Chapter 2

A Panel Threshold Model of Tourism Specialization And Economic Development

The significant impact of international tourism specialization in stimulating economic growth is especially important from a policy perspective. For this reason, the relationship between international tourism and economic growth would seem to be an interesting empirical issue. In particular, if there is a causal link between tourism specialization and economic growth, then appropriate policy implications may be developed. The purpose of this chapter is to investigate whether tourism specialization is important for economic growth in East Asia and the Pacific, Europe and Central Asia, Latin America and the Caribbean, the Middle East and North Africa, North America, South Asia, and Sub-Saharan Africa, over the period 1991-2008.

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A Panel Threshold Model of Tourism Specialization And Economic Development

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Abstract

The impact of the degree of tourism specialization, which is incorporated as a threshold variable, on economic growth is examined for a wide range of countries at different stages of economic development. The empirical results from threshold estimation identify two endogenous cut-off points, namely 14.97% and 17.50%. This indicates that the entire sample should be divided into three regimes. The results from panel threshold regression show that there exists a positive and significant relationship between economic growth and the growth rate of tourism in two regimes, the regime with the degree of tourism specialization lower than 14.97% (regime 1) and the regime with the degree of tourism specialization between 14.97% and 17.50% (regime 2). However, the magnitudes of the impact of the growth rate of tourism on economic growth in those two regimes are not the same, with the higher impact being found in regime 2. An insignificant relationship between economic growth and the growth rate of tourism is found in regime 3, in which the degree of tourism specialization is greater than 17.50%. The empirical results suggest that tourism growth does not always lead to economic growth.

2.1 Introduction

Tourism has grown enormously as a result of the globalization process. Tourism is described as a movement in the direction of increasing world economic integration through the reduction of natural and human barriers to exchange and increase international flows of capital and labour. Improvements in transportation include the introduction of low-cost air carriers, the emergence of new markets such as China and India, and diversification into new market niches, such as cultural tourism and ecotourism, are considered as key factors supporting tourism.

According to the World Tourism Organization, international tourist arrivals figures reached 924 million. This was an increase of 16 million from 2007, thereby representing a growth of 2% for the full year, but down from 7% in 2007 (see Figure 2.1). The demand for tourism slowed significantly throughout the year under the influence of an extremely volatile world economy, such as the financial crisis, price rises in commodities and oil, and a sharp fluctuation in the exchange rate. Based on these events, it seems that the world tourism situation is likely to become more difficult under the current global economic and financial crises (UNWTO, 2009).

Figure 2.2 shows that, while Europe ranks first in terms of world arrivals, with the Americas close behind, its share of world total arrivals has decreased. Africa, Latin America and the Caribbean are at the bottom of the list. On the other hand, the Asia-Pacific region has outperformed the rest of the world, with its share of international tourist arrivals having increased rapidly. Some of the strong growth appeared in South-East Asia and East and North-East Asia, especially in Macau and China. Similar evidence is found in the market shares in international tourism receipts (see Figure 2.3). Europe accounts for about 50% of world international tourism receipts, followed by Asia and the Pacific region. Once again, Africa, Latin America and the Caribbean remain far behind the other three regions (UNESCAP, 2009).

In general, the growth in international tourism arrivals significantly outpaced growth in economic output, as measured by Gross Domestic Product (GDP) (see Figure 2.4). In years when world economic growth exceeded 4 per cent, the growth in tourism volume has tended to be higher. When GDP growth falls below 2 per cent, tourism growth tends to be even lower. In the period 1975-2000, tourism increased at an average rate of 4.6 per cent per annum (UNWTO, 2008).

The roles of travel and tourism activity in the economy are considered in terms of its contribution towards the overall GDP of the region, and its contribution towards overall employment. In many developing regions the travel and tourism sectors have contributed a relatively larger total share to GDP and employment than the world average (World Travel and Tourism Council, 2009a). The travel and tourism economy GDP, the share to total GDP, the travel and tourism economy employment for all regions in 2009, as well as the future tourism in real growth forecasted by the World Travel and Tourism Council for the next ten years, are given in Table 2.1 (World Travel and Tourism Council, 2009b).

In general, some of the impacts of tourism on the economy have not always been regarded as beneficial. Tourism may also be a negative factor related to increased income inequality, damage to the environment, an increase in cultural repercussions, inefficient resource allocation, and other harmful externalities. In order to determine the true impacts of tourism on the economy, the approach to economic evaluation should be more rigorous, and should not ignore the existence of the possible costs related to tourism development. Regardless of the net benefit of tourism, there is a possibility that tourism does not always lead to economic growth. This study will identify whether tourism growth leads to economic growth in various economies, classified according to the degree of tourism specialization, and measures the overall impact.

The main contributions of the study are as follows. First, no previous studies have rigorously evaluated the relationship between economic growth and tourism growth in which the roles of domestic and international tourism have been included simultaneously. Most empirical studies have taken the share of international tourism receipts to national GDP to account for influencing economic growth, which leads to the contribution of domestic tourism on the national economy being ignored. In this study, the travel and tourism (T&T) economy GDP, which is obtained from the World Travel & Tourism Council database, is used as a threshold variable in the economic growth-tourism linkage. Second, the nonlinear relationship between economic growth and tourism growth when using the share of T&T economy GDP to national GDP as a threshold variable is examined. Finally, two of three regimes are shown to exhibit a positive and significant relationship between economic growth and tourism growth. For the remaining regime, countries with a degree of tourism specialization over 17.50 %, do not exhibit such a significant relationship.

The remainder of the study is organized as follows. Section 2 presents a literature review. Section 3 describes the data, methodology and empirical framework. The empirical results are analyzed in Section 4. Section 5 gives some concluding remarks.

2.2 Literature Review

In the economic growth literature, tourism's contribution to economic development has been well documented, and has long been a subject of interest from a policy perspective. The economic contribution of tourism has usually been considered to be positive to growth (see, for example, (Khan, Phang, & Toh, 1995; C.-K. Lee & Kwon, 1995; Lim, 1997; Oh, 2005).

The empirical literature on a reciprocal causal relationship between tourism and economic development may be considered in several classifications, depending on the techniques applied. Most historical studies have been based on various time series techniques, such as causality and cointegration, and have relied mainly on individual country or regional analysis. While this allows a deeper conception of the growth process for each country, it also creates difficulties in generalizing the results. Some of the interesting research using this approach include (Balaguer & Cantavella-Jordá, 2002; Brida, Carrera, & Risso, 2008; Dritsakis, 2004; Gunduz & Hatemi-J, 2005; Kim, Chen, & Jang, 2006; Louca, 2006; Oh, 2005). Even though the possible causal relationship between tourism and economic growth has been empirically analyzed in previous studies, the direction of such relationships has not yet been determined.

Using panel data, there is evidence of an economic growth-tourism nexus in the empirical work of Lee and Chang (C.-C. Lee & Chang, 2008), Fayissa et.al (Fayissa, Nsiah, & Tadasse, 2008), and Eugenio-Martin et.al (Eugenio-Martin, Morales, & Scarpa, 2004). Nevertheless, there has been little research on the effect on economic growth of the degree of tourism specialization. Sequeria and Campos (2005) used tourism receipts as a percentage of exports and as a percentage of GDP as proxy variables for tourism. A sample of 509 observations for the period 1980 to 1999 was divided into several smaller subsets of data. Their results from pooled OLS, random effects and fixed effects models showed that growth in tourism was associated with economic growth only in African countries. A negative relationship was found between tourism and economic growth in Latin American countries, and in the countries with specialization in tourism. However, they did not find any evidence of a significant relationship between tourism and economic growth in the remainder of the groups (Sequeira & Campos, 2005).

Brau et al. (2007) investigated the relative economic performance of countries that have specialized in tourism over the period 1980-2003. Tourism specialization and small countries are simply defined as the ratio of international tourism receipts to GDP and as countries with an average population of less than one million during 1980-2003, respectively. They used dummy regression analysis to compare the growth performance of small tourism countries (STCs) as a whole, relative to the performance of a number of significant subsets of countries, namely OECD, Oil, Small, and LDC. They found that tourism could be a growth-enhancing factor, at least for small countries. In other words, small countries are likely to grow faster only when they are highly specialized in tourism. Although the study considered the heterogeneity among countries in terms of the degree of tourism specialization and country size, the selection of such threshold variables was not based on any selection criteria. It would be preferable to use selection criteria to separate the whole sample into different subsets in which tourism may significantly affect economic growth (Brau, Lanza, & Pigliaru, 2007).

Po and Huang (2008) use cross section data (1995-2005 yearly averages) for 88 countries to investigate the nonlinear relationship between tourism development and economic growth when the degree of tourism specialization (defined as receipts from international tourism as a percentage of GDP) is used as the threshold variable. The result of the nonlinear threshold model indicated that the data for 88 countries should be divided into three regimes to analyze the tourism-growth nexus. The results of the threshold regression showed that, when the degree of specialization was below 4.05% (regime 1) or above 4.73% (regime 3), there existed a significantly positive relationship between tourism growth and economic growth. However, when the degree of specialization was between 4.05% and 4.73% (regime 2), they were unable to find a significant relationship between tourism and economic growth (Po & Huang, 2008).

A number of empirical studies, as pointed above, have suggested that there exist thresholds in the effect of tourism on economic growth. However, the endogenous threshold regression technique introduced by Hansen (Bruce E. Hansen, 1999) has not been widely used to identify a nonlinear relationship in the endogenous economic growth model in which the degree of tourism specialization is used as a threshold variable over cross-country panel data sets. Special attention is paid in this study to establish a new specification of a country's tourism specialization, which is defined as the share of the travel and tourism economy GDP (T&T economy GDP) to national GDP. T&T economy GDP measures direct and indirect GDP and employment associated with travel and tourism demand. This is the broadest measure of travel and tourism's contribution to the domestic economy. The T&T ratio to GDP is used as a criterion for identifying the impact of tourism on economic growth under different conditions.

2.3 Data

Subject to the availability of data, 131 countries are used in the sample, as given in Table 2.2. Annual data for the period 1991 to 2008 are organized in panel data format. The countries in the sample were selected based on data availability. Real GDP per capita (y), inflation (π), and the percentage of gross fixed capital formation (k) as a proxy for the capital stock are taken from the World Development Indicator (WDI) database (World Bank, 2009). The tourism data are obtained from the World Travel &Tourism Council website (World Travel and Tourism Council, 2009b) namely the ratio of real Travel &Tourism GDP to real national GDP (q), and the ratio of real government expenditure in tourism activities to GDP (g).

2.4 Methodology

The main purpose of this study is to use a threshold variable to investigate whether the relationship between economic growth and tourism growth is different in each sample grouped on the basis of certain thresholds. In order to determine the existence of threshold effects between two variables is different from the traditional approach in which the threshold level is determined exogenously. If the threshold level is chosen arbitrarily, or is not determined within an empirical model, it is not possible to derive confidence intervals for the chosen threshold. The robustness of the results from the conventional approach is likely to be sensitive to the level of the threshold. The econometric estimator generated on the basis of exogenous sample splitting may also pose serious inferential problems (for further details, see (Bruce E. Hansen, 1999)).

Critical advantages of the endogenous threshold regression technique over the traditional approach are that: (1) it does not require any specified functional form of non-linearity, and the number and location of thresholds are endogenously determined by the data; and (2) asymptotic theory applies, which can be used to construct appropriate confidence intervals. A bootstrap method to assess the statistical significance of the threshold effect, in order to test the null hypothesis of a linear formulation against a threshold alternative, is also available.

For the reasons given above, the panel threshold regression method developed by Hansen (1999) is applied to search for multiple regimes, and to test the threshold effect in the tourism growth and economic growth relationship. The possibility of endogenous sample separation, rather than imposing a priori an arbitrary classification scheme, and the estimation of a threshold level are allowed in the model. If a relationship exists between these two variables, the threshold model can identify the threshold level and test such a relationship over different regimes categorized by the threshold variable.

Panel Threshold Model

Hansen (1999) developed the econometric techniques appropriate for threshold regression with panel data. Allowing for fixed individual effects, the panel threshold model divides the observations into two or more regimes, depending on whether each observation is above or below the threshold level.

The observed data are from a balanced panel $(y_{it,} \mathrm{q}_{it}, \mathrm{x}_{it}: 1 \leq \mathrm{i} \leq \mathrm{n}, 1 \leq \mathrm{t} \leq \mathrm{T})$. The subscript *i* indexes the individual and *t* indexes time. The dependent variable y_{it} is scalar, the threshold variable q_{it} is scalar, and the regressor x_{it} is a *k* vector. The structural equation of interest is

$$y_{it} = \mu_i + \beta_1' x_{it} I(q_{it} \leq \gamma) + \beta_2' x_{it} I(q_{it} > \gamma) + e_{it} \tag{1}$$

where *I*(·) is an indicator function. An alternative intuitive way of writing (1) is

$$y_{it} = \begin{Bmatrix} \mu_i + \beta_1' x_{it} + e_{it,} & q_{it} \leq \gamma \\ \mu_i + \beta_2' x_{it} + e_{it,} & q_{it} > \gamma \end{Bmatrix}$$

Another compact representation of (1) is to set

$$x_{it}(\gamma) = \begin{Bmatrix} x_{it} I(q_{it} \leq \gamma) \\ x_{it} I(q_{it} > \gamma) \end{Bmatrix}$$

and $\beta = (\beta_1' \quad \beta_2')'$, so that (1) is equivalent to

$$y_{it} = \mu_i + \beta' x_{it}(\gamma) + e_{it} \tag{2}$$

The observations are divided into two regimes, depending on whether the threshold variable q_{it} is smaller or larger than the threshold γ. The regimes are distinguished by differing regression slopes, β_1 and β_2. For the identification of β_1 and β_2, it is required that the elements of x_{it} are not time-invariant. The threshold variable q_{it} is not time-invariant. μ_i is the fixed individual effect, and the error e_{it} is assumed to be independently and identically distributed (iid), with mean zero and finite variance σ^2.

It is easy to see that the point estimates for the slope coefficients β_s' are dependent on the given threshold value γ. Since the threshold value is not known and is presumed to be endogenously determined, Hansen (1999) recommends a grid search selection of γ that minimizes the sum of squared errors (SSE), denoted $S_1(\gamma)$, which is obtained by least squares estimation of (1):

$$\hat{\gamma} = argmin\ S_1(\gamma) \tag{3}$$

Given an estimate of γ, namely $\hat{\gamma}$, β_1 and β_2 can then be estimated, and the slope coefficient estimate is $\hat{\beta} = \hat{\beta}(\hat{\gamma})$. The residual variance is given by $\hat{\sigma}^2 = \frac{1}{n(T-1)} S_1(\hat{\gamma})$.

It is not desirable for a threshold estimate, $\hat{\gamma}$, to be selected which sorts too few observations into one regime or another. This possibility can be excluded by restricting the search in (3) to values of γ such that a minimal percentage of the observations lies in both regimes. The computation of the least squares estimate of the threshold $\hat{\gamma}$ involves the minimization problem (3).

It is important to determine whether the threshold effect is statistically significant. The null hypothesis of no threshold effects (that is, a linear formulation) against the alternative hypothesis of threshold effects, is given as follows:

$$H_0: \beta_1 = \beta_2$$

$$H_1: \beta_1 \neq \beta_2$$

Under the null hypothesis, the threshold effect γ is not identified, so classical tests such as the Lagrange Multiplier (LM) test do not have the standard distribution. In order to address this problem, a bootstrap procedure is available to simulate the asymptotic distribution of the likelihood ratio test. He showed that a bootstrap procedure attains the first-order asymptotic distribution, so p-values constructed from the bootstrap are asymptotically valid.

After the fixed effect transformation, equation (2) becomes:

$$y_{it}^{*} = \beta' x_{it}^{*}(\gamma) + e_{it}^{*} \tag{4}$$

Under the null hypothesis of no threshold effect, the model is given by:

$$y_{it} = \mu_i + \beta_1' x_{it} + e_{it} \tag{5}$$

After the fixed effect transformation, equation (5) becomes:

$$y_{it}^{*} = \beta_1' x_{it}^{*} + e_{it}^{*} \tag{6}$$

The regression parameter β_1 is estimated by OLS, yielding $\hat{\beta}_1$, residuals $\hat{e}_{it}^{*}$, and sum of squared errors, $S_0 = \hat{e}_{it}^{*}{}' \hat{e}_{it}^{*}$. The likelihood ration test of H_0 is based on:

$$F_1 = \frac{S_0 - S_1(\hat{\gamma})}{\hat{\sigma}^2} \tag{7}$$

where S_0 and S_1 are the residual sum of squared errors obtained from equation (1) without and with threshold effects (or panel threshold estimation), respectively, and $\hat{\sigma}^2$ is the residual variance of the panel threshold estimation.

Hansen (1999) recommended the following implementation of the bootstrap for the given panel data. Treat the regressors x_{it} and threshold variable q_{it} as given, holding their values fixed in repeated bootstrap samples. Take the regression residuals $\hat{e}_{it}^{*}$, and group them by individual, $\hat{e}_i^{*} = \hat{e}_{i1}^{*}, \hat{e}_{i2}^{*}, \hat{e}_{i3}^{*}, \ldots, \hat{e}_{iT}^{*}$. Treat the sample $\{\hat{e}_1^{*}, \hat{e}_2^{*}, \ldots, \hat{e}_n^{*}\}$ as the empirical distribution to be used for bootstrapping. Draw (with replacement) a sample of size n from the empirical distribution, and use these errors to create a bootstrap sample under H_0.

Using the bootstrap sample, estimate the model under the null hypothesis, equation (6), and alternative hypothesis, equation (4), and calculate the bootstrap value of the likelihood ratio statistic F_1 (equation (7)). Repeat this procedure a large number of times and calculate the percentage of draws for which the simulated statistic exceeds the actual. This is the bootstrap estimate of the asymptotic p-value for F_1 under H_0. The null hypothesis of no threshold effect will be rejected if the bootstrap estimate of the asymptotic p-value for likelihood ratio statistic F_1 is smaller than the desired critical value.

Having established the existence of a threshold effect, $\beta_1 \neq \beta_2$, it is questionable whether $\hat{\gamma}$ is consistent for the true value of γ (γ_0). This requires the computation of the confidence region around the threshold estimate. While the existence of threshold effect is well accepted, the precise level of the threshold variable is subject to debate. Under normality, the likelihood ratio test statistic, $LR_{n(\alpha)} = n\frac{S_n(\alpha)-S_n(\hat{\alpha})}{S_n(\hat{\alpha})}$, is commonly used to test for particular parametric values. Hansen (2000) proves that, when the endogenous sample-splitting procedure is used, $LR_{n(\alpha)}$ does not have a standard χ^2 distribution. As a result, he suggested that the best way to form confidence intervals for γ is to form the "no-rejection region" using the likelihood ratio statistic for a test of γ. In order to test the null hypothesis $H_0: \gamma = \gamma_0$, the likelihood ratio test reject for large values of $LR_1(\gamma_0)$, where

$$LR_1(\gamma) = \frac{S_1(\gamma)-S_1(\hat{\gamma})}{\hat{\sigma}^2}. \tag{8}$$

Note that the statistic (equation (8)) is testing a different hypothesis from the statistic (7), that is, $LR_1(\gamma)$ is testing $H_0: \gamma = \gamma_0$ while F_1 is testing $H_0: \beta_1 = \beta_2$. The likelihood ratio statistic in equation (8) has the critical values, under some technical assumptions, of 5.9395, 7.3523, and 10.5916 at the significance level 10%, 5% and 1%, respectively. The asymptotic confidence interval for γ at a (1-α) confidence level is found by plotting $LR_1(\gamma)$ against γ and drawing a flat line at the critical level. The null hypothesis will be rejected if the likelihood ratio test statistic exceeds the desired critical value. After the confidence interval for the threshold variable is obtained, the corresponding confidence interval for the slope coefficient can also be easily determined as the slope coefficient and the threshold value are jointly determined, $\hat{\beta} = \hat{\beta}(\hat{\gamma})$.

In some applications, there may be multiple thresholds. Similar procedures can be extended in a straightforward manner to higher-order threshold models. This method represents another advantage of threshold regression estimation over the traditional approach, which allows for only a single threshold.

The multiple thresholds model may take, for example, the form of the double threshold model:

$$y_{it} = \mu_i + \beta_1' x_{it} I(q_{it} \leq \gamma_1) + \beta_2' x_{it} I(\gamma_1 < q_{it} \leq \gamma_2) + \beta_3' x_{it} I(\gamma_2 < q_{it}) + e_{it} , \tag{9}$$

where thresholds are ordered so that $\gamma_1 < \gamma_2$. In the panel threshold model, Hansen also extended a similar computation to multiple thresholds (B.E. Hansen, 2000). The general approach is similar to the case of only a single threshold (or the 2 regime case). The method works as follows. In the first stage, let $S_1(\gamma)$ be the single threshold sum of squared error of equation (1), and let $\hat{\gamma}_1$ be the threshold estimate, which minimizes $S_1(\gamma)$. The second stage refers to the estimate of the second threshold parameter, $\hat{\gamma}_2^r$, by fixing the first stage estimate, $\hat{\gamma}_1$. The second stage threshold estimate is given by:

$$\hat{\gamma}_2^r = argmin\ S_2^r(\gamma_2) \tag{10}$$

Bai (1997) showed that $\hat{\gamma}_2^r$ is asymptotically efficient, but that $\hat{\gamma}_1$ is not, because the estimate $\hat{\gamma}_1$ is obtained from a sum of squared errors function which was contaminated by the presence of a neglected regime. The asymptotic efficiency of $\hat{\gamma}_2^r$ suggests that $\hat{\gamma}_1$ can be improved by a third stage estimation. Bai (1997) suggests the following refinement estimator. Fixing the second stage estimate, $\hat{\gamma}_2^r$, the refined estimate of $\hat{\gamma}_1$, that is $\hat{\gamma}_1^r$, is given by:

$$\hat{\gamma}_1^r = argmin\ S_1^r(\gamma_1) \tag{11}$$

This three stage sequential estimation yields the asymptotically efficient estimator of the threshold parameters, $\hat{\gamma}_1^r$ and $\hat{\gamma}_2^r$ (Bai, 1997).

In the context of model (9), there is either no threshold, one threshold, or two thresholds. F_1 in equation (7) is used to test the hypothesis of no threshold against one threshold, and a bootstrapping method is used to approximate the asymptotic p-value. If F_1 rejects the null of no threshold, a further step based on the model in equation (9) is to discriminate between one and two thresholds.

The minimizing sum of squared errors from the second stage threshold estimate is $S_2^r(\hat{\gamma}_2^r)$, with a variance estimate, $\hat{\sigma}^2 = \frac{S_2^r(\hat{\gamma}_2^r)}{n(T-1)}$. Thus, an approximate likelihood ratio test of one versus two thresholds can be based on the statistic:

$$F_2 = \frac{S_1(\hat{\gamma}_1) - S_2^r(\hat{\gamma}_2^r)}{\hat{\sigma}^2} \tag{12}$$

where $S_1(\hat{\gamma}_1)$ is the sum of squared errors (SSE) obtained from the first stage threshold estimation, $S_2^r(\hat{\gamma}_2^r)$ is the SSE obtained from the second stage threshold estimation, and $\hat{\sigma}^2$ is the residual variance of the second stage threshold estimation. The hypothesis of one threshold is rejected in favour of two thresholds if F_2 is large.

Note that the threshold estimators, $\hat{\gamma}_1^r$ and $\hat{\gamma}_2^r$, have the same asymptotic distributions as the threshold estimate in a single threshold model. This suggests that confidence intervals can be constructed in the same way as described above.

The panel specification of economic growth regression, in which the ratio of real government expenditure in tourism activities to GDP, the ratio of real capital expenditures by direct Travel & Tourism industry service providers and government agencies to GDP, inflation, and the percentage of gross fixed capital formation as the explanatory variables, together with the tourism variable, the growth rate of real Travel &Tourism GDP to real national GDP, are incorporated, takes the following form:

$$\left(\frac{\dot{y}}{y}\right)_{it} = \beta_1\left(\frac{\dot{y}}{y}\right)_{i,t-1} + \beta_2 g_{it} + \beta_3\pi_{it} + \beta_4 k_{it} + \delta_1\left(\frac{\dot{tour}}{tour}\right)_{it} I(q_{it} \le \gamma_1)$$
$$+\delta_2\left(\frac{\dot{tour}}{tour}\right)_{it} I(\gamma_1 < q_{it} \le \gamma_2) + \delta_3\left(\frac{\dot{tour}}{tour}\right)_{it} I(q_{it} > \gamma_2) + \upsilon_{it} \quad (13)$$

where

$\left(\frac{\dot{y}}{y}\right)_{it}$ is the growth rate of real GDP per capita at time t,

$\left(\frac{\dot{y}}{y}\right)_{i,t-1}$ is the growth rate of real GDP per capita at time t-1,

g_{it} is log of ratio of real government expenditure in tourism activities to GDP at time t,

π_{it} is inflation at time t,

k_{it} is log of the share of capital formation to GDP at time t,

$\left(\frac{\dot{tour}}{tour}\right)_{it}$ is the growth rate of real Travel &Tourism GDP to real national GDP at time t,

q_{it} is the ratio of real Travel &Tourism GDP to real national GDP at time t,

υ_{it} $= \mu_i + \eta_t + \varepsilon_{it}$, μ_i is an individual (country) effect, η_t is a time effect, and ε_{it} is independently and identically distributed across countries and years.

2.5 Empirical Results

The descriptive statistics, namely means, standard deviation, minimum values, and maximum values of the variables for the full sample are summarized in Table 2.3. By construction, the panel identifier, *country*, does not vary within the panel; i.e. it is time-invariant, reporting the within standard deviation is zero. Any variable with a within standard deviation of zero will be dropped from the fixed effect model. The coefficients on variables with small within standard deviations are not well defined. Similarly, the between standard deviation of *year* is zero by construction.

The results of economic growth and tourism growth are first examined using a linear specification. In this study, a data set is organized in the form of a panel data format, so a variety of different models for panel data is examined. This approach allows inclusion of country-specific effects, as well as time-specific effects on the formulation. Various estimation methods, such as pooled ordinary least squares (pooled OLS), fixed effect model, and random effect model, are used to estimate the relationship between economic growth. The regression results are given in Table 2.4.

According to the benchmark pooled OLS regression, only two variables, namely the growth rate of real GDP per capita in the previous year and log of share of real government expenditure in tourism activities to GDP, are significant. Furthermore, only the growth rate of real GDP per capita in the previous year is significant, with the expected sign. The estimated coefficient of the growth rate of real

Travel &Tourism GDP to real national GDP is positively, but insignificant. The insignificance of the estimated coefficients is obvious in the case of the inflation rate, and the share of capital formation to GDP.

The growth equation is re-estimated by the fixed effects and random effects model. A one-way fixed effects model permits each cross-sectional unit to have its own constant term while the slope estimates are constrained across units resulting in the structure;

$$y_{it} = x_{it}\beta_k + z_i\delta + \mu_i + \varepsilon_{it}$$

Rather than considering the individual-specific intercept as a fixed effects of that country, the random effects model specifies the individual effect as a random draw that is uncorrelated with the regressors and the overall disturbance term.

$$y_{it} = x_{it}\beta + z_i\delta + (\mu_i + \varepsilon_{it})$$

The fixed effects and random effects model display the estimates of σ_u^2 (labeled sigma_u), σ_ϵ^2 (labeled sigma_e), and *rho*; the fraction of variance due to μ_i. Stata fits a model in which the μ_i are taken as deviations from one constant term, displayed as *_cons*. The empirical correlation between μ_i and the fitted value is also displayed as *corr(u_i, Xb)*.

From the start, the individual-specific heterogeneity μ_i across countries is tested. When the μ_i are correlated with some of the regressors in the model, the fixed effects method becomes proper. The fixed effects model modestly relaxes the assumption that the regression function is constant over time and space. *F* statistic reported in fixed effects model is a test of the null hypothesis that the constant terms are equal across units (*F* test that all *u_i=0* is 59.77). A rejection of the null hypothesis indicates that pooled OLS would produce inconsistent estimates. The *F* test following the regression indicates that there are significant individual (country level) effects, implying the fixed effects model is superior to pooled OLS regression.

All explanatory variables are highly significant in both models, with the growth rate of real Travel &Tourism economy GDP per capita, and the growth rate of real GDP per capita in the previous year, having a positive effect on growth rate of real GDP per capita. That is , in fixed effects model, when the growth rate of real Travel &Tourism economy GDP per capita and the growth rate of real GDP per capita in previous year increases by 1%, growth rate of real GDP per capita increase 0.05272% and 0.03642%, respectively. In the random effects model, the effect of these two explanatory variables on the growth rate of real GDP per capita is indifferent. That is, when the growth rate of real Travel &Tourism economy GDP per capita and the growth rate of real GDP per capita in the previous year increases by 1%, the growth rate of real GDP per capita increase 0.05274% and 0.03629%, respectively.

Similar to the results from pooled OLS, the estimated coefficient of the share of real government expenditure in tourism activities to GDP remains having negative effect on the growth rate of real GDP per capita. The estimated coefficients of the inflation rate and gross fixed capital formation have the expected signs. This means that when the inflation rate increases by 1%, the growth rate of real GDP per capita under the fixed effects model and the random effects model decreases 0.00882% and 0.00882%, respectively. The estimates of *rho* in both models, suggest that almost all the variation in the growth rate of real GDP is related to inter-country differences in the growth rate of real GDP.

The Hausman test is a useful test for determining the most appropriate specification of the common effects model. If the regressors are *correlated* with μ_i, the fixed effects estimator is consistent but the random effects estimator is not. If the regressors are *uncorrelated* with the μ_i, the fixed effects estimator is still consistent, albeit inefficient, whereas the random effects estimator is consistent and efficient. If both the fixed effects and the random effects models generate consistent point estimates of the slope parameters, they will not differ meaningfully. This means that if the null hypothesis of the Hausman test is rejected-that the random effects estimator is consistent-one can, in that event, expects to see the difference between the two set of coefficients estimated by the fixed effects and the random effects models. The results from the Hausman test are reported in Table 2.5, and they do not resoundingly reject the null hypothesis. The country-level individual effects do not appear to be correlated with the regressors, so the random effects model is the preferred specification for these data. Anyway, the estimators generated by the fixed effects and the random effects model are slightly different. Both models are found to be consistent.

In summary, the effect of the growth rate of real Travel &Tourism economy GDP per capita on the growth rate of real GDP per capita is positive and significant across all models. Furthermore, the regression coefficients of government expenditure, inflation rate, gross fixed capital formation, and real GDP per capita in the previous period are generally consistent with standard results in the economic growth literatures.

Panel Threshold Regression Estimates

Before applying the threshold regression model, a test for the existence of threshold effect between economic growth and tourism growth is applied. This study uses the bootstrap method to approximate the *F* statistic, and then calculates the bootstrap p-value. Table 2.6 presents the empirical results of the test for a single threshold, multiple threshold and triple threshold effects. Through 1,200 bootstrap replications for each of the three bootstrap tests, the test statistics F_1, F_2 and F_3, together with their bootstrap p-values, are also reported. The test statistic for a single threshold is highly significant, with a bootstrap p-value of 0.042, the test statistic for a double threshold is also significant, with a p-value of 0.054, but the test statistic for a triple threshold is statistically insignificant, with a p-value of 0.220. Thus, this may be concluded that there is strong evidence that there are two thresholds in the relationship between economic growth and tourism growth.

Given a double threshold effect between economic growth and tourism growth, the whole sample is split into 3 regimes, where q_{it} is used as a threshold variable. Table 2.7 reports the point estimates of the two thresholds and their asymptotic confidence intervals. These results are useful to see how the threshold variable divides the sample into different regimes.

Figures 2.5-2.8 show the threshold estimates from plots of the concentrated likelihood ratio function, $LR_1(\gamma)$, corresponding to the first stage estimate of $\hat{\gamma}_1$, and $LR_2^r(\gamma)$ and $LR_1^r(\gamma)$, corresponding to the refined estimators, $\hat{\gamma}_2^r$ and $\hat{\gamma}_1^r$, respectively. The 95% confidence intervals for γ_2 and γ_1 can be found from $LR_2^r(\gamma)$ and $LR_1^r(\gamma)$ by the values of γ for which the likelihood ratio lies beneath the dotted line. In addition, the threshold estimates are the respective values of γ at which the likelihood ratio touches the zero axis.

As mentioned above, where a double threshold is found, a three stage procedure is used to estimate two threshold parameters. The first stage refers to the same estimation procedure as presented for the single threshold model, which yields the first estimate $\hat{\gamma}_1$, namely 24.66. Fixing this threshold parameter, the second stage estimates the second threshold paramete , $\hat{\gamma}_2^r$, which is 14.97. As the estimate $\hat{\gamma}_1$ is obtained with neglected regimes, a refinement is needed in this case. The estimate $\hat{\gamma}_1$ is improved by a third stage estimation, which yields the refinement estimator of $\hat{\gamma}_1$ (or $\hat{\gamma}_1^r$) of 17.50. The bootstrap p-value obtained from this double threshold model is 0.061. With respect to the threshold estimation results, the null hypothesis of a double threshold is not rejected. As a result, there are three regimes in the economic growth and tourism relationship, that is, the observations can be grouped into three regimes for analysis, based on the threshold levels of q_{it} as 14.97% and 17.50%.

Table 2.8 shows that the first category indicated by the first point estimates includes countries with a degree of tourism specialization lower than 14.97. The percentage of countries in this group ranges from 80% to 85% of the sample over 18 years. The second group is considered as a medium degree of tourism specialization. The countries in this group are not greater than 5 % of the entire sample, and the degree of tourism specialization for this group is relatively tight. A high degree of tourism specialization refers to countries with a degree of tourism specialization in excess of 17.50%. The percentage of countries in this group ranges from 12% to 16%.

The estimated model in the empirical framework is as follows:

$$g_{it} = \beta_1 g_{i,t-1} + \beta_2 gov_{it} + \beta_3 \pi_{it} + \beta_4 k_{it} + \delta_1 tour_{it} I(q_{it} \leq 14.9726\ )$$

$$+\delta_2 tour_{it}\, I(14.9726 < q_{it} \leq 17.4972) + \delta_3 tour_{it} I(q_{it} > 17.4972) + \upsilon_{it}$$

The threshold regression estimates for the economic growth-tourism model, conventional OLS standard errors and White's corrected standard errors for the three regimes are given in Table 2.9.

The first conclusion to be drawn is that the effect of government expenditure in tourism activity has the same sign as in the linear specification. The negative and insignificant results for all regimes, and absolute value of the coefficient for government expenditure, were found to be relatively low. This means that the government expenditure associated with travel and tourism, both directly and indirectly linked to individual visitors, such as tourism promotion, aviation, and administration, does not have an efficient result in tourism development. Second, the estimated coefficient of inflation is found to be negative and significant. The growth-inflation trade-off is a matter of some controversy. Therefore, the growth-inflation trade-off exists with lower inflation that promotes higher growth, and vice-versa. Third, the share of gross fixed capital formation to GDP, which is a proxy variable for investment in fixed capital assets by enterprises, government and households within the domestic economy, has a positive effect on economic growth.

Focusing on the coefficients of growth rate of real Travel &Tourism economy GDP per capita, the results for three regimes indicate that there is a significant and positive relationship between the growth rate in real Travel &Tourism economy GDP per capita and the growth rate in real GDP per capita in regimes 1 and 2, although the effects in both regimes are different. From Table 9, the positive and significant effect of the growth rate in real Travel &Tourism economy GDP per capita on the growth rate in real GDP per capita in regime 2 is higher, though less significant, than in regime 1. If q_{it} is greater than 14.97% and less than 17.50%, a 1% increase in the growth rate in real Travel &Tourism economy GDP per capita may contribute to an increase of 0.2637% in the growth rate in real GDP per capita, while the same 1% increase in the growth rate in real Travel &Tourism economy GDP per capita may account for an increase of only 0.0579% in the growth rate in real GDP per capita if q_{it} is not greater than 14.97% (namely, regime 1).

The evidence presented seems to show that tourism development in most destination economies (accounting for 80-85% of the sample) does not provide a substantial contribution to economic growth. This is frequently the case in developed and developing countries that are able to build their competitiveness and development on more valued-added industries. It can be observed that there exists no significant relationship between the growth rate in real Travel &Tourism economy GDP per capita and the growth rate in real GDP per capita in regime 3. In short, when q_{it} exceeds 17.50%, tourism growth does not lead to economic growth.

Based on these results, there might be some doubt as to why tourism development could make a significant contribution to GDP as a catalyst for favourable changes in some countries, while others do not have such substantial impacts. The data displayed in Table 2.10 clarify this issue.

It is evident that regime 3 has the highest average percentage of government spending in the tourism sector and percentage of capital investment in tourism activities. This implies that countries in regime 3 tourism development are promoted by, and are supported with, investment in tourism infrastructure and superstructure. Significant levels of capital investment are typically required, so the percentage of capital investment in travel and tourism activities is relatively higher than in the other two regimes. Since a time lag exists between invested inputs and generated output in the form of tourism earnings, the contribution of tourism to the overall economy has not been well recognized. In this case, tourism development during this stage may not contribute to economic growth in the local economies. Furthermore, there is supporting evidence to suggest that many destinations, particularly emerging tourism countries, have attempted to overcome the lack of financial resources to speed up the process of tourism-specific infrastructure development.

With limited opportunities for local public sector funding, these countries have been offered funding by international development organizations or international companies to make themselves more attractive as tourism destinations. Although foreign capital investment can generate extra income and growth from international tourist earnings for the host country, it can generate greater leakages than domestic capital investment from local private and government sources. In addition to the leakages being remitted to the source of international funds, more imported goods may be used to support tourism businesses. As a result, these factors could cause the contribution of tourism to GDP to be less than expected.

On the other hand, countries in regimes 1 and 2 have relatively low government spending and capital investment in the tourism and tourism-related sectors. The countries in these two regimes are possibly developed or developing, and their economies may not be so heavily dependent on the tourism sector. Conversely, they might be able to develop other non-tourism sectors that could make a greater contribution to overall economic growth. Even though it is obviously seen that tourism development in some countries, especially in regime 1, may not have a great impact on economic growth, these countries may nevertheless achieve economic growth through their higher valued-added non-tourism sectors.

2.6 Concluding Remarks

Tourism development has significant potential beneficial economic impacts on the overall economy of tourism destinations. This study has not investigated the direction of the relationship between economic growth and tourism growth, but whether tourism has the same impact on economic growth in countries that differ in their degree of tourism dependence.

This study examined a nonlinear relationship between economic growth and tourism growth by applying the panel threshold regression model of Hansen (1999) to a panel data set of 131 countries over the period 1991-2009. A share of T&T economy GDP to national GDP was defined as the degree of tourism specialization, and was used as a threshold variable in the model. The main purpose of the study was to examine whether economic growth was enhanced through tourism development when the sample was split endogenously and, if so, whether such impacts were different across various sub-samples.

The results from threshold estimation identified two endogenous cut-off points, namely 14.97% and 17.50%. This indicated that the entire sample should be divided into three regimes. The results from panel threshold regression showed that, when the degree of tourism specialization was lower than 14.97%, or was between 14.97% and 17.50%, there existed a positive and significant relationship between economic growth and tourism growth. Although such a relationship was found to be significant in both regimes, the magnitudes of those impacts were not the same. It was found that tourism had substantial effects on economic growth in regime 2, but yielded a slightly lower impact in regime 1. However, there exists an insignificant relationship between economic growth and tourism growth in regime 3, in which the degree of tourism specialization was greater than 17.50%. This could be explained by the fact that there are leakages in those economies where many tourism infrastructure projects have been developed, or where more imported goods are invested in order to support tourism expansion.

In order to summarize the empirical results, tourism growth does not always lead to economic growth. If the economy is too heavily dependent on the tourism sector, tourism development may not lead to impressive economic growth since the overall contribution of tourism to the economy could be reduced by many factors. It is important to consider the overall balance between international tourism receipts and expenditures, the degree of development of domestic industries, and their ability to meet tourism requirements from domestic production. Should these issues be constantly ignored, then such a country would likely experience lower benefits than might be expected, regardless of whether they are considered to be a country with a high degree of tourism specialization.

Table 2.1 Contribution of Tourism towards the Overall Economy GDP and Employment in 2009, and Projection of Travel & Tourism Economy Real Growth, by Global Regions

Regions	2009 Travel &Tourism Economy GDP (US$ Mn)	2009 Travel &Tourism Economy GDP % share	2009 Visitor Exports (US$ Mn)	2009 Travel &Tourism Economy Employment (Thous of jobs)	Travel & Tourism Economy Real Growth (2010-2019)
Caribbean	39,410.668	30.312	24,154.262	2,042.512	3.568
Central and Eastern Europe	142,439.966	9.580	36,940.472	6,797.150	5.741
European Union	1,667,656.460	10.716	423,685.250	23,003.960	3.808
Latin America	176,954.984	8.729	30,223.315	12,421.720	4.031
Middle East	158,112.740	11.457	50,738.918	5,130.767	4.564
North Africa	62,893.900	12.164	25,622.089	5,440.087	5.417
North America	1,601,235.000	10.492	188,517.700	21,130.230	4.031
Northeast Asia	1,053,780.332	18.333	114,400.124	70,512.123	5.488
Oceania	115,902.843	18.558	38,403.241	1,701.315	4.394
Other Western Europe	150,082.280	10.207	42,694.005	2,277.688	2.642
South Asia	84,223.460	14.846	14,904.677	37,174.593	4.970
South-East Asia	155,158.492	10.478	65,765.366	23,231.522	4.415
Sub-Saharan Africa	65,866.259	9.047	23,392.256	8,948.552	4.718
World	5,473,717.384		1,079,441.62	219,812.220	

Source: World Travel and Tourism Council (2009)

Table 2.2 Countries in the Sample

	Countries in the sample	
Albania	Guinea	Papua New Guinea
Algeria	Haiti	Paraguay
Angola	Honduras	Peru
Antigua and Barbuda	Hong Kong	Philippines
Argentina	Hungary	Poland
Armania	Iceland	Portugal
Australia	India	Qatar
Austria	Indonesia	Romania
Azerbaijan	Iran	Russia
Bahamas	Ireland	Saudi Arabia
Bahrain	Israel	Senegal
Bangladesh	Italy	Singapore
Barbados	Jamaica	Slovakia
Belgium	Japan	Slovenia
Belize	Jordan	South Africa
Benin	Kazakstan	Spain
Bolivia	Kenya	Sri Lanka
Botswana	Korea Republic	Swaziland
Brazil	Kuwait	Sweden
Bulgaria	Kyrgyzstan	Switzerland
Burkina faso	Laos	Syria
Cambodia	Latvia	Tanzania
Cameroon	Lebanon	Thailand
Canada	Ligya	Tunisia
Chile	Lithunia	Turkey
China	Luxembourg	Uganda
Colombia	Macedonia	U.K.
Congo	Madagascar	Ukrain
Costa Rica	Malaysia	United Arab Emirates.
Croatia	Maldives	U.S.A.
Cyprus	Mali	Uruguay
Czech Republic	Malta	Venezuela
Denmark	Mauritius	Vietnam
Dominican Republic	Mexico	Zambia
Ecuador	Moldova	
Egypt	Morocco	
Elsalvador	Mozambique	
Estonia	Namibia	
Ethiopia	Nepal	
Fiji	Netherlands	
Finland	New Zealand	
France	Nicaragua	
Germany	Nigeria	
Ghana	Norway	
Greece	Oman	
Grenada	Pakistan	
Guatemala	Panama	

Table 2.3 Summary Statistics

VARIABLES			FULL SAMPLE SUMMARY STATISTICS MEAN	STD.DEV.	MINIMUM	MAXIMUM	OBSERVATIONS
RATIO OF REAL TRAVEL &TOURISM GDP TO REAL NATIONAL GDP	q_{it}	**OVERALL**	**12.36536**	**11.64668**	**1.32169**	**96.26073**	**N=2358**
		BETWEEN		**11.33690**	**2.35479**	**83.32783**	**N=131**
		WITHIN		**2.83669**	**-5.35055**	**68.52476**	**T=18**
GROWTH RATE OF REAL GDP PER CAPITA	$\dot{y}_{it}$	**OVERALL**	**0.840181**	**1.00010**	**-0.52356**	**2.42251**	**N=2358**
		BETWEEN		**1.00253**	**-0.019801**	**2.35019**	**N=131**
		WITHIN		**0.04878**	**0.24956**	**1.37504**	**T=18**
GROWTH RATE OF REAL GDP PER CAPITA AT PREVIOUS TIME	$y_{i,t-1}$	**OVERALL**	**7.92891**	**1.54701**	**4.63436**	**11.12611**	**N=2358**
		BETWEEN		**1.54323**	**4.84609**	**10.65793**	**N=131**
		WITHIN		**0.16987**	**7.15912**	**8.950286**	**T=18**
GROWTH RATE OF REAL TRAVEL &TOURISM GDP TO REAL NATIONAL GDP	$\dot{tour}_{it}$	**OVERALL**	**0.03405**	**0.162411**	**-1.36645**	**2.36925**	**N=2358**
		BETWEEN		**0.033051**	**-0.02397**	**0.17627**	**N=131**
		WITHIN		**0.159037**	**-1.30843**	**2.27192**	**T=18**
SHARE OF REAL GOVERNMENT EXPENDITURE IN TOURISM ACTIVITIES TO GDP	$\frac{G_{it}}{Y_{it}}$	**OVERALL**	**0.79379**	**0.87781**	**0**	**7.70128**	**N=2358**
		BETWEEN		**0.84863**	**0.03102**	**5.94578**	**N=131**
		WITHIN		**0.23572**	**-0.82036**	**4.84453**	**T=18**
	g_{it}	**OVERALL**	**-0.61925**	**0.87627**	**-4.18572**	**2.04139**	**N=2358**
		BETWEEN		**0.84867**	**-3.61961**	**1.76885**	**N=131**
		WITHIN		**0.22978**	**-1.97926**	**2.02238**	**T=18**
INFLATION RATE	π_{it}	**OVERALL**	**1.74439**	**1.37265**	**-4.09176**	**8.46272**	**N=2358**
		BETWEEN		**0.95786**	**-0.48304**	**5.03489**	**N=131**
		WITHIN		**0.98654**	**-3.48918**	**7.38377**	**T=18**
SHARE OF CAPITAL FORMATION TO GDP	$\frac{K_{it}}{Y_{it}}$	**OVERALL**	**22.40727**	**7.71568**	**3.61769**	**210.97330**	**N=2358**
		BETWEEN		**5.05850**	**13.42123**	**46.76865**	**N=131**
		WITHIN		**5.84299**	**4.62633**	**206.25890**	**T=18**
	k_{it}	**OVERALL**	**3.06672**	**0.28601**	**1.28584**	**5.35173**	**N=2358**
		BETWEEN		**0.20625**	**2.58849**	**3.81526**	**N=131**
		WITHIN		**0.19892**	**1.55822**	**5.48806**	**T=18**
COUNTRY	***I***	**OVERALL**	**66**	**37.82336**	**1**	**131**	**N=2358**
		BETWEEN		**37.96051**	**1**	**131**	**N=131**
		WITHIN		**0**	**66**	**66**	**T=18**
YEAR	***T***	**OVERALL**	**1999.5**	**5.189228**	**1991**	**2008**	**N=2358**
		BETWEEN		**0**	**1999.5**	**1999.5**	**N=131**
		WITHIN		**5.189228**	**1991**	**2008**	**T=18**

Source: Author calculations based on 131 countries for the period 1991 to 2008.

Table 2.4 Linear Model Estimates

Variable	POLS	Fixed Effect	Random Effect
$y_{i,t-1}$	0.0481***	0.0364***	0.0363***
	(3.21)	(6.20)	(6.21)
$tour_{it}$	0.1510	0.0527***	0.0527***
	(1.19)	(8.81)	(8.82)
g_{it}	-0.0909***	-0.0154***	-0.0155***
	(-3.67)	(-3.66)	(-3.70)
π_{it}	0.0176	-0.0088***	-0.0088***
	(1.07)	(-9.10)	(-9.10)
k_{it}	0.0433	0.0562***	0.0562***
	(0.59)	(11.50)	(11.51)
con_s	0.2335	0.3830***	0.3840***
	(0.88)	(8.38)	(3.86)
sigma_u		1.00137	1.014933
sigma_e		0.04584	0.04584
rho		0.99791	0.99796
R^2	0.0087	within: 0.1674	within: 0.1674
		between: 0.0024	between: 0.0024
		overall: 0.0028	overall: 0.0028
Adjusted R^2	0.0066	-	-
F statistic	4.14	38.68	-
F test that all u_i=0	-	59.77	-
Wald chi2	-	-	447.82
Prob > F	0.0010	0.0000	0.0000
Number of observations	2358	2358	2358
Number of groups	-	131	131
Corr(u_i,Xb)	-	-0.0098	0 (assumed)

Note: ***, **, * denote significance at the 1%, 5% and 10% levels, respectively. t-statistics are given in parentheses.

Table 2.5 Hausman Test Results

Variables	Coefficients		Difference	sqrt (diag(V_b-V_B)
	Fe (b)	Re (B)	(b-B)	S.E.
$y_{i,t-1}$	.0364215	.036288	.0001335	.0006424
$\dot{tour}_{it}$	.0527214	.0527437	-.0000223	.0002325
g_{it}	-.0154018	-.0155513	.0001494	.0002607
π_{it}	-.0088247	-.0088206	-4.14e-06	.0000394
k_{it}	.0562243	.0562201	4.18e-06	.0002186

Ho: difference in coefficients not systematic, chi2(5) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 0.36, Prob>chi2 = 0.9963.

Table 2.6 Test for Threshold Effects

Test	F statistics	Bootstrap p-value	Critical values (10%,5%,1% critical values)
Single Threshold	*20.4055*	0.0420**	(13.4295, 17.9914, 31.5974)
Double Threshold	20.1857	0.0540*	(16.2184,20.5159, 101.1189)
Triple Threshold	8.4478	0.2200	(14.0185, 22.3348,38.9682)

Note: **, * denote significance at the 5% and 10% levels, respectively.

Table 2.7 Threshold Estimates

Test	Threshold estimate	Confidence region	Sum of Squared Errors
Single Threshold	24.6586	[18.2679 ,26.6774]	3.9006
Double Threshold			
First iteration:	14.9726	[13.8469 ,15.5572]	3.8656
Fixed threshold 24.6586	Thresholds: 14.9726 24.6586		
Second iteration:	17.4972	[16.4665 ,24.6586]	3.8553
Fixed threshold 14.9726	Thresholds: 14.9726 17.4972		
Triple Threshold			
Fixed thresholds:	24.6586	[6.4159 ,69.3503]	3.8407
14.9726 17.4972	Thresholds: 14.9726 17.4972 24.6586		

Table 2.8 Percentage of Countries in the Three Regimes across Years

Regime	Year																	
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
$q_{it} \leq 14.9726$	83	85	81	83	85	82	83	83	85	82	82	80	82	80	83	79	79	80
$14.9726 < q_{it} \leq 17.4972$	5	2	4	1	1	5	3	2	1	3	4	4	4	5	0	5	5	4
$q_{it} > 17.4972$	12	13	15	16	15	13	14	15	15	15	14	16	15	15	17	16	16	16
Total	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Table 2.9 Endogenous Threshold Regression for Double Threshold Model

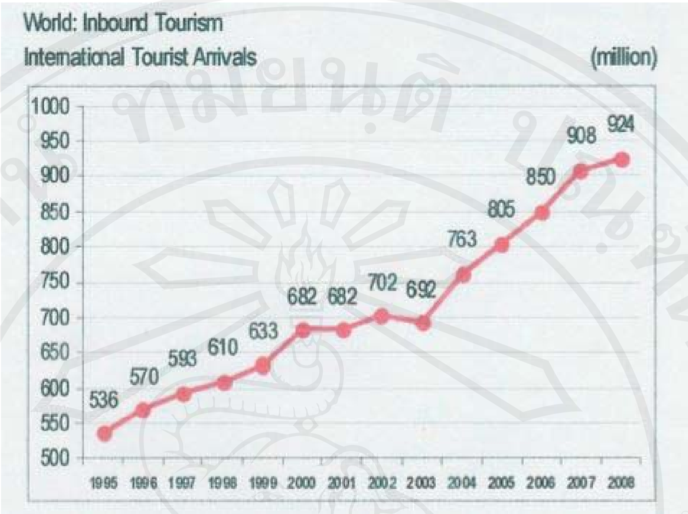
Regressors	Coefficient Estimates	OLS S.E.	White S.E
$y_{i,t-1}$	0.0233***	0.0061	0.0084
	(2.787)		
g_{it}	-0.0109*	0.0043	0.0059
	(-1.849)		
π_{it}	-0.0103***	0.0009	0.0013
	(8.0078)		
k_{it}	0.0535***	0.0049	0.0075
	(7.1004)		
$\dot{tour}_{it}I(q_{it} \leq 14.9726)$	0.0579***	0.0064	0.0102
	(5.6876)		
$\dot{tour}_{it}I(14.9726 < q_{it} \leq 17.4972)$	0.2637***	0.0359	0.0886
	(2.9763)		
$\boldsymbol{\dot{tour}_{it}I(q_{it}} > 17.4972)$	0.0027	0.0168	0.0343
	(0.0780)		

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

Table 2.10 Average share of real T&T Economy GDP, Government Expenditure in T&T, and Capital Investment in T&T in the Three Regimes

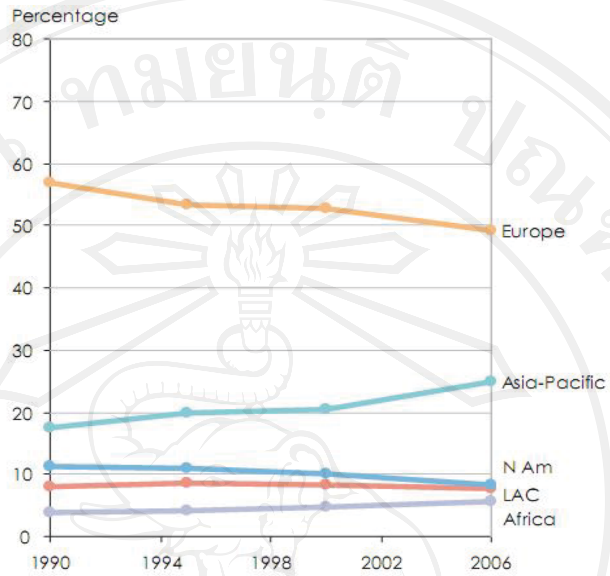
Regime	Share of real T&T economy GDP to national GDP (%)	Government expenditure in T&T activities (%)	Capital investment in T&T activities (%)
Regime 1			
1991	7.4068	0.5047	2.1203
1992	7.8389	0.5294	2.3278
1993	7.9017	0.5185	2.1725
1994	8.0327	0.5443	2.1576
1995	8.2525	0.5280	2.2226
1996	8.3262	0.5129	2.2174
1997	8.3912	0.5139	2.2677
1998	8.5691	0.4965	2.3603
1999	8.8774	0.5133	2.3181
2000	8.8029	0.5074	2.2175
2001	8.9258	0.5339	2.2024
2002	8.7334	0.5119	2.2274
2003	8.7633	0.5202	2.1965
2004	8.6424	0.5150	2.1942
2005	8.9432	0.5143	2.2772
2006	8.6445	0.4993	2.2640
2007	8.5787	0.4864	2.3082
2008	8.5157	0.4833	2.2490
average	**8.4526**	**0.51299**	**2.23896**
Regime 2			
1991	16.6349	1.0807	3.9583
1992	16.6349	1.0807	3.9583
1993	16.4542	1.6503	4.8336
1994	16.3098	0.9885	5.1155
1995	16.4665	1.2148	4.1081
1996	16.5037	1.1253	5.2113
1997	16.4629	1.0479	5.0210
1998	16.4712	1.1764	3.8771
1999	15.7195	1.2163	3.5854
2000	16.1261	1.6043	3.5029
2001	16.0737	1.1242	3.8655
2002	16.2984	1.2753	4.4813
2003	15.9190	1.5520	4.5139
2004	15.8353	0.7495	4.1083
2005	-	-	-
2006	15.7999	0.7249	3.0856
2007	15.9831	0.8390	3.2117
2008	16.6521	0.9503	5.4546
average	**16.2556**	**1.141239**	**4.22900**
Regime 3			
1991	35.0274	2.5356	8.3858
1992	34.1860	2.4402	8.2951
1993	32.1864	2.3555	8.0852
1994	31.3978	2.3831	8.3702
1995	30.8079	2.3361	8.0110
1996	32.8733	2.2550	7.7172
1997	32.9462	2.2600	7.7512
1998	31.9584	2.3144	7.8555
1999	31.8463	2.2663	7.4633
2000	32.2201	2.0916	7.4033
2001	32.8163	2.2172	7.6275
2002	32.4652	2.2841	7.4957
2003	35.2794	2.1983	8.0589
2004	34.1546	2.1811	7.4892
2005	29.9342	1.9120	7.2290
2006	33.9788	2.0128	9.2495
2007	33.9435	2.0217	9.1027
2008	35.3307	2.1873	8.7882
average	32.9641	2.23629	8.02107

Figure 2.1 World Inbound International Tourist Arrivals



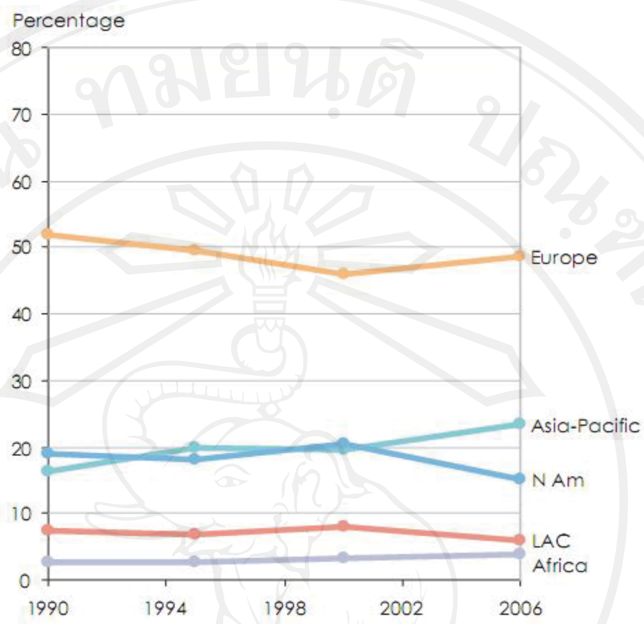
Source: World Tourism Organization (2009)

Figure 2.2 Shares in International Tourist Arrivals, Global Regions, 1990 to 2006



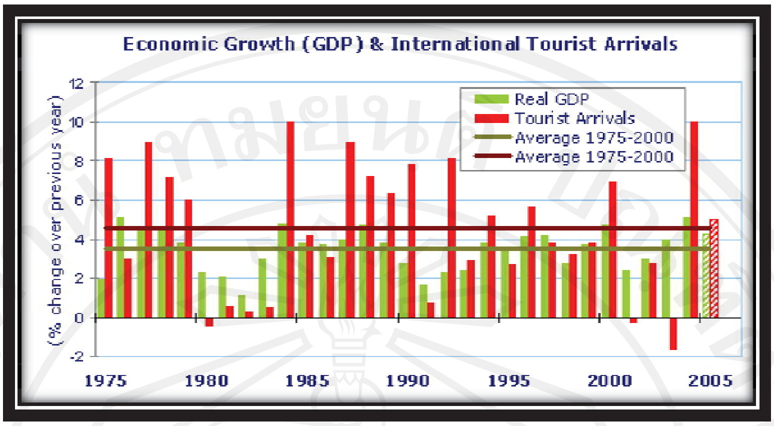
Source: Statistical Yearbook for Asia and the Pacific (2009)

Figure 2.3 Market Shares in International Tourism Receipts, by Global Region, 1990 to 2006



Source: Statistical Yearbook for Asia and the Pacific (2009)

Figure 2.4 Economic Growth and International Tourist Arrivals, 1975-2005



Source: World Tourism Organization (2008)

Figure 2.5: Confidence Interval Construction for Single Threshold

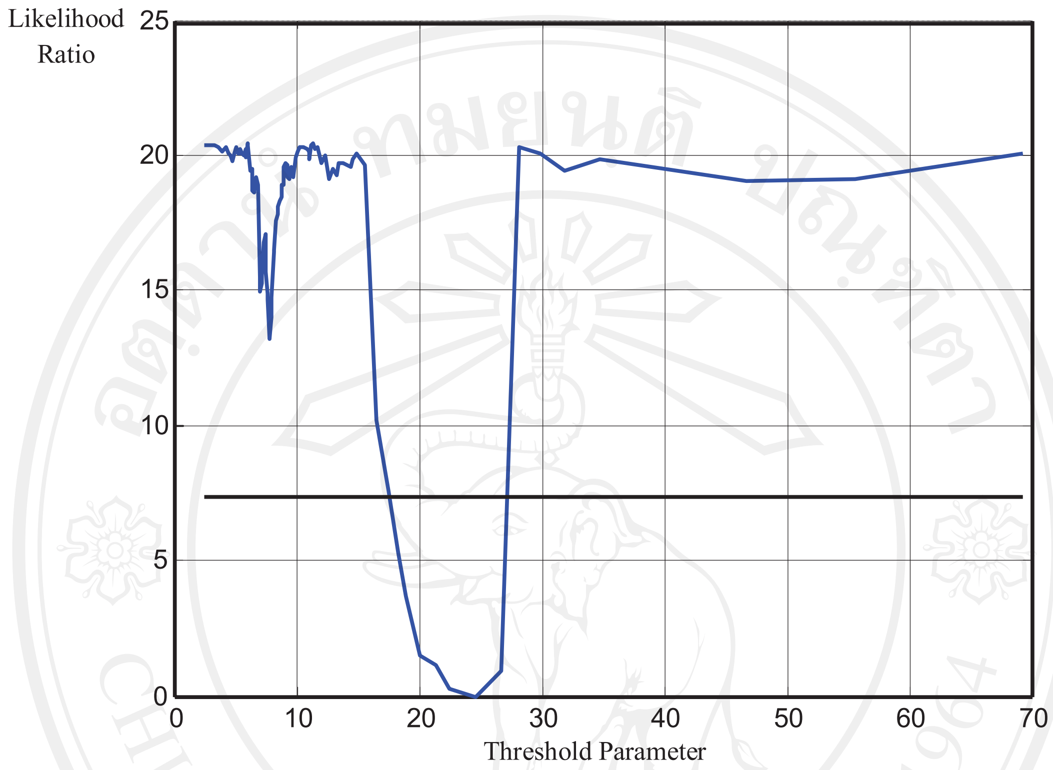


Figure 2.6 Confidence Interval Construction for Double Threshold

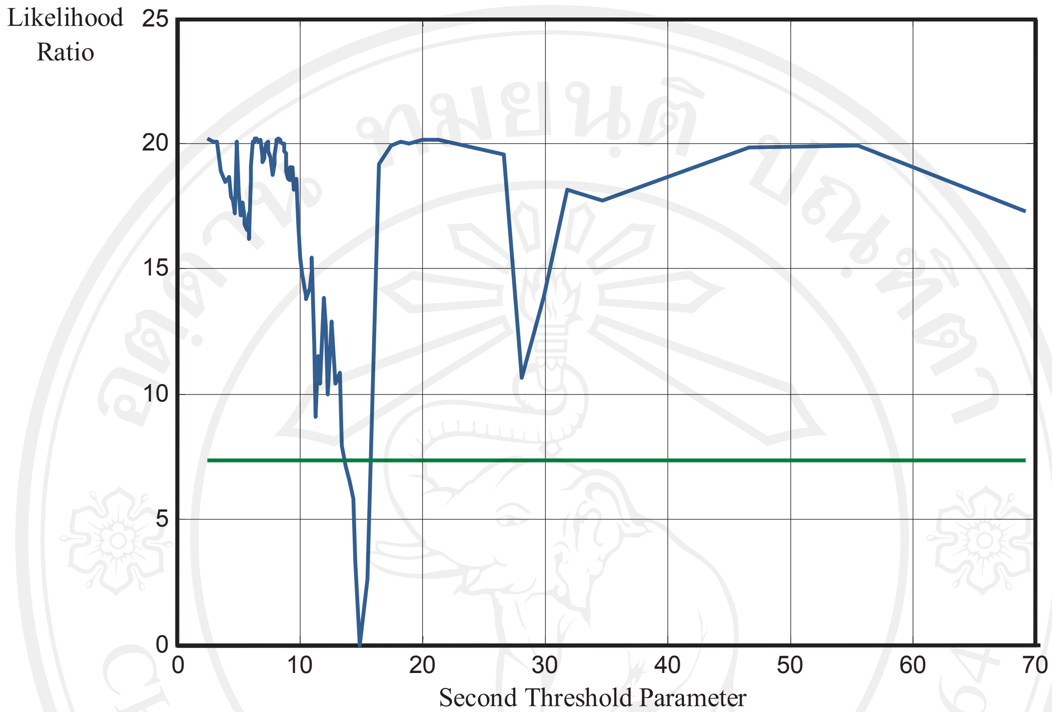


Figure 2.7 Confidence Interval Construction for Double Threshold

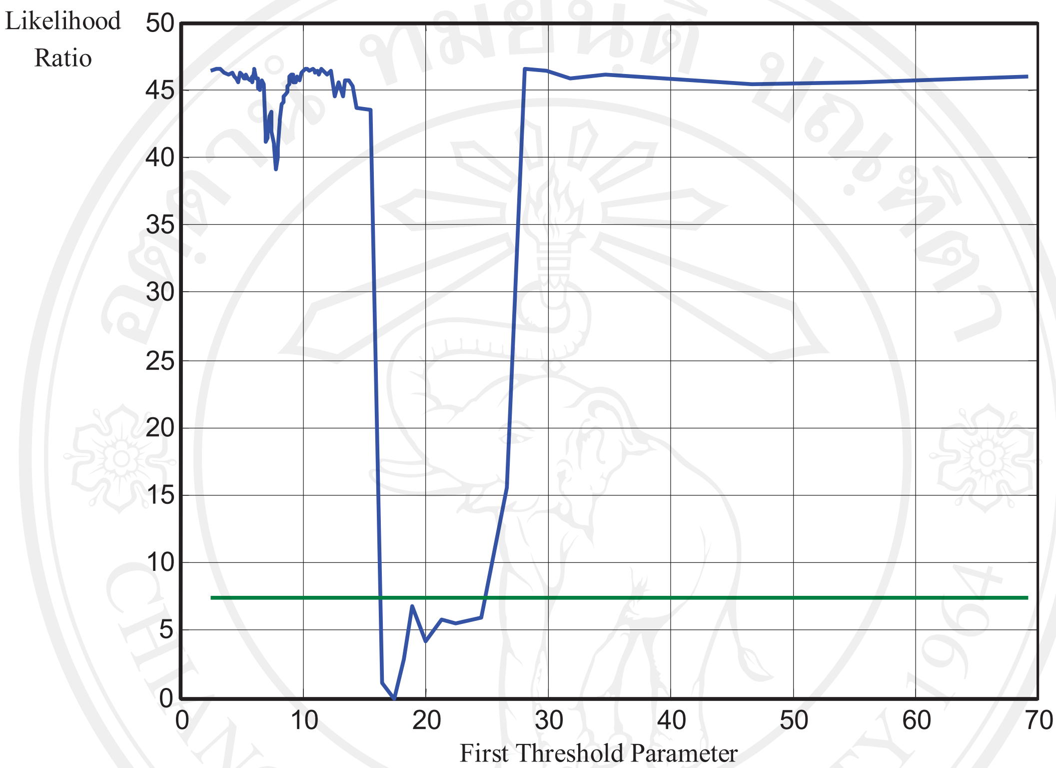


Figure 2.8 Confidence Interval Construction for Triple Threshold