Chapter 4
Demand for Tourism in Malaysia by UK and US Tourists: A Cointegration and Error Correction Model Approach

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4.1 Introduction

The travel and tourism industry is one of the world's largest and most diverse industries. Many nations rely on this dynamic industry as a primary source for generating revenues, employment, infrastructure development and economic growth. Over the last few years, tourism has become one of the fastest growing industries in the service sector and the second largest gross domestic product (GDP) contributing industry for Malaysia. The industry performed favorably as reflected in the growth of tourist arrivals and tourist receipts. According to the Malaysia Tourism Promotion Board (MTPB),[1] total tourist arrivals reached a high record of 20.7 million in 2007 as compared to 1.2 million in 1974. The share of tourism revenue in total earnings of the services account of the balance of payment increased from 32.7% in 2000 to 43% in 2005 while net contribution by tourism improved by RM11.2 billion to RM18.1 billion for the same period.[2]

Despite the important role of tourism industry in the Malaysian economy, the industry faces several issues and challenges such as decline in tourist arrivals from the short-haul, and regional markets such as South Korea, Japan, Thailand and Indonesia as the *won, yen, baht* and *rupiah* suffered from the recent regional currency crisis. The Malaysian tourism industry also faced increasing competition from other developing countries within the Asian region to gain market share in the tourism industry. At the same time, well-known industry players such as Thailand, Hong Kong, Indonesia and Singapore are launching aggressive promotions to attract tourists particularly from the long-haul markets (the US and Europe). In addition, a series of mishaps such as the Asian financial crisis (1997), avian influenza (1997),

[1] The Malaysia Tourism Promotion Board (MTPB), more popularly known as "Tourism Malaysia", was formally established with the primary objective to stimulate and increase the number of tourist arrivals to Malaysia.
[2] See Ninth Malaysia Plan 2006–2010.

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the September 11 incident in the United States (2001), Bali blasting on October 12 (2002), the Iraq War (2003), JW Marriot Hotel bombing in Jakarta (2003), the SARs (2002) and the Tsunami aftermath (2004), have adversely affected the tourism industry. The number of tourist arrivals declined substantially because foreign tourists are concerned about their safety and security when traveling in the Asian region.

Even though the global tourism industry had gradually recovered since then, the economic recovery was not strong as expected. Hence, international tourism remains in a precarious situation. Even without the complication of disaster, tourists or potential tourists still have preconceived ideas of the risk associated with travel to certain areas where uncertainty is high. Perceived danger has a negative effect to tourism industry.

Given the highlighted issues, the challenge faced by the Malaysian tourism industry is to increase and sustain the growth in tourist arrivals since Malaysia is the second most-visited country in Asia.[3] In order to increase and sustain arrivals, it is important to understand the factors that influence tourism demand in Malaysia. Hence, the main objective of this study is to investigate the long-run relationship between tourism demand and factors that influence tourism demand in Malaysia using a battery of cointegration tests and error correction models.

The short-run error correction model is then estimated to obtain the short-run elasticity of income, relative price of tourism in Malaysia and the price of tourism in the competing destinations. Modelling the short-run dynamics will provide information concerning how rapid is the adjustment taking place among the various variables to restore long-run equilibrium in response to short-term disturbances in the demand for tourism in Malaysia.

The paper proceeds as follows: Section 4.2 provides an overview of the Malaysian tourism industry. Section 4.3 reviews related literature. Section 4.4 explains the data and methodology used, followed by Section 4.5 which presents the empirical results and discussion. Finally, Section 4.6 concludes the paper.

4.2 Overview of the Malaysian Tourism Industry

Over the last 30 years, the tourism industry has contributed significantly to the Malaysian economy, particularly in terms of foreign exchange earnings and job creation. From 1974 to 2007, the numbers of tourist arrivals have increased almost 20-fold from 1.2 million to 20.9 million. Likewise, gross earning for the same period has also increased from RM0.35 billion to RM45.7 billion. The positive growth was sustained throughout the period, with the exception of 2003 when the number of tourist arrivals was adversely affected, particularly by the outbreak of Severe Acute Respiratory Syndrome (SARs), as well as geopolitical uncertainties worldwide.

[3] See the New Straits Time, December 24, 2005.

Table 4.1 Selected tourism indicators 2000–2010

Indicator	2000	2005	Prevision of 2010
Number of tourist arrivals (million)	10.2	16.4	24.6
By country of origin (%)			
ASEAN	70.4	76.8	65.0
China	4.2	3.8	6.1
Japan	4.5	1.9	2.2
Australia	2.3	1.5	2.7
United Kingdom	2.3	1.5	2.8
Taiwan	2.1	1.3	2.7
India	1.3	1.2	1.8
West Asia	0.5	1.0	2.7
Others	12.4	11.0	14.0
Total tourist receipts (RM billion.)	17.3	31.0	59.4
Per capita expenditure (RM)	1,696	1,890	2,417
Average length of stay (nights)	5.8	7.2	8.7
Number of hotels	1,492	2,256	3,218
Number of hotel rooms	124,413	170,873	247,008
Average occupancy rate of hotel (%)	59.2	63.5	66.4
Employment	390,600	451,000	520,700

Source: Ninth Malaysia Plan, 2006–2010

In 2005, tourist from the Association of South East Asian Nations (ASEAN) contributed for more than 70% of total arrivals. While, total tourist arrivals from China accounted for 3.8%, followed by Japan 1.9% as well as Australia and the UK 1.5% (Table 4.1).

In terms of growth of tourist arrivals, total tourist arrivals from ASEAN recorded an increase of 6.0% or 9.9% increase in total tourism receipts in 2005. While total tourist arrivals from the UK recorded an increase of 17.4% or 47.8% in receipts, the number of tourist arrivals from the US in 2005 recorded an increase of 4.3% or 4.5% in receipts (Table 4.2).

4.3 Review of Literature

Tourism can be defined in a variety of ways, but the broad focus is on travelers away from home and the services they utilize, including trans-portation modes, food and lodging services, entertainment, and tourist at-tractions (Sharpley and Telfer 2002). The United Nations World Tourism Organization (UNWTO) defines tourism as any activity that occurs when tourists travel, which encompasses everything from

Table 4.2 Tourist arrivals and receipts 2005/2004

Country of residence	Tourist arrivals 2004	Tourist arrivals 2005	Growth(%)	Tourist receipts (RM MIL) 2004	Tourist receipts (RM MIL) 2005	Growth (%)
Brunei	453,664	486,344	7.2	1,153.7	1,286.5	11.5
Indonesia	789,925	962,957	21.9	1,125.8	1,447.7	28.6
Philippines	143,799	178,961	24.5	282.6	348.8	23.4
Singapore	9,520,306	9,634,506	1.2	16,826.9	17,715.0	5.3
Thailand	1,518,452	1,900,839	25.2	1,362.7	2,005.6	47.2
Vietnam	42,088	52,543	24.8	62.1	79.3	27.7
Other Area	22,796	22,748	−0.2	33.5	38.4	14.8
Total Area	**12,491,030**	**13,238,898**	**6.0**	**20,846.3**	**22,921.3**	**9.9**
China	550,241	352,089	−36.0	1,329.2	787.0	−40.8
Taiwan	190,083	172,456	−9.3	458.0	343.6	−25.0
Hong Kong	80.326	77,528	−3.5	183.4	233.9	27.5
Japan	301,429	340,027	12.8	760.4	651.8	−14.3
South Korea	91,270	158,177	73.3	206.6	305.5	47.9
India	172,996	225,789	30.5	323.3	557.5	72.4
Saudi Arabia	39,432	53,682	36.1	222.3	420.9	89.4
U.A.E	21,161	29,606	39.9	91.9	176.3	91.8
Canada	32,822	31,167	−5.0	70.7	69.8	−1.2
USA	145,094	151,354	4.3	400.2	418.2	4.5
Australia	204,053	265,346	30.0	554.2	1,032.8	86.4
New Zealand	23,855	33,846	41.9	72.0	93.8	30.3
Denmark	11,884	11,681	−1.7	25.9	27.2	4.8
Finland	11,308	13,172	16.5	26.3	34.4	30.7
Norway	9,437	9,823	4.1	19.3	23.4	21.1
Sweden	25,960	32,408	24.8	59.2	80.9	36.7
UK	204,406	240,031	17.4	618.7	914.6	47.8
Italy	20,036	21,561	7.6	42.9	58.7	36.8
Spain	19,229	17,064	−11.3	45.4	43.8	−3.6
Belgium	7,449	9,386	26.0	17.9	30.7	71.6
Netherlands	28,112	40,494	44.0	64.3	138.9	116.0
France	32,562	40,474	24.3	67.8	107.2	58.1
Germany	53,783	59,344	10.3	127.1	152.3	19.9
Switzerland	15,584	17,701	13.6	41.1	47.7	16.2
South Africa	16,511	16,381	−0.8	58.3	54.9	−5.8
Other Asia	145,573	167,457	15.0	451.9	487.7	7.9
Other America	939,85	92,394	−1.7	236.2	183.6	−22.3
Other Europe	94,426	98,376	4.2	276.8	277.2	0.1
Other	561,029	413,343	−26.3	1,918.1	1,278.6	−33.3
Total non Area	**3,212,376**	**3,192,157**	**-0.6**	**8,804.1**	**9,032.8**	**2.6**
Grand total	**15,703,406**	**16,431,055**	**4.6**	**29,651.4**	**31,954.1**	**7.8**

Source: Tourism Malaysia, Profile of Tourists by Selected Markets 2005 the planning of the trip, traveling to the place, the staying itself, returning and reminiscences.

There exists a wide variety of published works on tourism demand modelling, which can be classified according to: (i) those that use single-equation estimation techniques; (ii) more complete models; and (iii) panel data studies (Saayman and Saayman 2008); however, majority of tourism studies have employed single-equation techniques, the most popular are log-linear and cointegration analyses (for example, Kulendran 1996, Kim and Song 1998, Lathiras and Syriopoulos 1998, Song and Witt 2000, Vanegas and Croes 2000, and Dritsakis 2004). Moreover, the choice of the log-linear functional form is often preferred because it is easy to interpret as elasticity and yielded superior empirical results in terms of "correct" coefficient signs and model fit.

The investigation of demand for tourism has generally involved the estimation of the relative importance of particular variables, which determine the level and pattern of tourist expenditure, such as income, relative prices, exchange rates and transport costs (Sinclair and Stabler 1997). Dritsakis (2004) in his study of German and British tourism demand for Greece using cointegration analysis, found that real income per capita, tourism prices, transportation cost and exchange rate are the main determinants of tourism demand in Greece. While, Song et al. (2003) in their study on demand for tourism in Hong Kong found that the most important factors affecting tourism demand are the cost of tourism in Hong Kong, income of tourist's country of origin, the cost of tourism in competing destinations and the "word of mouth".

Narayan (2003a) in examining the determinants of tourist expenditure in Fiji by using cointegration analysis and error correction models found that in the long-run real GDP of the origin country, relative price and transport costs (airfares) are significantly affect tourists spending in Fiji. In addition, coup d'etat negatively impact on tourist expenditure in the short-run. Meanwhile, Ishak (2006) in investigating factors that influence inbound tourists from Japan and Korea to Malaysia found that income of the origin country, the cost of tourism in Malaysia and exchange rates are important factors that influence the demand for tourism in Malaysia.

Special events or government policy are also important in influencing tourism demand. This factor was included as dummy variables in the international tourism demand functions to allow for the impact of "one-off" events (Witt and Witt 1995). Crouch (1994), found out more than half of the tourism studies have included dummy variables to account for various disturbances that might have biased the estimated parameters if they had been ignored. Such disturbances includes political factors and social conflict, terrorism, travel restrictions, exchange restrictions, changes in duty-free allowances, economic recessions, special events, oil crises and other disturbances that are difficult to quantify. Garin-Muňoz and Amaral (2000) used the 1991 Gulf War as a dummy variable in their study on International tourism flows to Spain. The results showed that the 1991 Gulf War had a significant negative effect on the international tourism flows to Spain.

In addition, Salman (2003) used the Chernobyl nuclear accident and the 1991 Gulf War as dummy variables in estimating the long-run relationship between monthly tourists flows to Sweden from American, European and Scandinavian countries. However, the results did not indicate any statistically significant effect of the Chernobyl nuclear accident, or the 1991 Gulf War on the international tourism demand to Sweden. Katafona and Gounder (2004) used coups and major cyclones in Fiji as dummy variables in modeling tourism demand for Fiji. The results of the study showed that coups are a major deterrent for tourism demand in Fiji, while major cyclones were not significant in influencing tourism demand for Fiji.

4.4 Data and Methodology

Most of tourism demand models borrow from consumer theory which assumes that the optimal consumption level depends on the consumer's income, the price of good, the prices of related goods and other factors. The Marshallian demand for tourism product can be derived as follows:

$$TAR_{ji} = f(Y_j, P_j, P_i, P_s, X) \tag{4.1}$$

where TAR_{ji} = demand for tourism in destination i by consumer from origin Country j; Y_j = the income of origin country j; P_j = the price of other goods and services in the origin country j; P_i = the price of tourism in destination i; P_s = the price of tourism in competing destinations; X = the vector of other factors affecting tourism demand.

When homogeneity is assumed, demand can be expressed as a function of income in constant domestic and destination prices and prices of substitutes in relative terms,

$$TAR_{ji} = f\left(\frac{Y_j}{P_j}, \frac{P_i}{P_j}, \frac{P_s}{P_j}, X\right) \tag{4.2}$$

Our tourism demand model is based on the above theory and follows that of Narayan (2003a). The study covers a period of 1995:1 through 2005:2 using quarterly data. Most tourism demand studies have either used tourist arrivals or tourist expenditure as a dependent variable in their model. For the purpose of this study, tourist arrivals will be employed as the dependent variable. The selection of independent variables are based on previous empirical studies (among others, Kulendran 1996, Lee et al. 1996, Song and Witt 2000, Salman 2003). In a survey of 80 empirical studies on international tourism demand, Crouch (1994) found that income, relative prices, transportation cost and exchange rates were the most commonly used explanatory variables.

The tourism demand function is estimated in a log-linear single equation model, where both the dependent and independent variables are expressed in logarithms. The choice of the log-linear form is often preferred because the coefficients are interpreted as elasticity. Recent empirical studies have adopted this functional form (Song and Witt 2000, Vanegas and Croes 2002, Kulendran and Witt 2001, Lim and McAleer 2002, Dritsakis 2004).

The method involved estimation of the following reduced-form function:

$$Y = \beta_0 + \beta_1 X + \beta_2 Z + \varepsilon \tag{4.3}$$

The dependent variable (*Y*) in this study will be the number of tourists who travel from origin country *j* (US and UK) to country *i* (Malaysia). *X* represents the set of explanatory variables that are significant determinants of tourism demand and are included in most studies. It consists of the level of real gross domestic product of country *j* during year *t*, the relative price of tourism for a tourist from country *j* to Malaysia in year *t* and the price of tourism in the substitute destinations *k* (Singapore, Thailand and the Philippines). *Z* represents dummy variables that are used to determine the effect of the Asian financial crisis, the "Malaysia ... Truly Asia" promotion campaign, the spread of the Severe Acute Respiratory Syndrome Virus (SARs) in Asia and the September 11 incident in the United States. ε is the white noise error terms, with a zero mean and constant variance.

In this study, the relative price of tourism is defined as a ratio of the consumer price index of the host country (CPI_{it}) to that of the country of origin (CPI_{jt}) adjusted by the relative exchange rate (ER_{ijt}) to obtain a proxy for the real cost of living (Kulendran 1996, Salman 2003). Hence, the relative price of tourism in Malaysia is defined in proxy terms by the relative CPIs as follows:

$$PR_{it} = \frac{CPI_{it}/ER_{ijt}}{CPI_{jt}} \tag{4.4}$$

where PR_{it} = relative price of tourism in country *i* (Malaysia), CPI_{it} = consumer price index for country *i* (Malaysia), CPI_{jt} = consumer price index for country *j* (tourist's country of origin), ER_{ijt} = exchange rate between currency country *i* (Malaysian Ringgit), and currency country *j* (foreign currency) in real term.

The price of tourism in other destinations (*k*) refers to the relative price of tourism in Singapore, Thailand and the Philippines. It is assumed that an increase in the price of tourism in Malaysia will increase demand for tourism in Singapore, Thailand and the Philippines, if these countries are substitute destinations for Malaysia, but otherwise demand for tourism in these countries will decrease, if they are complementary destinations for Malaysia.

Hence, the price of tourism (relative price of tourism) in Singapore, Thailand and the Philippines are calculated using the following formula:

$$PS_{kt} = \frac{CPI_{kt}/ER_{kjt}}{CPI_{jt}} \tag{4.5}$$

where PS_{kt} = price of tourism in destination *k* (*k* refers to Singapore, Thailand and the Philippines), CPI_{kt} = consumer price index for destination *k*, CPI_{jt} = consumer price index for foreign country (country j), ER_{kjt} = exchange rate between destination k and foreign currency (country j)

Our estimation is then based on the following long-run model:

$$\ln TAR_{jt} = \beta_0 + \beta_1 \ln Y_{jt} + \beta_2 \ln P_{Mit} + \beta_3 \ln P_{Skt} + \beta_4 \ln P_{Tkt} + \beta_5 \ln P_{Pkt} + \beta_6 D_{AFC} + \beta_7 D_{MTA} + \beta_8 D_{SAR} + \beta_9 D_{S11} + \varepsilon_{it} \quad (4.6)$$

where the subindex j is for countries, t is for time and ln denotes natural logarithm (log).

$\ln TAR_{jt}$	=	Log of the number of tourist who travel from the country of origin j to country i (Malaysia).
$\ln Y_{jt}$	=	Log for the real gross domestic product of country j (in dollars) during year t.
$\ln P_{Mit}$	=	Log for the cost of living in relative prices for a tourist from country j to Malaysia at time t.
$\ln P_{Skt}$	=	Log for the price of tourism in the competing destination k (Singapore) for tourists from the country of origin j, in year t.
$\ln P_{Tkt}$	=	Log for the price of tourism in the competing destination k (Thailand) for tourists from the country of origin j, in year t.
$\ln P_{Pkt}$	=	Log for the price of tourism in the competing destination k (the Philippines) for tourists from the country of origin j in year t.
D_{AFC}	=	Dummy variable to capture the effect of Asian financial crisis, taking the value of 1 if observation in 1997:3 to 1999:4, and 0 if otherwise.
D_{MTA}	=	Dummy variable to represent the "Malaysia . . . Truly Asia" promotion campaign, taking the value of 1 if observation in year 1999:4 to 2005:2 and 0 if otherwise.
D_{SAR}	=	Dummy variable: to capture the effect of the SARs in Asia, taking the value of 1 if observation in 2002:4 through 2003:4 and 0 if otherwise.
D_{S11}	=	Dummy variable: for the September 11 terrorist attacks in the US (2001), taking the value of 1 if observation in 2001:4 through 2002:4 and 0 if otherwise.

The expected signs for coefficients of explanatory variables are as follows:

$$\beta_1,\beta_7 > 0;\ \beta_2,\beta_3,\beta_4;\ \beta_5,\beta_6,\beta_8,\beta_9 < 0$$

The data used in this study were obtained from Malaysia Tourism Promotion Board (Planning and Research Division), *Key Performance Indicator of Tourism in Malaysia* (various issues), *Annual report of Bank Negara Malaysia* (various issues), *Economic Report 2005–2006* and *International Financial Statistics Yearbook* of the IMF.

In this study, we attempts to investigate the long-run relationship between tourism demand in Malaysia and the factors that influence tourism demand from the long-haul markets. We use cointegration and error correction models to analyze the tourism data for Malaysia and her partners the US and the UK.

4.4.1 Unit Root Tests

In carrying out the cointegration analysis, the first step is to implement the unit root tests. The unit root tests are conducted to verify the stationary properties of the time series data so as to avoid spurious regressions. A series is said to be integrated of order 1, denoted by $I(1)$, if it has to be differenced 1 time before it becomes stationary. If a series, by itself, is stationary in levels without having to be first differentiated, then it is said to be $I(0)$. For the purpose of this study, we use tests proposed by Dickey and Fuller (ADF 1979, 1981) and Kwiatkowski et al. (KPSS 1992) in testing the properties of unit root for all variables used. If all of the series are non-stationary in levels, it should be stationary in first difference with the same level of lags. For appropriate lag lengths, we use the Akaike Information Criterion (AIC) and Schwartz Bayesian Criterion (SBC).

4.4.1.1 Augmented Dickey-Fuller Test

The ADF test (Dickey and Fuller 1979) takes the following form:

$$\Delta Y_t = \alpha_0 + \delta T + \beta Y_{t-1} + \sum_{i=1}^{p} \theta_i \Delta Y_{t-i} + \mu_t \tag{4.7}$$

The ADF auxiliary regression tests for a unit root in Y_t, namely the logarithm of tourist arrivals, real GDP, the relative price of tourism in Malaysia and the price of tourism in the competing destinations; T denotes the deterministic time trend; $\Delta Y_{t\text{-}i}$ is the lagged first difference to accommodate a serial correlation in the error, $\mu_{t;}$ α, δ, β, and θ are the parameters to be estimated.

4.4.1.2 KPSS Test

In the first method, the unit root hypothesis corresponds to the null hypothesis. If we are unable to reject the presence of a unit root, meaning that the series are integrated of order one. However, Kwiatkowski et al. (1992) argued that not all series for which we cannot reject the unit root hypothesis are necessarily integrated of order one. Therefore, to circumvent the problem that unit root tests often have low power, they offer the KPSS test as an alternative test. Where stationarity is the null hypothesis and the existence of a unit root is the alternative. The KPSS test is shown by the following equation

$$y_t = x'_t \beta + \mu \tag{4.8}$$

The LM statistics is given by:

$$\mathrm{LM} = \sum_{t=1}^{T} \mathrm{S}_t^2 / \sigma_\varepsilon^2 \tag{4.9}$$

where, $\sigma_\varepsilon{}^2$ is an estimator for the error variance. This latter estimator $\sigma_\varepsilon{}^2$ may involve corrections for autocorrelation based on the Newey-West formula. In the KPSS test, if the null of stationarity cannot be rejected, the series might be cointegrated.

4.4.2 Cointegration Tests

The cointegration tests are applied to detect the presence of any long-run relationship between the variables. For the two series to be cointegrated, both need to be integrated of the same order. If both series are stationary or integrated of order zero, there is no need to proceed with cointegration tests since standard time series analysis will then be applicable. If both series are integrated of different orders, the two series could be cointegrated. Lack of cointegration implies no long-run equilibrium among the variables so that they can wander from each other randomly. Their relationship is thus spurious (Narayan 2003b).

In this study, if there is a long-run relationship between tourist arrivals and the explanatory variables in Eq. (4.6), then all variables should be cointegrated. To estimate the cointegrating relationship between tourist arrivals to Malaysia and its determinants (Income, relative price of tourism and the price of tourism in the competing destinations), Johansen's (1988, 1991) Full Information Maximum Likelihood (ML) technique is used. Given that it is possible to have multiple long-run equilibrium relationships between tourist arrivals and their determinants, the techniques described by Johansen (1988, 1991) and Johansen and Juselius (1990) allows one to determine the number of statistically significant long-run relationships. The Johansen approach to cointegration is based on Vector Autoregression (VAR). Consider the unrestricted VAR model represented by the following equation:

$$Y_t = \alpha + \sum_{k=i}^{p} \Pi_k Y_{t-k} + \varepsilon_t, t = 1, \ldots, \mathrm{T} \quad (4.10)$$

where ε_t is a i.i.d. P-dimensional Gaussian error with mean zero and variance matrix $\wedge$,Y_t is an (n$\times$1) vector of I(1) variables, and α is an (n$\times$1) vector of constants. Given that Y_t is assumed to be non-stationary, specifying $\Delta Y = Y_t - Y_{t-1}$.

4.4.3 Error Correction Model

An error correction model is used to capture adjustments in a dependent variable that depend on the extent to which an explanatory variable deviates from an equilibrium relationship with the dependent variable. It captures the dynamics of both short-run and long-run adjustments (Banerjee et al. 1993).

Equation (4.10) can be expressed in error correction form as follows:

$$\Delta Y_t = \sum_{k=i}^{p-1} \Gamma_k \Delta Y_{t-k} + \Pi Y_{t-k} + \varepsilon_t \tag{4.11}$$

where Y_t is a column vector of m variables, Γ and Π represent coefficient matrices, Δ is the first difference operator, and P represents the lag length. There exists no stationary linear combination of variables if Π has zero rank. If, however, the rank r of Π is greater than zero, then there exists r possible stationary linear combination. According to Engle and Granger (1987), Π may be decomposed into two matrices α and β, such that $\Pi = \alpha\acute{\beta}$. The cointegration vector β has the property that $\acute{\beta}Y$, is stationary even though Y, is non-stationary. The cointegration rank, r, can be formally tested using the maximum eigenvalue (λ_{max}) test and the trace test (λ_{tr}). The asymptotic critical values are provided in Johansen and Juselius (1990).

According to the Granger representation theorem, in the presence of a cointegration relationship among variables, a dynamic error correction representation of the data exists. Following Engle and Granger (1987), we estimate the following short-run model:

$$\begin{aligned}\Delta \ln TAR_t = \beta_0 &+ \sum_{i=0}^{p} \beta_1 \Delta \ln Y_{t-i} + \sum_{i=0}^{p} \beta_2 \Delta \ln P_{Mt-i} + \sum_{i=0}^{p} \beta_3 \Delta \ln P_{St-i} \\ &+ \sum_{i=0}^{p} \beta_4 \Delta \ln P_{Tt-i} + \sum_{i=0}^{p} \beta_5 \Delta \ln P_{Pt-i} + \beta_6 D_{AFC} + \beta_7 D_{MTA} \\ &+ \beta_8 D_{SAR} + \beta_9 D_{S11} + \delta_1 EC_{t-1} + \mu_t\end{aligned} \tag{4.12}$$

where μ_t is the disturbance term; EC_{t-1} is the error correction term generated from Johansen multivariate procedure, and P is the lag length. Equation (4.13) captures both the short-run and long-run relationship between tourist arrivals and a set of explanatory variables. The long-run relationship is captured by the lagged value of the long-run error correction term and it is expected to be negative in reflecting how the system converges to the long-run equilibrium, which implied by Eq. (4.6). Convergence is assured when δ_1 is between zero and minus one.

4.5 Empirical Results

In order to estimate the long-run relationship of the variables using the cointegration approach, firstly we need to examine the stationary properties of the time series data, to avoid spurious regression. Tables 4.3 and 4.4 summarize the outcome of the ADF and KPSS tests performed on all the series for the two countries (US and UK). It is evident from the table that the calculated ADF statistics are less than their critical values (obtained from Mackinnon 1991 tables), suggesting that the variables are not level stationary for all cases. This suspicion finds evidence of support when the results on the first difference of the series are examined. Which prove the hypothesis

Table 4.3 Augmented Dickey Fuller test (ADF) for individual countries

US						
	t_μ			t_τ		
Variables	Level	First-Difference	Conclusion	Level	First-Difference	Conclusion
ln*TAR*	–1.4951[2]	–8.3698[2]**	*I*(1)	–2.8602[2]	–8.2572[2]**	*I*(1)
ln*Y*	–2.8279[1]	–6.4679[1]**	*I*(1)	–3.4603[1]	–6.3791[1]**	*I*(1)
$\ln P_m$	–1.4194[1]	–3.6139[1]**	*I*(1)	–1.4720[1]	–3.7578[1]*	*I*(1)
$\ln P_s$	–2.1153[1]	–4.1473[1]**	*I*(1)	–2.6430[1]	–4.1416[1]*	*I*(1)
$\ln P_T$	–1.7571[1]	–4.3758[1]**	*I*(1)	–2.3615[1]	–4.3225[1]**	*I*(1)
$\ln P_p$	–1.8371[1]	–4.4119[1]**	*I*(1)	–1.8731[1]	–4.6682[1]**	*I*(1)
UK						
	t_μ			t_τ		
Variables	Level	First-Difference	Conclusion	Level	First-Difference	Conclusion
ln*TAR*	–1.4950[2]	–8.4884[2]**	*I*(1)	–2.5144[2]	–8.2572[2]**	*I*(1)
ln*Y*	–2.1021[1]	–6.8659[1]**	*I*(1)	–3.1799[1]	–6.7839[1]**	*I*(1)
$\ln P_m$	–1.7393[1]	–4.4270[1]**	*I*(1)	–1.5604[1]	–4.5051[1]**	*I*(1)
$\ln P_s$	–2.8134[2]	–4.2429[2]**	*I*(1)	–2.8061[2]	–4.2483[2]**	*I*(1)
$\ln P_T$	–2.4917[1]	–4.9834[1]**	*I*(1)	–2.5109[1]	–4.9363[1]**	*I*(1)
$\ln P_p$	–1.5142[1]	–6.4681[1]**	*I*(1)	–2.6685[1]	–6.7355[1]**	*I*(1)

Note: The *t*-statistics refer to the ADF test, where the subscripts μ and τ indicate the model that allows for a drift term and model with both a drift and a deterministic trend respectively. ** and * denote rejection of a unit root hypothesis based on MacKinnon (1991) critical values at 1% and 5% respectively. Figures in the square brackets indicate the lag length. The ADF test examines the null hypothesis of a unit root against the stationarity alternative.

that the series being stationary or *I*(1). This finding is corroborated by the η_μ and η_τ of the KPSS test. The results of KPSS test as reported in Table 4.4, rejects the null hypothesis of level and trend stationarity. However, the KPSS statistics does not reject the *I*(0) hypothesis for the first differences of the series at different levels of significance. Therefore, the combined results from both tests (ADF and KPSS) suggest that all series under consideration appear to be integrated of order 1, *I*(1).[4]

Having established that the variables are integrated of the same order of *I*(1), we then proceed with the cointegration tests in testing for the cointegration among the series. The Johansen and Juselius (JJ) approach is employed to test whether there is any cointegrated relationship among the selected variables. The results of the Johansen test for cointegration are summarized in Table 4.5.

[4]The Phillips and Perron (1988) test that allows for ϵ_t to be weakly dependent and follow heterogeneously distributed process has also been computed for all the series in this study. Since their verdict is in agreement with the ADF and KPSS, the procedure is not reported for reason of brevity.

Table 4.4 KPSS test for individual countries

US						
	η_μ			η_τ		
Variables	Level	First-Difference	Conclusion	Level	First-Difference	Conclusion
ln*TAR*	0.7640[1]**	0.03007[1]	*I*(0)	0.1468[1]*	0.0295[1]	*I*(0)
ln*Y*	0.8111[3]*	0.1723[3]	*I*(0)	0.1498[3]*	0.1156[3]	*I*(0)
lnP_m	0.5357[2]*	0.1652[2]	*I*(0)	0.1679[2]*	0.0646[2]	*I*(0)
lnP_s	0.5346[4]*	0.0454[4]	*I*(0)	0.1465[4]*	0.0449[4]	*I*(0)
lnP_T	0.5786[4]*	0.1588[4]	*I*(0)	0.2158[4]*	0.0458[4]	*I*(0)
lnP_p	0.4878[1]*	0.2152[1]	*I*(0)	0.1535[1]*	0.0650[1]	*I*(0)

UK						
	η_μ			η_τ		
Variables	Level	First-Difference	Conclusion	Level	First-Difference	Conclusion
ln*TAR*	0.3353 [1]*	0.2159[1]	*I*(0)	0.1465[1]*	0.0227[1]	*I*(0)
ln*Y*	0.4635[2]*	0.1404[2]	*I*(0)	0.1659[2]*	0.0645[2]	*I*(0)
lnP_m	0.3128[2]*	0.0688[2]	*I*(0)	0.1748[2]*	0.0668[2]	*I*(0)
lnP_s	0.1557[3]*	0.0889[3]	*I*(0)	0.1489[3]*	0.0682[3]	*I*(0)
lnP_T	0.5926[4]*	0.1214[4]	*I*(0)	0.1658[4]*	0.0276[4]	*I*(0)
lnP_p	0.4780[4]*	0.0834[4]	*I*(0)	0.1941[4]*	0.0786[4]	*I*(0)

Note: The η-statistics refer to the KPSS test, where the subscripts μ and τ indicate the model that allows for a drift term and model with both a drift and a deterministic trend respectively. ** and * denote rejection of a unit root hypothesis based on Kwiatkowski et al. (1992) critical values at 1% and 5% respectively. Figures in the square brackets indicate the lag length. KPSS tests the stationarity null hypothesis against the alternative hypothesis of a unit root.

The calculated Trace statistics and the maximum eigenvalue statistics indicate the existence of more than one cointegrating vector for each model (US and UK). Therefore, the hypothesis of no cointegrating vector is rejected at conventional significance levels for both countries. Rejecting the null hypothesis of no cointegration between the *I*(1) variables implies that the variables do not drift apart in the long-run. Therefore, there is a long run relationship.

Table 4.6 reports the results of long-run elasticity estimates, which is obtained by normalizing with respect to total tourist arrivals. The results are consistent with the previous studies (Narayan, 2003a; Salman 2003). The results reveal that incomes in the tourists' country of origin have a positive influence on tourist arrivals to Malaysia. The income elasticity is greater than one in both cases. A 1% increase in income of tourists' country of origin, increases tourist arrivals to Malaysia by 1.73% and 2.35% from the US and the UK respectively. The results also indicate that tourists from these markets are sensitive to the relative price of tourism in Malaysia.

Table 4.5 Cointegration tests using the Johansen and Juselius (JJ) approach

Ho	λ_{trace} test	5 % CV	λ_{max} test	5 % CV
U S:	301.1134*	95.7537	158.1061*	40.0766
r=0	143.0073*	69.8189	79.0839*	33.8769
r≤1	63.9234*	47.8561	35.7045*	27.5843
r≤2	28.2189	29.7971	15.6839	21.1316
r≤3	12.5349	15.4947	10.1579	14.2646
r≤4	2.3769	3.8415	2.3769	3.8415
r≤5				
K:	224.1717*	95.7537	81.8466*	40.0766
r=0	142.3251*	69.8189	62.6724*	33.8769
r≤1	79.6527*	47.8561	39.3821*	27.5843
r≤2	40.2705*	29.7971	27.5690*	21.1316
r≤3	12.7015	15.4947	11.8937	14.2646
r≤4	12.7015	3.8415	0.8078	3.8415
r≤5				

Note:
r stands for the number of cointegrating vectors.
Column 1 lists the null hypothesis of zero, at least one, two, . . .,five cointegrating vector; column 2 lists the trace statistics; column 3 lists the critical values for trace statistics at 5% significance level; column 4 lists the maximum eigenvalue statistics; column 5 lists the critical values for maximum eigen statistics at 5% significance level.
3. * indicates statistical significance at 5% level.

Moreover, tourists from the UK are more responsive to changes in relative prices of tourism in Malaysia than tourists from the US.

In terms of prices in the competing destinations, the findings reveal that Thailand and the Philippines are complementary destination for Malaysia, while Singapore is Malaysia's substitute destination. The results indicate that a 1% increase in the relative prices of tourism in Singapore will increase tourist arrivals from the US and the UK to Malaysia by 1.71% and 2.74% respectively. On the other hand, an increase in the relative prices of tourism in Thailand and the Philippines will decrease tourist arrivals from the US and the UK to Malaysia.

Table 4.6 Long-run elasticities of Malaysia's tourism demand

Tourist arrivals from:	Y	Pm	Ps	Pt	Pp
US	1.7317*	–1.8101**	1.7089**	–1.7016*	–1.9213**
	(0.6490)	(0.2242)	(0.5923)	(0.7421)	(0.2840)
	[2.6683]	[–8.0738]	[2.8852]	[–2.2929]	[–6.7642]
UK	2.3477**	–3.2029**	2.7359**	4.9342**	–3.3585*
	(0.2965)	(0.7844)	(0.7072)	(1.6108)	(1.3144)
	[7.9164]	[–4.0832]	[3.8686]	[–3.0633]	[–2.5753]

Note: Figures in the parentheses indicate standard errors and figures in the square brackets indicate t-statistics. ** and * denote significance at 1% and 5% level respectively.

Using the information provided by the Johansen cointegration test, an error correction model (ECM) is constructed to obtain the short-run elasticities. The coefficient of the error correction term represents the speed of adjustment back to the long-run relationship among the variables. In other words, this shows how quickly the system will return to equilibrium after a random shock. It is expected to be negative to ensure convergence. As stated by Hendry (1995), in general to specific modeling approach, the initial step is to set the value of lags of the explanatory variables, and then delete the most insignificant differenced variables. Therefore, in this study we start the estimates by using 4 lags and tried various values of lags. After several estimations, the model that fits the data best is presented in Table 4.7.

Table 4.7 Error correction model for tourism demand in Malaysia

Variable	US	UK
Constant	0.1452**	0.0207***
	(2.3992)	(4.4895)
$\Delta \ln TAR_{t-1}$	0.1404**	0.0108*
	(2.3253)	(1.8786)
$\Delta \ln Y_{t-1}$	0.0730	0.0911***
	(1.4192)	(3.2059)
$\Delta \ln Pm_{t-1}$	–0.5799***	–2.0286***
	(–6.1002)	(–5.0407)
$\Delta \ln Ps_{t-1}$	0.3639**	3.2011***
	(2.770)	(3.8687)
$\Delta \ln P_{T\,t-1}$	–2.7078**	–0.4707**
	(–2.2463)	(–2.1988)
$\Delta \ln Pp_{t-1}$	–0.2929***	–0.3583***
	(–2.8257)	(–5.6414)
D_{AFC}	–0.1252***	–0.5381**
	(–3.3404)	(–2.4781)
D_{mta}	0.2182** (2.0476)	0.0665** (2.0764)
D_{SARs}	–0.0007	–0.0736**
	(–0.0439)	(–2.0986)
D_{s11}	–0.1165***	–0.1375
	(–5.2778)	(–0.8081)
Ec_{t-1}	–0.1877***	–0.6153***
	(–11.5827)	(–2.9913)
R^2	0.9415	0.9429
Adjusted R^2	0.8829	0.8859
Jarque-Bera	472.8841	132.7277
(and probability)	(0.0000)	(0.0000)
Durbin-Watson	1.90	1.98
Serial Correlation	2.31	2.35
LM	(0.52)	(0.54)

Note:
1. ***, ** and * indicate significance at 1%, 5% and 10% levels respectively.
2. The figures in parentheses are the t-statistics.

The final results of the error correction term (EC_{t-1}) as presented in Table 4.7 passed the diagnostic tests. The Jarque-Bera statistics fails to reject the null hypothesis at 1% significance level confirming the normality of residuals. In addition, the Breusch-Godfrey's Lagrange Multiplier (LM) test statistic rejects the existence of serial correlation and therefore accepts the null hypothesis (no correlation exists between variables) at 5 percent significance level.

From Table 4.7, the estimated error correction term (EC_{t-1}) for the US and the UK are –0.1877 and –0.6153, respectively and are statistically significant. The negative values of the coefficients ensures that the series are not explosive and that in the long-run, equilibrium can be attained. The results also imply that the adjustment capacity is faster in the case of the UK compared to the US.

In the short-run, as expected, income is positively related to tourism demand. However, in this study, income is only significant in the case of tourist arrivals from the UK. A 1% increase in the income raised tourism demand (tourist arrivals) from the UK by 0.0911%% as compared to 0.0730% from the US.

The relative price of tourism in Malaysia is statistically significant in influencing tourist arrivals from both the US and the UK. The estimated coefficient of price elasticity is between 0 and 2 showing that a 1% increase in relative price of tourism in Malaysia decrease tourist arrivals from the US and the UK by 0.580 and 2.003% respectively. The results indicate that tourists from the UK are more sensitive to changes in prices of tourism than are the US.

In terms of price of tourism in the competing destinations, the price of tourism in Singapore is statistically significant in affecting tourist arrivals from the US and the UK to Malaysia. The positive sign indicates that tourists from the long-haul market (the US and the UK) regarded Malaysia and Singapore as substitute destinations. Therefore, increase in prices of tourism in Singapore will increase tourist arrivals from these markets to Malaysia.

On the other hand, the price of tourism in Thailand and the Philippines are negatively significant in explaining tourism demand from the US and the UK. This shows that tourists from these markets regarded Thailand and the Philippines as complementary destinations for Malaysia. Increase in tourism demand for Thailand and the Philippines will also increase demand for tourism in Malaysia. In other words, the demand tourism in Malaysia, Thailand and the Philippines are considered as a package. Tourists from these markets will visit Malaysia, Thailand and the Philippines together in one trip.

The 1997/98 Asian financial crisis tends to have a significant negative effect on tourist arrivals from the US and the UK. Tourist arrivals from UK decreased more than from US. This could be explained by the fact that Malaysia is not only a major tourism destination, but also an important industrial and trading partner for the US and the UK. As a result, the slowdown of businesses during the 1997/98 Asian financial crisis causes business traveling to decrease, adversely affecting the tourism industry.

The "Malaysia ... Truly Asia" promotion campaign dummy variable tends to have a significant positive effect on both tourist arrivals from the US and the UK. Tourist arrivals from the US and the UK increases because of this promotion campaign. However, the spread of SARs in Asia did have a significant negative impact on tourist arrivals from the UK only. Tourist arrivals from the UK decreased more than from the US because of this factor. The results indicate that tourists from the UK are more sensitive to the presence of any breakdown of diseases as compared to the US.

The September 11, 2001 terrorist attack in the US as expected tends to have a significant negative effect on tourist arrivals from the US. Tourist arrivals from the US decreased because of this factor. This could be due to the fact that tourists from the US are more concerned about their safety and security after the September 11 incidents, particularly when traveling in the Asian region. On the other hand, the September 11, 2001 incidents in the US do not defer tourist arrivals from the UK to Malaysia. This could be explained by the fact that tourists from the UK regarded Malaysia as a safe and pleasant place to visit because of the long-term historical relationship between the two countries. Moreover, the commitment by the Malaysian government in combating terrorists to ensure the safety of tourists has further increased the confidence of tourists to travel within Malaysia.

4.6 Conclusion

This study uses cointegration analysis and error correction models in estimating a tourism demand model for Malaysia by US and UK's tourists. Before proceeding to the cointegration analysis, the unit root tests (using ADF and KPSS tests) were conducted to verify the stationary properties of the data so as to avoid spurious regression. The combined results from both tests (ADF, KPSS) suggest that all the series under consideration appear to be integrated of order 1 or $I(1)$.

Further, the results of the cointegration indicate that there is a long-run relationship between tourist arrivals and its main determinants. The existence of cointegration allowed for the application of error correction models to determine the short-run elasticities. The results of the error correction model shows that income and the relative price of tourism in Malaysia significantly affects tourist arrivals from the US and the UK. The estimated coefficient of income variable for both countries is positive and less than 1 ($0 < Ey < 1$). This suggests that the demand for tourism in Malaysia is regarded as a normal necessity by tourists from the US and the UK.

The estimated price elasticity of demand for tourism in Malaysia by the US and the UK's tourists are –0.57 and –2.02 respectively. The results reveal that higher prices are likely to discourage the US and the UK's tourists from traveling to Malaysia. According to a survey of 71 cities worldwide by Swiss banking giant UBS (2006), they found that Malaysia's capital city, Kuala Lumpur, has the most competitive prices when they comes for food, electronic goods, clothes, public transport, hotel rates and entertainment.[5] With regard to this, in order to attract more tourist

[5] See The Star, November 7, 2006.

arrivals, Malaysia needs to maintain its price competitiveness especially in relation to other ASEAN countries.

In terms of price of tourism in the substitute destinations, tourism price in Singapore, Thailand and the Philippines are significant in influencing tourist arrivals from the US and the UK. The effect of the Asian financial crisis, as expected, tends to have a significant negative effect on tourist arrivals from the US and the UK. This could be explained by the fact that these two countries are Malaysia major trading partners. As a result, the slowdown of businesses during the Asian financial crisis causes business travelers to decrease, adversely affecting the tourism industry.

The "Malaysia ... Truly Asia" promotion campaign also appears to be significant in affecting tourism demand in Malaysia by tourists from these two markets. The results have important policy implication for Malaysia. The Malaysian authority should focus more on promoting Malaysia in the overseas markets as a quality, premier and value-for-money destination in order to increase tourists' arrivals. However, the spread of SARs in Asia has a significant negative impact on tourist arrivals from the UK only.

The effect of the September 11, 2001 terrorist attacks in the US tends to have a significant negative effect on tourist arrivals from the US only. Based on the results, it is recommended that in order to increase tourist arrivals from the long-haul markets, especially the US and the UK, Malaysia should also focus on safety and security of tourists, because tourists from these markets considered safety and security as an important factor for choosing destination. In addition, government should ensure that every necessary step will be taken in order to protect tourists in cases when there is a breakdown of diseases.

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