United Kingdom and United States Tourism Demand for Malaysia: A Cointegration Analysis

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Abstract

Tourism industry has been an important contributor to the Malaysia economy. In this paper we inspect variations in the long run demand for tourism from United Kingdom and United States to Malaysia. The demand for tourism has been explained by macroeconomic variables, including income in origin countries, tourism prices in Malaysia, and travel cost between the two countries. Annual data from 1972 to 2006 are used for the analysis. Augmented Dickey-Fuller and Johansen's maximum likelihood tests are used to test for unit root and cointegration. An error correction model (ECM) are estimated to a explain United Kingdom and United States demand for tourism to Malaysia. The results show that the long run equilibrium exists among variables, and the United Kingdom and United States tourists seem to be highly sensitive to the price variable.

Keywords: Tourism demand, cointegration analysis, Error Correction Model.

JEL classification: C22, L83

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1. Introduction

Before its dependence in 1957, the Malaysian economy was heavily dependent on primary commodities mainly tin, rubber, palm oil and petroleum products. Tourism industry effects positively on the economy besides an increase in foreign exchange earning, and employment opportunities. The Malaysian government has serious attention to develop tourism industry after decrease in oil and the world economic recession in the middle of the 1980s. The Ministry of Culture, Arts and Tourism had established in 1987 and later upgraded it to the Ministry of Tourism in 2004. The government was also allocated amount of fund to tourism industry besides providing sufficient basic infrastructure. The Malaysian government will spend RM1.8 billion under the Ninth Malaysian Plan (2006–2010), on upgrading tourist destinations and infrastructure, as well as on marketing promotions in major source markets(Government Malaysia, 2006).

Figure 1 illustrates that in 1980, the total tourist arrivals to Malaysia from United Kingdom (UK) and United States (US) were 54 and 37 thousand and increased to about 276 and 205 thousand in 2007 at an average annual rate of 9.4 and 10 percent respectively. Within the last 27 years tourist arrivals to Malaysia had increased especially in visit Malaysia year's in 1990, 2000, and 2007 at a growth rate of 90, 74 and 10 percent fro UK and 93, 122 and 18 percent for US. The Gulf War in 1991 and the Asian financial crisis in 1997 have negative affects on international tourist arrivals at an annual average rate of -18 and -3 percent fro UK and 30 and 3 percent for US. Also the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003 has negative affects on international tourist arrivals from UK at an annual average rate of -47 percent. The 11 September attack in 2001 has negative affects on international tourist arrivals from US at an annual average rate of -21 percent. In terms of international tourist arrivals in 2006, Malaysia was ranked as the fourteen world's top tourist destinations with 2.2 percent of market share. Also in Asia and the Pacific region Malaysia was ranked as the second place with 10.5 percent of market share after china (WTO, 2007).

Many countries depend on tourism industry to generate tax revenues, employment opportunities, growth of private sectors, and development of infrastructure. Tourism industry is very important to the economy and is identified as one of the major sources of economic growth. Therefore serious attention should be given in studying the factors that affect

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international tourist arrivals to this country. A cointegration analysis of multivariate time series has been carried out in this study. Economic variables such as income, tourism prices, and travel cost are examined to explain tourist arrivals from United Kingdom and United States to Malaysia.
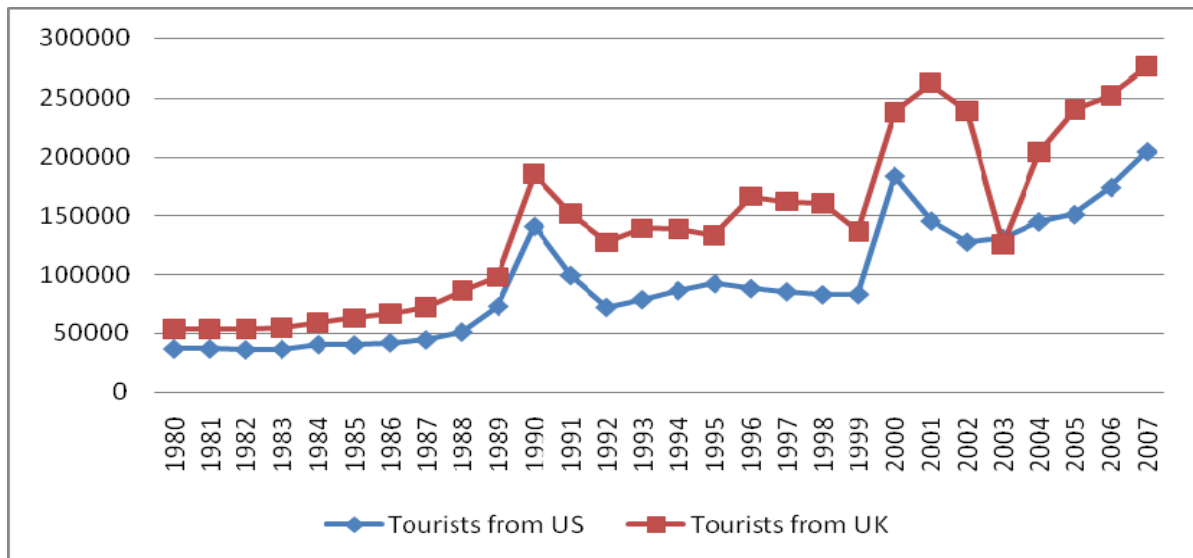

Figure 1. International tourist arrivals from United Kingdom and United States.

The rest of the paper is organized as follows: Comprehensive literature review on tourism demand is presented in Section 2. Section 3 focuses on methodology. Section 4 explains the model specification and the data used for the tourism demand analysis for Malaysia. Section 5 presents the empirical results. Conclusion and policy implication are presented in section 6.

2. Literature review

In general, the literature on modeling tourism demand focuses either on analysis of the effects of the various determinants and/or on the accurate forecasting of tourism demand. During the past two decades, advanced econometric techniques have also played an important role in the understanding of tourists' behavior and their demand for tourism products/ services. A large number of empirical studies on international tourism demand are found in the literature and are divided into two main categories. The first category consists of studies that estimate the determinants of international tourism demand using classical multivariate regressions. See for example, Lim (1997, 1999), Crouch (1994, 1995), and Witt and Witt (1995). The second category includes of studies that use modern time series and cointegration techniques. See,

for example, Ouerfelli (2008), Kulendran & Drivisekera (2007), Li et al. (2006), Dritsakis (2004), Narayan (2004), Song et al. (2003), and Kulendran and Witt (2001). Most of the existing empirical studies have used tourist arrivals/departures (Ouerfelli, 2008; Mervar, 2007; Dritsakis, 2004) and tourism receipts/expenditures as dependent variables (Hanly & Wade, 2007; Algieri, 2006; Mervare, 2002). The number of overnight stays and the average length of stay have also been studied, but much less frequently (George & Hyndman; 2007; Tresa Mounoz, 2007).

There are a large number of studies focusing on tourism demand. For example, Bernardina Algieri (2006) used the VAR model to investigate the determinants of tourism receipts in Russia, and the results show that the significant long-run cointegration relationship between Russian tourism receipts, real exchange rates, world GDP and air transport prices. Song and Witt (2003) investigated the tourism demand to Thailand from seven major countries using the Autoregressive Distributed Lag (ARDL) model. Their study found that the terrorist attacks on the USA on 11 September 2001, and the war on Iraq and the SARS epidemic in 2003, significant affects on international tourism demand to Thailand. Nikolaos Dritsakis (2004) found that the long-run relationship among important economic variables determining German and United Kingdom tourism demand to Greece using error correction model (ECM). Kulendran and Drivisekera (2007) analyzed the effects of marketing expenditure on tourism demand for Australasia using the ARDL model, and the results indicate that both the 'word-of-mouth effect' and visitor's satisfaction arrives to repeat visits also play an important role in promoting international tourist arrivals to Australia.

Han et al. (2006) used an almost ideal demand system (AIDS) model to investigate the US tourism demand for France, Italy, Spain, and UK and they found an increase in prices in France outcomes in an increase in US tourists' demand for Italy, indicating that France and Italy was considered substitutes by US tourists. Chokri Ouerfelli (2008) used the error correction models (ECM) to estimate the long-run tourism demand elasticities from the Germany, France, UK and Italy to Tunisia. Their results show that the relative prices and the income are highly elastic; also supply factor is significant in the destination choice decision especially for French and Italian tourists. Wang (2008) investigated tourism demand from Japan to Taiwan using the autoregression distributed lag model (ARDL), and the results indicate that the coefficient of transportation cost variables are statistically significant and

negative sign, indicates that an increase in oil prices result to decrease Japanese tourist arrivals to Taiwan. Their study also showed that the number of tourist arrivals declined the most during the SARS outbreak, followed by the September 21 earthquake and the September 11 attacks; the impact of the Asian Financial Crisis was relatively mild.

On researching the literature, one finds that there exist few empirical studies that have analyzed tourism demand for Malaysia using both the traditional and modern econometric techniques, for example Anaman and Animah Ismail (2002) analyzed the tourism demand from Brunei to Eastern Malaysia. Their results indicated that the main factors included personal income, exchange rate, the availability of cheaper price and better quality of goods and services in Malaysia relatively to Brunei, and provided a better place to rest and relax and to get away temporarily from stress and pressure. Tan et al (2002) examined the determinants of tourist flows to Malaysia and Indonesia. They found that the income per capita is an important factor that influences the decisions of tourists to travel to Indonesia and Malaysia. Mohd Salleh et al. (2007) investigated the tourism demand to Malaysia from 10 major markets, and results show that the world of mouth has a positive relationship in long-run, the 1997 economic crisis (D97) and the outbreak of SARS (D03) have a negative relationship in the short-run. Lean and Smyth (2008) examined the converging tourist arrivals from ten major markets. Their results demonstrated that the visitor arrivals from ten markets are converging with total tourist arrivals, and marketing strategies targeted at these markets are effective.

3. Methodology

The assumption of the classical regression model often requires that the regression variables are stationary. In the presence of non-stationary variables, the regression will be spurious (Granger, 1986); with high coefficient of determination, R^2, and significant t-statistics. In order to avoid the spurious regression, great effort has been made to further advance the econometric approach such as cointegration, the error correction model (ECM), the vector autoregressive (VAR) model, the autoregressive distributed lag model (ARDL). Before testing for cointegration between the variables we have to perform a test for a unit root using the ADF test (Dickey and Fuller, 1979) based on the auxiliary regression with an intercept and trend (or without trend) following:

$$\Delta y_t = \alpha + \delta_t + \beta y_{t-1} + \sum_{i=1}^{k} \gamma \, \Delta y_{t-1} + \varepsilon_t. \tag{1}$$

Where ε_t is a pure white noise error term and Y_t is the tourist arrivals variable (or each of them independent variables) to check whether it is stationary or not, $\Delta Y_t = (Y_t - Y_{t-1})$ is the first difference operator, i is for lag length (Gujarati, 2003). If the null hypothesis is rejected, we conclude that the series is stationary. Augmented Dickey– Fuller (ADF) unit root tests are computed for individual time series to test whether the variables are integrated. These variables may be cointegrated, and then there is a stable long run or equilibrium linear relationship between them. The EVIEWS 5 Software package, which is used to conduct the ADF tests, reports the simulated critical values.

3.2 Co-integration and Johansen test

There are several methods to conduct cointegration test. The two most widely used methods are the residual based Engle-Granger (1987) test base on the system of equation using vector autoregressive (VAR) models suggested by Johansen (1988, 1991) and Johansen and Juselius (1990, 1992). A Vector Autoregressive (VAR) approach is used to model each variable as a function of all the lagged endogenous variables in the system. Johansen (1988) considers a simple case where Yt is integrated of order one, such that the first difference of Yt is stationary. The procedure developed by Johansen (1988) which includes the identification of rank of the n× n matrix Π in the specification as given below:

$$\Delta Y_t = \mu_t + \Pi \, Y_{t-k} + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-1} + u_t \tag{2}$$

where Y_t is a column vector of the n variables, Π and Γ are coefficient matrices, Δ is difference operator, K is denotes the lag length and μ is a constant. The Π matrix conveys information about the long-run relationship between the Y_t variables, and the rank of Π is the number of linearity independent and stationary linear combination of variable studied. Thus, testing for cointegration involves testing for the rank of Π matrix r by examining whether the eigenvalues of Π are significantly different from zero. The maximum likelihood approach enables testing the hypothesis of r cointegrating relations among the elements of Y_t. Hence the null hypothesis of no cointegrating relations (r =0) implies Π= 0.

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In order to obtain the optimal VEC model we applied the minimum AIC-criterion, suggesting. To determine the number of cointegrating equations, the Johansen maximum likelihood method provides both trace and maximum eigenvalue statistics. One important regarding these two tests is that both tests have no standard distributions under the null hypothesis. The order of r is determined by using the likelihood ratio (LR) trace test statistic suggested by Johansen (1988).

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{k} \ln (1 - \hat{\lambda}_i) \qquad (3)$$

The maximum eigenvalue LR test statistic as suggested by Johansen is

$$\lambda_{max}(r, r+1) = -T \ln(1 - \hat{\lambda}_{r+1}) \qquad (4)$$

where r is the number of cointegrating vector, $\hat{\lambda}$ is the estimate values of the characteristics roots obtain from the estimated Π matrix and T is the number of observations. When the trace statistic (t) and the maximum eigenvalue statistic (λ) are greater than Osterwald-lenum (1992) critical values, the null hypothesis of r cointegrating vectors against the alternative of r+1 vectors is rejected.

One of the advantages of using the ECM provides a way of combining both the short-run (changes) and the long-run (levels) adjustment process simultaneously. Also, ECMs can avoid the occurrence of spurious regression and multicollinearity problems. A correctly indicated ECM model has to pass a series of diagnosed tests. These include the Breusch-Godfrey LM (Lagrange multiplier) test and/or Durbin-Watson test for serial correlation in the residual, the Jarque Bera LM test for normality distribution of the residuals in a regression model, the Ramsey RESET LM test for functional form misspecification, either the ARCH, the White test for heteroscedasticity in errors, the Chow test for predictive failure, and the CUSUM (Cumulative sum) test for structural stability.

4. Model specification and data

The model constructed is based on the classical economic theory which supposes that income, price and travel cost are important parameters in determining the demand for

international tourism. In investigating tourism demand to Malaysia from and United Kingdom and United States the following function is used:

$$TA_i = f_i(Y_i, TP_i, TC_i) \tag{5}$$

where (TA) is the measure of tourist arrivals from every origin country i, (Y) the real income per capita, (TP) tourism prices adjusted by exchange rate and (TC) travel cost between the origin and destination countries. Time series data from 1972 to 2006 is used in the analysis of tourist arrivals.

Table 1. Variables and sources.

Variable	Proxy	Description	Source
Tourist arrivals	TA	Annual tourist arrivals from UK and US.	Ministry of tourism Malaysia
Income	GDP	The real GDP per capita in the origin country in US$.	WDI
Tourism price	TP(CPI and ER)	The relative CPI Malaysia divided by CPI in origin country adjusted by exchange rate.	IFS
Travel cost	TC	The price of crude oil.	Energy Information Administration (EIA)

5. Empirical results

The results, reported in Tables 2 and 3, indicate that tourist arrivals, income, tourism price and travel cost for UK and US are non-stationary in their respective levels. By taking first differences shows that all time series become stationary as the ADF statistic for each time series at the 1% significance level. In other words, the time series data of all variables are integrated of order one I(1).

Table 2. ADF Unit Root Tests United Kingdom.

Variables	Level		First Difference	
	Intercept	Intercept and trend	Intercept	Intercept and trend
lnTA	-0.98 (0)	-3.08 (0)	-5.08 (2)*	-5.12 (2)*
lnY	1.41 (1)	-3.25 (1)	-4.68 (0)*	-5.14 (0)*
lnTP	-2.78 (0)	-2.18 (1)	-3.43 (0)**	-4.01 (0)**
lnTC	-2.75 (0)	-2.75 (0)	-4.94 (0)*	-4.60 (1)*

Note: The numbers in parenthesis are lag length. For Intercept and trend, the critical values for rejection are -4.26, and -3.55 at 1% and 5% respectively. For Intercept, the critical values for rejection are -3.64, and -2.95 at 1% and 5% respectively. The symbol * and ** indicates that the parameters are significant at the 1% and 5% levels.

Table 3. ADF Unit Root Tests United States.

Variables	Level		First Difference	
	Intercept	Intercept and trend	Intercept	Intercept and trend
LTA	-0.90 (0)	-3.27 (0)	-5.82 (0)*	-5.73 (3)*
LY	-0.76 (0)	-3.23 (1)	-4.95 (0)*	-4.97 (0)*
LTP	-1.29 (0)	-1.97 (0)	-4.70 (0)*	-4.73 (0)*
LTC	-2.75 (0)	-2.75 (0)	-4.94 (0)*	-4.60 (1)*

Note: The numbers in parenthesis are lag length. For intercept and trend, the critical values for rejection are -4.26, and -3.55 at 1% and 5% respectively. For intercept, the critical values for rejection are -3.64, and -2.95 at 1% and 5% respectively. The symbol * and ** indicates that the parameters are significant at the 1% and 5% levels.

The cointegration relationship between variables was also established using two likelihood ratio tests, a trace test and maximum eigenvalue test. Tables 4 and 5 show that the trace statistics (t) and the maximum eigenvalue statistics are greater than Osterwald-lenum (1992) critical values thus, the null hypothesis of r cointegrating vectors against the alternative of r+1 vector is rejected. The LR test indicates there is one cointegration relationships.

Table 4. Johansen and Juselious trace test for United Kingdom.

Trace statistic			Critical values	Prob[*]
Null	Alternative	Trace	95%	
r = 0	r = 1	61.1372*	47.8561	0.0018
r ≤ 1	r ≤ 2	25.4970	29.7970	0.1444

[*]Mackinnon-Haug-Michelis (1999) P-values.

Table 5. Johansen and Juselious trace test for United States.

Trace statistic			Critical values	Prob[*]
Null	Alternative	Trace	95%	
r = 0	r = 1	49.0113*	47.8561	0.0388
r ≤ 1	r ≤ 2	19.5238	29.7970	0.4557

[*]Mackinnon-Haug-Michelis (1999) P-values.

$$LTA = -21.8313 + 3.7515\ LY - 0.9804\ LTP - 0.2118\ LTC \qquad\qquad (6)\ UK$$
$$\qquad\qquad (3.7013)\qquad (-2.1653)\qquad (-3.5518)$$

$$LTA = -23.1248 + 3.5204\ LY - 1.0431\ LTP - 0.2007\ LTC \qquad\qquad (7)\ US$$
$$\qquad\qquad (5.2924)\qquad (-4.1741)\qquad (-2.0166)$$

In equation (6) and (7) the coefficients in the equilibrium relation, which are estimated long-run elasticities with respect to tourist arrivals show that all variables have an expected sign and statistically significant. Also results show that real income per capita is elastic, while tourism price and travel cost inelastic for both countries. The coefficient of income has significant and positive sign indicated that a 1% increase in income in origin countries results in a 3.75% and 3.52% increase in tourist arrivals from UK and US respectively. The negative sign of tourism price implied that increase in price of goods and services which purchased by tourists in Malaysia consequence to decrease their arrivals to Malaysia. The estimated tourism price elasticity suggests that 1% increase in price of goods and services in Malaysia lead to in a 0.98% and 1.04% decrease in tourist arrivals to Malaysia from UK and US respectively. Travel cost is a significant variable affected tourist arrivals to Malaysia and has a negative sign which indicated that increase in travel cost (increase in crude oil price) result to decrease in tourist arrivals to Malaysia.

5.1 Error Correction Models (ECM)

In order to estimate a dynamic international tourism demand a vector error correction (VEC) model using the ordinary least-squares method (OLS), the cointegrating vector should be included. Tourist arrivals can be expressed as:

$$\Delta \text{LTA}_t = \mu + \Gamma_1 \Delta \text{LTA}_{t-i} + \Gamma_2 \Delta \text{LY}_{t-i} + \Gamma_3 \Delta \text{LTP}_{t-i} + \Gamma_4 \Delta \text{LTC}_{t-i} + \lambda \mu_{t-1} + V_t. \qquad (8)$$

Tables 6 and 7 show the VEC model estimates for UK and US. The parsimonious model is obtained by deleting the insignificant variables until a regression with all its coefficients is statistically significant. To avoid misspecification, at least one of the lag variable (with largest t-ratio) will be retained in the case of all the lagged variables are not significant. The statistics reported for LM, RESET and White are F-statistics under relevant null hypothesis with p value in parentheses shows that there are no problems associated with serial correlation, functional form, normality or heteroscedasticity. In addition, the CUSUM test (Figures in Appendix) illustrates that the parameters of the model are stable.

Table 6: Estimation of the vector error correction model for United Kingdom

Dependent variable is ΔLTA

32 observation after adjustment

Repressors	General model			Parsimonious model		
	Coefficient	SE	t-Ratio	Coefficient	SE	t-Ratio
CONSTANT	0.0503	0.0672	0.7491	0.1997	0.0611	3.2640*
ΔLTA(-1)	0.0775	0.1954	0.3969	0.0941	0.1852	0.5080
ΔLTA(-2)	-0.1503	0.1721	-0.8734	_	_	_
ΔLY(-1)	-3.5295	2.4540	-1.4382	-5.3621	2.9509	-1.8171
ΔLY(-2)	3.5578	2.1164	1.6810	_	_	_
ΔLTP(-1)	-1.1212	0.3712	-0.0207	_	_	_
ΔLTP(-2)	0.8736	0.3351	2.6072*	-0.2824	0.1193	-2.3673**
ΔLTC(-1)	0.1055	0.1471	0.7176	_	_	_
ΔLTC(-2)	0.1964	0.1418	1.3851	0.1271	0.3176	0.4003
u1(-1)	-0.6412	0.2476	-2.5896*	-0.8806	0.2517	-3.4984*

Diagnostic Tests: $R^2 = 0.55$ D.W = 1.51
 JB Normality= 1.5298(0.4653), LM test = 2.5292(0.1092)
 Hetero, Test = 10.9191(0.0602), Ramsey's Rest = 0.5293(0.6003)

The symbol * and ** indicates that are significant at the 1% and 5%.

Table 6: Estimation of the vector error correction model for United States.

Dependent variable is ΔLTA

32 observation after adjustment

Repressors	General model			Parsimonious model		
	Coefficient	SE	t-Ratio	Coefficient	SE	t-Ratio
CONSTANT	0.0302	0.0578	0.5229	0.1914	0.3420	4.5571*
ΔLTA(-1)	0.0621	0.1767	0.3518	_	_	_
ΔLTA(-2)	-0.0687	0.1836	-0.3743	-0.0619	0.1620	-0.3820
ΔLY(-1)	1.3587	1.9069	0.7152	_	_	_
ΔLY(-2)	-0.9343	1.8937	-1.0214	-1.8284	1.6608	-1.1009
ΔLTP(-1)	-0.2726	0.4484	-0.6080	_	_	_
ΔLTP(-2)	1.6204	0.4326	3.7456*	-1.4273	0.3760	-3.7957*
ΔLTC(-1)	0.2880	0.1514	1.9015**	0.2921	0.1291	2.2628**
ΔLTC(-2)	0.1821	0.1503	1.2140	_	_	_
u1(-1)	-0.4685	0.1838	-2.5482*	-0.3729	0.1431	-2.6048*

Diagnostic Tests: $R^2 = 0.54$ D.W = 1.59
 JB Normality= 2.4900(0.0900), LM Test= 2.9849(0.0674)
 Hetero, Test =0.3661(0.9480), Ramsey's reset = 0.7103(0.5014)

The symbol *, ** indicates that are significant at the 1% and 5% levels.

6. Conclusion and policy implication

The long-run economic factors of international tourism demand are studied. Real income, tourism price and travel costs have been postulated to affect international tourism demand. Before testing for cointegration between these variables, the ADF test of non-stationarity is executed to determine the order of integration. The cointegration procedure of Johansen's maximum likelihood is used for estimation of the long run and testing of the cointegrating relationship between the variables.

Knowledge of the variables that influence the demand for international tourism is valuable to policy makers in planning growth strategies for the tourism industry in Malaysia. The United Kingdom and United States tourists seem to be highly sensitive to the price variable. Hence, policy makers and suppliers must closely monitor all tourism service providers such as hotels, restaurants, tourist operators, and transportation companies such as airport taxis and tourist

buses to ensure that they do not charge 'unreasonable' prices for their services. Also suppliers must consider prices in order to maintain the competitiveness of their products. As the demand is price elastic, a small percentage reduction in price could attract a large percentage of tourist arrivals and the pay-off could be significant.

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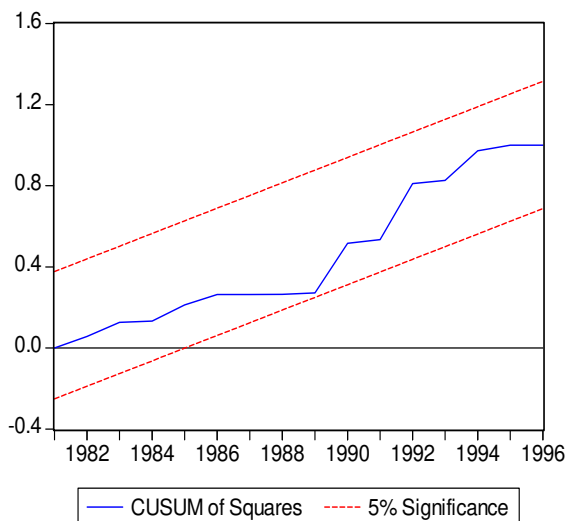**Appendix**

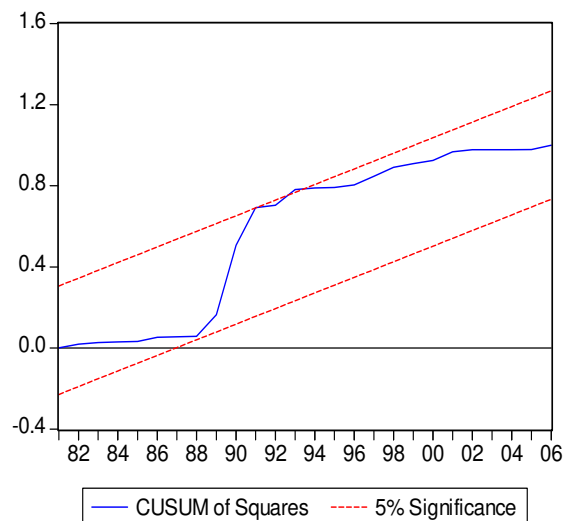**Figure A1. CUSUM Test for UK.**   **Figure A2. CUSUM Test for US.**
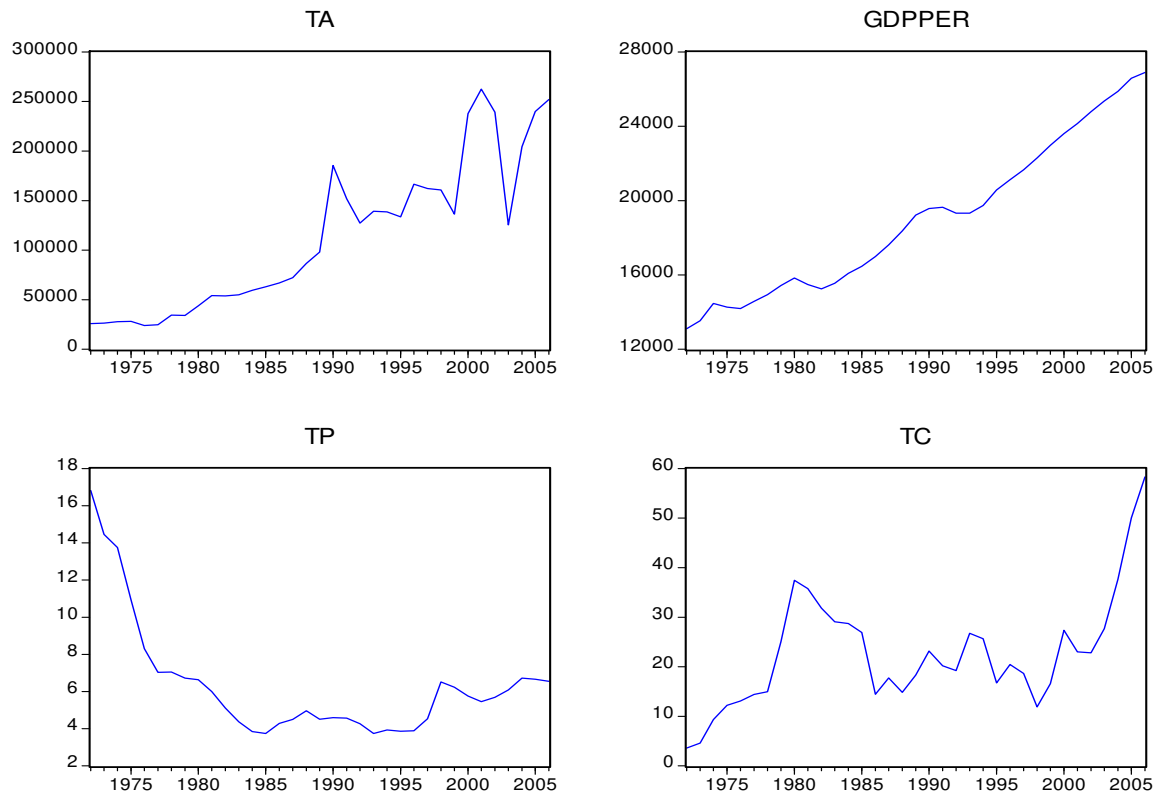
Figure A3. The United Kingdom Market.

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Figure A4. The United States Market.

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