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Business and Economics

MARKETING 'MALAYSIA WELCOMES THE WORLD:

ARE MALAYSIA'S TOURISM MARKETS CONVERGING?

Lean Hooi Hooi[1] and Russell Smyth[2]

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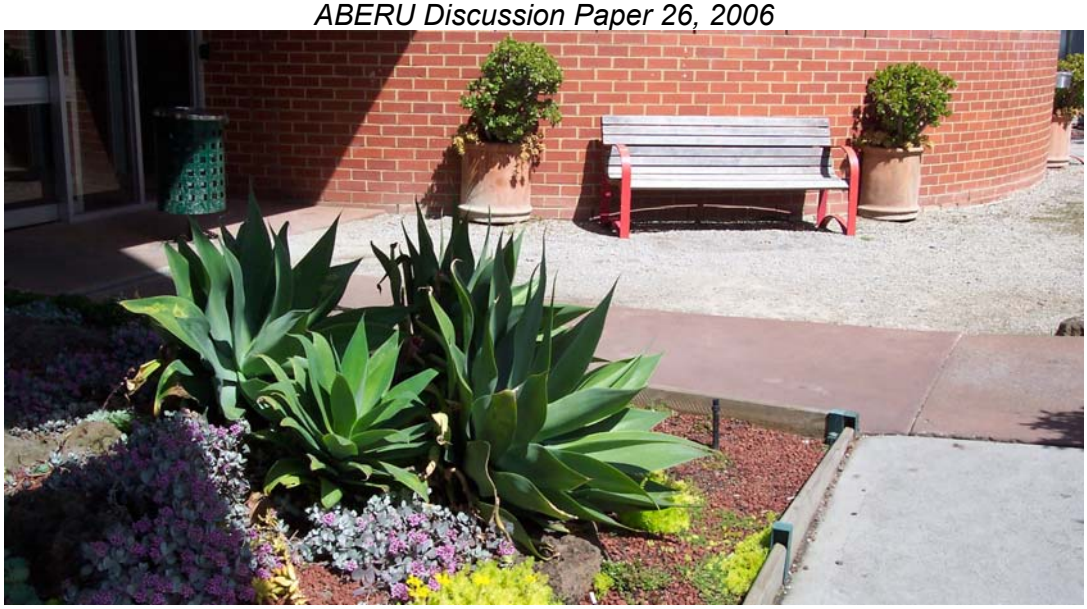

Abstract

Over the last 25 years Malaysia's tourism sector has emerged as an important source of foreign exchange for Malaysia. This paper applies univariate and panel Lagrange Multiplier (LM) unit root tests with one and two structural breaks to examine whether Malaysia's ten most important tourist markets are converging. The study finds strong evidence that Malaysia's tourism markets are converging. Based on these findings, implications are drawn about the success of the marketing strategies of Tourism Malaysia and the prospects for the continuing contribution of tourism to the Malaysian economy.

Keywords: Convergence hypothesis, Malaysia, Tourism, Unit Root.

JEL classification: C22

[1] Department of Economics, Monash University.
[2] Department of Economics, Monash University. E-mail: Russell.Smyth@BusEco.monash.edu.au; Telephone: (03) 9903 2134; Fax: (03) 9903 1128.

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I. INTRODUCTION

Over the last quarter century, beginning off a low base, Malaysia has developed a major travel and tourist industry. In 1980 Malaysia attracted a modest 2.3 million international tourist arrivals, but by 2005 this figure had increased to 16.4 million, making Malaysia the second most visited country in Asia after China (New Straits Times, December 24, 2005). Tourism has become Malaysia's most successful services sector with the tourism, restaurant and hotel sub sectors accounting for 43 per cent of total final services in 2005 (EIU, 2005). In 2006 official projections are that there will be 18.1 million international tourist arrivals in Malaysia and that travel and tourism will generate US$30.8 billion in total demand. The direct and indirect effect of travel and tourism in Malaysia in 2006 is expected to account for 14.6 per cent of GDP and 1,345,000 jobs (12.6 per cent of total employment). The travel and tourism sector will generate US$18.1 billion in export revenue, representing 10.1 per cent of exports in 2006 which makes tourism Malaysia's second largest foreign exchange earner after the manufacturing sector (WTTC, 2006).

The Malaysian government regards tourism as an important vehicle to diversify its economic structure. To accelerate private investment in tourism two funds were launched in 2001; namely, the Tourism Infrastructure Fund with an initial allocation of RM700 million and a Special Fund for Tourism and Infrastructure with an initial allocation of RM400 million. In 2005 the allocation to both funds was increased to RM1.2 billion (Government Malaysia, 2006). In addition, in 2006, in preparation for 2007 which has been slated as 'Visit Malaysia Year' with the theme 'Malaysia Welcomes the World', Tourism Malaysia received 30 per cent more funding for advertising and other promotions compared with 2005 (Ganesan, 2005). Under the Ninth Malaysian Plan (2006-2010), altogether the Malaysian government will spend RM1.8 billion (US$486.5 million) to upgrade tourist destinations and on tourist infrastructure as well as on marketing campaigns in major source markets (Government Malaysia, 2006). Tourism is set to increase in importance as a source of growth. Malaysia's travel and tourism sector is expected to grow 7.9 per cent in 2006 and 6.3 per cent per annum, in real terms, between 2007 and 2016 (WTTC, 2006). In 'Visit Malaysia Year' Malaysia expects to receive 20.1 million international tourist arrivals and this is projected to increase to 24.6 million international tourist arrivals by 2010 (Government Malaysia, 2006).

There is a sizeable literature on Malaysian tourism, but most of it is descriptive. The extant literature has discussed the role that tourism has played in contributing to economic growth (Khalifah & Tahir, 1997; Opperman, 1992; Musa, 2000; Teo, 2003); considered the potential for ecotourism (Wong, 1990; Smith, 1992; Cartier, 1998; Weiler & Ham, 2001; Sahb, 2005); described the potential conflict between tourism and traditional cultural and religious values (Din, 1982; Jafari, 1986; Sarkissian, 1998; Henderson, 2003) and examined the implications of the Asian financial crisis for tourism in Malaysia (de Sausmarez, 2003). There are few econometric studies which have analyzed international tourist arrivals. Anaman and Animah Ismail (2002) examined the factors determining cross-border tourism from Brunei to Eastern Malaysia based on a survey administered in 2000, while Tan *et al.* (2002) examined the determinants of tourist flows to Malaysia and Indonesia from six major markets; namely, Australia, Germany, Japan, United States, United Kingdom and Singapore from 1980 to 1997.

The aim of this study is to examine whether Malaysia's tourism markets are converging by applying the univariate and panel Lagrange multiplier (LM) unit root tests with one and two structural breaks proposed by Lee and Strazicich (2003, 2004) and Im *et al.* (2005). There are two factors that

explain convergence of tourism markets. First, over time, as income increases more people undertake international travel. This relationship between the demand for tourism and income has been established in tourism demand studies (for a survey, see Narayan, 2003). Second, countries competing for international tourists target source markets with holiday packages, reduced airfares and other inducements in an attempt to increase their share of the market (Narayan, 2006a). As discussed more fully in the next section, Malaysia has introduced a number of measures to increase international visitor arrivals from specific markets. The main rationale for testing whether specific source markets are converging is that it provides a formal test of whether initiatives targeted at specific markets are effective. The convergence hypothesis states that the difference between total international visitor arrivals and international visitor arrivals from a specific source market will be stationary. If Malaysia's tourism markets are converging, then the difference between total international visitor arrivals and international visitor arrivals from a specific source market will approach zero.

There is an emerging literature that has tested whether the time series of tourist arrivals or tourist expenditures are stationary. The objective of most of this literature is to ascertain whether shocks to tourist arrivals or tourist expenditures are permanent or transitory. There are studies of this sort for Australia (Narayan, 2006b); Bali (Smyth *et al.,* 2006); Egypt and Israel (Aly and Strazicich, 2000); Fiji (Narayan, 2005a, 2005b, 2005c); India (Bhattacharya and Narayan, 2005) and Malaysia (Lean and Smyth, 2006). The findings from these studies including Malaysia, is that international tourist arrivals and tourist expenditures are stationary and therefore shocks to tourist arrivals and expenditures are transitory. The implication of finding that shocks are transitory is that the long-run returns from investment in the tourist industry will be sustainable. There are, however, few studies of whether tourist markets are converging. The only extant studies of this description are Narayan (2006a) for Australia and Narayan (2006c) for Fiji.

The remainder of the paper is set out as follows. The next section motivates the paper by discussing the initiatives Tourism Malaysia has introduced to increase tourist arrivals from specific source markets and explaining how testing the convergence hypothesis assists in ascertaining whether such initiatives have been effective. Section III contains the empirical specification. The econometric methodology is specified in Section IV. The data is discussed in Section V. The empirical results are presented and analyzed in Section VI. The final section summarizes the implications of the results for marketing Malaysian tourism and the contribution of tourism to the Malaysian economy.

II. CONVERGENCE OF SOURCE MARKETS: IMPLICATIONS FOR MARKETING MALAYSIAN TOURISM

Malaysia's 10 major tourism source markets between 1995 and 2005 were Singapore, Thailand, Indonesia, Japan, China, Brunei, Taiwan, United Kingdom, Australia and the United States. The Malaysian government has undertaken intensive marketing campaigns in each of these markets to increase tourist numbers. Singapore, as Malaysia's major market, contributes over 50 per cent of international visitor arrivals to Malaysia. Tourism Malaysia is running a major promotional campaign in Singapore to encourage Singaporeans to visit Malaysia for 'Visit Malaysia Year'. Initiatives include a massive advertising billboard on Shaw Towers (a major office and shopping complex in downtown Singapore), a fleet of 100 taxis in Singapore adorned with Malaysia's national flower and the 'Visit Malaysia Year' logo, and tailored holiday packages specially designed to appeal to Singaporeans (Sawatan, 2006). The Malaysian and Singapore governments are considering allowing low-cost carriers AirAsia and Tiger Airways fly between Kuala Lumpur and Singapore (Ooi, 2006). Malaysia Transport Minister Datuk Seri Chan Kong Choy and his Singaporean counterpart Raymond Lim have agreed that further liberalisation would be beneficial in terms of increased tourism and trade. A committee has been set up to look into the pros and

cons of allowing the budget airlines to fly the Kuala Lumpur-Singapore route (The Star, 5 September 2006).

In Brunei, Indonesia and Thailand Malaysia has aggressively marketed itself as a destination for conferences, medical and health services as well as shopping. Cooperation under the purview of the Indonesia-Malaysia-Thailand growth triangle and Brunei-Indonesia-Malaysia-Philippines East ASEAN growth area (BIMP-EAGA) has facilitated cross-border tourism flows (Government Malaysia, 2006). Indonesia, together with China, is an important market for education tourism. Malaysia's foreign exchange earnings from education tourism increased from RM220 million in 2000 to RM450 million in 2005 and to further increase education tourism, Malaysia has established Education Promotion Centres in Beijing and Jakarta (Government Malaysia, 2006) Low-cost carriers fly from Bangkok to Kuala Lumpur and from Jakarta to Kuala Lumpur. In order to increase tourist arrivals from Thailand, the Malaysian government has announced that it will permit direct flights of low-cost carriers from Bangkok to Langkawi (Bernama Daily Malaysian News, August 15, 2006). Malaysia also attracts tourists from Brunei and Indonesia, as well as Singapore, visiting friends and relatives.

To increase tourist numbers from China, Tourism Malaysia has established offices in Beijing, Chengdu, Guangzhou, Shanghai and Kunming and run an advertising campaign featuring the interpreter from the first meeting between Mao Zedong and Malaysia's former prime minister, Tun Abdul Razak, in 1974 (Travel Trade Gazette Asia, October 21, 2005). Malaysia has also invested in a number of initiatives to make Malaysia more attractive to Chinese tourists. First, 30 Mandarin-speaking officers have been stationed at Kuala Lumpur International Airport with plans to assign Mandarin-speaking officers at immigration checkpoints in Johor Baru, where many Chinese tourists enter Malaysia from Singapore as part of Singapore-Malaysia-Thailand tours (Travel Trade Gazette Asia, October 21, 2005). Second, Tourism Malaysia has put up signposts and distributed pamphlets in Mandarin at major tourist sites to assist Chinese-speaking visitors (Yeong, 2006). Third, Malaysia has relaxed visa regulations for Chinese tourists. Chinese tourists are allowed to use multiple-entry visas that are valid for up to one year, provided each stay is less than one month (Asia in Focus, August 18, 2006). Malaysia is also considering introducing an online visa application option and waiving visas for Chinese tourists if their visit is less than 15 days (Dow Jones International, April 5, 2006). Fourth, Malaysia has promoted the 'Malaysia My Second Home Program' in China, designed to encourage foreigners to make Malaysia their second home by purchasing property and/or investing in Malaysia. From 2001 to 2005 this program attracted 7,308 participants; of which the main markets were China (24 per cent), Bangladesh (15 per cent), United Kingdom (8 per cent) and Singapore (6 per cent) (Government Malaysia, 2006).

Since 1999, Malaysia has marketed itself in Australia, Europe and the United States as the quintessential Asian destination, using the slogan 'Malaysia, Truly Asia'. In the United Kingdom Tourism Malaysia had a sponsorship deal for the 2005/06 season with Chelsea Football Club and in August 2006 announced that it plans to enter into a sponsorship deal with Manchester United (Ganesan, 2006). In the lead-up to 'Visit Malaysia Year' in 2007, throughout the second half of 2006 under the banner 'Meet Malaysia 2006' Tourism Malaysia is holding a series of tourism workshop focusing on promoting niche markets including cruises, ecotourism, medical tourism and sports holidays. In the United Kingdom Malaysia has also been promoting its home stay program where tourists can stay with families in traditional villages (Travel Trade Gazette, UK, August 4, 2006).

Testing whether source markets are converging signals to policy makers whether marketing strategies such as these that are targeted at increasing tourist arrivals from specific markets are effective. If visitor arrivals from a specific source market are converging with total tourist arrivals then this indicates that the market is growing in importance. If the convergence hypothesis holds for a specific market, this implies that the share of visitor arrivals from that market in total visitor arrivals is increasing and that marketing strategies targeted at that market are effective. If the convergence hypothesis is rejected for a specific market, this implies that the share of visitor arrivals from that market in total visitor arrivals is not increasing and that marketing strategies

targeted at that market are ineffective. The convergence hypothesis is also useful in planning future marketing strategies. If there is no evidence of convergence for a particular market, policy makers face two options; one option would be to withdraw from that market and reallocate advertising dollars elsewhere or, if the view is that the market still has potential, increase marketing expenditure or repackage the marketing campaign to increase its effectiveness in that source market (see Narayan 2006a, 2006c).

III. EMPIRICAL MODEL

The hypothesis is that Malaysia's tourism markets are converging. Following Narayan (2006a, 2006c) we define convergence as the reduction in the difference between total international visitor arrivals to Malaysia and international visitor arrivals from a source market *i*. To test the convergence hypothesis we examine whether or not the natural log of the difference between total international visitor arrivals to Malaysia and international visitor arrivals from each specific source market *i* is stationary as per Equation (1):

$$Y_{it} = \ln(V_t / V_{it}) \quad (1)$$

Here V_t denotes total international visitor arrivals to Malaysia at time *t*; V_{it} denotes international visitor arrivals to Malaysia from source market *i* at time *t* and Y_{it} is the observed difference in the natural log of international visitor arrivals at time t. Thus Equation (1) denotes the natural log of the tourists arrival ratio – i.e. total international tourist arrivals divided by the number of tourist arrivals from source market *i.*

IV. ECONOMETRIC METHODOLOGY

Univariate LM unit root test with one and two structural breaks

To examine whether the observed difference in the natural log of international visitor arrivals is stationary we employ the univariate LM unit root test with one and two structural breaks. The LM unit root test is based on the data generating process (DGP): $y_t = \delta' Z_t + e_t, e_t = \beta e_{t-1} + \varepsilon_t$. Here, Z_t consists of exogenous variables and ε_t is an error term with classical properties. Lee and Strazicich (2004) developed two versions of the LM unit root test with one structural break. Using the terminology of Perron (1989) who was the first to develop a unit root test with a structural break, Model A is known as the "crash" model, and allows for a one-time change in the intercept under the alternative hypothesis. Model A can be described by $Z_t = [1, t, D_t]'$, where $D_t = 1$ for $t \geq T_B + 1$, and zero otherwise, T_B is the date of the structural break, and δ' = (δ_1 , δ_2 , δ_3). An alternative to Model A is Model C, the "crash-cum-growth" model that allows for a shift in the intercept and a change in the trend slope under the alternative hypothesis and can be described by $Z_t = [1, t, D_t, DT_t]'$, where $DT_t = t - T_B$ for $t \geq T_B + 1$, and zero otherwise.

Lee and Strazicich (2003) extended the LM unit root test with one structural break to accommodate two structural breaks. The endogenous two-break LM unit root test can be considered as follows. Model AA, as an extension of Model A, allows for two shifts in the intercept and is described by $Z_t = [1, t, D_{1t}, D_{2t}]'$ where $D_{jt} = 1$ for $t \geq T_{Bj} + 1$, $j = 1, 2,$ and 0 otherwise. T_{Bj} denotes the date when

the breaks occur. Note that the DGP includes breaks under the null ($\beta = 1$) and alternative ($\beta < 1$) hypothesis in a consistent manner. Model AA has the following null and alternative hypotheses:

$$H_0 : y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + y_{t-1} + v_{1t},$$
$$H_A : y_t = \mu_1 + \gamma t + d_1 D_{1t} + d_2 D_{2t} + v_{2t}.$$

Here v_{1t} and v_{2t} are stationary error terms; $B_{jt} = 1$ for $t = T_{Bj} + 1,\ j = 1, 2,$ and 0 otherwise. Model CC extends Model C and includes two changes in the intercept and the slope. It is described by $Z_t = \left[1, t, D_{1t}, D_{2t}, DT_{1t}, DT_{2t}\right]'$, where $DT_{jt} = t - T_{Bj}$ for $t \geq T_{Bj} + 1,\ j = 1, 2,$ and 0 otherwise. Model CC has the null and alternative hypotheses:

$$H_0 : y_t = \mu_0 + d_1 B_{1t} + d_2 B_{2t} + d_3 D_{1t} + d_4 D_{2t} + y_{t-1} + v_{1t},$$
$$H_A : y_t = \mu_1 + \gamma t + d_1 D_{1t} + d_2 D_{2t} + d_3 DT_{1t} + d_4 DT_{2t} + v_{2t},$$

where v_{1t} and v_{2t} are stationary error terms; $B_{jt} = 1$ for $t = T_{Bj} + 1,\ j = 1, 2,$ and 0 otherwise. The LM unit root test statistic is obtained from the following regression:

$$\Delta y_t = \delta' \Delta Z_t + \phi \bar{S}_{t-1} + \mu_t \qquad (2)$$

where $\bar{S}_t = y_t - \hat{\psi}_x - Z_t \hat{\delta}_t$, $t = 2,...,T$; $\hat{\delta}$ are coefficients in the regression of Δy_t on ΔZ_t; $\hat{\psi}_x$ is given by $y_t - Z_t \delta$; and y_1 and Z_1 represent the first observations of y_t and Z_t respectively. The LM test statistic is given by the $\tilde{\tau} =$ t-statistic for testing the unit root null hypothesis that $\phi = 0$. The location of the structural break(s) is ascertained by selecting all possible break points for the minimum t-statistic as follows:

$$Inf\tilde{\tau}\left(\bar{\lambda}_i\right) = \ln \underset{\lambda}{f}\, \tilde{\tau}\left(\lambda\right), \text{ where } \lambda = T_B / T \qquad (3)$$

We selected the structural breaks where the endogenous two-break LM t-test statistic is at a minimum. Critical values are tabulated in Lee and Strazicich (2003, 2004), The maximum lag length was set equal to 12, as we use monthly data, and the lag selection criteria was the general to specific approach suggested by Hall (1994).

Panel LM unit root test with one and two structural breaks

Consider a model of the form: $y_{it} = \delta_i' X_{it} + e_{it}$, $e_{it} = \beta_i e_{i,t-1} + \varepsilon_{it}$ where y_{it} is the log of the tourist arrivals ratio, *i* represents the cross-section of source markets (*i = 1, . . . ,N*), *t* represents the time period (*t = 1, . . . , T*), e_{it} is the error term and X_{it} is a vector of exogenous variables. The test for the null hypothesis of a unit root in the tourist arrivals ratio is based on the parameter β_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 β_i allows for heterogeneous measures of persistence.

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

$T_{it} = t - TB$ if $t > TB_i$, zero otherwise. Two structural breaks are incorporated into the model by specifying X_{it} as $\left[1, t, D1_{it}, D2_{it} T1_{it}, T2_{it}\right]'$, where $D1_{it}$ and $D2_{it}$ are dummy variables that capture the first and second structural break respectively. $D1_{it}$ = 1 if $t > TB1$, zero otherwise; $D2_{it}$ = 1 if $t > TB2$, zero otherwise and $T1_{it} = t - TB1$ if $t > TB1$, zero otherwise; $T2_{it} = t - TB2$ if $t > TB2$, zero otherwise.

The panel LM test statistic is obtained by averaging the optimal univariate LM unit root t-test statistic estimated for each source market. This is denoted as LM_i^{τ}:

$$LM_{barNT} = \frac{1}{N} \sum_{i=1}^{N} LM_i^{\tau} \tag{4}$$

Im *et al*. (2005) constructed 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 expression:

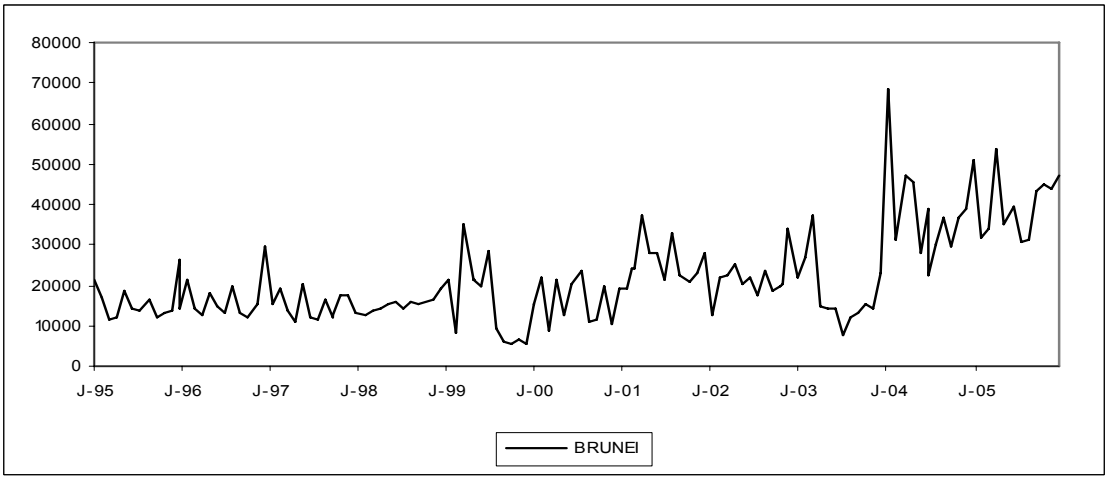
$$\psi_{LM} = \frac{\sqrt{N}\left[LM_{barNT} - E\left(L_T\right)\right]}{\sqrt{V\left(L_T\right)}} \tag{5}$$

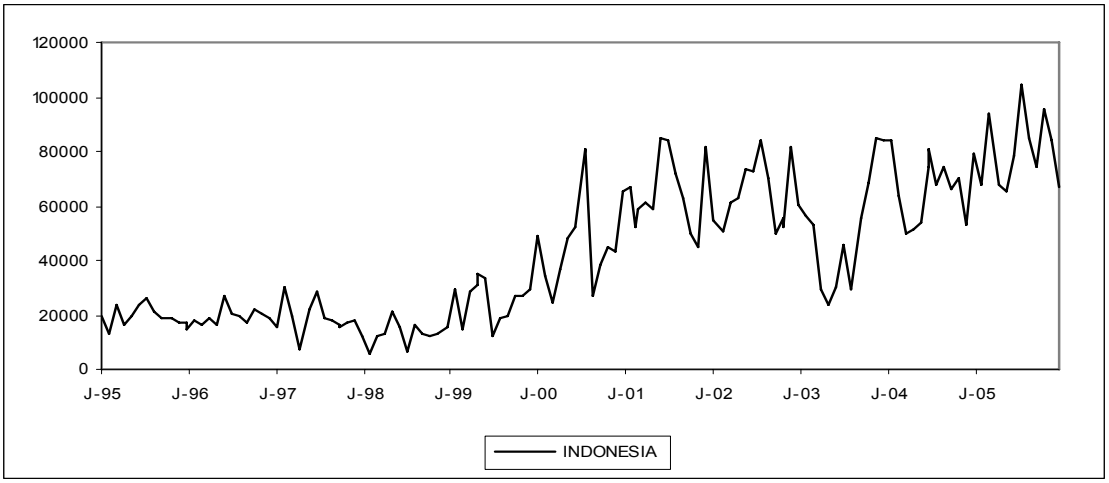
The numerical values for $E(L_T)$ and $V(L_T)$ are in Im *et al*. (2005). The asymptotic distribution is unaffected by the presence of structural breaks and is standard normal.

V. DATA

The data are monthly international visitor arrivals in Malaysia from each of Malaysia's ten major markets over the period January 1995 to December 2005. The ten major tourist markets were Singapore, Thailand, Indonesia, Japan, China, Brunei, Taiwan, United Kingdom, Australia and the United States. International visitor arrivals in Malaysia from each of these ten countries are plotted in Figure 1. The data are unpublished and were obtained on request from Tourism Malaysia and the Department of Immigration Malaysia. All of the data were expressed in logarithms prior to analysis.

Figure 1: International visitor arrivals from Malaysia's ten major markets

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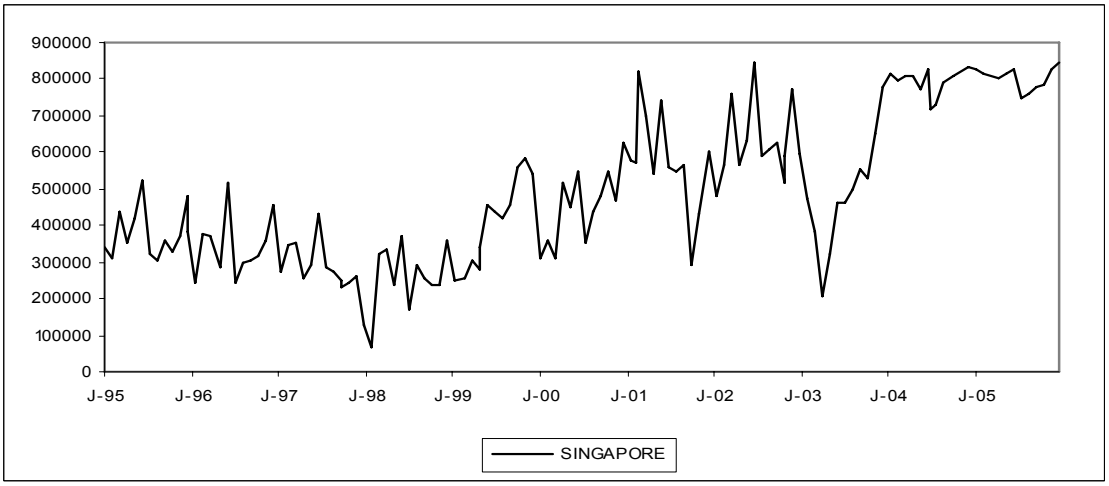
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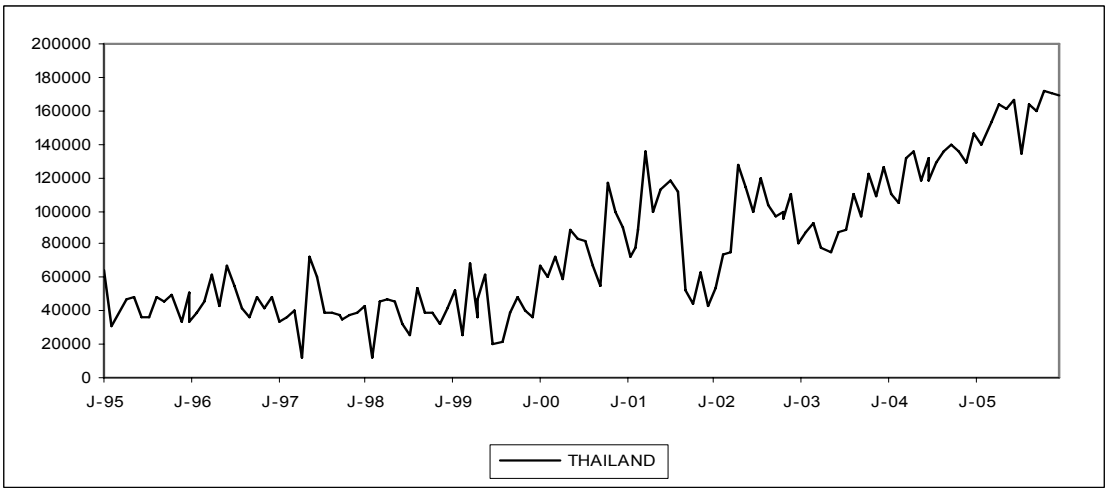
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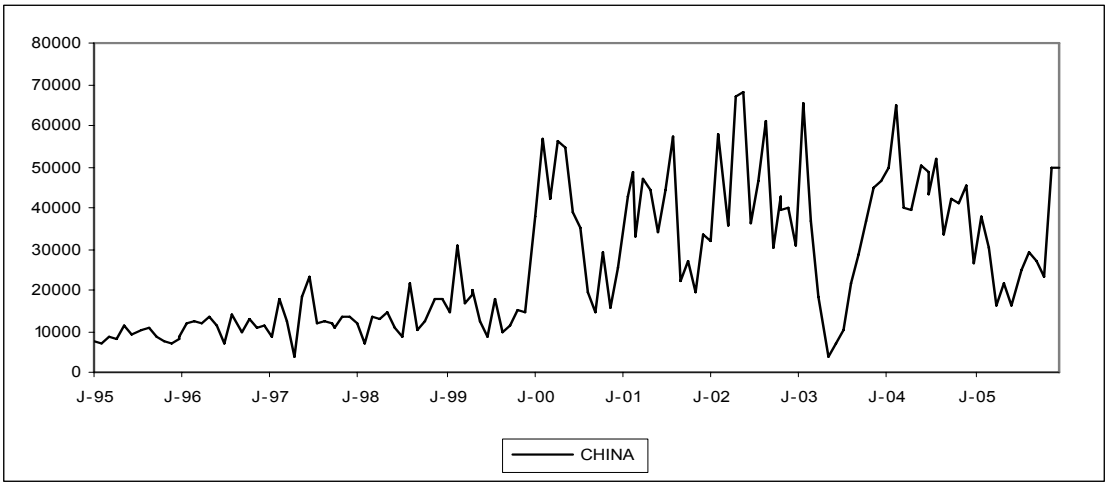
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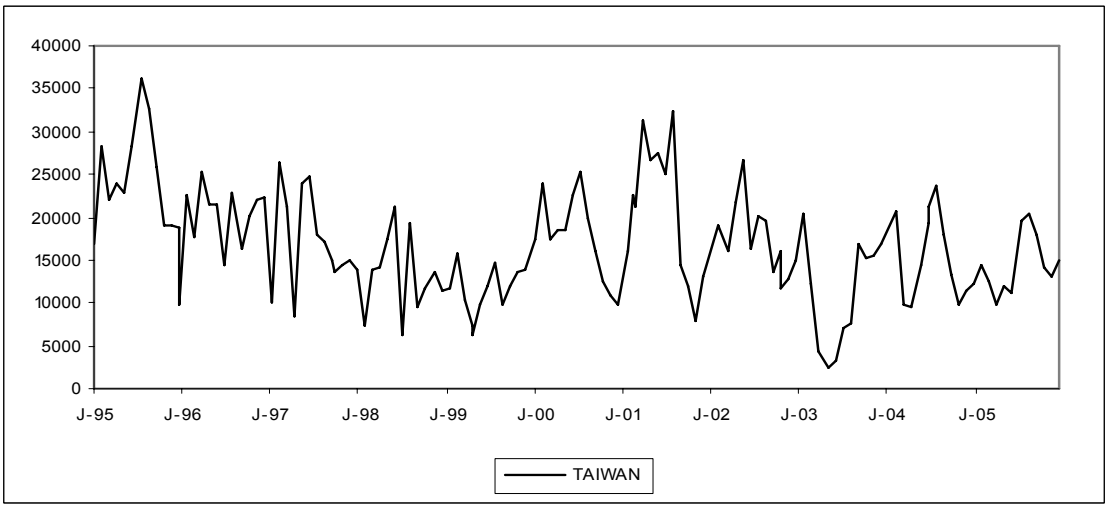
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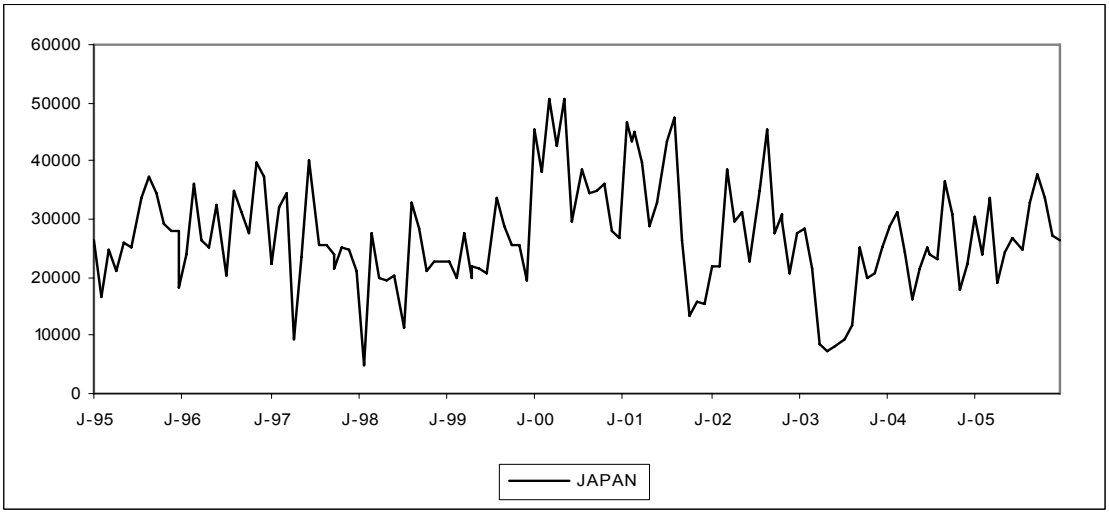
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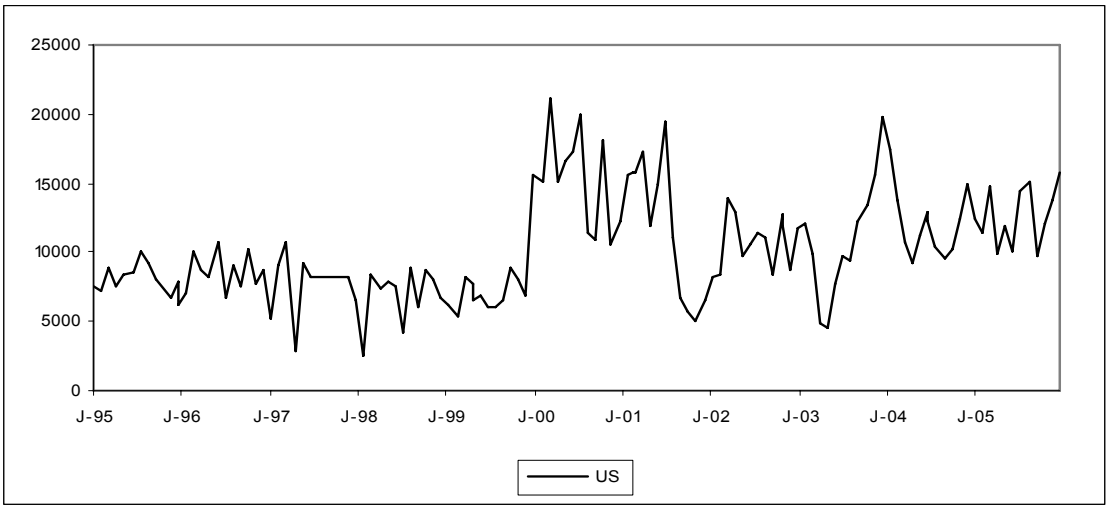
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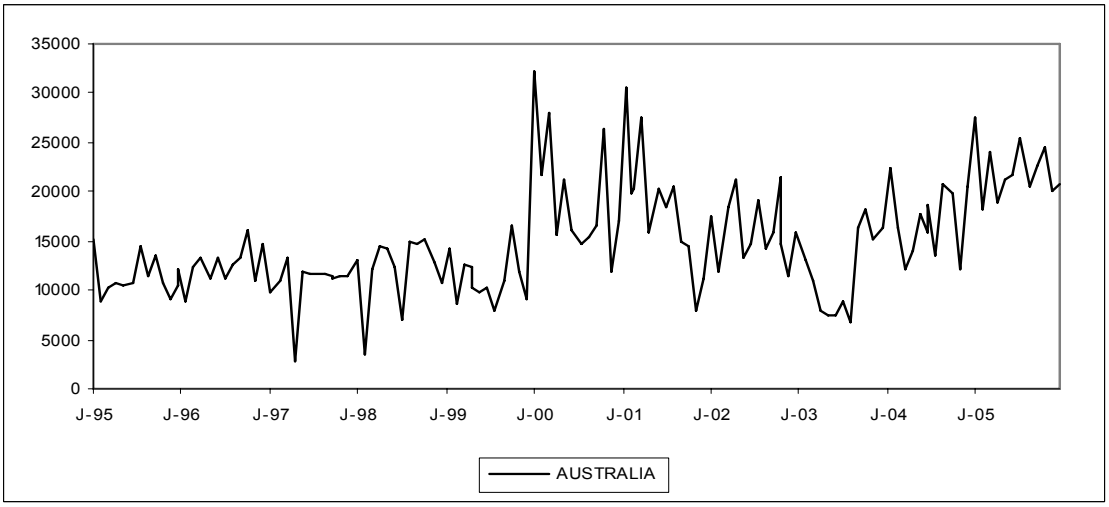
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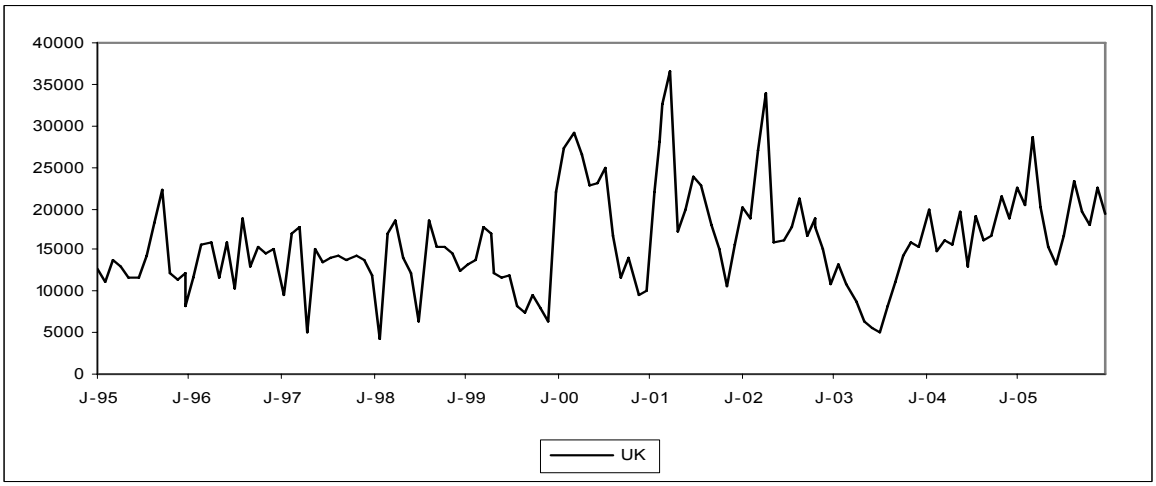
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VI. EMPIRICAL RESULTS

Table 1 presents the results for the LM unit root test with one break in the intercept (Model A). The unit root null hypothesis is rejected for Brunei, Indonesia, Singapore and Thailand at the 1 per cent level; for the United States at the 5 per cent level and for Australia at the 10 per cent level. Thus, the unit root null is rejected for 60 per cent of markets in Model A at the 10 per cent level or better. Table 2 presents the results for the LM unit root test with one break in the intercept and slope (Model C). The unit root null is rejected for 90 per cent of markets at the 5 per cent level or better. With Model C the only market for which the unit root null cannot be rejected is the United Kingdom.

Table 1: LM unit root test with one break in the intercept (Model A)

Market	TB	k	S_{t-1}	1	B_t
Brunei	01/99	3	-0.6308***	0.1318***	0.8567**
			(-5.6696)	(3.3927)	(2.5730)
Indonesia	12/99	9	-1.0395***	-0.0975***	-0.7374***
			(-4.5097)	(-3.3806)	(-3.0637)
Singapore	06/97	12	-1.0956***	0.0072	-0.0141
			(-4.2995)	(0.8379)	(-0.1385)
Thailand	06/02	1	-0.5583***	0.1328***	-0.2989
			(-5.5435)	(4.1107)	(-1.2494)
China	02/02	12	-0.5205	-0.0811**	0.2469
			(-3.1222)	(-1.9937)	(0.6943)
Taiwan	08/99	12	-0.4015	-0.0636*	0.4214
			(-2.8930)	(-1.8610)	(1.5010)
Japan	05/02	12	-0.4633	-0.0257	0.4679**
			(-2.8069)	(-1.1928)	(2.0436)
United States	07/00	12	-0.4847**	-0.0175	0.4562**
			(-3.7734)	(-0.9407)	(2.0063)
Australia	04/01	12	-0.7365*	0.0682**	0.3346
			(-3.4301)	(2.1583)	(1.4162)
United Kingdom	10/01	12	-0.3827	-0.0169	0.3668
			(-2.7871)	(-0.7821)	(1.5043)

Notes:
TB is the date of the structural break; k is the lag length; S_{t-1} is the LM test statistic; 1 is the constant; B_t is the dummy variable for the structural break in the intercept. Figures in parentheses are t-values. Critical values for the LM test statistic from Lee and Strazicich (2004) at the 10%, 5% and 1% significance levels are -3.211, -3.566, -4.239. Critical values for other coefficients follow the standard normal distribution.
* (**) *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Table 2. LM unit root test with one break in the intercept and slope (Model C)

Market	TB	k	S_{t-1}	1	B_t	D_t
Brunei	05/99	3	-0.6596***	0.1193	0.2690	0.1080*
			(-5.5079)	(2.2273)	(0.7819)	(1.7404)
Indonesia	04/00	0	-0.7795***	0.0465	-0.2248	-0.1292***
			(-9.1465)	(1.6369)	(-1.0068)	(-3.1083)
Singapore	04/97	12	-0.8260**	0.1378***	0.4724***	-0.1645***
			(-5.0302)	(4.2377)	(4.6362)	(-4.4797)
Thailand	03/99	0	-0.7871***	0.2852***	0.4795**	-0.2793***
			(-9.2199)	(6.3283)	(2.0618)	(-5.4626)
China	01/03	12	-1.0990***	-0.4053***	-1.4594***	1.0131***
			(-6.2766)	(-5.7560)	(-4.1949)	(6.2659)
Taiwan	01/99	12	-1.0299**	-0.2686***	-0.7308***	0.5504***
			(-4.9858)	(-3.8790)	(-2.6286)	(4.5748)
Japan	12/02	12	-0.6150**	-0.2580***	-0.3515	0.3407***
			(-4.5128)	(-4.2570)	(-1.5166)	(4.1991)
United States	06/01	12	-0.8299***	-0.1418***	-0.6699***	0.4230***
			(-5.7063)	(-4.2059)	(-3.1472)	(5.3195)
Australia	10/01	12	-0.8581**	0.1521***	0.7491***	-0.2421***
			(-4.4930)	(3.4781)	(3.0608)	(-3.7282)
United Kingdom	01/03	12	-0.5440	-0.2331***	-0.3258	0.2491***
			(-3.9631)	(-3.7408)	(-1.3384)	(3.4141)

Critical values

location of break, λ	0.1	0.2	0.3	0.4	0.5
1% significant level	-5.11	-5.07	-5.15	-5.05	-5.11
5% significant level	-4.50	-4.47	-4.45	-4.50	-4.51
10% significant level	-4.21	-4.20	-4.18	-4.18	-4.17

Notes:
TB is the date of the structural break; k is the lag length; S_{t-1} is the LM test statistic; 1 is the constant; B_t is the dummy variable for the structural break in the intercept; D_t is the dummy variable for the structural break in the slope. Figures in parentheses are t-values. The critical values for the LM test statistic are symmetric around λ and (1-λ). Critical values for other coefficients follow the standard normal distribution.
* (**) *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Given Models A and C suggest different results, which model is to be preferred? Sen (2003a) argued that Model C is preferable to Model A when the break date is treated as unknown. Further evidence from Monte Carlo simulations reported in Sen (2003b) show that Model C will yield more reliable estimates of the breakpoint than Model A. If, following the recommendation of Sen (2003a), we focus on Model C, using the univariate LM unit root test with one structural break, there is evidence that 90 per cent of Malaysia's tourist markets are converging at the 5 per cent level or better.

Lee and Strazicich (2003) noted that the LM unit root test with one break has low power to reject the unit root null relative to the LM unit root test with two structural breaks. Tables 3 and 4 present the results for the LM unit root test with two structural breaks. Table 3 contains the results for Model AA and Table 4 contains the results for Model CC. In Model AA the unit root null is rejected

for nine markets at the 5 per cent level or better; the only market for which the unit root null is not rejected is the United Kingdom. In Model CC the unit root null is rejected for nine markets at the 5 per cent level or better and the United Kingdom at the 10 per cent level. Thus, with Model CC, there is evidence of convergence in Malaysia's ten major tourist source markets at the 10 per cent level or better. At the 5 per cent level Models AA and CC give the same results. At the 10 per cent level, the only market for which they give different results is the United Kingdom. While Sen (2003a, 2003b) suggested that Model C is preferable to Model A in the one break case, no such clear cut claims can be made in the two break case. As Lumsdaine and Papell (1997) noted in the context of developing their ADF-type unit root test with two structural breaks, while it would be desirable to have a concrete statistical method for choosing between Models AA and CC, no such method exists in the literature. Overall, though, we prefer the results from Model CC over Model AA because Model CC is the more general case and has the advantage that it encompasses Model AA.

Table 3: LM unit root test with two breaks in the intercept (Model AA)

Market	TB_1	TB_2	k	S_{t-1}	1	B_{t1}	B_{t2}
Brunei	11/99	02/04	0	-0.6152***	0.1202***	0.7535**	-0.5664
				(-7.5117)	(3.5016)	(2.0810)	(-1.6215)
Indonesia	04/99	12/99	0	-0.7699***	-0.0651***	-0.4841**	-0.7124***
				(-8.9160)	(-3.0964)	(-2.1047)	(-3.1771)
Singapore	01/97	01/01	12	-1.2777**	0.0020	-0.0211	0.1711
				(-4.4565)	(0.2219)	(-0.2041)	(1.5372)
Thailand	02/00	06/02	0	-0.7518***	0.1914***	-0.3566	-0.3001
				(-8.7460)	(6.3652)	(-1.4851)	(-1.2513)
China	01/97	04/98	6	-0.4700**	-0.0200	-0.4929	-0.2920
				(-3.9629)	(-0.6067)	(-1.3459)	(-0.7934)
Taiwan	02/98	10/01	12	-0.6803**	-0.1405***	0.5351**	0.8828***
				(-3.8880)	(-3.2866)	(1.9938)	(3.1977)
Japan	03/00	05/02	12	-0.8364**	-0.0547**	0.1433	0.4625**
				(-3.8565)	(-2.2127)	(0.5813)	(1.9641)
United States	07/00	11/02	12	-0.5231**	0.0348	0.5432**	0.6563***
				(-4.2944)	(1.6391)	(2.3138)	(3.0194)
Australia	06/97	04/04	12	-1.1709**	0.1136***	-0.3604	-0.0978
				(-4.0509)	(3.1382)	(-1.4321)	(-0.3967)
United Kingdom	07/99	10/01	12	-0.5339	-0.0461*	0.6769***	0.3424
				(-3.1918)	(-1.8685)	(2.7888)	(1.3691)

Notes: TB_1 and TB_2 are the dates of the structural breaks; k is the lag length; S_{t-1} is the LM test statistic; 1 is the constant; B_{t1} and B_{t2} are the dummy variables for the structural breaks in the intercept. Figures in parentheses are t-values. Critical values for the LM test at 10%, 5% and 1% significance levels are -3.504, -3.842, -4.545.

* (**) *** denote statistical significance at the 10%, 5% and 1% levels respectively

Table 4: LM unit root test with two breaks in the intercept and slope (Model CC)

Market	TB_1	TB_2	k	S_{t-1}	1	B_{t1}	B_{t2}	D_{t1}	D_{t2}
Brunei	04/99	12/99	0	-0.8490***	0.2154***	-0.2529	-1.2187***	0.1311	-0.2177*
				(-9.6025)	(4.4063)	(-0.7649)	(-3.9119)	(1.0483)	(-1.7778)
Indonesia	10/99	02/02	0	-0.8161***	-0.0382	0.2682	0.2128	-0.2319***	0.1474***
				(-9.2827)	(-1.2743)	(1.1672)	(0.9378)	(-4.0620)	(2.6209)
Singapore	03/97	12/98	12	-1.1147***	-0.0155	-0.5690***	0.3085***	0.2638***	-0.2940***
				(-6.5611)	(-0.5859)	(-5.3867)	(2.7418)	(5.0918)	(-6.2574)
Thailand	03/99	12/99	0	-0.8673***	0.3144***	0.3945*	-0.8134***	-0.2234**	-0.0058
				(-9.7828)	(6.9700)	(1.6666)	(-3.6168)	(-2.4938)	(-0.0696)
China	05/98	01/03	12	-1.3215***	-0.0148	0.8096**	-1.6392***	-0.4122***	1.1434***
				(-6.5533)	(-0.2457)	(2.4257)	(-4.4041)	(-4.2231)	(6.4768)
Taiwan	01/99	05/02	12	-1.5481***	-0.4036***	-1.0541***	0.7395***	0.9954***	-0.5322***
				(-6.4343)	(-5.3046)	(-3.5988)	(2.7465)	(6.1430)	(-5.6162)
Japan	07/99	03/04	12	-1.5174***	-0.3506***	-0.8518***	0.9208***	0.5599***	-0.5592***
				(-6.6794)	(-5.8764)	(-3.9608)	(4.0005)	(6.3728)	(-6.3438)
United States	06/01	07/03	12	-0.9514**	-0.1627***	-0.7688***	0.1121	0.5235***	-0.2103***
				(-5.8008)	(-4.3884)	(-3.3215)	(0.5205)	(5.2847)	(-3.1810)
Australia	03/97	12/98	12	-0.8825**	0.0978	1.5498***	-0.5161**	-0.6568***	0.7706***
				(-6.0388)	(1.4941)	(6.0637)	(-1.9670)	(-5.1046)	(6.0046)
United Kingdom	03/99	04/02	12	-1.1427*	-0.0276	-0.5569**	0.7771***	0.5638***	-0.4725***
				(-5.4961)	(-0.7785)	(-2.2943)	(3.2440)	(5.2694)	(-5.1721)

Critical values for the LM test

λ_2	0.4			0.6			0.8		
λ_1	1%	5%	10%	1%	5%	10%	1%	5%	10%
0.2	- 6.16	- 5.59	- 5.27	- 6.41	- 5.74	- 5.32	- 6.33	- 5.71	- 5.33
0.4	-	-	-	- 6.45	- 5.67	- 5.31	- 6.42	- 5.65	- 5.32
0.6	-	-	-	-	-	-	- 6.32	- 5.73	- 5.32

Notes:
TB_1 and TB_2 are the dates of the structural breaks; k is the lag length; S_{t-1} is the LM test statistic; 1 is the constant; B_{t1} and B_{t2} are the dummy variables for the structural breaks in the intercept. D_{t1} and D_{t2} are the dummy variables for the structural breaks in the slope. Figures in parentheses are t-values. λ_j denotes the location of breaks.
* (**) *** denote statistical significance at the 10%, 5% and 1% levels respectively.

Turning to the break dates, in Model A the break in the intercept is statistically significant at the 10 per cent level or better for four markets (Brunei, Indonesia, Japan and the United States). In Model AA the first and/or second break in the intercept is statistically significant for six markets (Brunei, Indonesia, Taiwan, Japan, the United States and the United Kingdom) In Model C the break in the intercept and/or slope and in Model CC at least one of the breaks in the intercept and/or slope is statistically significant in each of the markets. In Model AA for Indonesia and Model CC for Brunei and Thailand both breaks occur in the same year. While it is unusual to find both breaks occurring in the same year in applications of unit root tests with structural breaks to macroeconomic indicators, in the tourism economics literature the situation is different simply because tourism indicators such as visitor arrivals are much volatile.

For Singapore, at least one break in each model occurs in the first half of 1997. There was tension between Malaysia and Singapore in early 1997 over agreement on railway services and tourist promotion that resulted in a decline in inbound tourism to Malaysia from Singapore throughout 1997. For several other markets, the break dates occur in 1997-1998. This was a period that contained a number of events – the Asian financial crisis (1997-1998), outbreak of dengue fever in Penang and cholera in Sabah (June, 1997) and a smoke pall over most of Malaysia due to burning forests in Indonesia (May-October 1997) - all of which had an adverse effect on tourism to Malaysia.

For China and Japan in Model A; Japan in Model AA and Indonesia, Taiwan and the United Kingdom in Model CC where the break occurs in late 2001 or early 2002, the likely reason is the 9/11 terrorist attacks in the United States that reduced international travel. The international media's spotlight on Jemaah Islamiyah's presence in Malaysia has had a negative effect on tourism. The cover of the February 11, 2002 edition of Time Magazine featured an outline of Osama bin Laden superimposed on the Malaysian flag, while the back cover carried an advertisement by Tourism Malaysia. An article in the issue claimed Malaysia was a hotbed for terrorist activities. In protest, Tourism Malaysia subsequently threatened to cancel future advertisements with Time Magazine.

For Thailand in Models A and AA and China in Model C and CC the break date occurs in the second half of 2002 or in early 2003 and is likely to be associated with the bombings in Bali which had an adverse effect on tourism throughout Southeast Asia. An article in the Asian Wall Street Journal (15 October, 2002) claimed that the Bali bombings created a ripple effect for Malaysia because potential tourists going to Southeast Asia did not distinguish between Malaysia and Indonesia as alternative destinations. An exacerbating factor was travel advisories warning of a Bali-style attack in Malaysia. For Australia and Brunei in Model AA and Japan and the United States in Model CC the second break occurs in the second half of 2003 or in 2004, between the avian flu and SARS scares in 2003 and the Asian tsunami at the end of 2004.

Table 5. Panel LM unit root tests

	G10	**G4**
No break	-7.391***	-2.729***
One break	-17.4148***	-7.2892***
Two breaks	-24.764***	-10.668***

Notes:
Critical values for the Panel LM test at 10%, 5% and 1% significant levels = -1.282, -1.645, -2.326.
* (**) *** denote statistical significance at the 10%, 5% and 1% levels respectively.
G10 is the full panel. G4 refers to China, Taiwan, Japan and the United Kingdom.

The results of the panel LM unit root test without a break and with one and two breaks applied to the full panel of ten source markets are reported in Table 5. The unit root null is rejected in each case. Taylor and Sarno (1998) suggested that rejection of the null hypothesis of joint non-stationarity using panel data tests might be due to as few as one of the series being stationary. Thus we also applied the LM unit root test without a break and with one and two breaks to a smaller panel consisting of China, Japan, Taiwan and the United Kingdom. These are the four countries for which there was no evidence of convergence with Model A, the model that was most supportive of the unit root null. The results of this exercise, which are also reported in Table 6, made no difference to the conclusions. In each case the unit root null is rejected at the 1 per cent level of significance. These results reinforce the conclusion from the univariate LM unit root test with two structural breaks that Malaysia's major tourist markets are converging. This finding is

consistent with previous studies of the convergence hypothesis for Australia's tourist markets (Narayan, 2006a) and Fiji's tourist markets (Narayan, 2006c).

VII. Conclusion

This paper has applied univariate and panel LM unit root tests with one and two structural breaks to test the convergence hypothesis for international visitor arrivals for Malaysia's ten major source markets. The main result from the study is that both the univariate and panel LM unit root tests provide strong support for the convergence hypothesis. The implication of this finding is that each of Malaysia's ten major markets is making a contribution to the increase in tourist arrivals in Malaysia. Thus, initiatives of Tourism Malaysia that have been targeted at increasing the number of tourists from Malaysia's major source markets have been effective. This result bodes well for the Malaysian economy given the increased importance of the travel and tourism sector over the last quarter century and the Malaysian government's stated aim to continue to develop the tourism sector further as a means to diversify Malaysia's economic structure.

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