

The estimated GARCH (1, 1) equation for monthly growth rates in the total number of tourist arrivals is given as follows:

$$h_t = \underset{(1.615)}{5.832} + \underset{(0.028)}{0.138}\,\varepsilon_{t-1}^{\;2} + \underset{(0.029)}{0.786}\,h_{t-1}$$

The estimated GARCH (1, 1) model of monthly growth rates in total number of international tourist arrivals to Thailand for the short run persistence lies at 0.138, whilst the long run persistence lies at 0.924. As the respective estimate of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCH (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimates are statistically adequate and sensible for the purpose of interpretation.

The estimated GJR (1, 1) equation for monthly growth rates in the total number of tourist arrivals is given as follows:

$$h_t = \underset{(1.611)}{5.829} + \underset{(0.048)}{0.123}\varepsilon_{t-1}{}^2 + \underset{(0.059)}{0.025} I\varepsilon_{t-1}{}^2 + \underset{(0.030)}{0.789} h_{t-1}$$

The asymmetry coefficient is found to be positive and significant for the GJR (1, 1) model, namely 0.123, which indicates that decreases in total number of tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR (1, 1) and where the figures in parentheses are standard errors, which indicates that the model provides an adequate fit to the data. As γ_1 is estimated significant and $\alpha_1 + \gamma_1 > \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous negative shocks having a greater impact on volatility than previous positive shocks of similar magnitude.

The estimated GARCH (1, 1) equation for monthly growth rates in Malaysian tourist arrivals is given as follows:

$$h_t = \underset{(15.645)}{33.132} + \underset{(0.042)}{0.118}\varepsilon_{t-1}{}^2 + \underset{(0.059)}{0.818} h_{t-1}$$

The estimated GARCH (1, 1) model of monthly growth rates in Malaysian tourist arrivals shows the short run persistence lies at 0.118, while the long run persistence lies at 0.936. As the respective estimate of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCH (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimates are statistically adequate and sensible for the purpose of interpretation.

The estimated GJR (1, 1) equation for monthly growth rates in Malaysian tourist arrivals is given as follows:

$$h_t = \underset{(15.719)}{26.257} + \underset{(0.050)}{0.071}\varepsilon_{t-1}{}^2 + \underset{(0.080)}{0.100} I\varepsilon_{t-1}{}^2 + \underset{(0.060)}{0.835} h_{t-1}$$

The asymmetry coefficient is found to be positive and significant for the GJR (1, 1) model, namely 0.071, which indicates that decreases in monthly Malaysian tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR (1, 1) and where the figures in parentheses are standard errors, which indicates that the model provides an adequate fit to the data. As γ_1 is estimated significant and $\alpha_1 + \gamma_1 > \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous negative shocks having a greater impact on volatility than previous positive shocks of similar magnitude.

The estimated GARCH (1, 1) equation for monthly growth rates in Japanese tourist arrivals is given as follows:

$$h_t = \underset{(10.738)}{32.064} + \underset{(0.065)}{0.293}\varepsilon_{t-1}{}^2 + \underset{(0.134)}{0.398} h_{t-1}$$

The estimated GARCH (1, 1) model of monthly growth rates in Japanese tourist arrivals shows the short run persistence lies at 0.293, while the long run persistence lies at 0.691. As the respective estimate of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCH (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimates are statistically adequate and sensible for the purpose of interpretation.

The estimated GJR (1, 1) equation for monthly growth rates in Japanese tourist arrivals is given as follows:

$$h_t = \underset{(73.385)}{145.296} + \underset{(0.132)}{0.038}\varepsilon_{t-1}{}^2 - \underset{(0.124)}{0.115} I\varepsilon_{t-1}{}^2 + \underset{(0.452)}{0.148} h_{t-1}$$

The asymmetry coefficient is found to be positive and significant for the GJR (1, 1) model, namely 0.038, which indicates that decreases in monthly Japanese tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR (1, 1) and where the figures in parentheses are standard errors, which indicates that the model provides an adequate fit to the data. As γ_1 is estimated significant and $\alpha_1 + \gamma_1 < \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous positive shocks having a greater impact on volatility than previous negative shocks of similar magnitude.

The estimated GARCH (1, 1) equation for monthly United Kingdom tourist arrivals is given as follows:

$$h_t = \underset{(2.781)}{3.273} + \underset{(0.038)}{0.092}\,\varepsilon_{t-1}^{\;2} + \underset{(19.825)}{0.890}\,h_{t-1}$$

The estimated GARCH (1, 1) model of monthly growth rates in United Kingdom tourist arrivals shows the short run persistence lies at 0.092, while the long run persistence lies at 0.982. As the respective estimate of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCH (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimates are statistically adequate and sensible for the purpose of interpretation.

The estimated GJR (1, 1) equation for the United Kingdom tourist arrivals is given as follows:

$$h_t = \underset{(3.092)}{3.051} + \underset{(0.049)}{0.084}\,\varepsilon_{t-1}^{\;2} + \underset{(0.094)}{0.040}\,I\varepsilon_{t-1}^{\;2} + \underset{(0.047)}{0.883}\,h_{t-1}$$

The asymmetry coefficient is found to be positive and significant for the GJR (1, 1) model, namely 0.084, which indicates that decreases in monthly United Kingdom tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR (1, 1) and where the figures in parentheses are standard errors, which indicates that the model provides an adequate fit to the data. As γ_1 is estimated significant and $\alpha_1 + \gamma_1 > \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous negative shocks having a greater impact on volatility than previous positive shocks of similar magnitude.

The estimated GARCH (1, 1) equation for monthly growth rates in American tourist arrivals is given as follows:

$$h_t = \underset{(12.227)}{93.615} + \underset{(0.051)}{0.181}\,\varepsilon_{t-1}^{\;2} + \underset{(0.073)}{0.230}\,h_{t-1}$$

The estimated GARCH (1, 1) model of monthly growth rates in American tourist arrivals shows the short run persistence lies at 0.181, while the long run persistence lies at 0.411. As the respective estimate of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCH (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimates are statistically adequate and sensible for the purpose of interpretation.

The estimated GJR (1, 1) equation for American tourist arrivals is given as follows:

$$h_t = \underset{(39.935)}{114.467} + \underset{(0.029)}{0.114}\varepsilon_{t-1}^{\;2} + \underset{(0.065)}{0.024}I\varepsilon_{t-1}^{\;2} + \underset{(0.390)}{0.326}h_{t-1}$$

The asymmetry coefficient is found to be positive and significant for the GJR (1, 1) model, namely 0.114, which indicates that decreases in monthly American tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR (1, 1) and where the figures in parentheses are standard errors, which indicates that the model provides an adequate fit to the data. As γ_1 is estimated significant and $\alpha_1 + \gamma_1 > \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous negative shocks having a greater impact on volatility than previous positive shocks of similar magnitude.

Table 1.11: Estimated GARCH Model

Parameters	GARCH				
	Total	**Malaysian**	**Japanese**	**UK**	**American**
ω	5.832***	33.132***	32.064***	3.273*	93.615***
	(1.615)	(15.645)	(10.738)	(2.781)	(12.227)
α	0.138***	0.118***	0.293***	0.092**	0.181***
	(0.028)	(0.042)	(0.065)	(0.038)	(0.051)
β	0.786***	0.818***	0.398***	0.890***	0.230***
	(0.029)	(0.059)	(0.134)	(0.045)	(0.073)
Diagnostics					
Second moment	0.924	0.936	0.691	0.982	0.411
AIC	7.054	9.073	7.386	8.128	7.386
BIC	7.118	9.142	7.466	8.196	7.456

Notes:
Numbers in parentheses are standard error.
The log-moment condition is necessarily satisfied as the second the moment condition is satisfied.
AIC and BIC denote the Akaike Information Criterion and Schwarz Criterion, respectively.
*** denotes the estimated coefficient is statistically significant at 1%.
** denotes the estimated coefficient is statistically significant at 5%.
* denotes the estimated coefficient is statistically significant at 10%.

Table 1.12: Estimated GJR Model

Parameters	GJR				
	Total	**Malaysian**	**Japanese**	**UK**	**American**
ω	5.829***	26.257*	145.296**	3.051*	114.467***
	(1.611)	(15.719)	(73.385)	(3.092)	(39.935)
α	0.123***	0.071*	0.038*	0.084*	0.114***
	(0.048)	(0.050)	(0.131)	(0.049)	(0.029)
γ	0.025*	0.100*	-0.115*	0.040*	0.024*
	(0.059)	(0.080)	(0.124)	(0.094)	(0.065)
β	0.789***	0.835***	0.148*	0.883***	0.326*
	(0.030)	(0.060)	(0.452)	(0.047)	(0.390)
Diagnostics					
Second moment	0.925	0.956	0.128	0.987	0.452
AIC	7.060	9.074	7.649	8.134	7.412
BIC	7.118	9.153	7.740	8.212	7.792

Notes:
Numbers in parentheses are standard error.
The log-moment condition is necessarily satisfied as the second the moment condition is satisfied.
AIC and BIC denote the Akaike Information Criterion and Schwarz Criterion, respectively.
*** denotes the estimated coefficient is statistically significant at 1%.
** denotes the estimated coefficient is statistically significant at 5%.
* denotes the estimated coefficient is statistically significant at 10%.

8.1 Forecasting

We used the sample for the total number of international tourist arrivals ranging from January 1976 to December 2009 and number of tourist arrivals ranging from January 1979 to December 2009 for each country. In order to strike a balance between the efficiency in estimation and a variable number of rolling regressions, the rolling window size is set for forecasting the period from January 1991 to December 2009 for total number of international tourist arrivals and from January 1994 to December 2009 for number of international tourist arrivals for each country. Using the notation developed in the previous section, the VaR forecast for the growth rate of tourist arrivals at any time t is given by, $VaR = E(Y_t|F_{t-1}) - \alpha\sqrt{h_t}$, where $E(Y_t|F_{t-1})$ is the forecasted expected growth rate of tourist arrivals, and h_t is the conditional volatility.

The forecasted VaR thresholds represent the maximum expected negative growth rate that could be expected given a specific confidence level. This paper uses 1% to calculate the VaR. Based on the Likelihood Ratio test; both models (GARCH and GJR) display the correct conditional coverage. In addition, the second moment additions for each rolling window of both models are satisfied for every rolling window which provides greater confidence in the statistic adequacy of the two estimated models. Finally, both models lead to the same average VaR at -91.09% which means that, on average, the lowest possible monthly growth rate in total tourist arrivals, and hence in tourist tax revenue, is -91.09%, given a 99% level of confidence. Monthly growth rate in Malaysian, Japanese, United Kingdom and American tourist arrivals have an average VaR at -647.71%, -132.95%, -329.83% and -213.67%, respectively. And hence in tourism tax revenue, are -647.71%, -132.95%, -329.83% and -213.67%, respectively, given 99% level of confidence.

9. Conclusion

The empirical study based on two widely-used conditional volatility models shows that the volatility is affected symmetrically by positive and negative shocks, with the previous positive shocks to the growth in tourist arrivals to Thailand having a greater impact on volatility than previous negative shocks of similar magnitude. The forecasted VaR threshold represents the maximum expected negative growth rate that could be expected given a specific confidence level. Both conditional volatility models leads to the same average VaR at -91.09% which means that, on average, the lowest possible monthly growth rate in total tourist arrivals, and hence in tourist tax revenue, is -91.09%, given a 99% level of confidence. The monthly growth rates in Malaysian, Japanese, United Kingdom and American tourist arrivals have an average VaR at -647.71%, -132.95%, -329.83% and -213.67%, respectively. VaR of short haul tourists are higher than medium haul and long haul tourists. And hence tourism tax revenue, are, -647.71%, -132.95%, -329.83% and -213.67%, respectively, given 99% level of confidence.

This should be useful information for both private and public tourist providers to manage sustainable tourism in Thailand.

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APPENDIX C

The Impacts of the Real Exchange Rate on the Volatility of International Tourist Arrivals to Thailand

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The Impacts of the Real Exchange Rate on the Volatility of International Tourist Arrivals to Thailand

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ABSTRACT

International tourism has an important role in Thailand's economy. This is because it can bring in a great amount of tourism revenue. Therefore, the promotion of the tourism industry is regarded as an important part of government policies. In fact, many factors such as political issue and the economic crisis, can affect a large number of international tourists. In this study, the real exchange rate is used because it has pervasive effects on the tourist budget. And it is considered to be a significant variable for the number of international tourist arrivals.

In this study, we will evaluate the change in the real exchange rate and its impact upon the volatility of international tourist arrivals to Thailand by using GARCHX model and GJR-X model.

International tourists are divided into three types which are short haul, medium haul and long haul. Malaysian tourists represent short haul tourists. Japanese tourists represent medium haul tourists and British and American tourists represent long haul tourists.

For the GARCHX model and GJR-X, the change in the real exchange rate can impact the volatility of Japanese tourist arrivals to Thailand. But this does not have an impact on the volatility of Malaysian, British and American tourist arrivals to Thailand.

Finally, we can conclude that the change in the real exchange rate impact only the volatility of medium haul tourists, not short and long haul tourists. There are significantly negative relationships between the real exchange rate and the volatility. If the real exchange rate increases, the volatility of medium haul tourists will decrease. If the real exchange rate decreases, the volatility of medium haul tourists will definitely increase.

1. Introduction

International tourism has experienced an overwhelming boom over the last two decades and has been called the largest industry in the world. Despite this positive outcome the rate of growth has varied unevenly from year to year.

In 2007, the growth of international tourists around the world was 6%, with 898 million international tourists (higher than in 2006, the growth of world tourism expanded by 5.5%). This was partly the result of the emergence of new destinations in Asia-Pacific, Africa, and Middle East regions. There were many obstacles to international travelling, such as increased expenses due to higher fuel cost, variance of currency exchange rates, as well as issues of economic stability, terrorism, unpredictable weather and epidemics.

International tourist arrivals to Thailand in 2007 experienced moderate growth at the rate of 4.65%, constituting 14,464,228 tourists. These figures were the result of political problems in the country which included several bombings in Bangkok and peripheral areas on New Year's Eve 2006. This brought on concerns over safety, especially in the East Asian market. Although these incidents did not have an impact on other regions' markets, there were also other factors which discouraged international inbound visits, such as the USA's economic downturn, unpredictable weather and terrorism in Europe. All of these problems resulted in a lower number of international tourists arrivals to Thailand during the first to the third quarter of the year than expected. However, in the fourth quarter the figures of inbound visitors recovered almost comparable with the target. Therefore, most markets had a higher growth rate as follows: Oceania (+16.59), South Asia (+13.27%), Middle East (+11.84%), Africa (+11.16), Europe (+11.08), and East Asia (+0.49%), whilst the US experienced a lower rate (-0.92%). The preliminary receipts from international tourist arrivals were 547,782 million baht, a 13.57% increase compared with the previous year. (Annual report of Tourism Authority of Thailand, 2007, 1)

Situation of International Tourist Arrivals to Thailand

East Asia:

The East Asian region had a very low growth rate with a total of 7,981,205 inbound tourists and a growth rate of 0.49%, only higher than that of the US region, since it was quite sensitive to crises, such as the several bombings in Bangkok and peripheral areas during the New Year celebrations. Therefore in the first half of 2007 the number of tourist arrivals decreased at a rate of 3.63%, which affected China, Hong Kong, Japan, Malaysia, Singapore, South Korea, Taiwan and Vietnam Markets. However, those markets' growth rate gradually adjusted to be positive in the second half of 2007, owing to the fact that political conflicts began to unravel and active market promotion was encouraged in many areas. As a result, almost all markets grew positively with a 4.47% increase in growth rate.

Europe:

There were 3,689,770 inbound visitors with quite a high tourism growth rate of 11.08%, even though the slowdown remained from the second to the third quarter due to anxiety over safety after the bombings in the United Kingdom. In addition, this situation influenced the decision for most travelers to postpone their long-haul journeys, preferring to travel within the home region instead. However, the tourism situation recovered during the fourth quarter after people's anxiety decreased and global warming became one of the major social issues. The outstanding growing markets included East Europe, Russia, and Scandinavia. The main markets of Thailand, including Germany and France, still continued to grow while the United Kingdom market's growth rate was quite stable compared with the previous year.

The Americas:

There were 817,564 inbound tourists, dropping 0.92% due to the USA's economic downturn during the second and the third quarter of the year, and the weak US dollar. It resulted in a decrease in the number of tourist arrivals in the North America market, the main market in the region including the USA and Canada with a decreasing growth rate of 2.66% and 0.1%, respectively. However, the situation recovered during the fourth quarter after people's anxiety was relieved and the government launched measures to deal with the country's economic crisis.

Thailand:

International tourists are divided into three types which are short haul, medium haul and long haul. Malaysian tourists represent short haul tourists. Japanese tourists represent medium haul tourists. And UK tourists and USA tourists represent long haul tourists.

This study covers conditional volatility of all tourist groups by taking changes in the real exchange rate into consideration. The reason is that the real exchange rate has a great effect upon international tourism demand.

According to the definition, the real exchange rate can be defined in the long run as the nominal exchange rate (e) that is adjusted by the ratio of the foreign price level (P_f) to the domestic price level (P). Mathematically, it can be shown as

The Real Exchange Rate $(REER) = e\dfrac{P_f}{P}$

2. Tools for study and literature review

2.1 Unit root tests:

2.1.1 Augmented Dickey and Fuller tests

To test for the long run frequency, Dickey and Fuller (1979) proposed a procedure based on the following auxiliary regression:

$$\Delta y_t = \alpha + \beta t + \delta y_{t-1} + \sum_{j=1}^{k} \gamma_j \Delta y_{t-k} + \varepsilon_t \quad (1.1)$$

where $\Delta y_t = (1-L)$ designates the first different filter, ε_t is the error term and α, β and δ are the parameters to be estimated.

2.1.2 Phillips and Perron Tests

The Phillips-Perron test is a unit root test. It is used in time series analysis to test the null hypothesis that a time series is I (1). It builds on the Dickey-Fuller test, but unlike the Augmented Dickey-Fuller test, which extends the Dickey-Fuller test by including additional lagged variables as regressors in the model on which the test is based, the Phillips-Perron test makes a non-parametric correction to the t-test statistic to capture the effect of autocorrelation present when the underlying autocorrelation process is not AR(1) and the error terms are not homoscedastic.

2.2 Volatility Analysis

For analyzing the volatility, we use econometrics as follows:

2.2.1 Conditional Mean Model

The conditional mean model is to the autoregressive moving average, or ARMA (p, q) model that is proposed by Box-Jenkins (1970) combining the AR (p) and MA (q). Such a model states that the current value of some series y depends linearly on its own previous values plus a combination of current and previous values of a white noise error term. The model could be written:

$$\beta(L)y_t = \mu + \theta(L)\mu_t \qquad (1.2)$$

where
$\beta(L) = 1 - \beta_1 L - \beta_2 L^2 - \cdots - \beta_p L^p$ and
$\theta(L) = 1 + \theta_1 L + \theta_2 L^2 + \cdots + \theta_q L^q$
or

$$y_t = \alpha + \beta_1 y_{t-1} + \beta_2 y_{t-2} + \cdots + \beta_p y_{t-p} + \mu_t + \theta_1 \mu_{t-1} + \theta_2 \mu_{t-2} + \cdots + \theta_q \mu_{t-q}, \quad (1.3)$$

with

$$E(\mu_t) = 0 ; E(\mu_t^{\,2}) = \sigma^2 ; E(\mu_t \mu_s) = 0, t \neq s$$

where $y_t, y_{t-1}, ..., y_{t-p}$ represent the current and lagged growth rate of tourist arrivals, p is the lag length of the AR error term, and q is the lag length of the MA error term.

If there are the seasonal effects, it will be the seasonal autoregressive moving average, or SARMA$(P,Q)_T$, model is given below:

$$y_t = \alpha + \beta_T y_{t-T} + \beta_{2T} y_{t-2T} + \cdots + \beta_{PT} y_{t-PT} + \mu_t + \theta_T \mu_{t-T} + \theta_{2T} \mu_{t-2T} + \cdots + \theta_{QT} \mu_{t-QT}, (1.4)$$

where $y_t, y_{t-T}, ..., y_{t-PT}$ represent the current and lagged growth rate of tourist arrivals, P is the lag length of the SAR error term, and Q is the lag length of the SMA error term.

The series is described by an AR integrated MA model or ARIMA (p,d,q) when y_t is replaced by $\Delta_1^d y_t$ and an SAR integrated SMA model or SARIMA $(P,D,Q)_T$ when y_t is replaced by $\Delta_1^D y_t$.

When we already construct the conditional mean model, after that we will construct the conditional volatility model latter.

2.2.2 Conditional Volatility Model

In this paper, we use the symmetric Generalized Autoregressive Conditional Heteroskedasticity (GARCH) model of Bollerslev (1986) to measure the risk from growth of number of tourist arrivals.

The GARCH (p, q) model is given as
$(i)\ Y_t = E(Y_t | F_{t-1}) + \varepsilon_t$ where
$(ii)\ \varepsilon_t = h^{1/2} \eta_t,$

$$(iii)\ h_{it} = \omega_i + \sum_{l=1}^{p} \alpha_i \varepsilon_{i,t-1}^2 + \sum_{l=1}^{q} \beta_i h_{i,t-1} \quad (1.5)$$

And the asymmetric GJR model of Glosten, Jagannathan and Runkle (1992), which discriminates between positive and negative shocks to the tourist arrivals series, will be used to forecast the required conditional volatilities.

The GJR (p, q) model is given as
$(i)\ Y_t = E(Y_t | F_{t-1}) + \varepsilon_t$ where
$(ii)\ \varepsilon_t = h^{1/2} \eta_t,$

$$(iii)\ h_{it} = \omega_i + \sum_{l=1}^{p} (\alpha_i \varepsilon_{i,t-1}^2 + \gamma I(\eta_{i,t}) \varepsilon_{i,t-1}^2) + \sum_{l=1}^{q} \beta_i h_{i,t-1} \quad (1.6)$$

$$(iv)\ I(\eta_{i,t}) = 1, \varepsilon_{i,t} \leq 0 \quad and \quad = 0, \varepsilon_{i,t} > 0$$

where F_t is the information set variable to time t, and $\eta : iid(0,1)$. The four equations in the model state the following: (i) the growth in tourist arrivals depends on its own past values; (ii) the shock to tourist arrivals has a predictable conditional variance component, h_t, and an unpredictable component, η_t; (iii) the conditional variance depends on its own past values and the recent shocks to the growth in the tourist arrivals series; and (iv) the conditional variance is affected differently by positive and negative shocks to the growth in tourist arrivals.

For the GARCHX (p, q) model, we added an external factor such as real exchange rate, therefore:

$$h_{it} = \omega_i + \sum_{l=1}^{p} \alpha_i \varepsilon_{i,t-1}^2 + \sum_{l=1}^{q} \beta_i h_{i,t-1} + \delta X_i \quad (1.7)$$

where X_i denotes external variables i.e. real exchange rate

For the GARCHX (1, 1) to be stationary, we need

$$\alpha_1 + \beta_1 < 1 \quad (1.8)$$

This model is called the GARCHX model since the constant in the GARCH models is replaced by an extra variable or extra term; for example, the real exchange rate. The GARCHX model is also a generalized version model by Braun, Nelson, and Sunier (1995) and Glosten, Jagannathan, and Runkle (1993). The GARCHX model may be considered a simplified version of Connor and Linton (2001).

For the GJR-X (p, q) model, we added an external factor such as real exchange rate, therefore:

$$h_{it} = \omega_i + \sum_{l=1}^{p} (\alpha_i \varepsilon_{i,t-1}^2 + \gamma I(\eta_{i,t}) \varepsilon_{i,t-1}^2) + \sum_{l=1}^{q} \beta_i h_{i,t-1} + \delta X_i \quad (1.9)$$

$$I(\eta_{i,t}) = 1, \varepsilon_{i,t} \le 0 \quad and \quad = 0, \varepsilon_{i,t} > 0$$

where X_i denotes external variables i.e. the real exchange rate

For the GJR-X (1, 1) to be stationary, we need

$$\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1 \quad (1.10)$$

In equations (1.7) and (1.9), the parameters are typically estimated by the maximum likelihood method to obtain Quasi-Maximum Likelihood Estimators (QMLE) in the absence of normality of η_t, the conditional shocks (or standardized residuals). The conditional log-likelihood function is given as follows:

$$\sum_{t=1}^{n} \ell_t = -\frac{1}{2} \sum_{t=1}^{n} \left(\log h_t + \frac{\varepsilon_t^2}{h_t} \right)$$

The QMLE is efficient only if η_t is normal, in which case it is the MLE. When η_t is not normal, the adaptive estimation can be used to obtain efficient estimators, although this can be computationally intensive. Ling and McAleer (2003b) investigated the properties of adaptive estimators for univariate non-stationary ARMA models with GARCH (*r, s*) errors. The extension to multivariate processes is very complicated.

Besides, we hardly apply the GARCHX model and the GJR-X model to analyze the international tourist arrivals. This model is mostly used to analyze financial volatility. Therefore, by applying the GARCHX model and the GJR-X model to analyze the international tourist arrivals is very interesting.

2.3 Literature Review

In studies of the impact of other factors on the volatility, GARCHX models was introduced by Apergis (1998) to investigate how short-run deviations from the relationship between stock prices and certain macroeconomic fundamentals affect stock market volatility. In the Apergis model, the squared past error-correction term which represents the short run deviations is added to the GARCH conditional volatility.

Soosung Hwang (2001) introduced a simple new conditional volatility model called GARCHX using the cross-sectional market volatility. The model was simple, but could be used to explain the proportion of market volatility included in individual stock volatility. Using data of the UK and US markets, this consisted of individual asset returns included in the FTSE350 and the S&P500. Daily log-returns are calculated from 11 December 1989 to 9 December 1999. He found that in more than three-quarter of cases, the maximum likelihood values of the GARCHX (1, 1) model were larger than those of the GARCHX (1, 1) model and the coefficients on the cross-sectional market volatility were significant. Therefore, individual stock volatility seemed to be better specified with the inclusion of additional cross-sectional market volatility. Finally, he found that the proportion of the market volatility in an individual stock's conditional volatility ranges from 12% to 16%.

From details of literature reviews, we can conclude that because there were several external factors affecting volatility. Therefore, Apergis (1998) introduced GARCHX (1, 1) models to investigate how short-run deviations from the relationship between stock prices and certain macroeconomic fundamentals affect stock market volatility. Finally, Soosung Hwang (2001) introduced GARCHX using the cross-sectional market volatility. Their results also show that the GARCHX (1, 1) and the asymmetric GJR-X (1, 1) models provide an accurate measure of risk like the GARCH (1, 1) and the asymmetric GJR (1, 1).

In study from literature review, we will estimate and forecast by using the GARCHX (1, 1) and GJR-X (1, 1) in the conditional volatility model.

3. Objective of this Study

To study whether the change in the real exchange rate has any effect toward the volatility of international tourist arrivals or not.

4. Data Collection

Based on the above methodology, we can divide data collection as follows: we used the secondary data from 1985 to 2009. The data used to measure the independent and dependent variables are from the Tourism Authority of Thailand (TAT), the Bank of Thailand (BOT) and the Immigration Bureau (Police Department).

Note, there are three important dips in the tourism activities in the periods of 1991, 1997 and 2005, respectively. The first period is due to the negative impact of the Gulf war during 1991. The second is due to the "Tomyumkung" economic crisis during 1997 in which the Asian tourists market seemed to be the most affected. The third period is due to the Tsunami disaster of 2004.

5. Unit Root Tests

Standard unit root test based on the methods of Augmented Dickey-Fuller (1979) and Phillips and Perron (1988) are reported in Table 1.1.

The ADF tests for a unit root are used for logarithmic variable series over the full sample period. Note that the ADF tests of the unit root null hypothesis correspond to the following one-sided test:

$$H_0 : \delta = 0$$
$$H_1 : \delta < 0$$

The ADF test results are confirmed by the Phillip-Perron test and the coefficient is significant at the 5% level. The results of the ADF unit root tests are that when the ADF test statistics are compared with the critical values from the nonstandard Dickey-Fuller distribution, the former for all of variable series are less than the critical value at 5% significance level. Thus, the null hypothesis of a unit root is rejected at the 5% level, implying that the series are stationary. By taking first differences of the logarithm of variables, the ADF tests show that the null hypothesis of a unit root is clearly rejected. The ADF statistics for the series are less than the critical value at the 5% significance level. Thus, the first differences of the logarithmic variables are stationary. These empirical results allow the use of these data to estimate conditional mean and conditional volatility model.

6. Volatility Model

The number and graph for monthly Malaysian tourist arrivals, monthly Japanese tourist arrivals, monthly UK tourist arrivals, and monthly American tourist arrivals are given in figure 1.1-1.4 and table 1.2-1.4, respectively. All data display degrees of variability and seasonality. The highest levels of tourism arrivals to Thailand occur during the winter season in East Asia, Europe and North America, while the lowest levels occur during in the summer season in East Asia, Europe and North America. The descriptive statistics are given in table 1.3. The monthly Japanese tourist arrivals display the greatest variability with the mean of 69,475.25 arrivals per month, a maximum of 127,334 arrivals per month, and low minimum of 13,745 arrivals per month. The monthly Japanese tourist arrivals have a standard deviation of 30,539.43, which is the highest standard deviation of the others.

As the focus of this paper is not concerned with the behavior of international tourist arrivals to Thailand, but is on the managing the risk associated with the variability in tourist arrivals and the policy to use the real exchange rate to motivate tourism. Therefore; we use the change (growth rate) in the real exchange rate and the change (growth rate) in number of international tourist arrivals to explain the impacts of the real exchange rate on tourism volatility.

Malaysian tourist arrivals, Japanese tourist arrivals, United Kingdom tourist arrivals and American tourist arrivals are given in figures 1.5-1.8, respectively. The descriptive statistics for the growth rates are given in table 1.4. Monthly Malaysian tourist arrivals display the greatest variability, with standard deviation of 26.91%, a maximum of 95.79%, and a minimum of -59.65%. Each of the data is found to be non-normal distributed, based on the Jaque-Bera Lagrange multiplier statistics for normality.

Table 1.1: the result of unit root tests

Variable	ADF Without trend		PP Without trend	
	level	1st difference	level	1st difference
DNM	-4.7576***	-12.6245***	-43.8670***	-281.2218***
DREM	-18.3016***	-12.8564***	-18.3016***	-236.8453***
DNJ	-5.1206***	-19.1764***	-29.2884***	-152.6287***
DREJ	-11.6645***	-9.7383***	-11.5826***	-91.8884***
DNUK	-3.2006**	-17.9916***	-18.3043***	-62.9643***
DREUK	-12.4235***	-10.4795***	-12.3958***	-169.0407***
DNUS	-4.5376***	-17.0839***	-24.4447***	-41.1062***
DREUS	-18.8233***	-11.7248***	-18.8460***	-324.7082***

Notes:

1. DNM denotes the growth rate of Malaysian tourist arrivals, DREM denotes the growth rate of Malaysia's real exchange rate, LNJ denotes the growth rate of Japanese tourist arrivals, LREJ denotes the growth rate of Japan's real exchange rate, LNUK denotes the growth rate of United Kingdom tourist arrivals, LREUK denotes the growth rate of United Kingdom's real exchange rate, LNUS denotes the growth rate of American tourist arrivals and LREUS denotes the growth rate of USA's real exchange rate.
2. *** denotes the null hypothesis of a unit root is rejected at the 1% level.
   ** denotes the null hypothesis of a unit root is rejected at the 5% level.

Table 1.2: Accumulation of the number of tourist arrivals to Thailand

Accumulation of Malaysia tourist arrivals (1979-2009)	Accumulation of Japanese tourist arrivals (1979-2009)	Accumulation of United Kingdom tourist arrivals (1979 -2009)	Accumulation of American tourist arrivals (1979-2009)
25,975,942	20,587,357	8,793,307	9,140,592

Table 1.3: Descriptive Statistics (monthly arrivals

Statistics	Malaysian (1985-2009)	Japanese (1985-2009)	UK (1985-2009)	American (1985-2009)
Mean	84,581.67	69,474.25	30,377.21	30,574.87
Median	80,959.50	66,835.50	25,039.50	26,849.00
Maximum	182,982	127,334	86,210	67,176
Minimum	21,454	13,745	5,153	9,893
Std. Dev.	28,934.77	30,539.43	18,082.67	13,042.02
Skewness	0.7338	-0.0061	0.7081	0.6650
Kurtosis	3.5056	1.8716	2.6931	2.5628
Jarque Bera	27.7088	14.6452	24.1499	22.5402
Probability	0.000001	0.00066	0.000006	0.000013

Table 1.4: Descriptive Statistics for Growth Rate (monthly arrivals)

Statistics	Malaysian (1985-2009)	Japanese (1985-2009)	United Kingdom (1985-2009)	American (1985-2009)
Mean	4.0549	2.3363	2.5390	2.0728
Median	1.1012	2.0238	1.7849	-0.9065
Maximum	95.7910	49.2124	68.5057	85.3883
Minimum	-59.6501	-44.2007	-48.0262	-40.8867
Std. Dev.	26.9133	18.8799	18.0955	17.6721
Skewness	0.5279	0.0449	0.3468	1.2696
Kurtosis	3.3509	2.6287	3.4739	5.7943
Jarque-Bera	14.1880	1.6780	8.0866	163.3566
Probability	0.0008	0.4347	0.0175	0.0000

Figure 1.1: Monthly Malaysian tourist arrivals from 1985-2009

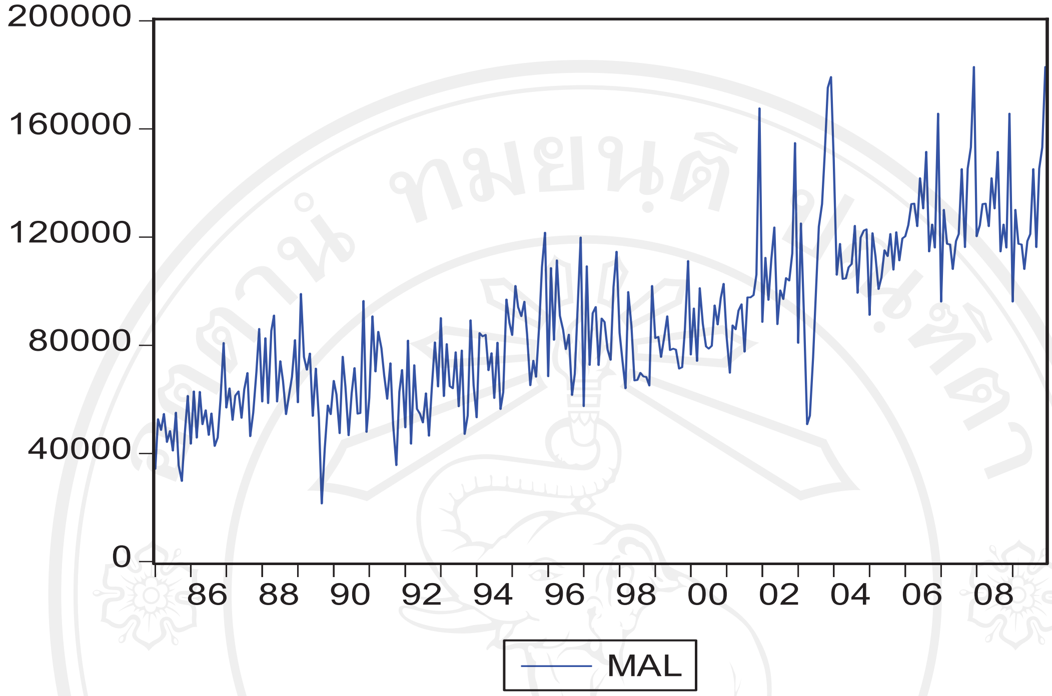


Figure 1.2: Monthly Japanese tourist arrivals from 1985-2009

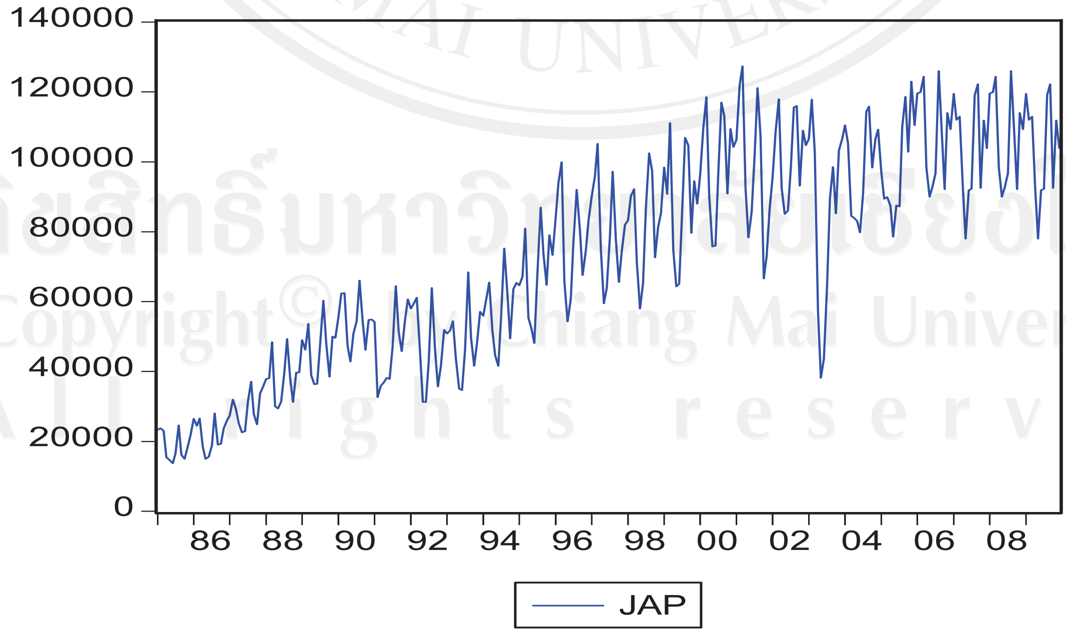


Figure 1.3: Monthly UK tourist arrivals from 1985-2009

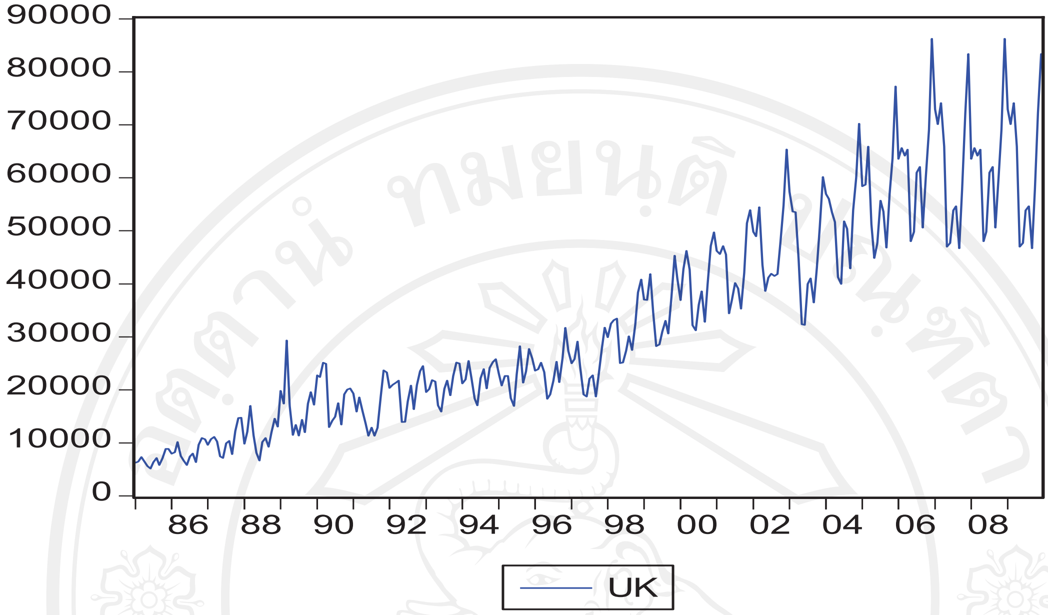


Figure 1.4: Monthly American tourist arrivals from 1985-2009

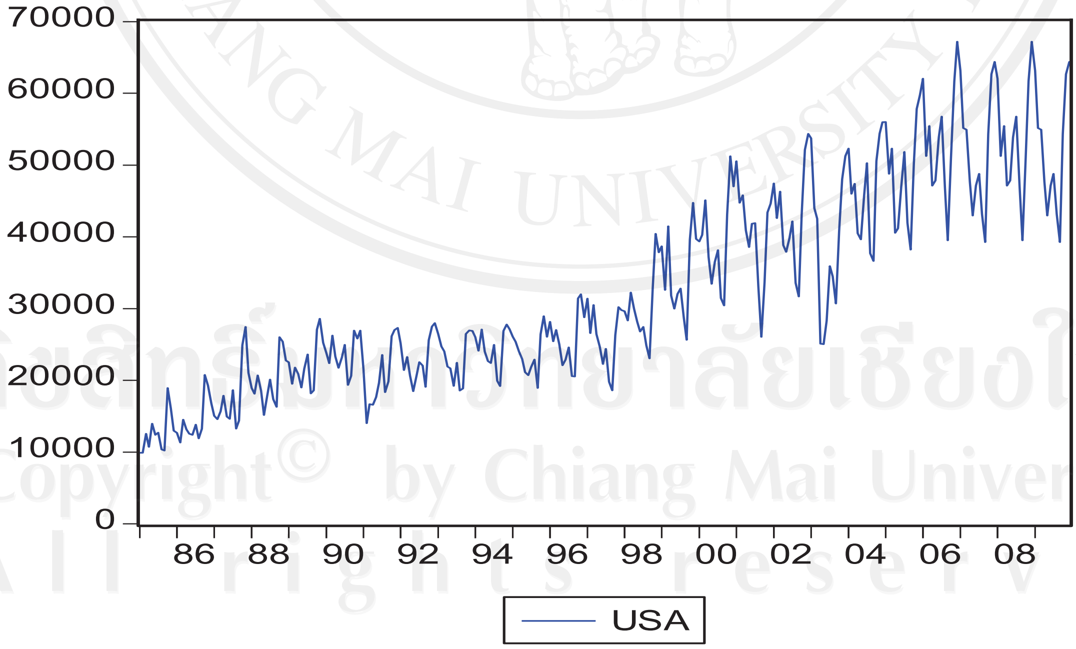


Figure 1.5: Monthly Malaysian tourist arrival growth rates from 1985-2009

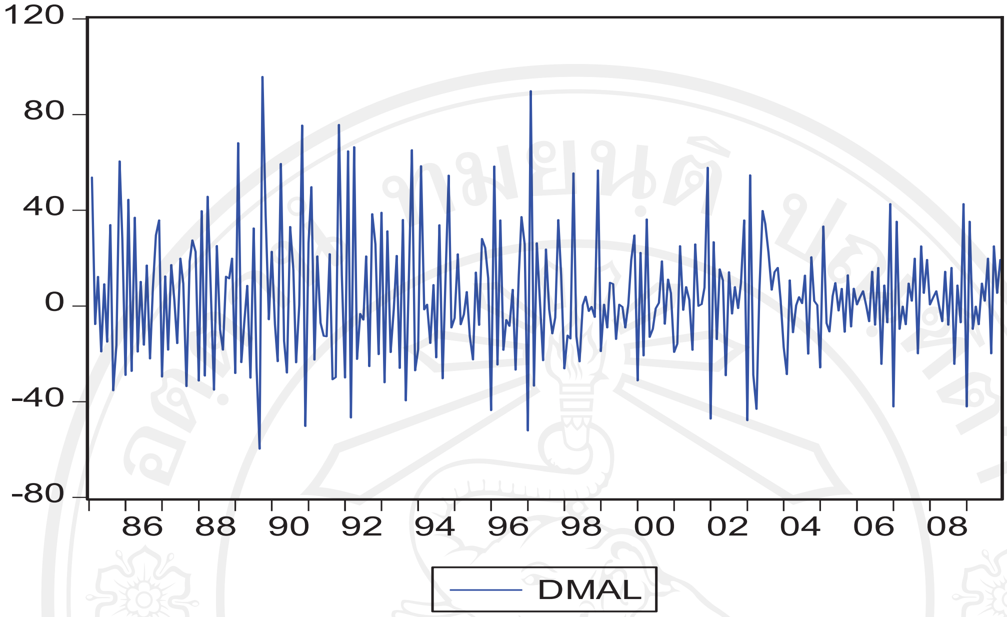


Figure 1.6: Monthly Japanese tourist arrival growth rates from 1985-2009

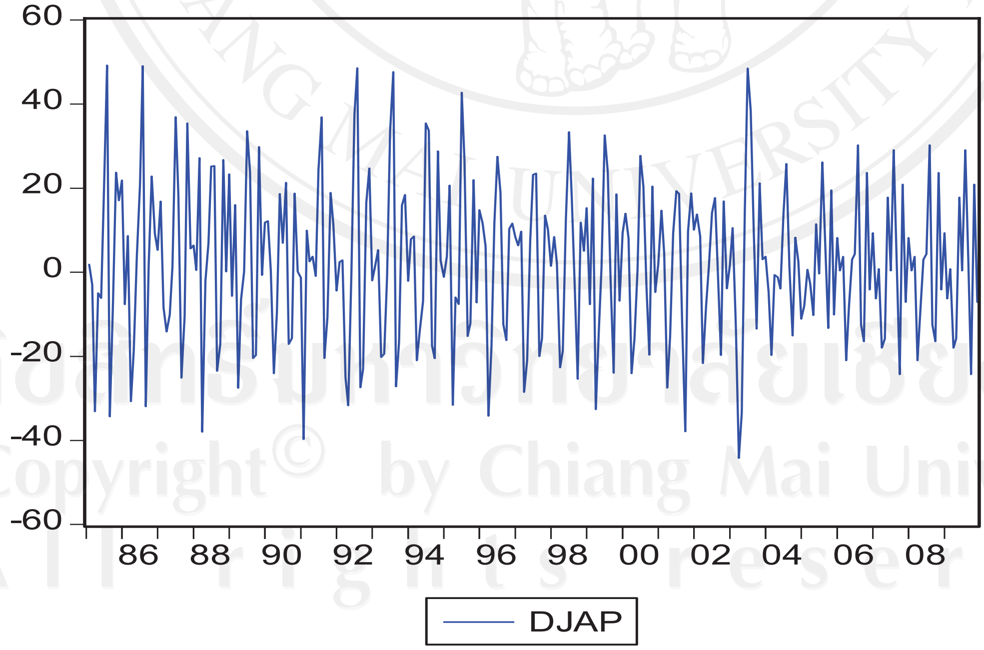


Figure 1.7: Monthly UK tourist arrival growth rates from 1985-2009

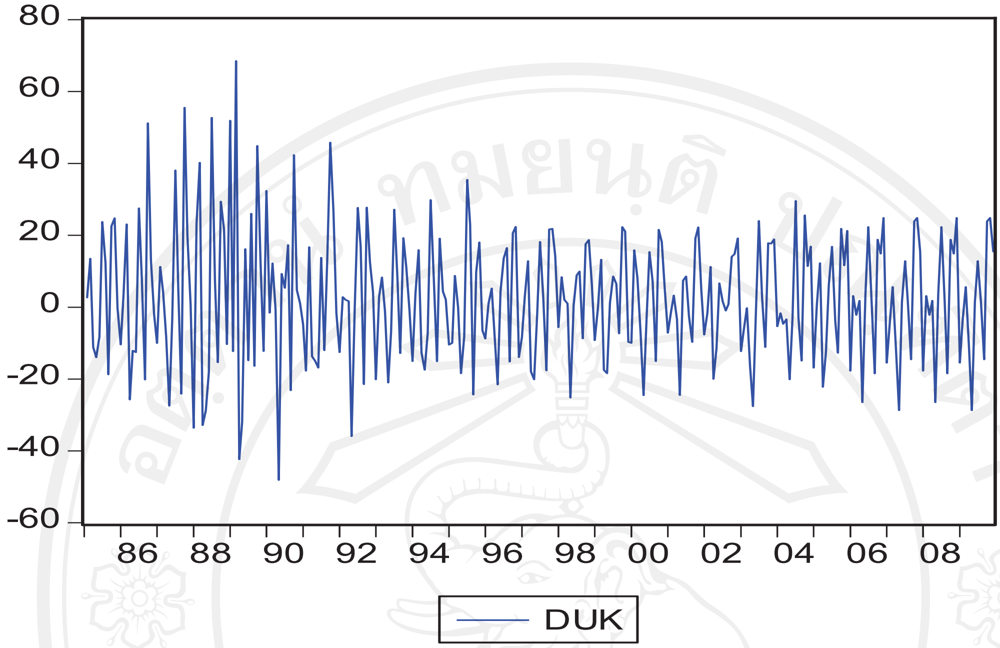
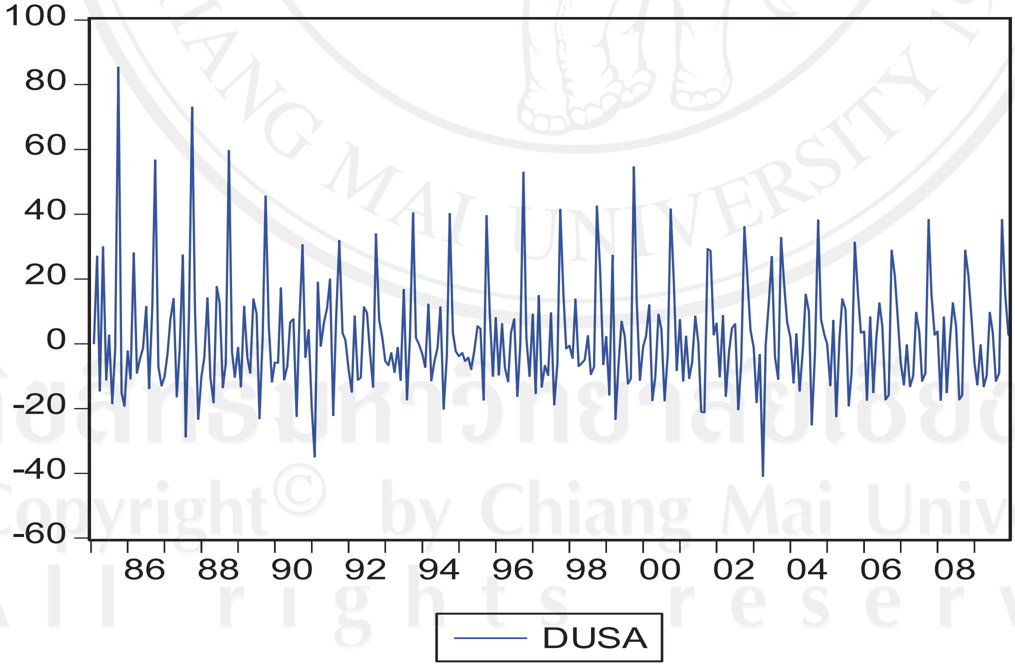


Figure 1.8: Monthly American tourist arrival growth rates from 1985-2009



7. ARMA or SARMA models for conditional mean model

Since the ADF test procedures show that the tourist arrival growth rate series are integrated of order zero, $I(0)$, the latter is used to estimate the Box-Jenkins models. The autoregressive moving average, or ARMA(p,q) model and the seasonal autoregressive moving average, or SARMA $(P,Q)_T$ are used in conditional mean estimation.

Table 1.5 presents the results of ARMA model for monthly Malaysian tourist arrival growth rates, model is given below:

Table 1.5: ARMA model for growth rates in monthly Malaysian tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	3.841	4.491	AIC=8.977	*F*=2.721
AR(1)	-0.503	-8.729	BIC=9.045	*p*=0.410
AR(2)	-0.229	-4.079		
AR(7)	-0.102	-2.092		
AR(12)	0.296	5.903		

Table 1.6 presents the results of ARMA model for monthly Japanese tourist arrival growth rates, model is given below:

Table 1.7 presents the results of SARMA model for monthly UK tourist arrival growth rates, model is given below:

Table 1.6: ARMA model for growth rates in monthly Japanese tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	2.433	3.940	AIC=8.476	*F*=0.495
AR(2)	-0.350	-6.522	BIC=8.516	*p*=0.482
AR(3)	-0.286	-5.315		

Table 1.7: SARMA model for growth rates in monthly UK tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	2.354	4.075	AIC=7.720	*F*=1.076
AR(6)	-0.918	-35.603	BIC=7.775	*p*=0.342
SAR(6)	0.653	13.552		
MA(1)	-0.455	-8.197		

Table 1.8 presents the results of SARMA model for monthly American tourist arrival growth rates, model is given below:

Table 1.8: SARMA model for growth rates in monthly American tourist arrivals

Variable	Coefficient	t-Statistic	AIC/BIC	LM(SC)
C	1.220	0.477	AIC=7.729	*F*=0.094
AR(1)	-0.181	-2.971	BIC=7.329	*p*=0.092
SAR(12)	0.812	25.551		

We use the two most commonly model selection criteria are the Akaike Information Criterion (AIC) and the Schwarz Baysian Criterion (BIC), with the decision to base the model choice being to select the model for which the appropriate criterion smallest.

For ensuring that the estimated residuals do not have serial correlation at the 5% significance level, we use the Breusch-Godfrey Lagrange multiplier test of serial correlation, LM (SC). It can be used to test for higher-order ARMA or SARMA errors, and is applicable in the presence of lagged dependent variables. Using the Lagrange multiplier test, if the computed *F* statistic exceeds the critical value at 5% level, this leads to the rejection of the null hypothesis of no serial correlation.

Furthermore, the computed *F* statistics for the LM (SC) test are all less than the critical value. Thus, the null hypothesis of no serial correlation is not being rejected for these models.

8. GARCHX and GJR-X for conditional volatility model

In this section, the growth rates in tourist arrivals and real exchange rates are used to estimate the GARCHX (1, 1) model and the GJR-X model. All estimations were conducted using Eviews 5.1. The models are estimated using QMLE for the case p=q=1 in table 1.9-1.10.

The estimated GARCHX (1, 1) equation of monthly growth rates in Malaysian tourist arrivals is given as follows:

$$h_t = \underset{(18.128)}{25.546} + \underset{(0.050)}{0.102}\,\varepsilon_{t-1}^{\,2} + \underset{(0.075)}{0.843}\,h_{t-1} - \underset{(0.316)}{0.021}\,drm$$

where *drm* is the growth rates in the real exchange rate of Malaysia

The estimated GARCHX (1, 1) model of monthly growth rates in Malaysian tourist arrivals to Thailand shows short run persistence lies at 0.102, while the long run persistence lies at 0.945. As the respective estimates of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCHX (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimate is statistically adequate and sensible for the purpose of interpretation. Finally, the change in the real exchange rate is insignificant.

The estimated GJR-X (1, 1) equation for monthly growth rates in Malaysian tourist arrivals is given as follows:

$$h_t = \underset{(22.325)}{35.302} + \underset{(0.049)}{0.010}\,\varepsilon_{t-1}^{\,2} + \underset{(0.147)}{0.273}\,I\varepsilon_{t-1}^{\,2}$$

$$+ \underset{(0.079)}{0.807}\,h_{t-1} - \underset{(0.275)}{0.185}\,drm$$

The asymmetry coefficient is found to be positive and significant for the GJR-X (1, 1) model, namely 0.010, which indicates that decreases in monthly Malaysian tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR-X (1, 1) and where the figures in parentheses are standard errors, indicating that the model provides an adequate fit to the data. As $\alpha_1 + \gamma_1 > \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous negative shocks having a greater impact on volatility than previous positive shocks of a similar magnitude. Finally, the change in the real exchange rate is insignificant

The estimated GARCHX (1, 1) equation of monthly growth rates in Japanese tourist arrivals is given as follows:

$$h_t = \underset{(0.255)}{0.601} + \underset{(0.001)}{0.040}\,\varepsilon_{t-1}^{\,2} + \underset{(7.06E-05)}{0.945}\,h_{t-1} - \underset{(0.109)}{0.828}\,drj$$

where *drj* is the growth rates in the real exchange rate of Japan

The estimated GARCHX (1, 1) model of monthly growth rates in Japanese tourist arrivals to Thailand shows the short run persistence lies at 0.040, while the long run persistence lies at 0.985. As the respective estimates of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCHX (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimate is statistically adequate and sensible for the purpose of interpretation. Finally, the change in the real exchange rate is negative and significant. It shows that when the real exchange rate increases, volatility will definitely decrease.

The estimated GJR-X (1, 1) equation for monthly growth rates in Japanese tourist arrivals is given as follows:

$$h_t = \underset{(51.191)}{563.163} + \underset{(0.036)}{0.134}\,\varepsilon_{t-1}^{\,2} - \underset{(0.039)}{0.068}\,I\varepsilon_{t-1}^{\,2}$$

$$+ \underset{(0.029)}{0.852}\,h_{t-1} - \underset{(4.617)}{1.522}\,drj$$

The asymmetry coefficient is found to be positive and significant for the GJR-X (1, 1) model, namely 0.134, which indicates that decreases in monthly Japanese tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR-X (1, 1) and where the figures in parentheses are standard errors, indicating that the model provides an adequate fit to data. As $\alpha_1 + \gamma_1 < \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous positive shocks having a greater impact on volatility than previous negative shocks of a similar magnitude. Finally, the change in the real exchange rate is insignificant.

The estimated GARCHX (1, 1) equation of monthly growth rates in United Kingdom tourist arrivals is given as follows:

$$h_t = \underset{(2.589)}{3.446} + \underset{(0.053)}{0.143}\varepsilon_{t-1}^2 + \underset{(0.064)}{0.835}h_{t-1} + \underset{(0.977)}{0.957}druk$$

where *druk* is the growth rates in the real exchange rate of UK

The estimated GARCHX (1, 1) model of monthly growth rates in British tourist arrivals to Thailand shows the short run persistence lies at 0.143, while the long run persistence lies at 0.978. As the respective estimate of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCHX (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimate is statistically adequate and sensible for the purpose of interpretation. Finally, the change in the real exchange rate is insignificant.

The estimated GJR-X (1, 1) equation for monthly growth rates in United Kingdom tourist arrivals is given as follows:

$$h_t = \underset{(294.894)}{269.025} + \underset{(0.086)}{0.013}\varepsilon_{t-1}^2 - \underset{(0.117)}{0.223}I\varepsilon_{t-1}^2$$

$$+ \underset{(0.6375)}{0.475}h_{t-1} - \underset{(14.120)}{7.181}druk$$

The asymmetry coefficient is found to be positive and significant for the GJR-X (1, 1) model, namely 0.013, which indicates that decreases in monthly British tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR-X (1, 1) and where the figures in parentheses are standard errors, indicating that the model provides an adequate fit to the data. As $\alpha_1 + \gamma_1 < \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous positive shocks having a greater impact on volatility than previous negative shocks of a similar magnitude. Finally, the change in the real exchange rate is insignificant.

The estimated GARCHX (1, 1) equation of monthly growth rates in American tourist arrivals is given as follows:

$$h_t = \underset{(6.441)}{9.688} + \underset{(0.047)}{0.086}\varepsilon_{t-1}^2 + \underset{(0.099)}{0.797}h_{t-1} - \underset{(0.262)}{0.098}drus$$

where *drus* is the growth rates in the real exchange rate of USA

The estimated GARCHX (1, 1) model of monthly American tourist arrivals to Thailand shows the short run persistence lies at 0.086, while the long run persistence lies at 0.883. As the respective estimate of the second moment conditions, $\alpha_1 + \beta_1 < 1$ for GARCHX (1, 1), are satisfied. The QMLE are consistent and asymptotically normal. This means that the estimate is statistically adequate and sensible for the purpose of interpretation. Finally, the change in the real exchange rate is insignificant.

The estimated GJR-X (1, 1) equation for monthly growth rates in American tourist arrivals is given as follows:

$$h_t = \underset{(27.798)}{109.694} + \underset{(0.181)}{0.303}\,\varepsilon_{t-1}^{\;2} - \underset{(0.161)}{0.269}\,I\varepsilon_{t-1}^{\;2}$$

$$+ \underset{(0.273)}{0.432}\,h_{t-1} + \underset{(0.451)}{0.028}\,drus$$

The asymmetry coefficient is found to be positive and significant for the GJR-X (1, 1) model, namely 0.303, which indicates that decreases in monthly American tourist arrivals to Thailand increase volatility. As the respective estimates of the second moment conditions, $\alpha_1 + \frac{1}{2}\gamma_1 + \beta_1 < 1$ for GJR-X (1, 1) and where the figures in parentheses are standard errors, indicating that the model provides an adequate fit to the data. As γ_1 is estimated significant and $\alpha_1 + \gamma_1 < \alpha_1$, it appears that volatility is affected asymmetrically by positive and negative shock, with previous positive shocks having a greater impact on volatility than previous negative shocks of a similar magnitude. Finally, the change in the real exchange rate is insignificant.

8.1 Forecasting

The forecast accuracies statistics were produced using Eviews 5.1 and are presented in table 1.11. Their forecasting performances are compared between the GARCHX model and the GJR-X models using the root mean squared error (RMSE). The estimated values of the RMSE show that the GARCHX model generates relatively accurate tourism volatility forecasts except for the Japan and the USA volatility, and the GJR-X model generates relatively accurate tourism volatility forecasts except for the Malaysia and the UK volatility.

Table 1.9: Estimated GARCHX Models

Parameters	GARCHX			
	Malaysian	Japanese	UK	American
ω	25.546*	0.601**	3.446*	9.688*
	(18.128)	(0.255)	(2.589)	(6.441)
α	0.102**	0.041*	0.143***	0.086*
	(0.050)	(0.001)	(0.053)	(0.047)
β	0.843***	0.945*	0.835***	0.797***
	(0.075)	(7.06E-05)	(0.064)	(0.099)
δ	-0.021	-0.828*	0.957	-0.098
	(0.316)	(0.109)	(0.977)	(0.262)
Diagnostics				
Second moment	0.945	0.986	0.978	0.883
AIC	8.924	8.453	7.498	7.290
BIC	9.046	8.546	7.606	7.386

Notes:
Numbers in parentheses are standard error.
The log-moment condition is necessarily satisfied as the second the moment condition is satisfied.
AIC and BIC denote the Akaike Information Criterion and Schwarz Criterion, respectively.
*** denotes the estimated coefficient is statistically significant at 1%.
** denotes the estimated coefficient is statistically significant at 5%.
* denotes the estimated coefficient is statistically significant at 10%.

Table 1.10: Estimated GJR-X Models

Parameters	GJR-X			
	Malaysian	Japanese	UK	American
ω	35.302*	563.163***	269.025*	109.694***
	(22.325)	(51.191)	(294.894)	(27.798)
α	0.010*	0.134***	0.013*	0.303*
	(0.049)	(0.036)	(0.086)	(0.181)
γ	0.207*	-0.068*	-0.223*	-0.269*
	(0.147)	(0.039)	(0.117)	(0.161)
β	0.807***	0.852***	0.475*	0.432*
	(0.079)	(0.029)	(0.638)	(0.273)
δ	-0.185	-1.522	-7.181	0.028
	(0.275)	(4.617)	(14.120)	(0.451)
Diagnostics				
Second moment	0.921	0.952	0.376	0.600
AIC	8.915	8.451	8.563	7.307
BIC	9.051	8.557	8.686	7.416

Notes:
Numbers in parentheses are standard errors.
The log-moment condition is necessarily satisfied as the second the moment condition is satisfied.
AIC and BIC denote the Akaike Information Criterion and Schwarz Criterion, respectively.
*** denotes the estimated coefficient is statistically significant at 1%.
** denotes the estimated coefficient is statistically significant at 5%.
* denotes the estimated coefficient is statistically significant at 10%.

Table 1.11: the Forecasting Results

Countries	**Malaysia**		**Japan**		**UK**		**USA**	
Model	GARCHX	GJR-X	GARCHX	GJR-X	GARCHX	GJR-X	GARCHX	GJR-X
RMSE	25.938	26.087	18.845	18.825	14.472	18.057	14.089	14.086

9. Conclusion

The monthly number of international tourist arrivals to Thailand and their associated growth rates for the period 1985-2009 were analyzed. The main purpose is to analyze and compare the volatility among major tourists of Thailand such as Malaysian tourists and Japanese tourists including British and American tourists by considering with the real exchange rate and also use the GARCHX model and the GJR-X model.

Besides, we hardly apply the GARCHX model and the GJR-X model to analyze the international tourist arrivals. This model is mostly used to analyze financial volatility. Therefore; by applying the GARCHX model and the GJR-X model to analyze the international tourist arrivals is very interesting.

We can divide the tourists into 3 groups (1) short haul such as Malaysian tourists (2) medium haul such as Japanese tourists and (3) long haul such as British and American tourists.

The estimated GARCHX (1, 1) model of monthly growth rates in Malaysian tourist arrivals to Thailand shows the short run persistence lies at 0.102, while the long run persistence lies at 0.945. Finally, the change in the real exchange rate is insignificant.

The estimated GJR-X (1, 1) equation for monthly growth rates in Malaysian tourist arrivals reflects the asymmetry coefficient is found to be positive and significant for GJR-X (1, 1) model, namely 0.010, which indicates that decreases in monthly Malaysian tourist arrivals to Thailand increase volatility.

The estimated GARCHX (1, 1) model of monthly growth rates in Japanese tourist arrivals to Thailand reflects the short run persistence lies at 0.040, while the long run persistence lies at 0.985. Finally, the change in the real exchange rate is negative and significant. It shows that when the real exchange rate increases, volatility will definitely decrease.

The estimated GJR-X (1, 1) equation for monthly growth rates in Japanese tourist arrivals shows the asymmetry coefficient is found to be positive and significant for the GJR-X (1, 1) model, namely 0.134, which indicates that decreases in monthly Japanese tourist arrivals to Thailand increase volatility. Finally, the change in the real exchange rate is insignificant.

The estimated GARCHX (1, 1) model of monthly growth rates in British tourist arrivals to Thailand shows the short run persistence lies at 0.143, while the long run persistence lies at 0.978. Finally, the change in the real exchange rate is insignificant.

The estimated GJR-X (1,1) equation for monthly growth rates in British tourist arrivals shows the asymmetry coefficient is found to be positive and significant for the GJR-X (1,1) model, namely 0.013, which indicates that decreases in monthly British tourist arrivals to Thailand increase volatility. Finally, the change in the real exchange rate is insignificant.

The estimated GARCHX (1, 1) model of American tourist arrivals to Thailand shows the short run persistence lies 0.086, while the long run persistence lies at 0.883. Finally, the change in the real exchange rate is insignificant.

The estimated GJR-X (1,1) equation for monthly American tourist arrivals shows the asymmetry coefficient is found to be positive and significant for the GJR-X (1,1) model, namely 0.303, which indicates that decreases in monthly American tourist arrivals to Thailand increase volatility. Finally, the change in the real exchange rate is insignificant.

As there are forecasting performances between the GARCHX model and the

GJR-X model using the root mean squared error (RMSE), the estimated values of the RMSE show that the GARCHX model generates relatively accurate tourism volatility forecasts except for the Japan and USA volatility, and GJR-X model generate relatively accurate tourism volatility forecasts except for the Malaysia and UK volatility. Moreover, the change in the real exchange rate impacts only the volatility of Japanese tourists, not Malaysian, British and American tourists.

Finally, we can conclude that the change in the real exchange rate impact only the volatility of medium haul tourists, not short and long haul tourists. There are significantly negative relationships between the real exchange rate and the volatility. If the real exchange rate increases, the volatility of medium haul tourists will decrease. If the real exchange rate decreases, the volatility of medium haul tourists will definitely increase.

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