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Are external shocks permanent or transitory? An analysis of visitor arrivals to Thailand

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Keywords

Are, external, shocks, permanent, transitory, analysis, visitor, arrivals, Thailand

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Are External Shocks Permanent or Transitory? An Analysis of Visitor Arrivals to Thailand

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Abstract

Tourism industry in Thailand has recently experienced several external shocks such as September 11 attacks, SARS outbreak, Bird Flu, Political unrest and the recent global financial crisis which may have a temporary or permanent impact on the number of visitor arrivals to the country. This paper conducts univariate and panel Lagrange Multiplier tests with a break proposed by Lee and Strazicich (2004) and Im, Lee, and Tieslau (2005) to identify the time of the structural break and to determine whether shocks to visitor arrivals to Thailand have a temporary or permanent impact. We use annual data for Thailand's top ten source markets, Malaysia, Japan, Korea, China, United Kingdom, United States, Singapore, Germany, Taiwan and Hong Kong over the period of 1988-2006. Results from the univariate estimation models indicates that shocks have a temporary effect on visitor arrivals to Thailand from China, Hong Kong, Japan, Korea, Singapore and the US and thus Thailand's tourism industry from these countries is sustainable in the long run. However, shocks have a permanent effect on tourism in Thailand from Germany, Malaysia, Taiwan and UK. The panel tests indicate that shocks have only a transitory effect on the number of visitor arrivals to Thailand.

Keywords: External shocks; Tourism; Unit Root Hypothesis; Thailand.

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1. Introduction

Recent research on tourism in Asia is common (Vogt and Wittayakorn, 1998; Hiemstra and Wong, 2002; Song *et al.* 2003; Oh and Morzuch, 2005; Song and Witt, 2006) but this research has mainly concentrated in the area of forecasting and modelling for tourism demand function. Research in the area of testing for the random walk hypothesis to visitor arrivals to Asia is scarce and there are no studies in the case of tourist arrivals to Thailand. Testing for the random walk hypothesis in the case of visitor arrivals has important implications for policy as the random walk hypothesis asserts that a series is a non-stationary process or a unit root process and thus has a permanent effect.[1] The importance of this topic is further explained by the fact that the number of visitors arrivals to Thailand have been subject to many external shocks such as September 11 attack, financial crisis, SARS outbreak, political unrest, terrorism threat, the Bird Flu scare and the recent global financial crisis. Given the number of shocks encountered by Thailand in the last decade, it becomes crucial to determine if these shocks have a temporary or permanent impact on the number of visitor arrivals to the country from its ten major source markets; Malaysia, Japan, Korea, China, United Kingdom (UK), United States (US), Singapore, Germany, Taiwan and Hong Kong. Shocks to visitor arrivals are considered to be temporary if visitor arrivals are characterized by a stationary process and thus are sustainable in the long-run. However, if visitor arrivals are found to contain a unit root, this implies that shocks to visitor arrivals are permanent.

There are only a limited number of studies that examine the impact of shocks on tourism and whether these shocks have a permanent of transitory impact on the tourism industry using the unit root tests. These studies include Aly and Strazicich (2004); Narayan (2005); Bhattacharya and Narayan (2005); and Lean and Smyth (2009). Aly and Strazicich (2004) found that shocks have a transitory effect on annual tourist visits in Egypt and Israel. Bhattacharya and Narayan (2005) applied the Augmented Dickey Fuller (ADF) and panel unit root test to examine whether shocks have a permanent or transitory effect to visitor arrivals in India and found they have a transitory effect. Narayan (2005) examined the effect of the 1987 political coups in Fiji on tourist arrivals and expenditures. He found that the coups in Fiji only had a transitory effect on both tourist arrivals and expenditure. Lean and Smyth (2009) utilized the univariate LM unit root tests with one and two structural breaks to examine the impact of Asian crisis, Avian Flu, terrorism threats on tourist arrivals to Malaysia. Their study found that the effect of shocks on the number of visitor arrivals to Malaysia is only transitory. This study extends further the limited literature related to testing of the random walk hypothesis of visitor arrivals to Thailand, a country that is quickly becoming one of the most important and attractive destination for tourism in the Asia Pacific region.

Despite the importance of Thailand in the tourism industry and the volatility of the tourism industry in general, no studies have so far addressed the issue of external shocks and their effect on tourism arrivals to Thailand. The aims of this study are two fold. Firstly, we identify a structural break date of visitor arrivals to Thailand for its top ten major markets; and secondly we conduct unit root tests to ascertain whether shocks to the tourism industry in Thailand have a temporary or a permanent impact. This study differs from other studies as this paper examines stationary in both univariate and panel setting but also for the first time in the tourism literature in Thailand the issue of a structural break in both univariate and panel data series is considered. This paper will conduct univariate Lagrange Multiplier (LM) unit

root test proposed by Lee and Strazicich (2004) with a break in the intercept (Model A) and a break in the intercept and slope (Model C) along with panel LM test with structural break proposed by Im, Lee, and Tieslau (2005) to identify the time of the structural break and to determine whether shocks to visitor arrivals to Thailand have a temporary or permanent impact.

The rest of the paper is organized as follows. Section 2 overviews the importance of the tourism sector in Thailand's economy, while Section 3 discusses the univariate and panel LM methodology. Section 4 discusses the data and empirical results with Section 5 concluding with some policy implications.

2. The importance of Tourism sector in Thailand's Economy

Thailand is one of the emerging economies in East Asia which relies heavily on its exports. Agriculture, forestry, fishing, mining, minerals and manufacturing are the major industries. Apart form conventional industries, the tourism sector, for decades in Thailand has been the fastest growing sector bringing foreign exchange earnings, employment opportunities and thus contributing significantly to the economy. According to Mintel International Group Limited (2009), Thai tourism sector generated 11 percent of employment (both direct and indirect) and 6.5 per cent of GDP in 2008/2009. Thailand's tourism sector is expected to grow in the future despite the high volatility currently experienced in the tourism industry

Table 1 shows that total international visitor arrivals to Thailand together with arrivals from its top ten generating markets for the period of 1988-2006. According to this table, Thailand attracted little less than 5 million visitors in late 1980s. After about 10 years (by 2001) Thailand passed the 10 million arrivals. In 2006 international visitor arrivals accounted for almost 14 million. Table 1 also presents top 10 generating countries for international visitors to Thailand. Of these, Malaysia, Japan and South Korea are recorded as top three generating markets, each registering over 1 million visitors in recent years. These are followed by China, the UK, the US, Singapore and Germany that bring visitors to Thailand over a half a million to one million a year. Taiwan and Hong Kong make relatively a smaller contribution in international visitor arrivals compared to others.

Table 1: International Visitor Arrivals in Thailand from Top 10 Generating Markets

Year	Malaysia	Japan	Korea	China	UK	US	Singapore	Germany	Taiwan	HK	Total Arrivals
1988	867658	449086	65379	134942	279604	257594	248514	190339	188787	279604	4,230,737
1990	804629	635555	144747	64738	318220	291635	289411	239915	480896	265585	5,298,860
1992	729453	569744	203877	128948	236468	274397	324312	275506	707293	291170	5,136,443
1994	898800	691705	368370	257455	258209	292344	386851	353237	448162	310504	6,166,496
1996	1056172	934111	488669	456912	286889	308573	437103	353677	447124	396679	7,192,145
1998	931553	982116	218109	604472	490304	415831	497221	393399	421293	290797	7,842,760
2000	1111687	1202164	451347	753781	619659	518053	563679	390030	706482	243952	9,578,826
2002	1332355	1239421	704649	797976	704416	555353	546796	411049	674366	335816	10,872,976
2004	1404929	1212213	898965	729848	757268	627506	578027	455170	540803	489171	11,737,413
2006	1591328	1311987	1092783	949117	850685	694258	687160	516659	475117	376636	13,821,502

Source: WTO (various years)

3. Methodology

Since Perron's (1989) seminal work, it is well known that if potential structural breaks are not allowed for in testing for unit roots in time series, the tests may be biased towards a mistaken non-rejection of non-stationarity. Since then, a number of studies have proposed different ways of estimating the time of the break endogenously. These studies include Zivot and Andrews (1992), Perron (1997), Lumsdaine and Papell (1997) and Vogelsang and Perron (1998). However, these endogenous break unit root tests assume no break under the unit root null and derive their critical values accordingly. Nunes *et al* (1997) show that this assumption leads to size distortions in the presence of a unit root with a break. Therefore, we conduct the minimum LM unit root one break test proposed by Lee and Strazicich (2004) which has many advantages: endogenously determines a structural break from the data; breaks are allowed under both the null and the alternative hypothesis; corresponds to Perron's (1989) exogenous structural break with changes in the level and both level and trend (Models A and C); avoids the problems of bias and spurious rejections with the traditional ADF tests; and Lee and Strazicich (2003) show that the LM unit root test statistic which is estimated by the regression according to the LM principle will not spuriously reject the null hypothesis.

Consistent with the univariate LM unit root tests, the Im *et al* (2005) panel LM unit root test has many advantages over other panel tests; it allows for a structural break under both the null and the alternative hypothesis; panel LM t-statistics allow for the presence of heterogeneous intercepts, deterministic trends, and persistence parameters across panel members; and they allow for heterogeneous structural break that vary for different countries and are endogenously determined from the data.

3.1 Univariate LM Unit Root Test

Equivalent to Perron's (1989) models, Lee and Strazicich (2004) develop two versions of the LM unit root test with one structural break, Model A is known as the 'crash model' and Model C is known as the' crash-cum-growth model'. Model A allows for a one-time change in the intercept under the alternative hypothesis and is described as $Z_t = [1, t, D_t]'$, where $D_t = t \geq T_B + 1$, and zero otherwise. Model C allows for a shift in intercept and change in trend slope under the alternative hypothesis and is described as $Z_t = [1, t, D_t, DT_t]'$, where $DT_t = t - T_B$ for $t > T_B + 1$, and zero otherwise.

The one break LM unit root test statistics according to the LM (score) principle are obtained from the following regression:

$$\Delta y_t = \delta' \Delta Z_t + \phi \tilde{S}_{t-1} + u_t \qquad (1)$$

where $\tilde{S}_t = y_t - \tilde{\psi}_x - Z_t \tilde{\delta}$ ($t = 2, \ldots T$) and Z_t is a vector of exogenous variables defined by the data generating process; $\tilde{\delta}$ is the vector of coefficients in the regression of Δy_t on ΔZ_t respectively with Δ the difference operator; and $\tilde{\psi}_x = y_1 - Z_1 \tilde{\delta}$, with y_1 and Z_1 the first observations of y_t and Z_t respectively.

The unit root null hypothesis is described in (1) by $\phi = 0$ and the LM *t*-test is given by $\tilde{\tau}$; where $\tilde{\tau}$ = *t*-statistic for the null hypothesis $\phi = 0$. The augmented terms $\Delta \tilde{S}_{t-j}$, $j = 1, \ldots k$, terms

are included to correct for serial correlation. The value of *k* is determined by the general to specific search procedure [2]. To endogenously determine the location of the break (T_B), the LM unit root searches for all possible break points for the minimum (the most negative) unit root *t* –test statistic as follows:

$$Inf\ \tilde{\tau}(\tilde{\lambda}) = Inf_{\lambda}\tilde{\tau}(\lambda)\text{; where } \lambda = T_B / T$$

3.2 Panel LM Unit Root Test

Consider a model which tests for stationarity of tourism arrivals:

$$TA_{it} = \delta_i' X_{it} + u_{it} \qquad u_{it} = \kappa_i u_{i,t-1} + \varepsilon_{it} \tag{2}$$

Where i represents the cross-section of countries (i=1,…,N), t represents the time period (t=1,….,T), u_{it} the error term and X_{it} is a vector of exogenous variables. The test for the unit root null is based on the parameter κ_i, while ε_{it} is a zero mean error term that allows for heterogeneous variance structure across cross-sectional units but assumes no cross-correlations. The parameter κ_i allows for heterogeneous measures of persistence.

A structural break is incorporated in the model by specifying X_{it} as $[1, t, D_{it}, T_{it}]'$ where D_{it} is a dummy variable that denotes a mean shift and T_{it} denotes a trend shift. If a structural break for country i occurs at TB_i, then the dummy variable D_{it} = 1 if $t > TB_i$, zero otherwise, and $T_{it} = t - TB$, zero otherwise.

In panel framework, following Im *et al* (2005), the null hypothesis is given by $H_0 : \phi_i = 0$ for all i (implying that all the individual series have a unit root), versus the alternative $H_1 : \phi_i < 0$ for i = 1,2, ..., N_1 and to ϕ_i = 0 for i = N_1 + 1, N_1 + 2, ..., N (implying that at least one of the series is stationary). The panel LM test statistic is obtained by averaging the optimal univariate LM unit root t-test statistic estimated for each country. This is denoted as LM_i^{τ}:

$$LM_{barNT} = \frac{1}{N}\sum_{i=1}^{N} LM_t^{\tau} \tag{3}$$

Im *et al*. (2005) then construct a standardized panel LM unit root test statistic by letting $E(L_T)$) and $V(L_T)$ denote the expected value and variance of LM_i^{τ}, respectively under the null hypothesis. Im *et al*. (2005) then compute the following:

$$\psi LM = \frac{\sqrt{N}[LM_{barNT} - E(L_T)]}{\sqrt{B(L_T)}} \tag{4}$$

The numerical values for E(LT) and V(LT) are provided by Im *et al* (2005). The asymptotic distribution of this test is unaffected by the presence of a structural break and is standard normal.

4. Empirical Findings

This study uses annual data for ten countries; Malaysia, Japan, Korea, China, United Kingdom (UK), United States (US), Singapore, Germany, Taiwan and Hong Kong from 1988 – 2006 to test for stationary using both univariate and panel tests with one structural break. [3]

Data is collected from World Trade Organization (various years), yearbook of tourism statistics.

Table 2 and 3 indicate the time of the structural breaks which are consistent with the September 11 2001, SARS outbreak in 2003, war in Iraq in 2003, global recession (in early 2000s) and Asian financial crisis (during 1997-1998). For example, the 2003 SARS outbreak which spreads through out Asia in most of this year, had severely affected the tourism sector in Thailand during this period, especially the number of arrivals to Thailand from USA. This outbreak resulted in forcing the Thai authority to decrease its target from the number of arrivals to Thailand. Another structural break in the number of visitor arrivals data to Thailand is associated with the September 11 attacks on United States, which negatively affected the number of visitor arrivals to Thailand, especially from the Western World. This is due to issues related to security and safety. Additionally, the structural break which occurred in the data, that is the year 2004, was associated with the bird flu outbreak. This also had a negative impact on the number of tourist arrivals to Thailand, especially from the other part of Asia. According to Untong et al. (2006) the number of visitor arrivals to Thailand during this period declined by 190,000 people (around 9.6 per cent).

Table 2: LM Unit Root Test with One Structural Break (Model A)

Country	TB	Optimal *k*	Test Statistic
Malaysia	2001N	2	-3.1525
Japan	2002***	2	-4.2847***
Korea	2000***	3	-3.1670
China	1998***	3	-4.9265***
United Kingdom	1998N	2	-1.7999
United States	2004**	2	-3.2511*
Singapore	1996***	2	-3.3874*
Germany	1998N	0	-1.9940
Taiwan	2002N	0	-2.9963
Hong Kong	2000N	2	-4.2008*
Panel LM Test Statistic			-10.705***

Notes: TB is the date of the structural break; k is the lag length (maximum used here = 4).
N denotes the structural break is not significant.
The 1%, 5% and 10% critical values for the minimum LM test with one break are 4.239 -3.566 -3.211 respectively (Lee and Strazicich (2004)). The corresponding critical values for the panel LM test are −2.326, −1.645 and −1.282.

Table 2 also presents the results for LM unit root tests with one break in the intercept (Model A). In Model A the unit root null is rejected for Japan and China at the one percent significance level; Hong Kong at the five percent significance level; US and Singapore at the ten percent level. These stationarity results imply that shocks to visitor arrivals from these five countries to Thailand will have a temporary effect and thus are sustainable in the long-run However, for the other five countries, visitor arrivals contain a unit root suggesting than shocks to visitor arrivals from Malaysia, Korea, UK, Germany and Taiwan will have a permanent effect on Thailand tourism.

Table 3: LM Unit Root Test with One Structural Break (Model C)

Country	TB	Optimal *k*	Test Statistic
Malaysia	2002***	2	-3.7441
Japan	2000N	2	-4.6747**
Korea	2000***	2	-5.3281***
China	1996***	3	-4.9265**
UK	1996****	3	-3.5496
US	2003****	4	-3.8038
Singapore	2000N	1	-3.9369
Germany	1994***	0	-3.8452
Taiwan	1996***	3	-4.1321
HK	1996N	4	-3.9354
Panel LM Test Statistic			-13.760***

Notes: TB is the date of the structural break; *k* is the lag length (maximum used here = 4).
N denotes the structural break is not significant.
Critical values taken from Lee and Strazicich (2004).
The 1%, 5% and 10% critical values for the panel LM test are −2.326, −1.645 and −1.282.

The results for LM unit root tests with a break in the intercept and slope (Model C) is presented in Table 3. Table 3 indicates that for visitor arrivals to Thailand from Korea, Japan and China we are able to reject the unit root null hypothesis at the one percent, five percent and five percent level of significance respectively. These results imply that exogenous shocks have a temporary effect in visitor arrivals to Thailand from these three counties only. That is initial visitor arrivals from these tree countries will fall due to the negative shocks but will return thereafter to their equilibrium path. For the other seven countries, visitor arrivals contain a unit root suggesting than shocks to visitor arrivals from these seven countries will have a permanent effect on Thailand tourism.

A possible reason for the LM unit root tests to reject the unit root null for half the counties in Model A and three based on Model C is the small sample size of the data. To address this issue, we apply the panel LM unit root tests for both Models A and C. The results are reported at the bottom of Tables 1and 2, where unit root null is rejected for both models. These results indicate that visitor arrivals to Thailand are a stationary process and thus shocks to visitor arrivals to Thailand will only have a temporary effect and therefore are sustainable in the long.

5. Conclusion and Policy Implications

This study conducts univariate LM unit root test proposed by Lee and Strazicich (2004) with a break in the intercept and a break in the intercept and slope (Model C), and panel LM test with structural break proposed by Im, Lee, and Tieslau (2005) for tourist arrivals to Thailand from its top ten source markets from 1988-2006**.** These unit root tests not only identify the time of the structural break but determine whether shocks to visitor arrivals to Thailand have a temporary or permanent impact.

Results from LM unit root tests with one break in the intercept (Model A) and one break in the intercept and slope (Model C) suggests that shocks to visitor arrivals to Thailand from China, Hong Kong, Japan, Korea, Singapore and the US have only a transitory effect and therefore is sustainable in the long run. However, for the other countries, visitor arrivals contain a unit root suggesting that shocks to visitor arrivals from Germany, Malaysia, Taiwan and UK have a permanent effect on Thailand tourism. Additionally, this study applies the panel LM unit root tests for both Models A and C and results show that exogenous shocks such as the September 11 2001, SARS outbreak in 2003, war in Iraq in 2003, global recession (in early 2000s) and Asian financial crisis (during 1997-1998) have only temporary effect on the number of arrivals to Thailand from the ten countries. This result is plausible given that the tourism industry had recovered quite strongly and in a short period of time. One of the conclusions which can be made that implementing the right policies and strategies in dealing with external shocks can result in quick recovery and eliminate the permanent effect of these shocks on the tourism industry in Thailand.

Endnotes

1 For example, if the impact of shocks (such as September 11 attacks) on tourism is permanent, this means that the recovery of this sectors will take very long time to rerun to normal and the government and tourism agencies must do something about it to assist in the recovery process.

2 General to specific procedure begins with the maximum number of lagged first differenced terms max k =4 and then examine the last term to see if it is significantly different from zero. If insignificant, the maximum lagged term is dropped and then estimated at k =4 terms and so on, till the maximum is found or k =0.

3 Due to the short time span of the data, the authors decided to conduct unit root tests with only one structural break, even though unit root test with two structural breaks is available.

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