APPENDIX A

Modeling International Demand to Thailand: Spatial and Temporary Aggregation Using Panel Data

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Modeling International Demand to Thailand: Spatial and Temporary Aggregation Using Panel Data

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ABSTRACT

Tourism activities in Thailand are responsible for about 6% of the Thai GDP. Additional receipts from tourism contribute substantially in financing the current account deficit of the balance of payments. These are convincing arguments to justify a careful analysis to forecast international tourism demand to Thailand. These findings will help marketing and tourism authorities focus promotions and positioning for the appropriate target markets. Using annual data from 1981–2007, the nature of short run and long run relationships was examined empirically by estimating a static linear-fixed and random-effect model and difference transformation dynamic model. A very important finding was that in the long run, the coefficients are sensitive in significance to the real per capita GDP, the nominal exchange rate of the tourist's original country to Baht per dollars, the relative price to reach Thailand by individuals coming from their original country, and also to transport costs to reach Thailand by individuals coming from their original country, and present expected signs. One of the main conclusions of the study is the significant value of the lagged dependent variable in dynamic panel data, which may be interpreted as a minor word-of-mouth effect on the consumer decision in favor of the destination. The government, the TAT (Tourism Authority of Thailand), and the private sector should be monitored more carefully for every condition related to tourism which may create cause tourists to have a negative image of Thailand during their travels.

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1. Introduction

The tourism industry has had a major role in the economic development of Thailand over the past 40 years. From 1987 to 2006, arrivals of international tourists in Thailand have increased by an excellent level. Thailand has been placed among the top 20 most popular tourist destinations in the world. International tourists to Thailand increased from 3.48 million in 1987 to 13.82 millions in 2006. The national income of Thailand from the tourism industry was ranked second only to income from commercial exports in 2006. The income received from international tourists was 50,024 million Baht and accounted for 3.85% of GDP in 1987, and changed to 7,813,050 million Baht, accounting for 6.23% of GDP in 2006 (Table 1). Grouping by nationality of international tourists to Thailand during 1971 to 2005 shows tourists from East Asia (56.29%), Europe (24.87%), United States of America (7.44%), South Asia (4.36%), Oceania (4.18%), Middle East (2.10%), and Africa (0.76%), respectively. (Figure 1)

In Asia (2007), the ranking of international tourists who came to Thailand was ranked second behind China in the tourism market.

From 1981–2007, the original countries that sent the most numbers of international tourists to Thailand were Malaysia, with the highest average number of 1,578,632 (11.42(%, and Japan with 1,293,313 (9.36%). Korea came third with 1,101,525 (7.97%), and China came fourth with 1,033,305 (7.48%). The top 10 ranking countries of international tourists to Thailand are Malaysia, Japan, Korea, China, Singapore, United Kingdom, United States of America, Australia, Germany, and Taiwan, respectively. (Table 1) Numbers of tourists from these countries have also been continuously growing during the period of 1981–2007. (Figure 2) So far, most research on tourism demand and the international flow of tourism have focused on explaining tourism demand and flows in developed countries, with little reference to developing countries, and even less to explaining tourism in Thailand. This research is an attempt to fill these voids, and aims to use panel data econometrics to explain the determinants of tourism to Thailand. There is also a small amount of research in Thailand applying econometric model forecasting for international tourist demand, especially in solution with method panel data. Hsiao (2003) indicated that, compared with the use of time series or cross section data, the use of pooled time series and cross section data has several advantages, such as greater degrees of freedom, the mitigation of multi-collinearity, a reduction in omitted variable bias, and hence, an improvement in the accuracy of parameter estimation. Therefore, empirical analysis exploits the panel structure of the data set, for the top ten countries which send 63.16% of the international tourists who have come to Thailand during the period of 1981 to 2007, to estimate the determinants of international tourism demand to Thailand.

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Table 1: Average numbers of international tourists to Thailand during the years 1981 – 2007

Rank	Name of Country	Average Numbers of Tourists	%
1	Malaysia	1,578,632	11.42
2	Japan	1,293,313	9.36
3	Korea	1,101,525	7.97
4	China	1,033,305	7.48
5	Singapore	818,162	5.92
5	U.K.	745,525	5.39
6	U.S.A.	640,674	4.64
8	Australia	538,490	3.9
9	Germany	507,942	3.67
10	Taiwan	472,851	3.42
International Tourists from the Top 10 countries		8,730,419	63.16
Total International Tourists		13,821,802	100

Source: Tourism Authority of Thailand (TAT)

Figure 1: International Tourist Arrivals to Thailand by Nationality

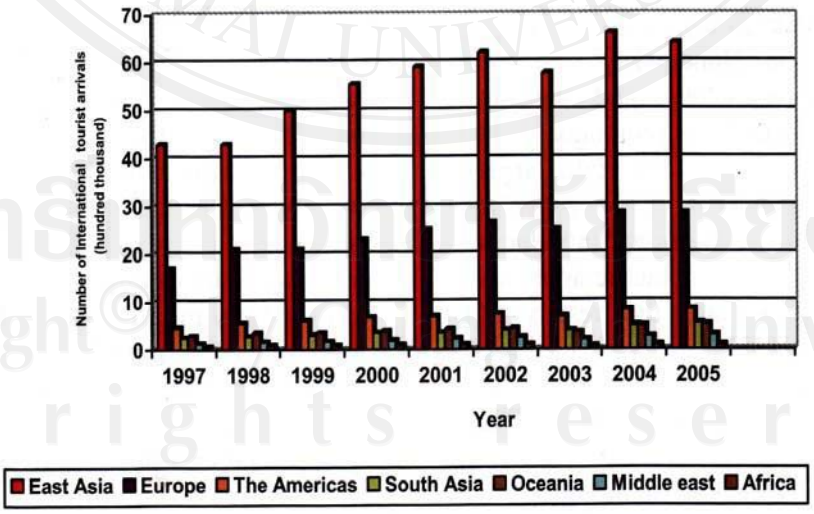

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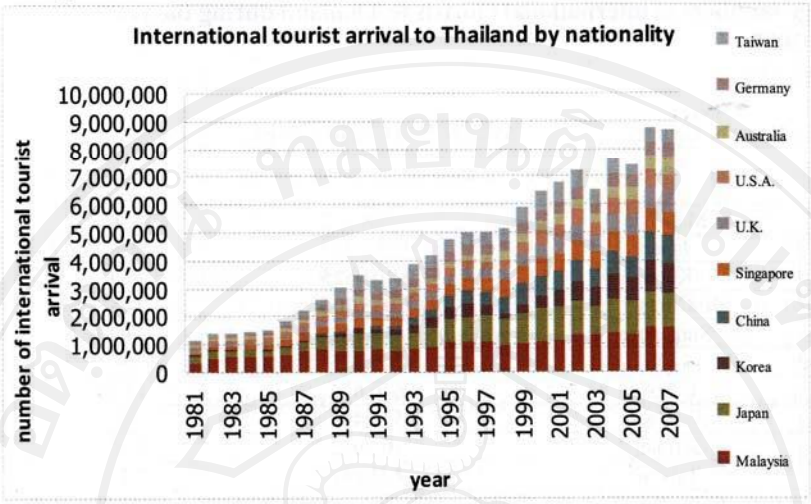
Figure 2: Top Ten International Tourist Arrivals to Thailand during 1981–2007.



Source: Tourism Authority of Thailand (TAT)

In order to investigate the determinants of international tourism demand to Thailand, static panel data models using fixed effect and random effect estimators were implemented, while dynamic panel data models adopted the generalized method of moments (GMM), estimator (panel GMM procedures), and panel GMM of Arellano and Bond (1991). These findings help marketers and tourism authorities to focus their promotions and positioning strategies to the right target markets. The remainder of the paper is organized as follows: Section 2 introduces the data set and the econometric approach to be followed, while the results of empirical estimation are presented in Section 3. Policy implications and some concluding remarks are given in Section 4.

2. Data and empirical methodology

2.1. Data

This paper uses time series data from 1981–2007 for the top ten source countries of international tourists to Thailand, which include Malaysia, Japan, Korea, China, Singapore, U.K., U.S.A., Australia, Germany and Taiwan. International tourism demand is usually measured by proxies such as the number of foreign visitors, the volume of earnings generated by foreign visitors, and the number of nights spent by visitors from abroad. Consequently, we use the number of foreign visitors, namely international tourist arrivals, to estimate international tourism demand to Thailand. Yearly data for international tourist arrivals collected from statistical data sets for each country have been obtained from the World Tourism Organization or Tourism Authority of Thailand (TAT). The sample period is from the years 1981 to 2007. The panel models are estimated by using fixed effects or random effect for static models and panel GMM procedures and GMM procedures of Arellano and Bond (1991) for dynamic models.

We use dependent variables DT for the total number of tourist arrivals per annum to a particular destination to measure the demand for tourism to Thailand. The key independent variables in equations are Real GDP per capita in country of origin or tourism disposable income of individuals coming from origin country (Y_{it}). This variable is the approximated income with origins' per capita GDP at constant prices. Data are taken from GDP per capita from the United States

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Department of Agriculture, Economic Research Service, and International macroeconomic data sets.

As far as relative prices are concerned, it is common in tourism demand studies to use the CPI of a destination country for relative tourism prices. The inverse of this shows how many "baskets" of goods a tourist has to give up in his home country in order to buy a basket of goods in the destination country (RP_{it} = CPI Thailand / CPI origin country), obtained data from IMF and BOT (Bank of Thailand). The other independent variables also include the nominal exchange rate of the original country to which the value to Thai Baht per dollar is modified (ER_{it}), obtained from United States Department of Agriculture, Economic Research Service international, and macroeconomic data set. Transportation costs from origin country *i* to Thailand, or transport costs to reach Thailand by individuals coming from the original country (TC_{it}). Since information on bilateral transport costs were unavailable, this variable is approximated with Jet Fuel (Dollar)/CPI origin. Data is taken from the United States Energy Information Administration (2007) Rotterdam (ARA) Kerosene-Type Jet Fuel Spot Price FOB.

2.2. Empirical Methodology

The primary purpose of the paper is to detect the most significant factors affecting the flow of international tourists by country of origin. Panel data models were constructed by using yearly data corresponding to the top ten countries sending international tourists to Thailand. The use of this type of data enables a relatively large number of observations to be had, and a concomitant increase in the degrees of freedom, thereby reducing collinearity and improving the efficiency of the estimates (Song and Witt, 2000). In this paper, balanced panel data sets are used. Garín-Muñoz and Pérez-Amaral (2000) suggested that tourism has a great deal of inertia, so that the dynamic structure of consumer preference should be considered in the tourism demand model (Garín-Muñoz, 2006). In particular, if the impact of previous tourism is neglected, the estimated results of other relevant variables will be overestimated. Furthermore, Song and Witt (2000) noted that the static regressions of tourism demand models might raise some significant problems, such as structural instability, forecasting failures and spurious regression. Hence, including the lagged dependent variable in a dynamic model of tourism demand is one way of sensibly accommodating the dynamic structure of consumer preferences, where changes in tastes might be regarded as endogenous (Garín-Muñoz and Pérez-Amaral, 2000; Garín-Muñoz, 2006; Ledesma-Rodríguez, Navarro-Ibáñez and Pérez- Rodríguez, 2001). In our paper, the lagged dependent variable of tourism demand, which will be interpreted as being based on habit formation or as interdependent preferences, are included as regressors to consider the possibility of a change in consumer preferences over time.

The model to be estimated as a Static model is given as:

$$\ln DT_{it} = a_i + y_1 \ln Y_{it} + y_2 \ln RP_{it} + y_3 \ln ER_{it} + y_4 \ln TC_{it} + \lambda_{it} + \mu_{it} + \varepsilon_{it} \quad (1)$$

In equation (1), i refers to factors affecting the flow of international tourists by country of origin, and $t=1,...,T$ represents the time period. λ is a year-specific intercept, μ is as unobserved country-specific effect ($E(\mu_i) = 0$), and ε_{it} is the disturbance term. It is assumed that ε_{it} is serially uncorrelated, with zero mean and independently distributed across countries, but there are no restrictions on heteroskedasticity across time and countries. A positive sign is expected for the coefficients y_1 and y_3, while a negative sign is expected for the coefficients y_2 and y_4. The variables used in equations (1) can be summarized in Table 4.

Using panel data allows one not only to investigate dynamic relations, but also

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to control for unobserved cross-section heterogeneity. With panel data, the issue is whether to use a random-effects or fixed-effects estimation approach. The random effects approach to estimating y exploits the correlation in the composite error in equation (6), vjt = cit $+\varepsilon_{it}$, cit = $\lambda_{it} + \mu_{it}$. The approach puts ci in the error term assuming that ci is orthogonal to xjt and use a Generalised Least Squares (GLS) estimator to take into account serial correlation in the composite error vjt. There can, however, be many instances where this assumption is violated. Specifically, cj can be correlated with xjt in the present model if the cj influences the price, exchange rate and income variables. In such a case, the fixed-effects estimator may be more appropriate to use. Wooldridge (2001:266) shows that a fixed effect estimator is more robust than a random effects estimator. A shortcoming of the approach is, however, that time-constant factors, such as geographical factors, cannot be included in xjt, otherwise there would be no way to distinguish the effects of these variables from the effects of the unobservable cj. Another shortcoming of the fixed effects estimator is that it is less efficient than the random effects estimator – it has less degree of freedom and takes into calculation only the variation "within" units, and not between units. Accordingly, to determine which of these estimators are more appropriate to use in the present case, both a fixed effects (FE) and random effects (RE) estimator were initially used to estimate equation and the Hausman specification test done to evaluate the assumption in the random effects model that cj is orthogonal to xjt. Rejection of the null hypothesis would lead to rejection of the random effects estimator. The results of the Hausman Specification Tests are summarized in Tables 7 and 8 below.

In the dynamic panel estimation we included the lagged values of DT in order to capture the quality of the experience of the tourist to a particular destination, which will also serve as an indicator of how suitable the tourism products in that country are for the particular market segment.

The model to be the estimated Dynamic model is given as:

$$\ln DT_{it} = a_i + y_1 \ln Y_{it} + y_2 \ln RP_{it} + y_3 \ln ER_{it} + y_4 \ln TC_{it} + y_5 \ln DT_{it-1} + \lambda_{it} + \mu_{it} + \varepsilon_{it} \quad (2)$$

Owing to the unavailability of suitable data to capture economic and social structures, there are other factors that are hypothesized to affect tourism demand but which have been omitted from the analysis. If certain variables excluded are correlated with the dependent variable, subsequently, the estimation results are subject to omitted variable bias. The panel data models were used in the paper in order to reduce the possible omitted variable bias.

However, autocorrelation may arise in a dynamic panel data model due to the inclusion of a lagged dependent variable, as well as individual effects characterizing the heterogeneity among the individuals (Baltagi, 2001). Since $\ln DT_{it}$ is a function of μ_{it}, it immediately follows that DT_{it-1} is also a function of μ_{it}. Therefore, DT_{it-1}, an explanatory variable in equation (2), is correlated with the error term. Garín-Muñoz (2006) noted that, when lagged dependent variables are included as regressors, not only is the OLS estimator biased and inconsistent, but the within groups (WG) and random effects estimators are also biased and inconsistent. One solution to avoid the bias and inconsistency is to use the first difference transformation, and to treat the lags of the dependent variables as instruments for the lagged dependent variable (Garín-Muñoz, 2006; Ledesma-Rodríguez, Navarro-Ibáñez and Pérez- Rodríguez, 2001).

A generalized method of moments (GMM) approach can be used to unify the estimator and eliminate the disadvantages of reduced sample sizes. As suggested by Arellano and Bond (1991), the list of

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instruments can be exploited by additional moment conditions and allowing the number to vary with *t*, so that all moment conditions can be estimated by GMM. However, the GMM estimator for γ is asymptotically normal, based on the assumptions of homoskedastic and uncorrelated errors term. In this paper, the GMM approach is used to compute the panel GMM and GMM-DIFF estimator. The first difference transformation model, namely GMM-DIFF estimator, as suggested by Arellano and Bond (1991), is based on taking first differences to eliminate the individual effects, and regard the dependent variable lagged two or more periods as instruments for the lagged dependent variable. The solution used in this paper was to implement the GMM procedure of Arellano and Bond (1991). The GMM-DIFF method of Arellano and Bond (1991) was used to investigate the impacts of international tourism demand to Thailand.

The dynamic and first difference versions of the tourism demand model are given as follows:

$$\Delta \ln DT_{it} = y_1 \Delta \ln Y_{it} + y_2 \Delta \ln RP_{it} + y_3 \Delta \ln ER_{it} + y_4 \Delta \ln TC_{it} + y_5 \Delta \ln DT_{it-1} + \Delta \lambda_{it} + \Delta \mu_{it} + \Delta \varepsilon_{it} \quad (3)$$

where $\Delta \ln DT_{it} = \ln DT_{it} - \ln DT_{it-1}$, and analogously for the remaining variables. It should be mentioned that using a dynamic panel model will generate more precise results by differencing the data and by removing the problem of non-stationarity (Garín-Muñoz, 2006). Estimating equation (3) by OLS does not lead to a consistent estimator for γ because $\ln DT_{it-1}$ and ε_{it-1} are correlated, even as $T \rightarrow \infty$. However, an instrumental variable approach, whereby $\ln DT_{it-2}$ or $\ln DT_{it-2} - \ln DT_{it-3}$ can be used as instruments, leads to consistency as ε_{it} is not autocorrelated (Anderson and Hsiao, 1981). However, a second instrumental variables estimator requires an additional lag to construct the instrument, such that the effective number of observations used in estimation is reduced. Additionally, In order to support the use of the difference transformation in the dynamic model (equations (2) and (3)), we implement panel unit root tests using the Levin, Lin and Chu (2002) and Breitung (2000) methods. The latter test assumes a common unit root process, while the LLC test, and Maddala and Wu (1999) and Choi (2001) ADF-Fisher Chi-square PP-Fisher Chi-square tests assume separate unit root processes, and assumes that each individual unit in the panel shares the same AR(1) coefficient, but allows for individual effects, time effects and possibly a time trend. It may be viewed as a pooled Dickey-Fuller or an Augmented Dickey-Fuller (ADF) test, with the null hypothesis of non-stationarity, or I(1). After transformation, the t-star test statistic is asymptotically distributed as a standard normal under the null hypothesis of non-stationarity. As for the LLC test, Maddala and Wu (1999) and Choi (2001), ADF-Fisher Chi-square PP-Fisher Chi-square tests are based on the mean of the individual Dickey-Fuller t-statistics of each unit in the panel, and lagged dependent variables may be used to accommodate serial correlation in the errors. After transformation these statistics are asymptotically distributed as standard normal under the null hypothesis of non-stationarity. The results of the panel unit root tests are reported in Tables 5 and 6. Table 6 shows the results of all tests for which the null hypothesis of a unit root is rejected for the levels of annually all-variable. However, for the series of first differences, the null hypothesis of a unit root are all rejected.

3. Empirical Results

This section presents the results of the static and dynamic models for investigating the effects of factors affecting the flow of international tourists by country of origin to Thailand. We first present the estimates of the static linear

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fixed effects model discussed in sub-section 3.1, and then present the estimates of the difference transformation dynamic model discussed in sub-section 3.2. The results of the static fixed and random effect model are presented in Table 2.The results of the dynamic difference model are presented in Table 3. As for the static model, Table 2 gives the results of the determinants of international tourism demand to Thailand.

3.1. Static model

Initially, a static version of the model is estimated, that is, a model without the second term in equation (1). Table 2 shows the results of a static panel model for investigating the effects of factors affecting the flow of international tourists by country of origin to Thailand. The presence of cross-section and period-specific effects terms λ_{it} and μ_{it} may be handled using fixed or random effects methods. You may, with some restrictions, specify models containing effects in one or both dimension, for example, a fixed effect in the cross-section dimension, a random effect in the period dimension, or a fixed effect in the cross-section and a random effect in the period dimension. Note, in particular, however, that two-way random effects may only be estimated if the data is balanced so that every cross-section has the same set of observations. Random effects for which the random effect specifications assume that the corresponding effects λ_{it} and μ_{it} are realizations of independent random variables with mean zero and finite variance. Most importantly, the random effects specification assumes that the effect is uncorrelated with the idiosyncratic residual ε_{it}.

The result in static panel data with period random and idiosyncratic random to estimate the determinants of tourism demand form a total number of international tourist arrivals from the top ten countries to Thailand (DTit). All coefficients are sensitive in significance to real per capita GDP, nominal exchange rate of original country to Baht per dollars, transport costs to reach Thailand by individuals coming from their home countries, and also sensitive to the relative price to reach Thailand by individuals coming from their home countries and present expected signs. As an increase in origins' real per capita GDP, and an increase in nominal exchange rate of original country to Baht per dollars, leads to an increase in total number of tourist arrivals from original country to Thailand, on average an *ceteris paribus*. On the other hand, an increase in transport costs to reach Thailand by individuals coming from their home country and in relative price to reach Thailand by individuals coming from original country causes a reduction in the total number of tourist arrivals to Thailand, on average and *ceteris paribus*.

When comparing the result with cross-section, period and idiosyncratic random effects, all the coefficients are sensitive in significance to real per capita GDP, and also sensitive to the nominal exchange rate of the original country to Baht per dollars, relative price to reach Thailand by individuals coming from their original country, transport costs to reach Thailand by individuals coming from their original country, and also present expected signs to consider an adjusted R-squared quite low at 0.680 and Durbin-Watson 0.129. The Durbin-Watson statistic in output is very close to zero, indicating the presence of serial correlation in the residuals. From the result with cross-section, period and idiosyncratic random effects, a 1% increase in origins' real per capita GDP leads to a 1.865% increase in the total number of tourist arrivals to Thailand, on average an *ceteris paribus*. A 1% increase in transport costs to reach Thailand by individuals coming from their home country leads to a 0.054% decrease in the total number of tourist arrivals to Thailand, on average and *ceteris paribus,* and a 1%

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increase in relative price to reach Thailand by individuals coming from another country leads to a 0.630% decrease in the total number of tourist arrivals to Thailand. Finally, a 1% increase in the nominal exchange rate of original country to Baht per dollars causes a 0.189% reduction in the total number of tourist arrivals, on average and *ceteris paribus*.

The fixed effect results in Cross-section fixed (dummy variables) and Period fixed (dummy variables) effects all the coefficients are sensitive in significant to real per capita GDP, nominal exchange rate of original country to Baht per dollars, the relative price to reach Thailand by individuals coming from their original country and also to transport costs to reach Thailand by individuals coming from other countries and present expected signs with adjusted R-squared quite high at 0.938 and Durbin-Watson 0.370. A 1% increase in origins' real per capita GDP, leads to a 1.292% increase in total number of tourist arrivals in original country to Thailand, on average an *ceteris paribus*. A 1% increase in transport costs to reach Thailand by individuals coming from other countries leads to a 0.121% decrease in the total number of tourist arrivals to Thailand, on average and *ceteris paribus*, and a 1% increase in relative price to reach Thailand leads to a 2.242% decrease in the total number of tourist arrivals to Thailand. Finally, a 1% increase in the nominal exchange rate of original country to Baht per dollars causes a 0.714% reduction in the total number of tourist arrivals to Thailand, on average and *ceteris paribus*.

When comparing the results with other fixed effect to cross-section fixed (dummy variables), period random and idiosyncratic random effects, all the coefficients look similar to the former fixed effects with strong sensitivity to real per capita GDP, nominal exchange rate of original country to Baht per dollars, relative price to reach Thailand by individuals coming from other countries, and also sensitive to transport costs to reach Thailand, and present expected signs, consider to both Adjusted R-squared and Durbin-Watson quite a litter bit lower at 0.903 and 0.339.

3.2 Dynamic Model

3.2.1 Panel GMM (Panel Generalized Method of Moments)

The GMM estimator belongs to a class of estimators known as M-estimators that are defined by minimizing some criterion functions. GMM is a robust estimator in that it does not require information of the exact distribution of the disturbances. GMM estimation is based upon the assumption that the disturbances in the equations are not correlated with a set of instrumental variables. The GMM estimator selects parameter estimates so that the correlations between the instruments and disturbances are as close to zero as possible, as defined by a criterion function.

By choosing the weighting matrix in the criterion function appropriately, GMM can be made robust to heteroskedasticity and/or autocorrelation of unknown form. The GMM estimator, based upon the conditions that each of the right-hand side variables, is uncorrelated with the residual.

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Table 2: The Log linear Static panel data in dependent total number of tourist arrivals from the top ten countries to Thailand (DT_{it}).

Variable	RE Effect	RE-RE Effect	FE–FE Effect	FE-RE Effect
Constant	10.85955*** (0.156)	-5.294488*** (0.795)	-1.413860*** (1.197)	-9.432369*** (0.480)
LNY	0.135659*** (0.015)	1.864949*** (0.085)	1.292380*** (0.118)	2.131409*** (0.054)
LNTC	-0.086230*** (0.019)	-0.053838* (0.033)	-0.120760* (0.052)	-0.040934** (0.019)
LNRP	-0.884250** (0.096)	-0.629971** (0.233)	-2.241699*** (0.187)	-2.090006*** (0.178)
LNER	0.047256*** (0.008)	0.189286** (0.089)	0.714638*** (0.104)	1.011712*** (0.087)
Adjusted R-squared	0.119	0.680	0.938	0.903
Period random (SD)	0.048	0.048	-	0.048
Cross-section random(SD)	-	0.409	-	-
Idiosyncratic random(SD)	0.252	0.252	-	0.252
Period random (Rho)	0.035	0.010	-	0.035
Cross-section random(Rho)	-	0.718	-	-
Idiosyncratic random (Rho)	0.965	0.272	-	0.965
Durbin-Watson stat	0.050	0.129	0.370	0.339

Standard errors are in parentheses; *** denotes significance at the 1% level,
** denotes significance at the 5% level , * denotes significance at the 10% level.

Table 3: Panel Generalized Method of Moments in dependent total number of tourist arrivals from the top ten countries to Thailand (DT_{it}).

Variable	FE Effect	RE Effect	FE-RE Effect	GMM-DIFF
Constant	2.090349*** (0.541)	0.460826*** (0.164)	-0.181797 (0.250)	
LNY	-0.377685*** (0.101)	-0.027035*** (0.011)	0.127441 (0.078)	1.958955*** (0.250)
LNTC	-0.013560 (0.025)	-0.029250 (0.024)	-0.093100** (0.038)	-0.011790 (0.043)
LNRP	0.055289 (0.071)	-0.003970 (0.006)	-0.366192** (0.142)	-0.940028* (0.441)
LNER	-0.121023 (0.147)	-0.031100 (0.070)	0.199831*** (0.070)	0.325587** (0.135)
LNDT(-1)	1.105386*** (0.042)	0.980193*** (0.012)	0.859682*** (0.033)	0.096031*** (0.031)
Adjusted R-squared	0.968	0.973	0.968	
Durbin-Watson stat	1.857	1.869	1.769	

Standard errors are in parentheses; *** denotes significance at the 1% level.
** 5% level * 10% level, t ratios in parentheses. Method of estimation: GMM-DIFF of Arellano and Bond.(1991) t ratios in parentheses. Estimates are obtained using instruments DT_{it} lagged in one and six periods.

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The Panel GMM EGLS fixed effect result to estimate the determinants of tourism demand form total number of international tourist arrivals to Thailand from the top ten countries (DT_{it}) in Cross-section fixed (dummy variables) is sensitive in significance to real per capita GDP but doubtfully present unexpected signs, since 1% increase in origins' real per capita GDP, leads to a 0.378 % decrease in the total number of tourist arrivals to Thailand, on average an *ceteris paribus*, but coefficients is sensitive in significant to number of tourist arrivals in original top ten country to Thailand who got an experienced to Thailand in the past year as 1% increase in number of tourist arrivals in original top ten country to Thailand last year leads to a 1.105 % increase in total number of tourist arrivals in original country to Thailand, on average an *ceteris paribus* consider to adjusted R-squared quite high at 0.968 and Durbin-Watson 1.857.

When comparing the results with Panel GMM EGLS with Cross-section random, period random and idiosyncratic random effects coefficients is sensitive in significant to real per capita GDP but also doubtfully present unexpected signs, since a 1% increase in origins' real per capita GDP leads to a 0.027% decrease in the total number of tourist arrivals to Thailand, on average an *ceteris paribus*, but coefficients are sensitive in significant to number of tourist arrivals from the top ten countries to Thailand who had an experience in Thailand in the past year, with a 1% increase in the number of tourist arrivals from the top ten countries to Thailand last year leads to a 0.980% increase in total number of tourist arrivals in original country to Thailand, on average an *ceteris paribus*, consider to adjusted R-squared quite high at 0.973 and Durbin-Watson 1.869.

The result with Panel GMM EGLS with cross-section random, period random, and idiosyncratic random effects coefficients is sensitive in significance to transport costs to reach Thailand by individuals coming from other countries, and also relative to the price to reach Thailand by individuals coming from original countries, and the nominal exchange rate of the original country to Baht per dollars, and present with expected signs, since 1% increase in transport costs to reach Thailand by individuals coming leads to a 0.012% decrease in total number of tourist arrivals in original country to Thailand, on average an *ceteris paribus* and 1% increase in relative price to reach Thailand by individuals coming from other countries leads to a 0.940% decrease in the total number of tourist arrivals. A 1% increase in nominal exchange rate of original country to Baht per dollars causes a 0.325% increase in the total number of tourist arrivals to Thailand, on average and *ceteris paribus*. Finally a 1% increase in the total number of tourist arrivals from the top ten countries to Thailand in the past year leads to a % increase in total number of tourist arrivals to Thailand, on average an *ceteris paribus*, consider to adjusted R-squared quite high at 0.968 and Durbin-Watson 0.860.

3.2.2 GMM-Diff

The results of the GMM-DIFF method of Arellano and Bond (1991) to estimate the determinants of tourism demand form total number of international tourist arrivals in original top ten country to Thailand (DT_{it}) are shown in Table 3. The consistency and accuracy of the estimates depend on whether the lagged dependent variables and explanatory variables are valid instruments in GMM-DIFF estimation (Garín-Muñoz and Montero-Martín, 2007).

The results with GMM-DIFF coefficients are sensitive in significance to real per capita GDP, relative price to reach Thailand by individuals coming from other countries, nominal exchange rate of other countries to Baht per dollars, and present

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with expected signs, since a 1% increase in origins' real per capita GDP leads to a 1.959% increase in the total number of tourist arrivals to Thailand, on average an *ceteris paribus* and 1% increase in relative price to reach Thailand by individuals leads to a 0.940% decrease in the total number of tourist arrivals. A 1% increase in the nominal exchange rate of original country to Baht per dollars causes a 0.199 % increase in the total number of tourist arrivals to Thailand, on average and *ceteris paribus*. Finally a 1% increase in the total number of tourist arrivals from the top ten countries to Thailand in the past year leads to a 0.096 % increase in the total number of tourist arrivals to Thailand, on average and *ceteris paribus*.

4. Conclusion

The purpose of this paper was to investigate the determinants of international tourism demand to Thailand, static panel data models using fixed effect, random effect estimators were implemented, while dynamic panel data models adopted the generalized method of moments (GMM) estimator (panel GMM procedures) and panel GMM of Arellano and Bond (1991). This paper uses time series data from 1981–2007 for the top ten countries that send the most international tourists to Thailand, which include Malaysia, Japan, Korea, China, Singapore, U.K., U.S.A., Australia, Germany, and Taiwan, to estimate international tourism demand to Thailand. The nature of the short run and long run relationships was examined empirically by estimating a static linear fixed and random effect model and difference transformation dynamic model, respectively. A very important finding was that, both in short run and long run, the coefficients are sensitive in significance to real per capita GDP, nominal exchange rate of original country to Bath per dollars, relative price to reach Thailand by individuals coming from original country and also to transport costs to reach Thailand by individuals coming from original country and present expected signs, especially in all static model. However, some cases in short run dynamic model still be doubted for real per capita GDP with unexpected signs. One of the main conclusions of the study is the significant value of the lagged dependent variable in dynamic panel data for every model (1.105. 0.980, 0.860, 0.096), which may be interpreted as a minor word-of-mouth effect on the consumer decision in favor of the destination. The government, TAT, and the private sector should be monitored more carefully for every condition related to tourism which causes a negative image to tourists during travel in Thailand. The estimated values of the income elasticity suggest that the economic conditions of tourists who visit Thailand are very important factors in determining tourism demand to Thailand. The estimated values of the income elasticity in panel static model show most of the results tourism to Thailand is a luxury good. Moreover tourism to Thailand is more sensitive to relative prices from original countries than nominal exchange rates of the original country to Baht per dollars and transport costs to reach Thailand by individuals coming from other countries.

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Table 4: Descriptive Statistics of Variable in panel data

Variable	Mean	Std. Dev	Min	Max	Observations
LnDT – overall	12.62947	1.01137	9.057888	14.27207	N = 270
- between		5421947	11.93326	13.68774	n = 10
- within		.8702341	9.754101	14.54449	T = 27
LnY – overall	9.26699	1.222155	5.26284	10.6165	N = 270
- between		.236756	6.363287	10.40789	n = 10
- within		.334567	8.166543	10.37369	T = 27
LnTC – overall	-4.630463	.5588851	-5.519437	-2.725351	N = 270
- between		.1174437	-4.769207	-4.358014	n = 10
- within		.5476246	-5.791885	-2.997799	T = 27
lnRP – overall	-.0648708	.1884156	-.5154645	.6980007	N = 270
- between		.1174437	-.203615	.2075776	n = 10
- within		.1517912	-.4155864	.4255523	T = 27
LnER – overall	1.982569	2.103512	-3.53021	4.299622	N = 270
- between		2.187384	-3.401531	3.888777	n = 10
- within		.3202651	1.124757	2.94197	T = 27
Country – overall	5.5	2.877615	1	10	N = 270
- between		3.02765	1	10	n = 10
- within		0	5.5	5.5	T = 27
Year – overall	14	7.803345	1	27	N = 270
- between		0	14	14	n = 10
- within		7.803345	1	27	T = 27

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Table 5: Results of panel unit root tests based on 4 method tests for all variables

Method test	Test statistic	Significance level for rejection
Null : unit root (assumes common unit root process)		
Levin,Lin and Chu (2002) t*- Statistics		
1. $lnDT_{it}$	1.67	0.95
2. lnY_{it}	-0.39	0.34
3. $lnTC_{it}$	-2.88	0.002
4. $lnRP_{it}$	1.05	0.85
5. $lnER_{it}$	-0.59	0.27
Breitung(2000)t*-Statistics		
1. $lnDT_{it}$	-1.86	0.03
2. lnY_{it}	-0.03	0.48
3. $lnTC_{it}$	-1.18	0.033
4. $lnRP_{it}$	-1.18	0.033
5. $lnER_{it}$	1.19	0.88
Null : unit root (assumes individual unit root process)		
Lm, Pesaran and Shin (2003) W-Statistics	1.19	0.88
1. $lnDT_{it}$	-1.39	0.09
2. lnY_{it}	3.25	0.999
3. $lnTC_{it}$	1.18	0.88
4. $lnRP_{it}$	-0.13	0.44
5. $lnER_{it}$		
Maddala and Wu (1999) and Choi (2001)		
ADF-Fisher Chi-square	15.10	0.77
1. $lnDT_{it}$	37.40	0.01
2. lnY_{it}	3.07	0.999
3. $lnTC_{it}$	16.93	0.65
4. $lnRP_{it}$	17.34	0.63
5. $lnER_{it}$		
PP-Fisher Chi-square	27.79	0.35
1. $lnDT_{it}$	9.62	0.97
2. lnY_{it}	1.24	0.99
3. $lnTC_{it}$	13.11	0.87
4. $lnRP_{it}$	12.84	0.88
5. $lnER_{it}$		

A * indicates the rejection of the null hypothesis of non-stationary (Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-Type test using ADF and PP-test (Maddala and Wu (1999) and Choi (2001)) or stationary at least at the 10 percent level of significance.

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Table 6: Results of panel unit root tests after first differencing into these variables.

Method test	Test statistic	Significance level for rejection
Null : unit root (assumes common unit root process)		
Levin,Lin and Chu (2002) t*- Statistics		
1. $\ln DT_{it}$	8.52*	0.000
2. $\ln Y_{it}$	-7.83*	0.000
3. $\ln TC_{it}$	-12.61*	0.000
4. $\ln RP_{it}$	-9.88*	0.000
5. $\ln ER_{it}$	-5.41*	0.000
Breitung(2000)t*-Statistics		
1. $\ln DT_{it}$	-5.33*	0.000
2. $\ln Y_{it}$	-3.47*	0.000
3. $\ln TC_{it}$	-10.79*	0.000
4. $\ln RP_{it}$	-6.27*	0.000
5. $\ln ER_{it}$	-5.37*	0.000
Null : unit root (assumes individual unit root process)		
Lm, Pesaran and Shin (2003) W-Statistics		
1. $\ln DT_{it}$	-10.35*	0.000
2. $\ln Y_{it}$	-8.09*	0.000
3. $\ln TC_{it}$	-11.56*	0.000
4. $\ln RP_{it}$	-7.93*	0.000
5. $\ln ER_{it}$	-4.34*	0.000
Maddala and Wu (1999) and Choi (2001) ADF-Fisher Chi-square		
1. $\ln DT_{it}$	-118.07*	0.000
2. $\ln Y_{it}$	93.56*	0.000
3. $\ln TC_{it}$	725.70*	0.000
4. $\ln RP_{it}$	89.23*	0.000
5. $\ln ER_{it}$	51.57*	0.000
PP-Fisher Chi-square		
1. $\ln DT_{it}$	117.25*	0.000
2. $\ln Y_{it}$	88.64*	0.000
3. $\ln TC_{it}$	725.58*	0.000
4. $\ln RP_{it}$	87.43*	0.000
5. $\ln ER_{it}$	46.00*	0.000

A * indicates the rejection of the null hypothesis of non-stationary (Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-Type test using ADF and PP-test (Maddala and Wu (1999) and Choi (2001)) or stationary at least at the 10 percent level of significance.

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Table 7: Redundant Fixed Effects Tests

Redundant Fixed Effects Tests			
Test cross-section fixed effects			
Effects Test	Statistic	d.f.	Prob.
Cross-section F	241.349314	(9,256)	0.0000

Table 8: Hausman Test

Correlated Random Effects - Hausman Test			
Test period random effects			
Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	84.573454	4	0.0000

Table 9: Period random effects test comparisons

Period random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(Y)	1.292380	2.131409	0.010935	0.0000
LOG(TC)	-0.120760	-0.040934	0.002252	0.0925
LOG(RP)	-2.241699	-2.090006	0.003242	0.0077
LOG(ER)	0.714638	1.011712	0.003250	0.0000

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Figure 3: Number of international tourists arrival (DT) to Thailand from 1981 to 2007

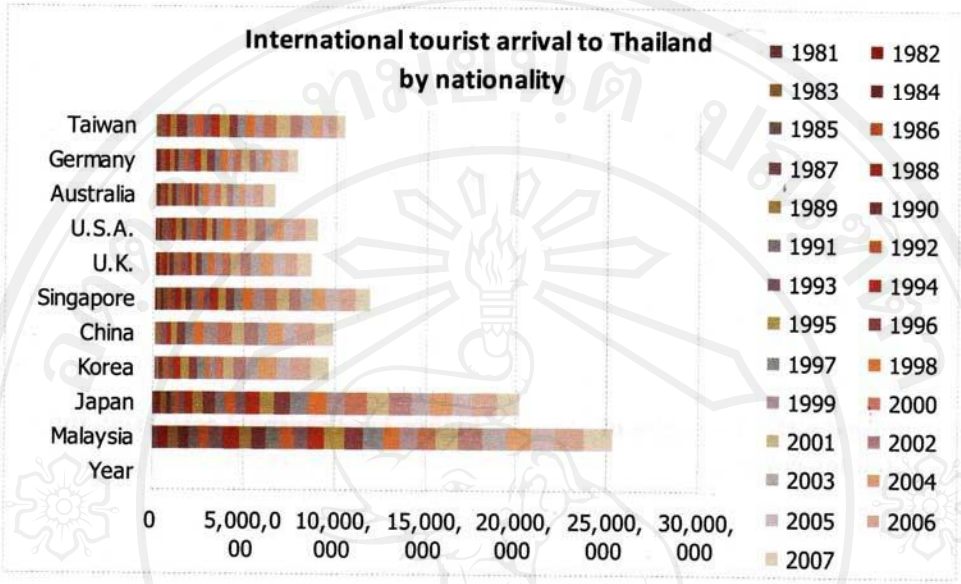

Figure 4: Total number of international tourists (DT)

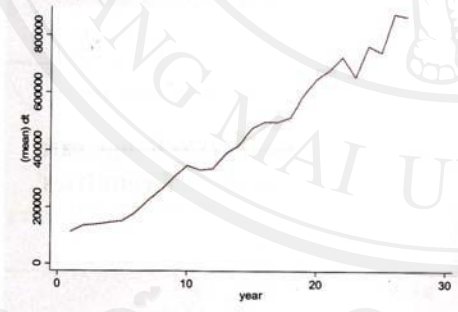

Figure 5: Real GDP per capita (Y)

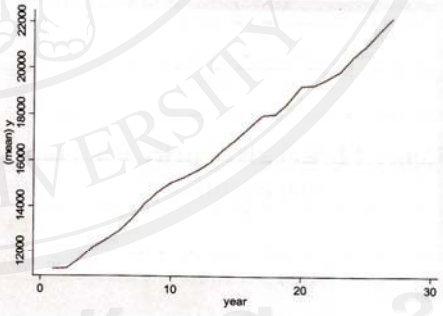

Figure 6: Transport costs to reach Thailand (TC)

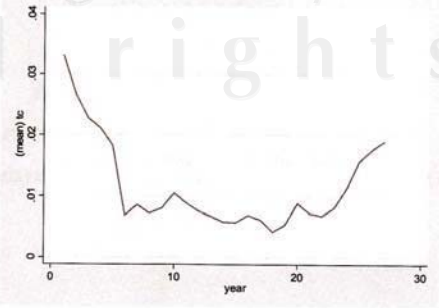

Figure 7: Relative price to reach Thailand (RP)

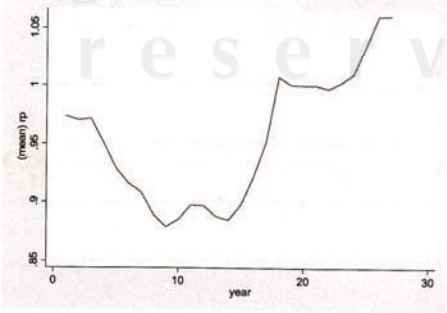

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Figure 8: Nominal exchange rate of original country to Bath per dollars

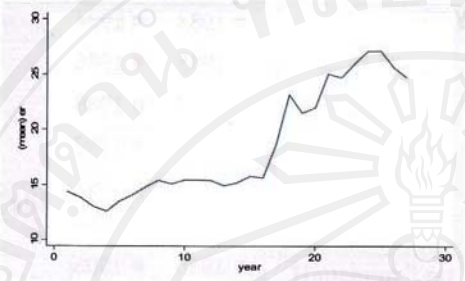


Figure 9: international tourists from top ten countries

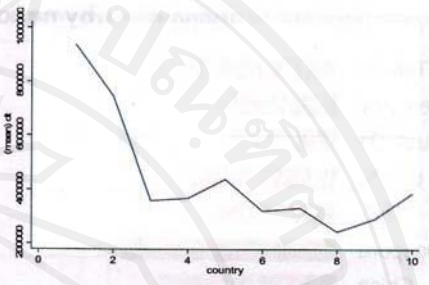


Figure 10: Real GDP per capita of top ten countries

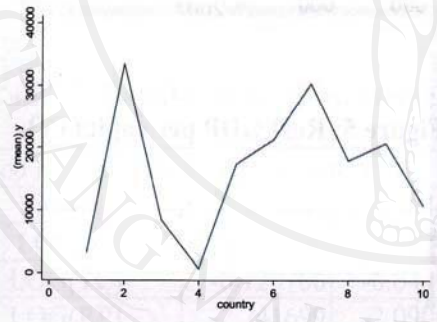


Figure 11: Transport costs from top ten countries

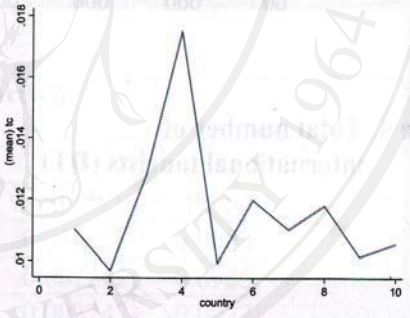


Figure 12: Relative price from top ten countries

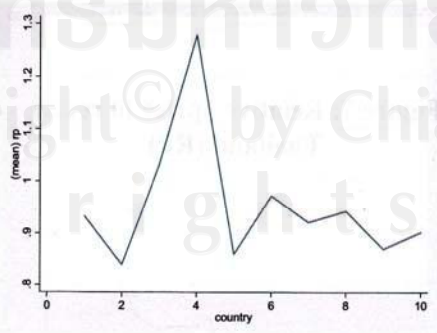
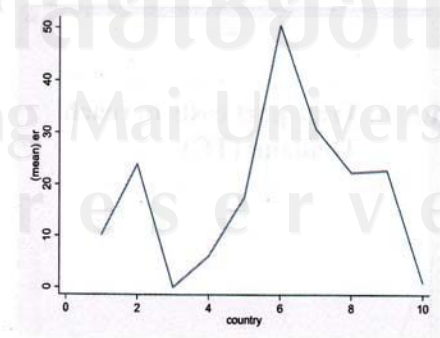


Figure 13: Nominal exchange rate from top ten countries



1.Malaysia 2.Japan 3.Korea 4.China 5.Singapore 6.U.K 7 . U.S.A 8. Australia 9. Germany 10. Taiwan

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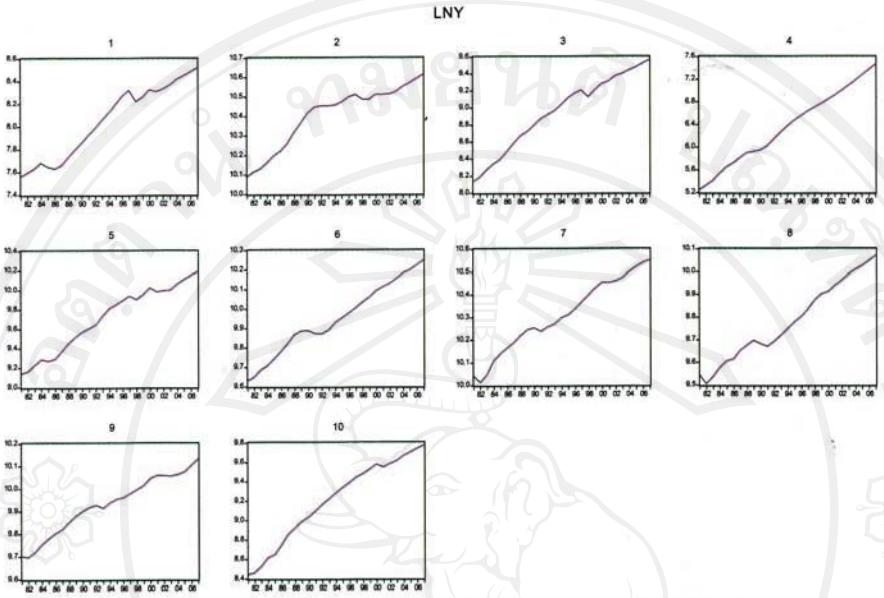
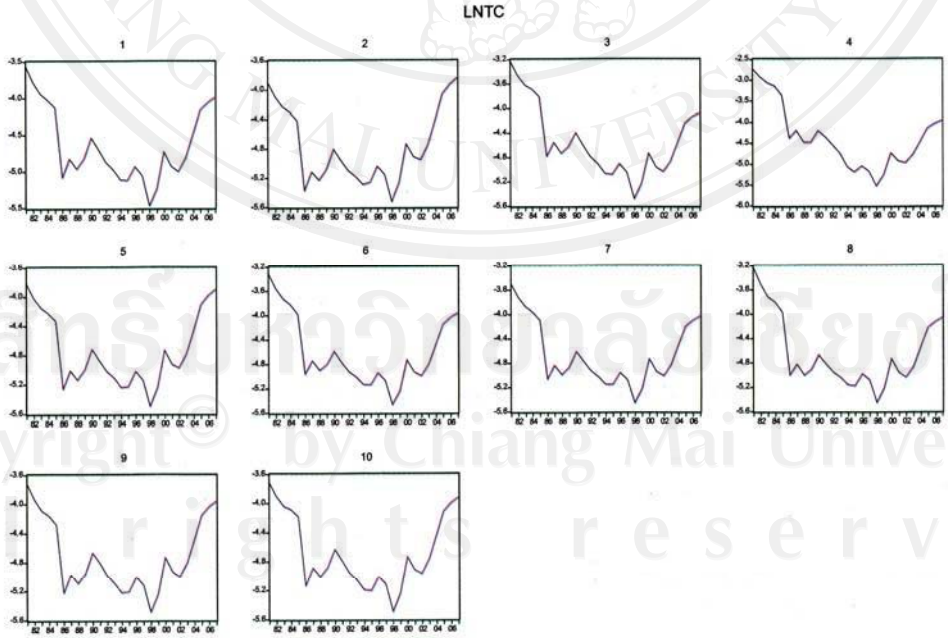
Figure 14: LnY of Ten countries



1. Malaysia 2.Japan 3.Korea 4.China 5.Singapore 6.U.K 7 . U.S.A 8. Australia 9. Germany 10. Taiwan

Figure 15: LnTC of Ten countries



1. Malaysia 2.Japan 3.Korea 4.China 5.Singapore 6.U.K 7 . U.S.A 8. Australia 9. Germany 10. Taiwan

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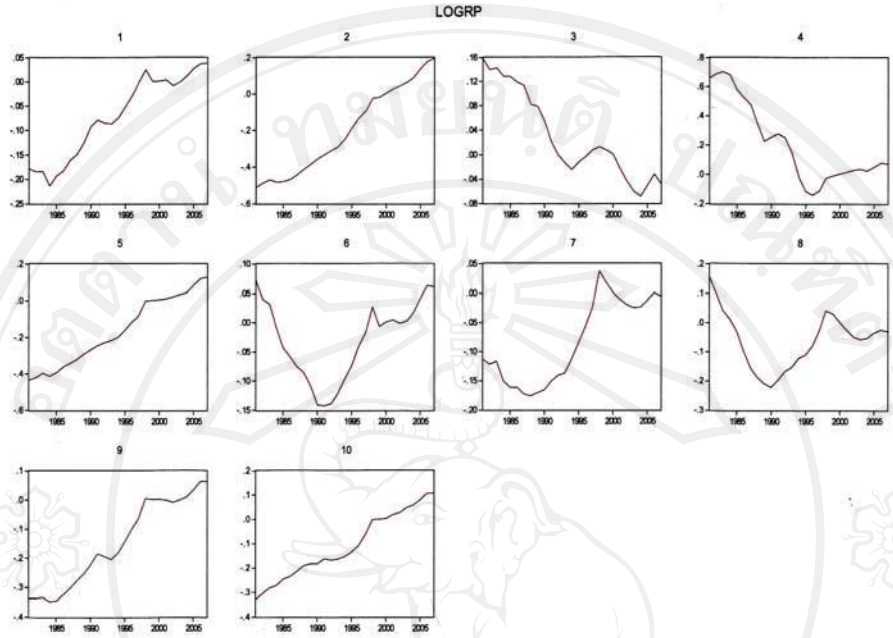
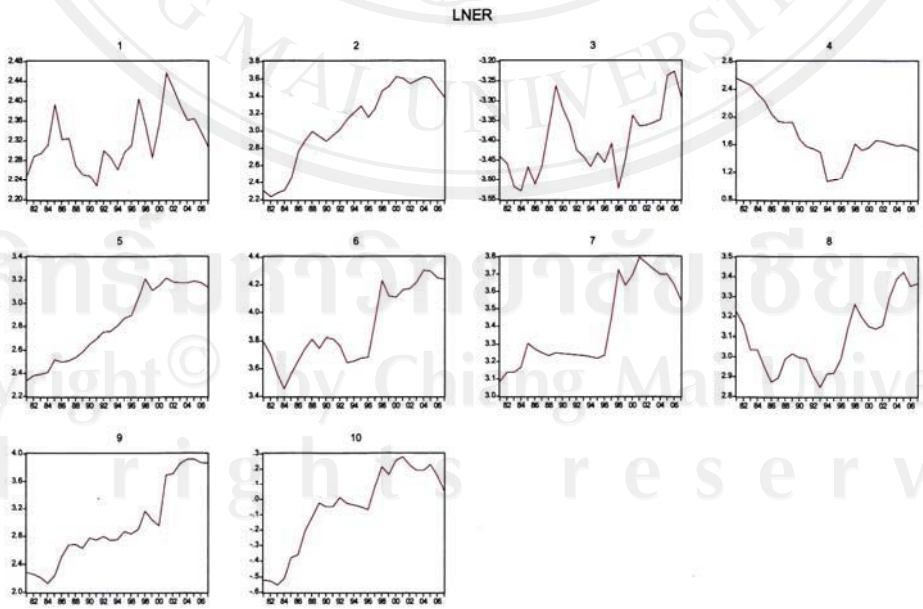
Figure 16: LnRP of Ten countries



1. Malaysia 2.Japan 3.Korea 4.China 5.Singapore 6.U.K 7 . U.S.A 8. Australia 9. Germany 10. Taiwan

Figure 17: LnER of Ten countries



1. Malaysia 2.Japan 3.Korea 4.China 5.Singapore 6.U.K 7 . U.S.A 8. Australia 9. Germany 10. Taiwan

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APPENDIX B

The Modeling of International Tourists Demand To Thailand With Panel Data Test

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The Modeling of International Tourists Demand To Thailand With Panel Data

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ABSTRACT

This paper seeks to find the long-run relationships among international tourist arrivals to Thailand with economic variables such as income, transportation costs, relative prices, and the exchange rate for the period of 1981–2007. The Co-integration techniques used were based on Panel Co-integration, while as OLS estimator and DOLS estimator were used to find long-run relationships of the international tourism demand model in Thailand, as well as by using fixed and random effects for static models, and including short-run relationship estimate dynamic panel data to test tourists' different purposes on business and holidays in Thailand.

After Panel Unit Root Tests, the long-run results indicate that the economic conditions of tourists from Malaysia, Japan, Korea, China, Singapore, U.K., U.S.A., Australia, Germany and Taiwan who visited Thailand between 1981–2007 were very important factors in determining tourism demand in Thailand, and growth in income (GDP) of Thailand's major tourist source markets has a positive impact on international visitor arrivals to Thailand. The estimated values of the total cost suggest that the total cost is affected in the positive direction by tourists from distant countries to Thailand. Considering the top ten countries that send tourists for business and holiday purposes to Thailand suggests that the economic conditions of tourists who visit Thailand are very important factors in determining tourism demand to Thailand, but relative price, total cost, and nominal exchange rates were found to be less effective. Dynamic panel GMM estimator in the short run found that a positive coefficient on lagged tourist arrivals also suggests the presence of repeat visits, which may be reflecting the positive experience of tourists' expenditures with respect to Thailand's multicultural background, hospitality, excellent beach resorts, etc. The findings lend support to the current policy of the government whereby significant marketing effort is being made at the international level to further promote Thailand's tourism products.

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1. Introduction

International tourism is a fast-growing industry generating half-a-trillion dollars in annual revenues, accounting for almost 10% of total international trade, and contributing almost half of the revenues from total trade in services. International tourism is the world's largest export earner. Moreover, it is a labour-intensive industry, employing an estimated 100 million people around the world. The tourism industry has had a major role in the economic development of Thailand over the past 40 years. Thailand has been placed among the twenty most popular tourist destinations in the world. Numbers of international tourists to Thailand increased from 3.48 million in 1987 to 13.82 million in 2006. The income received from international tourists accounted for 6.23% of the GDP in 2006, while the ranking of international tourists in Asia who came to travel in Thailand was second behind China in the tourism market in 2007.

Groupings by nationality of international tourists to Thailand from 1997 to 2005 show tourists from East Asia at 56.29%, Europe at 24.87%, United States of America at 7.44%, South Asia at 4.36%, Oceania at 4.18%, the Middle East at 2.10%, and Africa at 0.76%. (Figure 1) When looking at the tourist nationality breakdown, we can see that more than 50 percent of international tourist arrivals are intra-region tourists. The numbers show that there are markets where more effort needs to be focused. Europe and America are two areas where people have high amounts of disposable income to use while traveling. Especially America, which shows only 7.44 percent contributions to the total number of tourists in the years 1977 to 2005. The market can be penetrated more effectively if Thailand can catch more attention. The potential of Thailand's tourism relies on the advantages of having resources, including natural resources such as beaches, islands, tropical forests, coral reefs, and farms, and also the tropical climate.

Thailand has been one of the top destinations for nature-seeking tourists for the past many years. Local culture and traditions where each part of Thailand has its own unique cultures help spread out the spectrum of tourists' experiences when they come to the country. The long history of the nation and its location has created many historical and archeological sites, which interest visitors with both educational information and stunning beauty. Thai food is one of the most popular cuisines around the world. Rich and various varieties of food can be found throughout the country. Each part of the country has its own special dishes, which visitors can explore as part of their adventurous journeys. Top-ranked hotels, resorts, and spas are ready to welcome visitors at most of the popular destinations in the Thailand, and the warm hospitality of Thai people is successful in impressing visitors which will bring them back again. The number of international tourists arrivals to Thailand has increased every year since 1981–2007. In 1981 the number of international tourist arrivals from the top ten countries to Thailand was less than 0.2 million, but the number grew continuously to nearly 1.4 million in 2007.The top ten countries that sent the most tourists were Malaysia, Japan, South Korea, China, Singapore, U.K., U.S.A., Australia, Germany, and Taiwan. Economists have tried to understand the international tourist consumer behavior through demand models. For example, Barry and O'Hagan (1972), Jud, G.D. and Joseph, H., (1974), Uysal and Crompton (1984), Summary (1987), N. (1996), Lim C. and M. McAleer (2000) studied the demand of international tourists going to Australia, as did Durbarry (2002), Paresh, Kumar, and Narayan (2004), and Resina Katafono and Aruna Gounder (2004), Richa (2005), Parsert, N. Rangaswomy and Chukiat (2006).

The sources above mostly focuses on international tourism demand functions based on time series analysis. Recently a lot of research about international tourist demand function has used the econometric method based on the panel data analysis. The researchers studied papers such as Durbary (2000), Munoz and Amaral (2002), Naude and Saayman (2004), Eilat and Einav (2004), Chin and Pan (2004), Proenca and Soukiazis (2005), and Maloney and Rojas (2005). Furthermore this research focuses on both the panel unit root test and the panel cointegration test.

In order to investigate the determinants of international tourism demand to Thailand, static panel data models using fixed effect and random effect estimators were implemented, while dynamic panel data models adopted the generalized method of moments (GMM) and estimator (panel GMM procedures). These findings help marketers and tourism authorities to focus their promotions and positioning strategies to the right target markets. The remainder of this paper is organized as follows: Section 2 introduces the data set and the econometric approach to be

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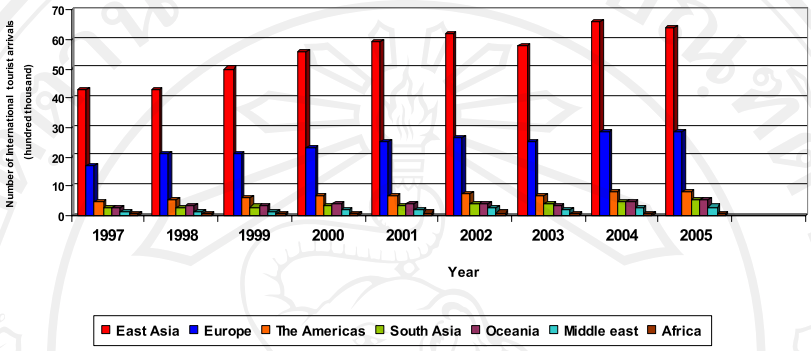
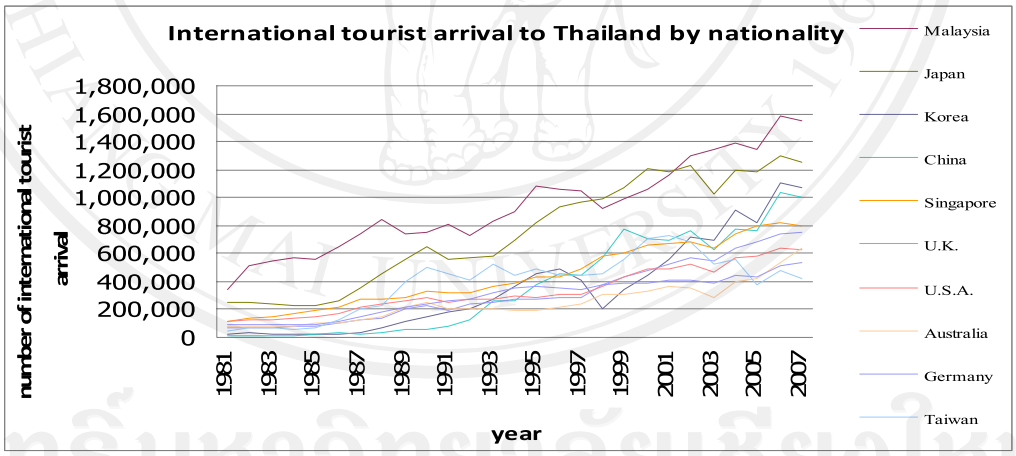
followed, while the results of empirical estimation are presented in Section 3. Policy implications and some concluding remarks are given in Section 4.

Figure 1: International Tourist Arrivals to Thailand by Nationality



Source: Tourism Authority of Thailand (TAT)

Figure 2: Number of international tourist arrivals (DT) to Thailand from 1981 to 2007



Source: Tourism Authority of Thailand (TAT)

2. DATA AND EMPIRICAL METHODOLOGY

2.1. Data

This paper uses time series data from 1981–2007 for the top ten source countries of international tourists to Thailand, which include Malaysia, Japan, Korea, China, Singapore, U.K., U.S.A., Australia, Germany and Taiwan. International tourism demand is usually measured by the number of foreign visitors, namely international tourist arrivals, to estimate international tourism demand to Thailand**.** Yearly data for international tourist arrivals collected from statistical data sets for each country have been obtained from the World Tourism Organization or the Tourism Authority of Thailand (TAT). The panel models are estimated by using fixed effects or random effect for static models and panel GMM procedures. We also test effects from the different purposes of tourists to Thailand with dependent variables, namely business and holiday.

The key independent variables in equations are real GDP per capita in country of origin. *Tourism disposable income of*

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individuals coming from origin country (Y_{it}). This variable is approximated income with origins' per capita GDP at constant prices. Data is taken from GDP per Cap from the United States Department of Agriculture, Economic Research Service, and international macroeconomic data sets.

country (RP_{it} = CPI Thailand / CPI origin country). Data comes from IMF and BOT (Bank of
Thailand). Independent variables also include nominal exchange rate of original country to Thai baht per dollar (ER_{it}) obtained from United States Department of Agriculture, Economic Research Service international macroeconomic data set and transportation costs from origin country i to Thailand. Since information on bilateral transport costs was unavailable, this variable is approximated with Jet Fuel (Dollar)/CPI origin. Data is taken from the United States Energy Information Administration (2007), Rotterdam (ARA) Kerosene-Type Jet Fule Spot Price FOB.

2.2. Empirical Methodology

The primary purpose of the paper is to detect the most significant factors affecting the flow of international tourists by country of origin. Panel data models were constructed by using yearly data corresponding to the top ten countries sending international tourists to Thailand.

2.2.1 The concept and background of International Tourism Demand Model

A simple origin-destination demand model for international tourism can be written as: (equation number (1)).

Dt = f (Yt TCt RPt ERt) (1)

TCt = a measure of transportation costs from the origin to destination country at time t; Pt = is a measure of tourism price of goods and services at time t.
and assume that (+ Yt), (-TCt), (- RPt)(+ERt) and explain that when income at time t is increasing then the demand for international tourism is increasing simultaneously. When the measure of transportation costs from the origin to destination country at time t is increasing then the demand for international tourism decreases. And when the measure of tourism price of goods and services is increasing then the demand for international

As far as relative prices are concerned, it is common in tourism demand studies to use the CPI of a destination country for relative tourism prices. The inverse of this shows how many "baskets" of goods a tourist has to give up in his home country in order to buy a basket of goods in the destination

tourism is decreasing. And the equation (1) can be expressed in log-linear (or logarithmic) form equation number (2).

ln Dt = α + βln Yt + γln TC + δln RPt, + φln Dt -1 + θln ER + u t (2)

where:
ln Dt = logarithm of tourist arrivals (or demand) from the origin to destination country at time t;
ln Yt = logarithm of real GDP in original country at time t;
lnTCit = logarithm of between original country and destination country at time t;
ln RPt = logarithm of relative prices (or CPI of destination country/CPI of original
country) at time t;
lnERt = logarithm of nominal exchange rate of original countries convert to Thai bath per dollar at time t;
u t = independently distributed random error term, with zero mean and constant
variance at time t;
α, β, γ, δ, φ, θ = parameters to be estimated; $\beta > 0$, $\gamma < 0$, $\delta < 0$, $0<\varphi< 1$, $\theta > 0$
(substitutes) and $\theta < 0$ (complements).

The above information mostly focuses on international tourism demand function based on time series analysis. Recently a lot of research about international tourist demand function has used the econometric method based on the panel data analysis. Researchers who have studied research include Durbary (2000), Munoz and Amaral (2002), Naude and Saayman (2004), Eilat and Einav (2004), Chin and Pan (2004), Proenca and Soukiazis (2005), and Maloney and Rojas (2005. Furthermore this research or the "A Panel Unit Root and Panel Cointegration Test of Modeling International tourism Demand to Thailand" focuses on both the panel unit root test and the panel cointegration test. The above researchers have not used both the panel unit root test and the panel cointegration test for estimated international tourism demand function. Also, the models used in this research has been

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modified from equation (2) and can be written as equation (3), (4) and (5).

$$\ln DTit = \alpha + \beta \ln (Yit) + u\,it \quad (3)$$

$$\ln DTit = \rho + \gamma \ln (TCit) + u\,it \quad (4)$$

$$\ln DTit = \eta + \theta \ln(RPit) + u\,it \quad (5)$$

ln D1it = logarithm of tourist arrivals (or demand) from the origin countries number i to destination country (Thailand) at time t;
ln Yit = logarithm of real GDP in original countries number i at time t;
lnTCit = logarithm of price of Jet Fuel of original countries number i at time t;
lnRPit = logarithm of relative prices in country of origin i compare to Thailand at time t;
lnERit = logarithm of nominal exchange rate of original country number i per destination country(Thailand) at time t;
u it = independently distributed random error term, with zero mean and constant variance number i at time t;
α, ρ, η, μ ,β, γ, θ,€ = parameters to be estimated, $\alpha > 0$, $\rho > 0$, $\eta > 0$, $\mu > 0$, $\beta > 0$, $\gamma < 0$, $\theta < 0$, € > 0.

Furthermore the equation of international tourism demand model each of country has been modified from equation (3), (4) and (5) (6) to be equations (7), (8) and (9),(10) as well as these equation can presented below that:

$$\ln DTit = \alpha 1 + \beta 1 \ln (Yit) + \beta 2\,(D2*\ln(Yit)) + \beta 3\,(D3*\ln(Yit)) + \beta 4\,(D4*\ln(Yit)) + \beta 5\,(D5*\ln(Yit)) + \beta 6\,(D6*\ln(Yit)) + \beta 7(D7*\ln(Yit)) + \beta 8(D8*\ln(Yit)) + \beta 9(D9*\ln(Yit)) + \beta 10(D10*(\ln Yit)) + u\,it \quad (7)$$

$$\ln DTit = \alpha 2 + \beta 11 \ln(TC_{it}) + \beta 12(D2*\ln(TC_{it})) + \beta 13(D3*\ln(TC_{it})) + \beta 14(D4*\ln(TC_{it})) + \beta 15(D5*\ln(TC_{it}) + \beta 16(D6*\ln(TC_{it})) + \beta 17(D7*\ln(TC_{it})) + \beta 18(D8*\ln(TC_{it}t)) + \beta 19(D9*\ln(TC_{it}t)) + \beta 20(D10*\ln(TC_{it})) + u\,it \quad (8)$$

$$\ln DTit = \alpha 3 + \beta 21 \ln(RPit) + \beta 22(D2*\ln(RPit)) + \beta 23(D3*\ln(RPit)) + 24(D4*\ln(RPit)) + \beta 25(D5*\ln(RPit)) + 26(D6*\ln(RPit)) + \beta 27(D7*\ln(RPit)) + 28(D8*\ln(RPit)) + \beta 29(D9*\ln(RPit)) + \beta 30(D10*\ln(RPit)) + u\,it \quad (9)$$

$$\ln DTit = \alpha 4 + \beta 31 \ln(ERit) + 32(D2*\ln(ERit)) + \beta 33(D3*\ln(ERit)) + \beta 34(D4*\ln(ERit)) + \beta 35(D5*\ln(ERit)) + \beta 36(D6*\ln(ERit)) + \beta 37(D7*\ln(ERit)) + \beta 38(D8*\ln(ERit)) + \beta 39(D9*\ln(ERit)) + \beta 40(D10*\ln(ERit)) + u\,it \quad (10)$$

where:
i = cross-section-data (the number of country arrival to Thailand)
t = time series data

where:
i = cross-section-data (the number of country arrival to Thailand);
t = time series data;
ln DTit = logarithm of tourist arrivals (or demand) from the origin countries number i to destination country (Thailand) at time t;

ln Y_{it} = logarithm of real GDP per capita in country of origin or tourism disposable income of individuals coming from original countries number i at time t;

lnTCit = logarithm of price of Jet Fuel of original countries number i at time t;

lnRPit = logarithm of relative prices in country of origin compare to Thailand;

lnERit = logarithm of nominal exchange rate of original country number i at time t;

u it = independently distributed random error term, with zero mean and constant variance number i at time t;

D2 = 1 is Japan, D3 = 0 is otherwise;
D3 = 1 is Korea, D4 = 0 is otherwise;
D4 = 1 is China, D5 = 0 is otherwise;
D5 = 1 is Singapore, D6 = 0 is otherwise;
D6 = 1 is U.K., D7 = 0 is otherwise;
D7 = 1 is U.S.A., D8 = 0 is otherwise;
D8 = 1 is Australia, D9 = 0 is otherwise;
D9 = 1 is Germany , D10 = 0 is otherwise;
D10 = 1 is Taiwan , D10 = 0 is otherwise;

And defined that $\beta 1,\ldots, \beta 30$ and $\alpha 1$, $\alpha 2$ and $\alpha 3$ = parameters to be estimated; $\beta 1,\ldots\ldots, \beta 10 > 0$, $\beta 11,\ldots\ldots, \beta 20 < 0$ and $\beta 21,\ldots\ldots, \beta 30 < 0$, and $\beta 31,\ldots\ldots, \beta 40 < 0$. ;

2.2.2 . Panel Unit-Root Tests

Recent literature suggests that panel-based unit root test have higher power than unit root test based on individual time series,

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see Levin, Lin and Chu (2002), Im, Persaran and Shin (2003), and Breitung (2000) to mention a few of popular test purchasing power parity (PPP) and growth convergence in macro panels using country data over time. This research focus on four type of panel unit root test such as Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-Type test using ADF and PP-test (Maddala and Wu (1999) and Choi (2001)).

2.2.3 Estimating panel cointegration model

The various (casually single equation) approach for estimating a cointegration vector using panel data such as Pedroni (2000, 2001) approach, Chiang and Kao (2000, 2002) approach and Breitung (2002) approach. For this research we use Chiang and Kao (2000, 2002) approach to estimate panel cointegration.

2.2.4. Estimating panel data in Tourism demand

A panel is a set of observations on individuals, collected over time. An observation is the pair $\{y_{it}, \chi_{it}\}$, where the i subscript denotes the individual, and the t subscript denotes time. A panel may be balanced:

$\{y_{it}, \chi_{it}\}$: t = 1, …, T; i = 1, …, n,

or unbalanced:

$\{y_{it}, \chi_{it}\}$: For I = 1, …, n, $t = \underline{t}_i$, …, $\bar{t}_i$.

1.) Individual-Effects Model

The standard panel data specification is that there an individual-specific effect which enters linearly in the regression

$$y_{it} = \chi'_{it}\beta + \alpha_i + u_{it}$$

The typical maintained assumptions are that the individuals i are mutually independent, that α_i and u_{it} are independent, that u_{it} is iid across individuals and time, and that u_{it} is uncorrelated with χ_{it}.

OLS of y_{it} on χ_{it} is called pooled estimation. It is consistent if

$$E(\chi_{it}\alpha_i) = 0 \qquad \text{(Eq.11)}$$

If this condition fails, then OLS is inconsistent. (Eq.11) fails if individual-specific unobserved effect α_i is correlated with the observed explanatory variables χ_{it}. This is often believed to be plausible if u_i is an omitted variable. If (Eq.1) is true, however, OLS can be improved upon via a GLS technique. In either event, OLS appears a poor estimation choice. Condition (Eq.1) is called the *random hypothesis*. It is a strong assumption, and most applied researchers try to avoid its use.

2.)Fixed Effects

This is the most common technique for estimation of non-dynamic linear panel regressions.

The motivation is to allow α_i to be arbitrary, and have arbitrary correlated with χ_{it}. The goal is to eliminate α_i from the estimator, and thus achieve invariance.

There are several derivations of the estimators.

First, let

$$d_{ij} = \begin{cases} 1 & \text{if } i = j \\ 0 & \text{eles} \end{cases}, \text{ and } d_i = \begin{pmatrix} d_{i1} \\ \vdots \\ d_{in} \end{pmatrix}$$

An n x 1 dummy vector with a "1" in the i'th place. Let $\alpha = \begin{pmatrix} \alpha_1 \\ \vdots \\ \alpha_n \end{pmatrix}$ Then note that

$$\alpha_i = d'_i \alpha,$$

And

$$y_{it} = \chi'_{it}\beta + d'_i\alpha + u_{it}. \qquad \text{(Eq.12)}$$

Observe that

$$E(u_{it} \mid \chi_{it}, d_{it}) = 0,$$

So (Eq.2) is a valid regression, with d_i as a regressor along with χ_i.

OLS on (Eq.12) yield estimator $(\hat{\beta}, \alpha)$. Conventional inference applies. Observe that this is generally consistent.

- If χ_i contains an intercept, it will be collinear with d_i, so the intercept is typically omitted from χ_{it}.

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- Any regressor in χ_{it} which is constant over time for all individuals (e.g., their gender) will be collinear with d_i, so will have to be omitted.
- There are n + k regression parameters, which is quite large as typically n is very large.

Computationally, you do not want to actually implement conventional OLS estimation, as the parameter space is too large. OLS estimation of β proceeds by the FWL theorem. Stacking the observations together:

$$y = \chi\beta + Du + e,$$

Then by the FWL theorem,

$$\hat{\beta} = \left(X'(I - P_D)X\right)^{-1}\left(X'(I - P_D)y\right)$$

$$= \left(X^{*\prime}X^{*}\right)^{-1}\left(X^{*\prime}y^{*}\right),$$

where

$$y^{*} = y - D(D'D)^{-1}D'y$$

$$X^{*} = X - D(D'D)^{-1}D'X.$$

Since the regression of y_{it} on d_i is a regression onto individual-specific dummies, the predicted value from these regressions is the individual specific mean $\bar{y}_{it}$, and the residual is the dream value

$$y^{*}_{it} = y_{it} - \bar{y}_i.$$

The fixed effects estimator $\hat{\beta}$ is OLS of y^{*}_{it} on χ^{*}_{it} the dependent variable and regressors in deviation-from-mean form.

Another derivation of the estimator is to take the equation

$$y_{it} = \chi'_{it}\beta + \alpha_i + u_{it},$$

and then take individual-specific means by taking the average for the i' th individual:

$$\frac{1}{T_i}\sum_{t=\underline{t}_i}^{\bar{t}_i} y_{it} = \frac{1}{T_i}\sum_{t=\underline{t}_i}^{\bar{t}_i} \chi'_{it}\beta + \alpha_i + \frac{1}{T_i}\sum_{t=\underline{t}_i}^{\bar{t}_i} u_{it}$$

or

$$\bar{y}_{it} = \bar{\chi}'_i\beta + \alpha_i + \bar{u}_i.$$

Subtracting, we find

$$y^{*}_{it} = \chi^{*\prime}_{it}\beta + u^{*}_{it},$$

which is free of the individual-effect u_i.

3.) Dynamic Panel Regression

A dynamic panel regression has a lagged dependent variable

$$y_{it} = \omega y_{it-1} + \chi'_{it}\beta + \alpha_i + u_{it}. \quad \text{(Eq.13)}$$

This is a model suitable for studying dynamic behavior of individual agents.

Unfortunately, the fixed effects estimator is inconsistent, at least of T is held finite as $n \to \infty$. This is because the sample mean of $y_{it} - 1$ is correlated with that of e_{it}.

The standard approach to estimate a dynamic panel is to combine first-differencing with IV or GMM. Taking first-differences of (Eq.3) eliminates the individual-specific effect:

$$\Delta y_{it} = \omega \Delta y_{it-1} + \Delta\chi'_{it}\beta + \Delta\alpha_{it}. \text{(Eq.14)}$$

However, if e_{it} is iid, then it will be correlated

$$E\left(\Delta y_{it-1}\Delta\alpha_{it}\right) =$$
$$E\left(\left(y_{it-1} - y_{it-2}\right)\left(\alpha_{it} - \alpha_{it-1}\right)\right)$$
$$= -E\left(y_{it-1}\alpha_{it-1}\right) = -\sigma_e^2.$$

with Δy_{it-1} :

So OLS on (Eq.4So OLs) will be inconsistent.

But if there are valid instruments, then IV or GMM can be used to estimate the equation. Typically, we use lags of the dependent variable, two periods back, as y_{t-2} is uncorrelated with $\Delta\alpha e_{it}$. Thus values of $y_{it-k}, k \geq 2,$ are valid instruments.

Hence a valid estimator of α and β is to estimate (13.4) by IV using y_{t-2} as an instrument for Δy_{t-1} (which is just identified). Alternatively, GMM using y_{t-2} and y_{t-3} as instruments (which is overidentified, but loses a time-series observation).

A more sophisticated GMM estimator recognizes that for time-periods later in the sample, there are more instruments available, so the instrument list should be different for each equation. This is conveniently organized by the GMM principle, as this enables the moments from the different time-periods to be stacked together to create a list of all the

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moment conditions. A simple application of GMM yields the parameter estimates and standard errors.

4.3. Empirical Results

4.3.1 The empirical results of the panel unit root test

This paper used the panel unit root test of the variables by four standard method tests for panel data. Namely, Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-Type test using ADF and PP-test (Maddala and Wu (1999) and Choi (2001)). Table 1 presents the results of panel unit root tests based on the four method tests for all variables used in modeling international tourism demand to Thailand. Most of the results indicate the presence of unit roots, as the Levin, Lin and Chu (2002), Breitung (2000) method test, Im, Pesaran and Shin (2003), Maddala and Wu (1999), and Choi (2001) method tests indicate that lnDTt lnYt lnTCt lnRPt lnERt fails to reject the null of the four unit roots. So, all variables should be taken first differing or take second differing, as well as when taking the first differing in all variables, then the results of panel unit root test based on the four methods can presented in table 2.

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Table 1: Results of panel unit root tests based on 4 method tests for all variables

Method test	Test statistic	Significance level for rejection
Null : unit root (assumes common unit root process)		
Levin,Lin and Chu (2002) t*-Statistics		
1. $lnDT_{it}$	1.67	0.95
2. lnY_{it}	-0.39	0.34
3. $lnTC_{it}$	-2.88	0.002
4. $lnRP_{it}$	1.05	0.85
5. $lnER_{it}$	-0.59	0.27
Breitung(2000)t*-Statistics		
1. $lnDT_{it}$	-1.86	0.03
2. lnY_{it}	-0.03	0.48
3. $lnTC_{it}$	-1.18	0.033
4. $lnRP_{it}$	-1.18	0.033
5. $lnER_{it}$	1.19	0.88
Null : unit root (assumes individual unit root process)		
Lm, Pesaran and Shin (2003) W-Statistics		
1. $lnDT_{it}$	1.19	0.88
2. lnY_{it}	-1.39	0.09
3. $lnTC_{it}$	3.25	0.999
4. $lnRP_{it}$	1.18	0.88
5. $lnER_{it}$	-0.13	0.44
Maddala and Wu (1999) and Choi (2001)		
ADF-Fisher Chi-square		
1. $lnDT_{it}$	15.10	0.77
2. lnY_{it}	37.40	0.01
3. $lnTC_{it}$	3.07	0.999
4. $lnRP_{it}$	16.93	0.65
5. $lnER_{it}$	17.34	0.63
PP-Fisher Chi-square		
1. $lnDT_{it}$	27.79	0.35
2. lnY_{it}	9.62	0.97
3. $lnTC_{it}$	1.24	0.99
4. $lnRP_{it}$	13.11	0.87
5. $lnER_{it}$	12.84	0.88

A * indicates the rejection of the null hypothesis of non-stationary (Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-Type test using ADF and PP-test (Maddala and Wu (1999) and Choi (2001)) or stationary at least at the 10 percent level of significance

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Table2 : Results of panel unit root tests after first differencing into these variables.

Method test	Test statistic	Significance level for rejection
Null : unit root (assumes common unit root process)		
Levin,Lin and Chu (2002) t*- Statistics		
1. $lnDT_{it}$	8.52***	0.000
2. lnY_{it}	-7.83***	0.000
3. $lnTC_{it}$	-12.61***	0.000
4. $lnRP_{it}$	-9.88***	0.000
5. $lnER_{it}$	-5.41***	0.000
Breitung(2000)t*-Statistics		
1. $lnDT_{it}$	-5.33***	0.000
2. lnY_{it}	-3.47***	0.000
3. $lnTC_{it}$	-10.79***	0.000
4. $lnRP_{it}$	-6.27***	0.000
5. $lnER_{it}$	-5.37***	0.000
Null : unit root (assumes individual unit root process)		
Lm, Pesaran and Shin (2003) W-Statistics		
1. $lnDT_{it}$	-10.35***	0.000
2. lnY_{it}	-8.09***	0.000
3. $lnTC_{it}$	-11.56***	0.000
4. $lnRP_{it}$	-7.93***	0.000
5. $lnER_{it}$	-4.34***	0.000
Maddala and Wu (1999) and Choi (2001)		
ADF-Fisher Chi-square		
1. $lnDT_{it}$	-118.07***	0.000
2. lnY_{it}	93.56***	0.000
3. $lnTC_{it}$	725.70***	0.000
4. $lnRP_{it}$	89.23***	0.000
5. $lnER_{it}$	51.57***	0.000
PP-Fisher Chi-square		
1. $lnDT_{it}$	117.25***	0.000
2. lnY_{it}	88.64***	0.000
3. $lnTC_{it}$	725.58***	0.000
4. $lnRP_{it}$	87.43***	0.000
5. $lnER_{it}$	46.00***	0.000

A *** indicates the rejection of the null hypothesis of non-stationary (Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-Type test using ADF and PP-test (Maddala and Wu (1999) and Choi (2001)) or stationary at least at the 1 percent level of significance.

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4.3.2 The empirical results of panel cointegration test

Table 3 : Results of panel cointegration test of the modeling international tourists arrival in Thailand based on ADF statistic (Koa,1999).

From : computed

Test Name	Test statistic	Significance level for rejection of the null hypothesis (no cointegration)
ADF-statistic	-2.658221***	.00039

Table 3 presents the results of panel cointegration test of the modeling of international tourism demand in Thailand based on ADF statistics. ADF statistics indicate that all variables used in this model are significant at the rejection of the null hypothesis (no cointegration) at the 0.01 level of significance.

4.3.3 The empirical results of estimating panel cointegration model

1. The empirical results of estimating panel cointegration model with all countries providing international tourists arrival to Thailand based on both OLS-estimator and DOLS-estimator

Table 4. Results of the long-run relationship of the modeling international tourism demand To Thailand base on OLS , DOLS, estimator (lnDi t is dependent variable)

From : computed

Variables	OLS estimator	DOLS estimator
Constant	5.67*** (10.73)	-8.79*** (-13.67)
1. $\ln Y_{it}$	0.42*** (8.01)	1.98*** (27.30)
2. $\ln TC_{it}$	-0.09 (-1.47)	-0.19*** (-4.30)
3. $\ln RP_{it}$	0.39 (1.19)	1.05*** (9.23)
4. $\ln ER_{it}$	-0.37*** (3.36)	-2.04*** (-8.67)
5. $\ln \Delta Y_{i\,t-1}$		-0.88 (-1.18)
6. $\ln \Delta TC_{i\,t-1}$		0.14*** (1.92)
7. $\ln \Delta RP_{i\,t-1}$		-0.65*** (-2.90)
8. $\ln \Delta ER_{i\,t-1}$		1.87*** (2.56)
Sum squared resid	240.98	19.09
Adjusted R-squared	0.11	0.90

Note: estimates refer to (fixed-effects) long- run elasticity of output with respect to the relevant regression. T-ratios are in parenthesis and a * denotes statistical significance at the 10 percent level and a ** denotes statistical significance at the 5 percent level and a *** denotes statistical significance at the 1 percent level. NT=270 for 1981-2007.

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Table 4 presents the results of the long-run relationship of the modeling international tourism demand Thailand based on OLS-estimator and DOLS-estimator (lnDit is a dependent variable). The empirical results of the long-run tourism demand model for Thailand's ten main tourist source countries (Malaysia, Japan, South Korea, China, Singapore, U.K., U.S.A., Australia, Germany, and Taiwan) during the years 1981–2007, obtained by normalizing visitor arrivals, are presented in Table 3. All variables appear with both the correct sign and incorrect sign. With the OLS-estimator, the results of all variables showed that ten countries as in long-run base on OLS-estimator and DOLS estimator to estimating panel cointegration model suggested real GDP per capita of origin countries increasing 1%, then the number of tourists from ten country arriving to Thailand increasing 0.42% or 1.98%, and in DOLS-estimator suggested that when transport costs to reach Thailand increasing 1% then the number of tourists from ten country arriving to Thailand decreasing 0.19%. DOLS-estimator also suggested that nominal exchange rate of original country converted to Thai Baht per dollars ($LnER_{it}$) and the relative price ($LnRP_{it}$) to reach Thailand have significant impact on international tourist arrivals to Thailand but not expected signs. The effect of change in the short run when $LnRP_{it}$ increases 1% is that the number of tourists from the ten countries arriving to Thailand increases 0.65%. When $LnER_{it}$ increases 1%, the number of tourists from the ten countries arriving to Thailand increases 1.87%. With unexpected signs in TC change from 1%, then the number of tourists from the ten countries arriving to Thailand increases 0.14%.

2. The empirical results of estimating panel cointegration model with each of ten international tourists countries arrival to Thailand based on OLS- estimator

Table 5. The empirical results of estimating panel cointegration model with each country of international tourists arrival to Thailand based on OLS-estimator

Variable	**Japan**	**Korea**	**China**	**Singapore**	United Kingdom
lnyi t	-0.96*** (-5.44)	0.34 (0.77)	1.27*** (9.10)	1.05*** (7.46)	-0.31* (-1.80)
lnTC i t	0.85*** (5.64)	0.66*** (4.39)	0.36*** (2.60)	0.42*** (2.92)	0.59*** (3.86)
lnRP i t	-3.47*** (-2.86)	-0.60** (-2.06)	4.17*** (5.02)	-2.21*** (-6.25)	-0.85*** (-2.62)
lnER i t	-4.11*** (-6.51)	-0.07 (-0.17)	-8.17*** (-9.19)	-2.80 (-6.05)	-0.36 (-0.87)
Variable	USA	Australia	**Germany**	**Taiwan**	Malaysia
lnYi t	1.27*** (3.38)	-0.07 (-0.16)	0.29 (0.73)	0.52 (0.87)	0.75*** (3.23)
lnTC i t	0.84*** (5.82)	0.85*** (5.75)	1.06*** (7.37)	0.49*** (3.24)	-0.75*** (-13.37)
lnRP i t	-0.14 (-0.39)	-1.11*** (-2.99)	-0.70 (-1.50)	-0.62*** (-2.18)	0.32 (1.14)
lnER i t	0.84 (1.09)	-2.21*** (-3.05)	0.14 (0.23)	-0.60 (-1.36)	-0.43 (-1.12)

Note: estimates refer to long-run elasticity of output with respect to the relevant regression. T-ratios are in parenthesis and a * denotes statistical significance at the 10 percent level and a ** denotes statistical significance at the 5 percent level and a *** denotes statistical significance at the 1 percent level. NT=270 for 1981-2007.

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4.3.4 Log linear Statistics Panel data estimate factor in international tourist demand from different purposes of original top ten countries to Thailand

Table 6. shows the results of the **Log linear Statistics panel data in dependent** total number of tourist arrivals in original top ten countries for Business purpose to Thailand (Bus_{it})

Variable	Fixed Effect	Random Effect
Constant	-12.53*** (-21.79)	-8.49*** (-15.92)
LNY	2.36*** (35.65)	1.99*** (34.37)
LNTC	-0.03 (-1.56)	-0.05** (-2.29)
LNRP	-0.08 (-0.36)	0.66*** (3.98)
LNER	0.29*** (2.51)	-0.04 (-0.61)

Note:T- ratios are in parenthesis and a * denotes statistical significance at the 10 percent level and a ** denotes statistical significance at the 5 percent level and a *** denotes statistical significance at the 1 percent level.

Table 7. The results of the Log linear Statistics panel data in dependent total number of tourist arrivals in original top ten countries for holiday purpose to Thailand (Ho_{it}).

Variable	Fixed Effect	Random Effect
Constant	-10.26** (-19.31)	-5.26*** (-10.76)
LNY	2.19*** (35.78)	1.86*** (35.02)
LNTC	-0.04 (-1.99)	-0.06*** (-2.99)
LNRP	-2.22*** (-10.19)	-0.34** (-2.21)
LNER	1.06*** (10.11)	0.09* (1.74)

Note:T- ratios are in parenthesis and a * denotes statistical significance at the 10 percent level and a ** denotes statistical significance at the 5 percent level and a *** denotes statistical

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Table 8. The results of Log linear dynamic panel data in dependent total number of tourist arrivals in original top ten countries for Business purpose (Bus_{it}) and for holiday purpose to Thailand (Ho_{it}).

Variable	Business purpose	Holidays purpose
	Fixed Effect	Fixed Effect
Constant	-1.08** (-2.30)	-4.38*** (-5.51)
LNY	0.27*** (3.30)	0.86*** (6.60)
LNTC	-0.09*** (-4.71)	-0.07 (-1.76)
LNRP	0.32*** (-4.71)	0.11 (1.16)
LNER	-0.64*** (-5.02)	0.16 (0.81)
LNBus(-1)	0.80 *** (24.74)	0.60*** (11.55)

Note:T- ratios are in parenthesis and a * denotes statistical significance at the 10 percent level and a ** denotes statistical significance at the 5 percent level and a *** denotes statistical significance at the 1 percent level.

Table 5 presents the results of the long-run relationship of the modeling of international tourism demand to Thailand based on OLS-estimator by each of country. The empirical results of the long-run tourism demand model for Thailand's ten main tourist source countries (Malaysia, Japan, South Korea, China, Singapore, U.K., U.S.A., Australia, Germany, and Taiwan) obtained by normalizing visitor arrivals are presented on table 5 based on OLS-estimator. Most all variables appear with both the correct sign and incorrect sign. Clearly, real GDP per capita of origin countries, travel costs of origin countries, the relative price to reach Thailand by individuals coming from their original country, and also the nominal exchange rate of original country converted to Thai Baht per dollars are influential in determining international tourist arrivals to Thailand.

In Japan, based on OLS-estimator in long-run estimating panel cointegration model suggested LnY_{it} , lnTCit, lnRPit and lnERit are significant but present unexpected signs in LnY_{it}(-0.96), lnTCit (0.85), lnERit (4.11) and present expected signs only in lnRPit (-3.47). In South Korea, the panel cointegration model suggested lnTCit (0.66) and lnRPit (-0.60) are significant, but lnTCit presents unexpected signs. In China, the panel cointegration model suggested all variables are significant in LnYit (1.27), lnTCit (0.36), lnRPit (4.17), and lnERit (-8.17), but only LnYit presents any expected signs.

The resulting effect on tourist numbers from Singapore suggested nearly all of LnYit (1.05), lnTCit (0.42), lnRPit (-2.21), and lnERit (-2.80) are significant, but present with expected signs in LnYit and lnRPit. The resulting effect in tourist numbers from United Kingdom suggested nearly all of LnYit (0.31), lnTCit (0.59), and lnRPit (-0.85) are significant except lnERit, but only lnRPit presents expected signs. The resulting effect in tourists number from USA suggested LnYit (1.27) and lnTCit (0.84) are significant, but only LnYit presented expected signs. The resulting effect in tourist numbers from Australia suggested lnTCit (0.85), lnRPit (-1.11), and lnERit (-2.21) are significant, but only lnRPit presented expected signs.

The resulting effect in tourists from Germany suggested only lnTCit (1.06) has significance but presented unexpected signs.

The resulting effect in tourists from Taiwan suggested lnTCit (0.49) and lnRPit (-0.62) are significant, but only lnRPit presented expected signs. The resulting effect in tourists from Malaysia suggested LnYit (0.75) and lnTCit (-0.75) are significant and present expected signs. Panel data estimate factors for international tourists demand from different purposes of original top ten countries to Thailand divined by dependent variables in business purpose and holiday purpose during 1981 to 2007, only real GDP per capita and in nominal exchange rate of original from ten countries convert to Bath per dollars the

coefficients are significant, and present expected signs. A 1% increase in the origins' real GDP per capita from the ten countries leads to a 2.36 % increase in total number of tourist arrivals in original top ten countries for Business purpose to Thailand, on average *ceterisparibus*. A 1% increase in nominal exchange rate of original from ten countries converted to baht per dollars causes a 0.29% increase in total number of tourist arrivals from original countries for business purpose to Thailand, on average and *ceteris paribus*.

With random Effects estimator Model assume Cross-section random and Idiosyncratic random almost variable coefficients seem significant, except nominal exchange rate, a 1% increase in origins' real GDP per capita from ten countries, leads to a 1.99% increase in total number of tourist arrivals in original top ten countries for business purpose to Thailand, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries leads to a 0.05 % decrease in total number of tourist arrivals in original ten countries for Business purpose to arrivals in original countries for holidays to Thailand, on average and *ceteris paribus*.

With random Effects estimator assume Cross-section random and Idiosyncratic random all variable coefficients seem significant and present expected signs.A 1% increase in origins' real GDP per capita from ten countries, leads to a 1.86 % increase in total number of tourist arrivals in original top ten countries for a holiday purpose to Thailand, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries, leads to a 0.06 % decrease in total number of tourist arrivals in original top ten countries for a holiday purpose to Thailand, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 0.34 % increase in total number of tourist arrivals from the original top ten countries for holiday purpose to Thailand, on average a *ceterisparibus*. Finally, a 1% increase in nominal exchange rate of original from ten countries convert to Bath per dollars, leads to a 0.09% increase in total number of tourist arrivals in original top ten countries for a holiday purpose to Thailand, on average a *ceterisparibus*.

4.3.5 Log linear Statistics Dynamic panel GMM estimate factor in international tourists demand from different purpose of original top ten countries to Thailand

Thailand, on average a *ceterisparibus*. Finally, a 1% increase in relative price from origins' ten countries leads to a 0.66 % increase in the total number of tourist arrivals from the original top ten countries for business purpose to Thailand, on average a *ceterisparibus*.

To test for international tourists holiday purpose to Thailand with Fixed Effects estimator almost variable coefficients seem significant, except transport costs to reach Thailand and present expected signs. A 1% increase in origins' real GDP per capita from ten countries, leads to a 2.19 % increase in total number of tourist arrivals in original top ten countries for holidays to Thailand, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries, leads to a 2.22 % decrease in total number of tourist arrivals in original top ten countries for a holiday purpose to Thailand, on average aa *ceterisparibus*. Finally, a 1% increase in nominal exchange rate of original from ten countries convert to baht per dollars causes a 1.06% increase in total number of tourist

For the total number of tourist arrivals from the original top ten countries for business purpose to Thailand (Busit) with dynamic panel data fixed effects estimator assume cross-section fixed (dummy variables) all variable coefficients seem significant but present unexpected signs in relative price and nominal exchange rate of original country convert to Bath per dollars. A 1% increase in origins' real GDP per capita from ten countries, leads to a 0.27% increase in total number of tourist arrivals in original top ten countries for Business purpose to Thailand, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries leads to a 0.09% decrease in total number of tourist arrivals in original top ten countries for Business purpose to Thailand, on average an *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 0.32% increase in total number of tourist arrivals in original top ten countries for business purpose to Thailand, on average an *ceterisparibus*. A 1% increase in nominal exchange rate of original from ten ountries, leads to a 0.64 % decrease in total number of tourist arrivals in original top ten countries for Business purpose to Thailand, on average a *ceterisparibus*. Finally, a 1% increase in the total number of tourist arrivals in original top ten countries for business purpose to Thailand last year, leads to

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a 0.80% increase in total number of tourist arrivals in original ten countries to Thailand, on average a *ceterisparibus*.

As for the total number of tourist arrivals in original top ten countries for a holiday purpose to Thailand (Hoit) with dynamic panel data Fixed Effects estimator assume cross-section fixed (dummy variables), only real GDP per capita and the number of tourist arrivals in original top ten countries to Thailand who got an experience to Thailand for a holiday purpose last year are significant and present expected signs. A 1% increase in origins' real per capita GDP, leads to a 0.86% increase in total number of tourist arrivals in original top ten countries to Thailand for a holiday purpose to Thailand, on average an *ceteris paribus* and a 1% increase in total number of tourist arrivals in original top ten countries to Thailand for a holiday purpose last year leads to a 0.60% increase in total number of tourist arrivals in original ten countries for a holiday purpose to Thailand, on average a *ceterisparibus.*

4.4. Conclusion of Research and Policy Recommendations

This paper was motivated by the need for empirical analysis of the behavior of international tourists arriving to Thailand and an analysis of the determinants of Thailand's international tourism demand from its ten main source markets (Malaysia, Japan, South Korea, China, Singapore, U.K.,
U.S.A., Australia, Germany, and Taiwan). In this article, four standard panel unit root tests were used test for all variables. Namely, Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Fisher-Type test using ADF and PP- test (Maddala and Wu (1999) and Choi (2001)) and Hadri (1999). This article used panel cointegration tests based on both ADF- statistics and PP-statistics as well as the tests suggested by Kao (1990) and Kao, Chiang and Chen (1999). Furthermore in this article DOLS-estimator and fixed and random effect in panel data were used to investigate long-run equilibrium relationships between the number of international tourists arriving to Thailand and to test with dynamic effect in the short run with long run effect in different purpose from business and holiday in Thailand.

The conclusion of the research and policy recommendations are as follows: There are three important conclusions and recommendations that emerge from the empirical analysis of the research. The positive coefficients that greater than one on income in country of origin, which suggests that the Thai tourism product is a luxury good. This is encouraging, especially as Thailand is presently planning to rely much more on this industry as a source of foreign currency earnings. On the basis of statistical significance, Dols estimates imply that nominal exchange rate of the original ten countries and relative prices matter for top ten international tourists to Thailand and effect of nominal exchange rate in the short run still be so strong to increasing number of international tourists to Thailand at the same direction and in the opposite direction in relatively price but little effect from implied total cost from relative oil jet price of original country to Thailand. The panel cointegration in OLS estimator found that the estimated values of the income elasticity suggest that the economic conditions of tourists who visit Thailand are very important factor in determining tourism demand in Thailand in country like China (1.27), Singapore (1.05), USA (1.27), Malaysia (0.75), but in the opposite direction and less effect in Australia (-0.07), the United Kingdom (-0.31), and Japan (-0.96).

The estimated values of the total cost suggest that the total cost is effect in the positive direction in long distance country from Thailand (Germany (1.06), Australia (0.85), USA (0.84)) than short distance countries from Thailand (China (0.36), Singapore (0.42), Taiwan (0.49)), and get a negative direction in a border country like Malaysia because when oil jet price increase the tourists may come by car instead of by airplane. Relative price (CPI origin < CPITH) increase lead to a decrease in number of tourists from Japan (-3.47), Singapore (-2.21), Australia (-1.11), and UK (0.85) and nominal exchange rate of original country leads to a decrease in total number of tourist arrivals to Thailand such as China (-8.17), Japan (-4.11), and Australia (-2.21). Considering the top ten countries for tourists with business purposes to Thailand in the long run with fixed effect, the estimated values of the income elasticity (2.36) suggest that the economic conditions of tourists who visit Thailand are a very important factor in determining tourism demand in Thailand and still consider tourism in Thailand as a luxury good, but the result

shows little effect in nominal exchange rate (0.29). The result in random effect estimator also found that relative price from ten countries in positive effect (0.66) number of tourist arrivals to Thailand and little negative effect in total cost (0.05)

Considering the top ten countries for tourists holiday purpose to Thailand in the long run fixed effect, the estimated values of the income elasticity (2.19) suggest that the economic conditions of tourists who visit Thailand are very important factor in determining tourism demand to Thailand and still consider tourism in Thailand is luxury goods and the result show strong effect in relative price (-2.22) and in nominal exchange rate (1.06). The result in random effect estimator also confirmed this, but with less negative effect in total cost (-0.06) and relative price (-0.34).

Dynamic panel GMM estimator consider top ten countries for tourists business purpose and holiday purpose to Thailand in the short run found that total number of tourist arrivals in original top ten countries for business purpose and holiday purpose to Thailand last year, leads to an increase in total number of tourist arrivals to Thailand in this year (0.24 and 0.28). A positive coefficient on business purpose and holiday purpose to Thailand last year, leads to an increase in total number of tourist arrivals to Thailand in this year (0.80 and 0.06). A positive coefficient on

lagged tourist arrivals also suggests the presence of repeat visits, which may be reflecting the positive experience of tourists expenditure with respect to its multicultural background, hospitality, and excellent beach resorts, among others. The findings lend support to the current policy of the government whereby significant marketing effort is being made at the international level to further promote Thailand's tourism products.

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APPENDIX C

Determinants of international tourists traveling to major tourist region in Thailand with panel data analysis

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Determinants of international tourists traveling to major tourist region in Thailand with panel data analysis

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ABSTRACT

Thailand had been ranked among the twenty most popular tourist destinations in the world. The income received from international tourists has accounted for 6.23% of the GDP. The major international tourists regions in Thailand are Bangkok, Chiang Mai, Chonburi (Pattaya), and Phuket. Econometric model for international tourist demand with panel data for the period of January 1992 to December 2006, using fixed effect and random effect estimators in different or unique regions, will be useful for policy decision-making with different strategies for raising the economies of each unique region.

Consider the ten major source countries of tourists to Bangkok, Chiang Mai, Chonburi (Pattaya), and Phuket. In Bangkok, the estimated value of the income from the original countries have positive inelasticity in the long run and are highly effective in a negative relative price, with nominal exchange rate, but little effect positively in total cost from the original countries has been found. In Chiang Mai, the estimated value of the income shows high positive elasticity and little positive effect in relative price for numbers of international tourists. In Pattaya the estimated values of the income has positive inelasticity and the result still shows high effects in negative nominal exchange rate, but little positive effect in total cost. In Phuket, the estimated values of the income has high positive elasticity and the result also shows rather high effects in positive relatively to tourism demand to Phuket, but rather low negative effect in total cost and negative inelasticity effect in nominal exchange rate. It is important for policymakers to closely monitor the economic cycles in the economies of the original countries that send tourists to Chiang Mai and Phuket. Suppliers in Bangkok must be careful with prices in order to maintain the competitiveness of their products, and for nominal exchange rate in Bangkok and Pattaya shoould also be closely watched to diversify risks by trying to encourage promotional activities.

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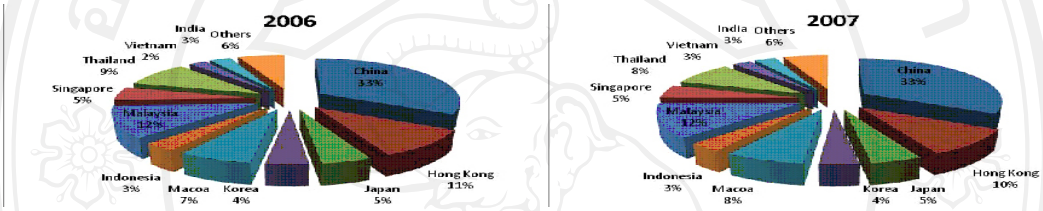
1. Introduction

International tourism is a fast growing industry generating half a trillion dollars in annual revenues and accounting for almost 10% of total international trade, and almost half of total trade in services. International tourism is the world's largest export earner. Moreover, it is a labour-intensive industry, employing an estimated 100 million people around the world. Tourism has an important role in stimulating investments in new infrastructure, as well as in generating government revenues through various taxes and fees. The tourism industry has had a major role in the economic development of Thailand over the past 40 years. Thailand had been placed among the top 20 most popular tourist destinations in the world. International tourists to Thailand increased from 3.48 million in 1987 to 13.82 million in 2006. The income received from international tourists accounted for 6.23% of GDP in 2006, while ranking of international tourists in Asia (2007) coming to travel to Thailand (8%) was ranked fourth behind China (33%), Hong Kong (10%), and Malaysia (12%) in the tourism market. (Figure 1)

Figure 1. Market share of international tourists in Asia



Source: Tourism Authority of Thailand (2007)

Figure 2. International Tourist Arrivals to Thailand by Nationality

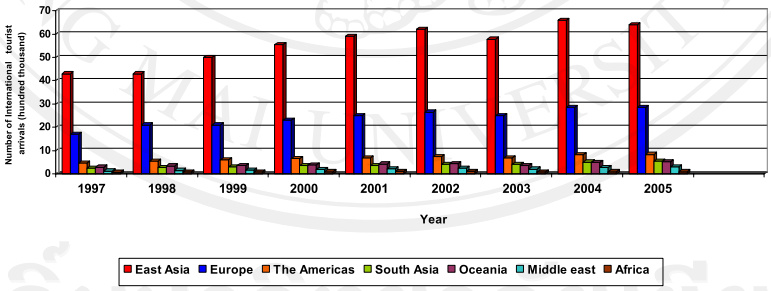


Figure 3. Tourist expenditure proportions in Thailand

Source: Tourism Authority of Thailand (2007)

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Grouping of international tourists of Thailand by nationality for the year 2007 shows international tourists from East Asia (56.29%), Europe (24.87%), the United States of America (7.44%), South Asia (4.36%), Oceania (4.18%), Middle East (2.10%), and Africa (0.76%), respectively. (Figure 2) When looking at tourist nationality breakdown, all along, more than 50 percent of international tourist arrivals are intra-region tourists. The number shows that there are markets where effort is needed to be focused. Europe and the American continent are two areas where people have high disposable incomes to use for traveling. Especially America, which shows only a 7.44 percent contribution to the total tourist revenue for the years 1977 to 2005. Tourist expenditure proportions in Thailand has the highest proportion for shopping (25-35%), second proportion in accommodation (24-29%), and food and beverage come third (15-18%). (Figure 3) International tourists to Thailand could be divided into two groups: (1) Thai tourist groups and (2) foreigner tourist groups from several different countries. The potential of Thai tourism relies on the advantage of having resources, including natural resources. These include beaches, islands, tropical forests, coral reefs, farms, and the tropical climate. Thailand has been one of the top destinations for nature-seeking international tourists for the past years. Each part of Thailand has its own unique cultures and traditions which help spread out the spectrum of tourists' experiences when coming to the country. A long national history and its location has created many historical and archeological sites, which interest visitors with both educational information and stunning beauty. Thai food is one of the most popular cuisines around the world. Each part of the country has its own special dishes, which visitors can explore as part of their adventurous journey. For other interests (shopping, food, MICE, golf, wellness and spas), the major provinces in Thailand that seem to meet these requirement for most international tourists are Bangkok, Chiang Mai, Chonburi (Pattaya), and Phuket.

There is a small amount of research in Thailand applying econometric models for international tourist demand, especially in solutions with method panel data used for different or unique regions (Bangkok, Pattaya, Chiang Mai and Phuket) which will be useful for policy decision-making in different strategies for raising the economies for tourism of each of unique region. These findings help marketers and tourism authorities to identify their promotion and positioning strategies to the right target market.

The purpose of this paper is to measure tourist arrival patterns of major countries to Thailand in the four main tourist regions in Thailand: Bangkok, Chonburi (Pattaya), Phuket, and Chiang Mai, and to detect the most significant factors affecting the flow of international tourists by country of origin to make strategic recommendations for government policy and tourist sector strategies. In order to investigate the determinants of international tourism demand to Thailand, static panel data models using fixed effect and random effect estimators were implemented. These findings help marketers and tourism authorities to focus their promotions and position strategies to the right target markets. The remainder of the paper is organized as follows: Section 2 introduces the data set and the econometric approach to be followed, while the results of empirical estimation are presented in Section 3. Policy implications and some concluding remarks are given in Section 4.

2. Data and empirical methodology

2.1. Data

This paper uses time series data from January 1992 to December 2006 for the top ten source countries of international tourists to four major tourist regions in Thailand: Bangkok, Chonburi (Pattaya), Phuket, and Chiang Mai. We use the number of foreign visitors, namely international tourist arrivals, to estimate international tourism demand to the four major tourist regions in Thailand. Monthly data for international tourist arrivals collected from statistical data sets for each country have been obtained from the World Tourism Organization or Tourism Authority of Thailand (TAT). The sample period is from January 1992 to December 2006. The panel models are estimated by using fixed effects or random effect for static models.

The primary purpose of this paper is to detect the most significant factors affecting the flow of international tourists by country of origin. Panel data models were constructed by using yearly data corresponding to the top ten countries sending international tourists to Thailand. The use of this type of data enables a relatively large number of observations to be made, and a concomitant increase in the degrees of freedom, thereby reducing collinearity and improving the efficiency of the estimates (Song and Witt, 2000). In this paper,

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balanced panel data sets are used**.** The model to be estimated as a Static model is given as:

$$\ln DT_{it} = a_i + y_1 \ln Y_{it} + y_2 \ln RP_{it} + y_3 \ln ER_{it} + y_4 \ln TC_{it} + \lambda_{it} + \mu_{it} + \varepsilon_{it} \quad (1)$$

With panel data, the issue is whether to use a random-effects or fixed-effects estimation approach. The random effects approach to estimating y exploits the correlation in the composite error in equation (6), vjt = cit +ε_{it} , cit = λ_{it} + μ_{it} . The approach puts ci in the error term assuming that ci is orthogonal to xjt and use a Generalised Least Squares (GLS) estimator to take into account serial correlation in the composite error vjt. There can, however, be many instances where this assumption is violated. Specifically, cj can be correlated with xjt in the present model if the cj influences the price, exchange rate and income variables. In such a case, the fixed-effects estimator may be more appropriate to use. Wooldridge (2001:266) shows that a fixed effect estimator is more robust than a random effects estimator. A shortcoming of the approach is, however, that time-constant factors, such as geographical factors, cannot be included in xjt, otherwise there would be no way to distinguish the effects of these variables from the effects of the unobservable cj. Another shortcoming of the fixed effects estimator is that it is less efficient than the random effects estimator – it has less degree of freedom and takes into calculation only the variation “within” units, and not between units. Accordingly, to determine which of these estimators are more appropriate to use in the present case, both a fixed effects (FE) and random effects (RE) estimator were initially used to estimate equation and the Hausman specification test done to evaluate the assumption in the random effects model that cj is orthogonal to xjt. Rejection of the null hypothesis would lead to rejection of the random effects estimator.

Data variable

Y_{it} = GDP per capita in country of origin. *Disposable tourism income of individuals coming from origin country*. This variable is approximated income with origins’ per capita GDP at constant prices. Data are taken from GDP per Cap from United States Department of Agriculture, Economic Research Service, international macroeconomic data set.

RP_{it} = CPI Thailand / CPI origin country. Data from IMF and BOT (Bank of Thailand)

ER_{it} = nominal exchange rate of original country to Thai Baht per dollar . Exchange rate from United States Department of Agriculture, Economic Research Service. International macroeconomic data set.

TC_{it} = transportation costs from origin country i to Thailand ***or*** transport costs to reach Thailand by individuals coming from their original country. Since information on bilateral transport costs was unavailable, this variable is approximated with Jet Fuel (Dollar)/CPI origin. Data has been taken from the United States Energy Information Administration (2007) Rotterdam (ARA) Kerosene-Type Jet Fuel Spot and Distance from capital of original country to capital of Thailand Indian Industry Directory of Indian Suppliers air distance calculator. From http:// www. indianindustry.com/travel-tools/air-distance-calulator.html (Sources: United States Energy Information Administration (2007) Rotterdam (ARA) Kerosene-Type Jet Fuel Spot Price FOB. (Note: 1 gallon = 3.785 liters. Total Jet oil per person in Air Bus 380 = 3 liter/100 km/person, TC = (Jet Fuel(Dollar)/CPI origin)/ person * Distance (km) from capital of original country to capital of Thailand)

2.2. Empirical Methodology

For the purpose to measure and predict tourist arrival pattern of major countries to the four main tourist regions in Thailand : Bangkok, Pattaya, Phuket and Chiang Mai This paper will analyst with fix effect ,random effect.from the equation (2) , equation (3) , equation (4) and equation (5) as follow.

$$BKT_{it} = f(BK_{it-1}, Y_{it}, RP_{it}, ER_{it}, TC_{it}) \quad (2)$$

BKT_{it} = the number of tourist arrivals in original country to Bangkok

i = original country (i = 1,2,……,10)

t = monthly data 1992-2007

1. Malaysia 2.Japan 3.Korea 4. UK 5. U.S.A 6. Germany 7. Chaina 8. Taiwan 9. Australia 10. Singapore

$$PAT_{it} = f(PAT_{it-1}, Y_{it}, RP_{it}, ER_{it}, TC_{it}) \quad (3)$$

PAT_{it} = the number of tourist arrivals in original country to Pataya.

i = original country (i = 1,2,……,10)

t = monthly data 1992-2007

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1. Taiwan 2. U.K 3.Hongkong 4. Japan 5. Korea 6. U.S.A 7. Singapore 8.Australia 9. Malaysia 10. German

$CM_{it} = f(CM_{it-1}, Y_{it}, RP_{it}, ER_{it}, TC_{it})$ (4)

CM_{it} = the number of tourist arrivals in original country to Chiang Mai.

i = original country (i = 1,2,……,10)

t = monthly data 1992-2007

1. U.S.A. 2. France 3. Japan 4. Germany 5. UK 6. Netherlands 7. singapore 8. Malaysia 9. Taiwan 10. Australia

$PK_{it} = f(PK_{it-1}, Y_{it}, RP_{it}, ER_{it}, TC_{it})$ (5)

PK_{it} = the number of tourist arrivals in original country to, Phuket .

i = original country (i = 1,2,……,10)

t = monthly data 1992-2007

1.Germany 2.Taiwan 3.U.K 4.Sweden 5.Japan 6.Switzerland 7.Italy 8.Korea 9.Hongkong 10. France 11.U.S.A

Y_{it} = GDP per capita in country of origin.

RP_{it} = CPI Thailand / CPI origin country.

ER_{it} = nominal exchange rate defined as the currency of Thailand per currency of original country :ER(Baht/Origin).

TC_{it} = transportation costs from origin country i to Thailand

After that the Equation (1) ,equation (2) , equation (3) and equation (4) are specified in log form in Equation (6) ,equation (7) , equation (8) and equation (9) and analyst with fix effect ,random effect to compare the best result.

$$\ln BK_{it} = a_i + y_1 \ln Y_{it} + y_2 \ln RP_{it} + y_3 \ln ER_{it} + y_4 \ln TC_{it} + u_{jt} \quad (6)$$

$$\ln PAT_{it} = a_i + y_1 \ln Y_{it} + y_2 \ln RP_{it} + y_3 \ln ER_{it} + y_4 \ln TC_{it} + u_{jt} \quad (7)$$

$$\ln CM_{it} = a_i + y_1 \ln Y_{it} + y_2 \ln RP_{it} + y_3 \ln ER_{it} + y_4 \ln TC_{it} + u_{jt} \quad (8)$$

$$\ln PK_{it} = a_i + y_1 \ln Y_{it} + y_2 \ln RP_{it} + y_3 \ln ER_{it} + y_4 \ln TC_{it} + u_{jt} \quad (9)$$

2.3. Analysis of major original tourism to four main tourist regions in Thailand

Bangkok is the most popular destination for all international tourists. Three other popular and attractive destinations for foreign tourist groups are Pattaya, Phuket, and Chiang Mai, respectively. Tourism Authority of Thailand (TAT) reported in 2002 that percentage divided by international tourists and Thai international tourists in Bangkok is about 63.3% to 36.7%, in Chiang Mai it is about 29.2% to 70.8%, in Chonburi (Pattaya) it is about 31.2% to 68.8%, in Phuket it is about 53.5% to 46.5%. Average period of international tourists' stay in Bangkok is 2.84 days, in Chiang Mai 5.43 days, in Pattaya 4.21 days, and in Phuket 4.21 days. During January 1992 to December 2006, international tourists arrival to Bangkok continuously increased (Figures 4, 5), and major countries sending tourists were Malaysia, Japan, South Korea, U.K., U.S.A., Germany, Taiwan, Australia, Singapore, and Hong Kong with the average total number around 40,000 and 60,000 per month. (Figure 6) Singapore (12.86%) is the first, and the second and third are U.K. (12.16%) and Australia (11.84%). (Figure 7) Considering seasonal distribution of international tourist arrivals to Bangkok from January to December 2006, most come in January, March, July, November, and December.

Due to the unique lifestyle of Thai traditional cultures and the modernization of people in the central part of the Kingdom of Thailand, Bangkok is considered to be one of the most attractive capital cities for all international tourists around the world. Many tourist-attractive places were constructed in Bangkok which serves as gateway for airway transportation and international communication. Most of the international tourists travel to Bangkok for business and get entertainment from daytime to night without interruption by seasonal effects.

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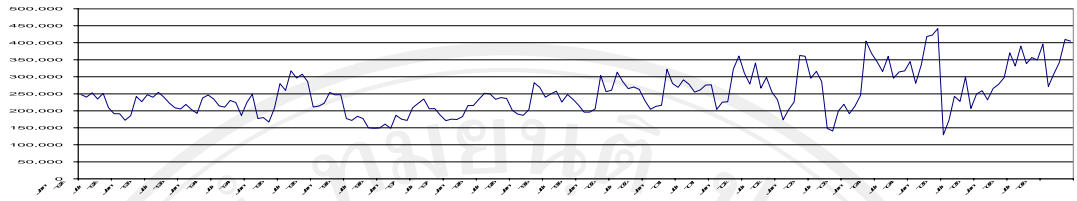
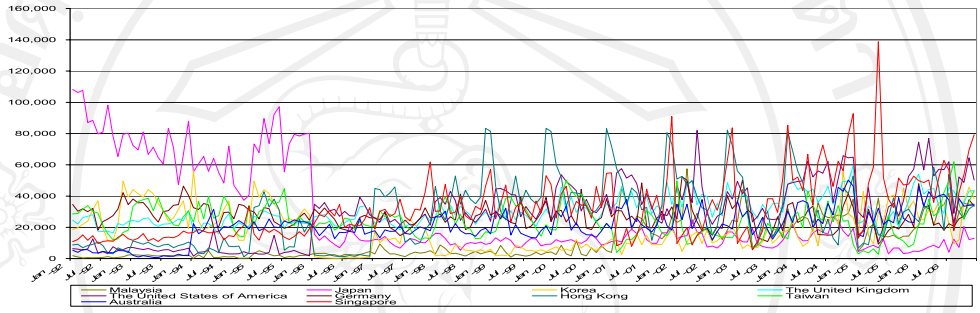
Figure 4: Total Number of top ten international tourist source countries arrivals (DT) to Bangkok, Thailand from January 1992 to December 2006



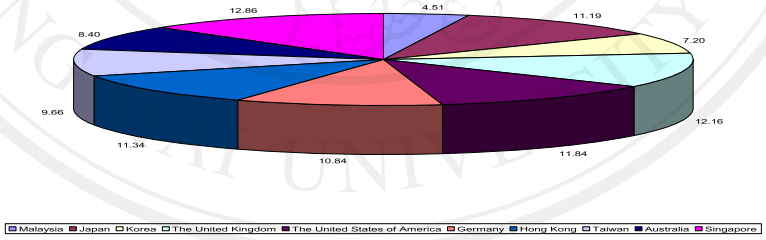
From: computed

Figure 5: Number of top ten international tourist source countries arrivals (DT) to Bangkok, Thailand from January 1992 to December 2006



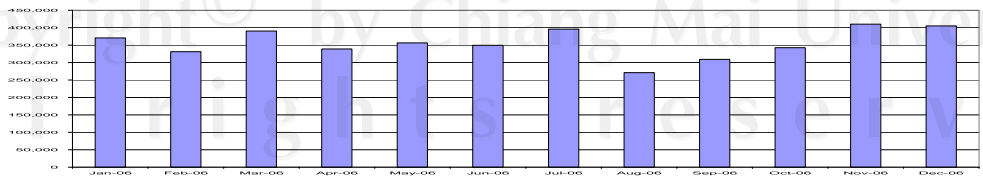
From: computed

Figure 6: Percentage of original top ten international tourist source countries arrivals (DT) to Bangkok, Thailand from 1992 to 2006.



From: computed

Figure 7: Seasonal distribution of original top ten international tourist source countries arrival (DT) to Bangkok, Thailand from January to December 2006



From: computed

During January 1992 to December 2006, international tourists arriving to Chiang Mai continuously increased (Figure 8,9), and major countries sending tourists were U.S.A., France, Japan, Germany, U.K., Netherlands, Malaysia, Singapore, and Taiwan, with average total

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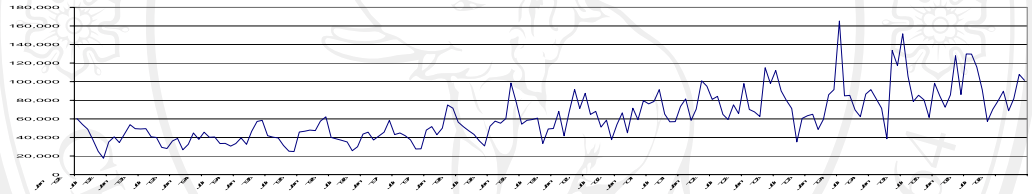
international tourist numbers around 10,000 and 20,000 per month. (Figure 10) U.S.A. (16.91%) is the first, and the second and third are Germany (13.11%) and Australia (11.84%). (Figure 11) Considering seasonal distribution of major tourist source countries arriving to Chiang Mai from January to December 2006, most came in January, Febuary, March, November and December.

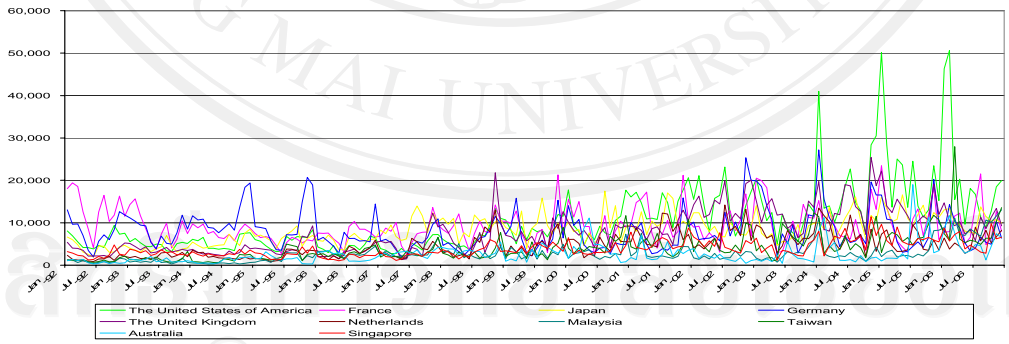
Chiang Mai is one of the most famous and attractive cities in the northern part of Thailand. The culture of northern Thai people is world-renowned. Mountainous forests, waterfalls, botanical gardens, museums, palaces, Buddhist temples, Doi Suthep mountain, golden pagodas, elephant farms, a national zoo, orchid gardens, a night bazaar, international tourists while visiting Chiang Mai. modern shopping centers, silk, umbrella, and wood-carving factories, and historical places of hill tribes are attractive spots for visitors from abroad. Also, some senior Japanese pensioners plan to settle in Chiang Mai city for the long-term. Regarding the purposes for the trips, foreign international tourists came to Chiang Mai for vacations, to visit cultural centers, and for ecotourism. Many international tourists enjoy shopping because of their high purchasing power from their income from abroad. Backpacking international tourists with low expenses also enjoy their vacations. Thai New Year festival in April, the Full Moon Festival in November, and the Chinese New Year festival in February are the most popular festivals for

Figure 8: Total number of tourists arrivals (DT) to Chiang Mai, Thailand from January 1992 to December 2006



From: computed

Figure 9: Number of tourists from source countries arriving (DT) to Chiang Mai, Thailand from January 1992 to December 2006



From: computed

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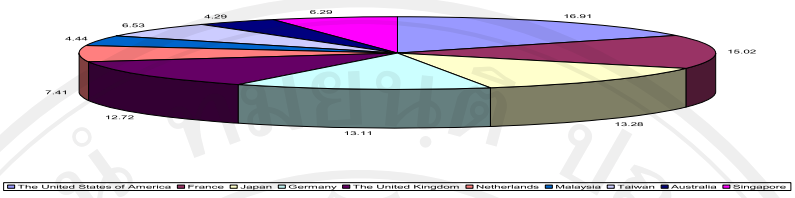
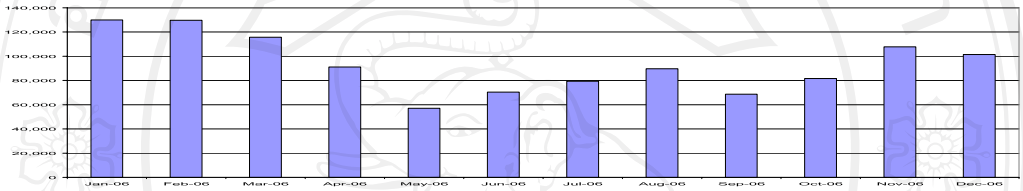
Figure 10: Percentage of international tourists from source countries arriving (DT) to Chiang Mai, Thailand from 1992 to 2006



From: computed

Figure 11: Seasonal distribution of tourist arrivals (DT) to Chiang Mai, Thailand, from top ten international source countries, January to December 2006



From: computed

From January 1992 to December 2006, international tourists arrivals to Pattaya continuously increased (Figure 12,13). The major source countries were Taiwan, U.K., Hong Kong, Japan, South Korea, U.S.A., Singapore, Malaysia, Germany, and France, with average total international tourists numbering around 20,000 to 50,000 per month. (Figure 14) China (23.82%) is the first, the second is Germany (13.60%), and the others are The United Kingdom (11.52%), Taiwan (11.22%), and Hong Kong (10.89%). (Figure 15) Considering the seasonal distribution of tourist arrivals to Pattaya from January to December 2006, most tourists come in January, Febuary, March, April, and December.

Pattaya is one of a nearest cities to Bangkok with sea-shore that can easily be reached by international tourists. International tourists can visit Pattaya by service of public bus or private cars from Bangkok (140 kms) on a highway within two hours. Pattaya has become the most popular beach resort for Thai people who work and stay in Bangkok. Many foreign international tourists enjoy staying in Pattaya too. Millions of Bangkok residents go to Pattaya every year to take a rest and enjoy the beach environment for the weekend. Most visitors are foreigners. Two-thirds of them expect to enjoy their exciting sea activities. International tourists to Pattaya hope to enjoy food and drinks in their favorite bars, nightclubs, and restaurants located near Pattaya beach. Fresh air and blue sky on Pattaya beach creates a good impression for all international tourists and frequently brings back the visitors to visit these favorite places again. Some businessmen who travel to the Far East or Australia chose to extend their trips with a stop-over in Pattaya.

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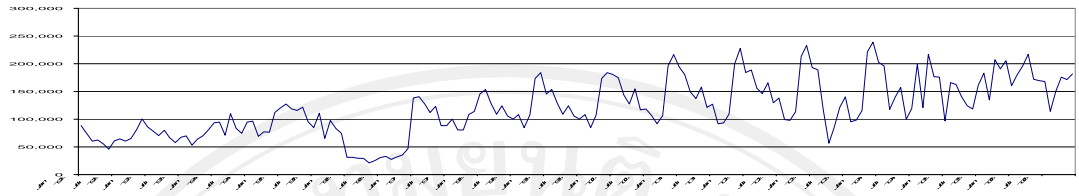
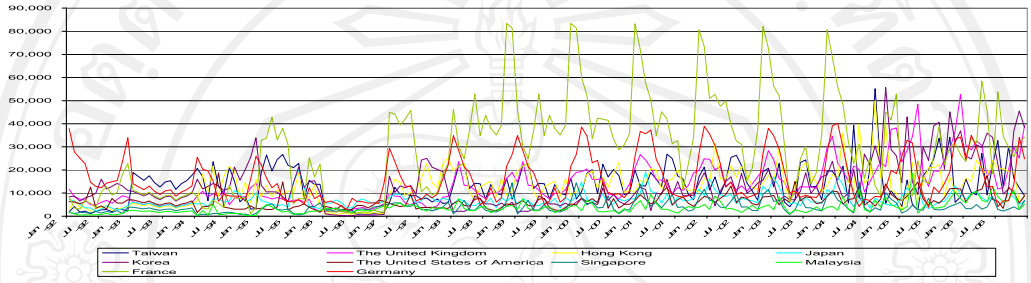
Figure 12: Total Number of tourists from source countries arriving (DT) to Pattaya, Thailand from January 1992 to December 2006



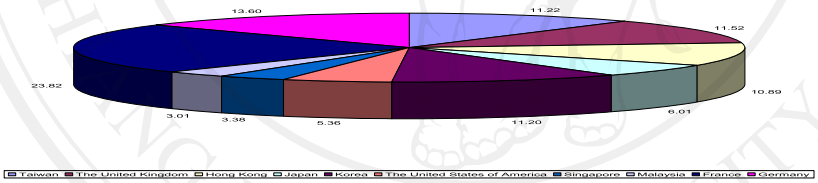
From: computed

Figure 13: Number of tourists from the top ten source countries arriving (DT) to Pattaya, Thailand from January 1992 to December 2006



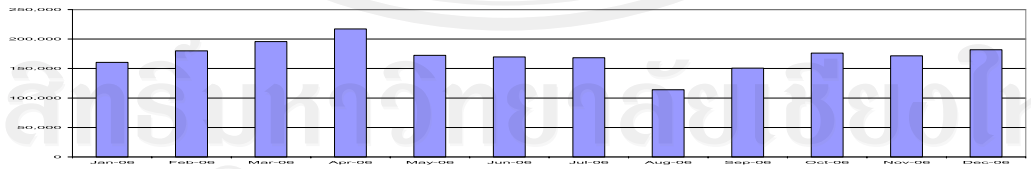
From: computed

Figure 14: Percentage of tourist arrivals from the top ten source countries arriving (DT) to Pattaya, Thailand from 1992 to 2006



From: computed

Figure 15: Seasonal distribution of tourist arrivals (DT) to Pattaya, Thailand, from top ten international source countries, January to December 2006



From: computed

From January 1992 to December 2006, international tourists arrivals to Phuket continuously increase, but dropped down in 2005 because of effects from the 24 December 2004 tsunami, and grew up again in 2006. (Figure 16,17) Major countries sending tourists were Germany, Taiwan, U.K., Sweden, Japan, Switzerland, Italy, Korea, Hong Kong, and France with an average total of international tourists numbering between 10,000 and 30,000 every month. (Figure 18) Taiwan (18.04%) is the first and the second is Germany (14.93%). Third and fourth are The United Kingdom (12.96%), and Japan (11.14%).(Figure 19) Considering the seasonal distribution of tourist arrivals to Phuket from January to December 2006, most come in January, Febuary, March, November, and December.

Phuket province is an attractive place on a large island surrounded by white sand on

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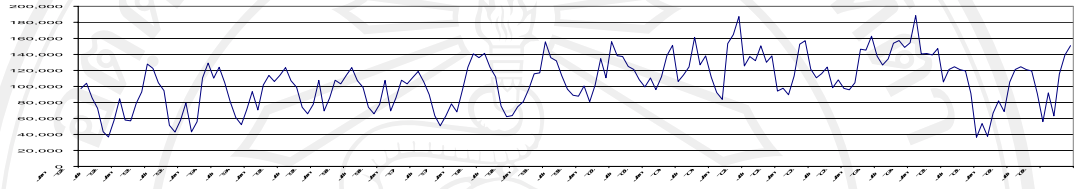
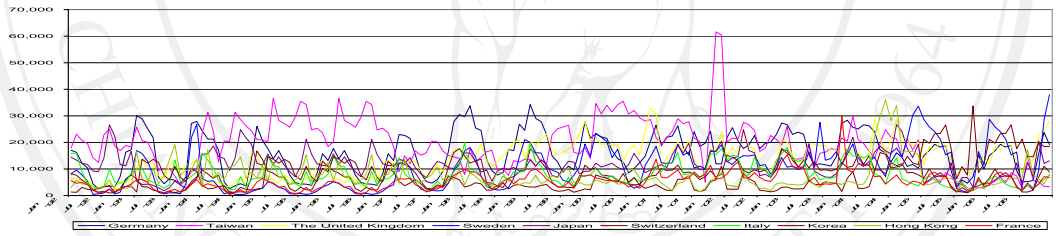
the beach of the Andaman Sea. Most international tourists coming from European countries, America, and Asian countries know the name of this province as the "Pearl of the Andaman Sea". During December a January, many international tourists fr Europe and America can travel from th home countries by direct flights to Phuket. escape from frozen temperature of the win season in Europe and America, many international tourists occasionally migrate for extended stays in Phuket. Good impressions from modern accommodations, favorite foods and drinks in Thai or European and American styles, beautiful sun, and white sand on the beach of the Andaman Sea for all seasons enhance foreign international tourists' impressions and they frequently visit Phuket.

Figure 16: Total Number of tourists from top ten source countries arriving (DT) to Phuket, Thailand from January 1992 to December 2006



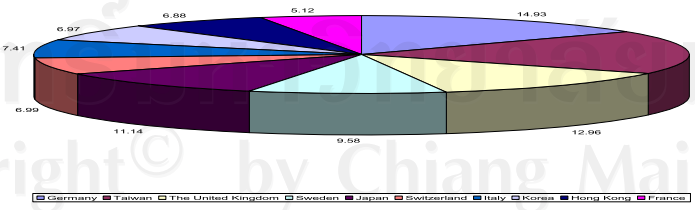
From: computed

Figure 17: Number of tourists from top ten source countries arriving (DT) to Phuket, Thailand from January 1992 to December 2006



From: computed

Figure 18: Percentage of tourists arrivals (DT) from top ten source countires to Phuket, Thailand from 1992 to 2006



From: computed

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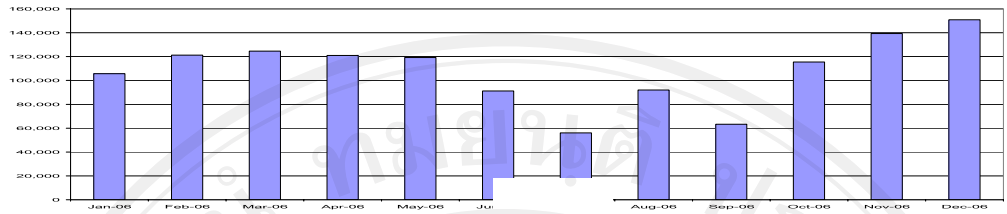
Figure 19: Seasonal distribution of tourist arrivals (DT) to Phuket, Thailand from top ten source countries from January to December 2006



From: computed

3. Empirical Results

This section presents the results of the statistics from investigating the effects of factors affecting the flow of international tourist arrivals by country of origin in the four main tourist regions in Thailand: Bangkok, Chonburi (Pattaya), Phuket, and Chiang Mai. We present the estimates of the static linear fixed effects model and random effect model and then present the estimates of the difference after adjusting from seasonal static linear fixed effects model and random effect model. Initially, a static version of the model is estimated, that is, a model without the second term in equation (1). Table 2 shows the results of a static panel model for investigating the effects of factors affecting the flow of international tourists by country of origin to Thailand. The presence of cross-section and riod-specific effects terms λ_{it} and μ_{it} may be handled using fixed or random effects methods. If the data is balanced so that every cross-section has the same set of observations, random effects for which the random effect specifications assume that the corresponding effects λ_{it} and μ_{it} are realizations of independent random variables with mean zero and finite variance. Most importantly, the random effects specification assumes that the effect is uncorrelated with the idiosyncratic residual.

The results of the static fixed and random effect model in the four main tourist regions in Thailand (Bangkok, Chiang Mai, Chonburi (Pattaya) and Phuket) are presented in Table 1–Table 4 and are discussed in sub-section 3.1-3.4.

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3.1. The results of the static for investigating the effects of factors affecting the flow of international tourists by country of origin in Bangkok

Table 1. The results of Log Linear Static panel data in dependency upon the total number of tourist arrivals from top ten source countries to Bangkok, Thailand

From: computed

Variable	Cross-section fixed	Cross-section random	SCross-section fixed	SCross-section random
Constant	4.40*** (9.42)	5.38*** (11.94)	4.37*** (9.43)	5.35*** (11.93)
LNY	0.38*** (5.53)	0.36*** (5.60)	0.38*** (5.56)	0.36*** (5.63)
LNTC	0.32*** (6.36)	0.38*** (7.82)	0.33*** (6.54)	0.39*** (7.98)
LNRP	-2.35*** (-7.93)	-1.40*** (-5.38)	-2.34*** (-7.93)	-1.40*** (-5.40)
LNER	-0.85*** (-7.53)	-0.25*** (-4.18)	-0.84*** (-7.51)	-0.25*** (-4.17)
Sum squared resid	1179.04	1213.92	1166.59	1201.00
Adjusted R-squared	0.31	0.09	0.31	0.09
Durbin-Watson stat	0.37	0.36	0.37	0.35
F-statistic	63.00	44.45	63.84	45.61

Note: T- ratios are in parentheses. A * denotes statistical significance at the 10 percent level. ** denotes statistical significance at the 5 percent level, and *** denotes statistical significance at the 1 percent level.

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For the total number of tourist arrivals from the top ten source countries (Malaysia, Japan, Korea, United Kingdom (U.K.), United States Of America (U.S.A.), Germany, Taiwan, Australia, Singapore, and Hong Kong) to Bangkok, Thailand, with Log linear static panel data Fixed Effects estimator assuming cross-section fixed (dummy variables) all variable coefficients seem significant but present unexpected signs in total cost and nominal exchange rate of original countries to baht per dollars. A 1% increase in origins' real per capita from ten countries GDP leads to a 0.38% increase in total number of tourist arrivals in original ten countries to Bangkok Thailand, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries leads to a 0.32% increase in total number of tourist arrivals in original ten countries to Thailand, on average a ceterisparibus. A 1% increase in relative price from origins' ten countries leads to a 2.35% decrease in total

number of tourist arrivals from the original ten countries to Bangkok, on average a *ceterisparibus*. A 1% increase in nominal exchange rate of original ten countries leads to a 0.85% decrease in total number of tourist arrivals from original countries to Bangkok, on average a *ceterisparibus*.

For the total number of tourist arrivals from the original countries to Bangkok with Log linear static panel data and Fixed Effects estimator assuming cross-section random all variable coefficients seem significant but present unexpected signs in total cost and nominal exchange rate of original countries to baht per dollars. A 1% increase in origins' real per capita from ten countries GDP leads to a 0.36% increase in the total number of tourist arrivals from the original ten countries to Bangkok, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries leads to a 0.38% increase in the total number of tourist arrivals from the ten countries to Bangkok, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 1.40% decrease in the total number of tourist arrivals from the original countries to Bangkok, on average a *ceterisparibus*. A 1% increase in nominal exchange rate of original from ten countries leads to a 0.25% decrease in the total number of tourist arrivals from the original countries to Thailand, on average a *ceterisparibus*.

For the total number of tourist arrivals from the original top ten countries to Bangkok, Thailand, with Log linear adjustment seasonal static panel data Fixed Effects estimator assuming cross-section fixed but period random all variable coefficients seem significant but present unexpected signs in total cost and nominal exchange rate of original countries to baht per dollars. A 1% increase in origins' real per capita from ten countries' GDP leads to a 0.38% increase in the total number of tourist arrivals from the original countries to Bangkok, Thailand, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries leads to a 0.33% increase in total number of tourist arrivals from the original ten countries to Thailand, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 2.34% decrease in the total number of tourist arrivals from the original ten countries to Bangkok, Thailand, on average a *ceterisparibus*. A 1% increase in the nominal exchange rate of the original ten countries leads to a 0.84% decrease in the total number of tourist arrivals from the ten countries to Bangkok, Thailand, on average a *ceterisparibus*.

For the total number of tourist arrivals from the original top ten countries to Bangkok, Thailand, with Log linear adjustment seasonal static panel data Fixed Effects estimator assuming cross-section random, all variable coefficients seem significant but present unexpected signs in total cost and nominal exchange rate of original countries to baht per dollars. A 1% increase in origins' real per capita from ten countries GDP leads to a 0.36% increase in total number of tourist arrivals from the original ten countries to Bangkok, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries leads to a 0.39% increase in the total number of tourist arrivals from the original ten countries to Bangkok, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 1.40% decrease in the total number of tourist arrivals from the original ten countries to Bangkok, on average a *ceterisparibus*. A 1% increase in nominal exchange rate of the ten countries leads to a 0.25% decrease in the total number of tourist arrivals from the original ten countries to Bangkok, on average a *ceterisparibus*.

3.2 Results of the static for investigating the effects of factors affecting the flow of international tourists by country of origin to Chiang Mai

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Table 2. The results of Log linear Static panel data in dependency on the total number of tourist arrivals from the top ten source countries to Chiang Mai, Thailand

From: computed

Variable	Cross-section fixed	Cross-section random	SCross-section fixed	SCross-section random
Constant	-18.84*** (-13.86)	-10.61*** (-9.63)	-19.21*** (-15.09)	-11.54*** (12.42)
LNY	3.71*** (19.16)	2.54*** (16.28)	3.76*** (20.76)	2.68*** (17.90)
LNTC	19.16 (0.44)	0.10*** (2.77)	0.007 (0.22)	0.09*** (2.58)
LNRP	-0.08 (-0.37)	0.70*** (3.42)	-0.12 (-0.57)	0.61*** (3.17)
LNER	0.03 (0.82)	0.01 (0.30)	0.034 (1.03)	0.02 (0.53)
Sum squared resid	469.55	498.32	405.80	432.59
Adjusted R-squared	0.63	0.33	0.66	0.36
Durbin-Watson stat	0.96	0.90	0.98	0.92
F-statistic	235.40	220.25	272.44	255.38

Note: T- ratios are in parenthesis. A * denotes statistical significance at the 10 percent level. ** denotes statistical significance at the 5 percent level, and *** denotes statistical significance at the 1 percent level.

For the total number of tourist arrivals from the original top ten countries (U.S.A., France, Japan, Germany, U.K., Netherlands, Malaysia, Singapore, Taiwan, and Australia) to Chiang Mai, Thailand, with Log linear static panel data Fixed Effects estimator assuming cross-section fixed (dummy variables) only real per capita GDP coefficients seem significant and present expected signs. A 1% increase in origins' real per capita from the ten countries GDP leads to a 3.71% increase in total number of tourist arrivals from the original ten source countries to Chiang Mai, Thailand, on average a *ceterisparibus*.

For the total number of tourist arrivals from the original top ten source countries to Chiang Mai with Log linear static panel data Fixed Effects estimator assuming cross-section random, most variable coefficients seem significant except in nominal exchange rate of original ten countries but present unexpected signs in total cost and relative price. A 1% increase in origins' real per capita from ten countries GDP leads to a 2.54% increase in the total number of tourist arrivals from the original ten countries to Chiang Mai, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries leads to a 0.10% increase in the total number of tourist

arrivals from original ten countries to Chiang Mai, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 0.70% decrease in the total number of tourist arrivals from the original ten countries to Chiang Mai, on average a *ceterisparibus*.

For the total number of tourist arrivals from the original top ten countries to Chiang Mai with Log linear adjust seasonal static panel data Fixed Effects estimator assuming cross-section fixed, all variable coefficients seem significant but present unexpected signs except in origins' real per capita from ten countries' GDP. A 1% increase in origins' real per capita from ten countries GDP leads to a 0.43% increase in the total number of tourist arrivals from the original ten countries to Chiang Mai, on average a *ceterisparibus*. A 1% increase in total cost origins' ten countries leads to a 0.32% increase in the total number of tourist arrivals from the original ten countries to Chiang Mai, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 1.87% increase in the total number of tourist arrivals from the original ten countries to Chiang Mai, on average a *ceterisparibus*. A 1% increase in nominal exchange rate of original from ten countries leads to a 0.006% decrease in the total number of tourist arrivals from the original ten countries to Chiang Mai, on average a *ceterisparibus*

For the total number of tourist arrivals from the original top ten countries to Chiang Mai with Log linear adjustment for seasonal static panel data Fixed Effects estimator assuming cross-section random, most variable coefficients seem significant except in nominal exchange rate of the ten source countries, but present unexpected signs except in origins' real per capita from the ten countries' GDP. A 1% increase in the origins' real per capita from the country's GDP leads to a 2.68% increase in the total number of tourist arrivals from the original countries to Chiang Mai, on average a *ceterisparibus*. A 1% increase in total cost of origins' countries leads to a 0.09% increase in the total number of tourist arrivals from the ten countries to Chiang Mai, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 0.61% increase in the total number of tourist arrivals from the ten countries to Chiang Mai, on average a *ceterisparibus*.

3.3 The results of the static for investigating the effects of factors affecting the flow of international tourists by country of origin to Pattaya

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Table 3. The results of Log linear Static panel data in dependency on the total number of tourist arrivals from original top ten countries to Pattaya

From: computed

Variable	Cross-section fixed	Cross-section random	SCross-section fixed	SCross-section random
Constant	4.15*** (-9.75)	5.09*** (11.78)	4.10*** (9.85)	5.01*** (11.78)
LNY	0.30*** (5.06)	0.26*** (4.63)	0.30*** (5.19)	0.26*** (4.76)
LNTC	0.23** (4.99)	0.24*** (5.53)	0.24*** (5.46)	0.26*** (5.98)
LNRP	-0.43* (-1.77)	0.18*** (0.80)	-0.42* (-1.76)	0.17 (0.78)
LNER	-0.85*** (-10.62)	-0.53 (-8.12)	-0.83*** (-10.70)	-0.53*** (-8.23)
Sum squared resid	867.53	898.99	831.90	862.07
Adjusted R-squared	0.47	0.14	0.48	0.15
Durbin-Watson stat	0.67	0.64	0.67	0.64
F-statistic	123.00	74.10	128.81	79.54

Note: T- ratios are in parenthesis. A * denotes statistical significance at the 10 percent level. ** denotes statistical significance at the 5 percent level and *** denotes statistical significance at the 1 percent level.

For the total number of tourist arrivals from the top ten source countries (Taiwan, U.K., Hong Kong, Japan, South Korea, U.S.A., Singapore, Malaysia, Germany, and France) to Pattaya, Thailand, with Log linear static panel data Fixed Effects estimator assuming cross-section fixed (dummy variables), all variable coefficients seem significant but present unexpected signs in total cost and nominal exchange rate of original countries to baht per dollars . A 1% increase in origins' real per capita from the ten countries' GDP leads to a 0.30% increase in the total number of tourist arrivals from the ten source countries to Pattaya, on average a *ceterisparibus*. A 1% increase in total cost of the ten countries leads to a 0.23% increase in the total number of tourist arrivals from the countries to Pattaya, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries leads to a 0.43% decrease in the total number of tourist arrivals from the original ten countries to Pattaya, on average a *ceterisparibus*. A 1% increase in the nominal exchange rate of the ten countries leads to a 0.85% decrease in the total number of tourist arrivals from the original ten countries to Pattaya, on average a *ceterisparibus*.

For the total number of tourist arrivals from the original top ten countries to Pattaya

with Log linear static panel data Fixed Effects estimator assuming cross-section random, almost variable coefficients seem significant except in nominal exchange rate of the ten source countries, but present unexpected signs in total cost, in relative price, and in nominal exchange rate of original countries to baht per dollars. A 1% increase in origins' real per capita from the ten countries' GDP leads to a 0.26% increase in the total number of tourist arrivals from the original ten countries to Pattaya, on average a *ceterisparibus*. A 1% increase in total cost of the ten countries leads to a 0.24% increase in the total number of tourist arrivals from the ten source countries to Pattaya, on average a *ceterisparibus*. A 1% increase in relative price from the ten countries leads to a 0.18% decrease in the total number of tourist arrivals from the ten source countries to Pattaya, on average a *ceterisparibus*.

For the total number of tourist arrivals from the top ten source countries to Pattaya with Log linear adjustment for seasonal static panel data and Fixed Effects estimator assuming cross-section fixed, all variable coefficients seem significant but present unexpected signs in total cost and nominal exchange rate of original countries to baht per dollars. A 1% increase in the origin countries' real per capita leads to a 0.21% increase in the total number of tourist arrivals from the ten countries to Pattaya, on average a *ceterisparibus*. A 1% increase in total cost in the ten source countries leads to a 0.42% increase in the total number of tourist arrivals from the ten countries to Pattaya, on average a *ceterisparibus*. A 1% increase in relative price from the original ten countries leads to a 1.05% decrease in the total number of tourist arrivals from the ten countries to Pattaya, on average a *ceterisparibus*. A1% increase in the nominal exchange rate of the ten countries leads to a 0.49% decrease in the total number of tourist arrivals from the source countries to Pattaya, on average a *ceterisparibus*.

For the total number of tourist arrivals from the original top ten source countries to Pattaya with Log linear adjustment for seasonal static panel data and Fixed Effects estimator assuming cross-section random, most variable coefficients seem significant except in relative price from the ten countries, but present unexpected signs in total cost, in relative price, and in nominal exchange rate of original countries to baht per dollars. A 1% increase in origins' real per capita from the ten countries' GDP leads to a 0.26% increase in the total number of tourist arrivals from the ten countries to Pattaya, on average a *ceterisparibus*. A 1% increase in total cost in the ten countries leads to a 0.26% increase in the total number of tourist arrivals from the ten countries to Pattaya, on average a *ceterisparibus*. A 1% increase in nominal exchange rate of the original ten countries leads to a 0.53% decrease in the total number of tourist arrivals from the ten countries to Pattaya, on average a *ceterisparibus*.

3.4 Results of the static for investigating the effects of factors affecting the flow of international tourists by country of origin to Phuket

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Table 4. The results of Log linear Static panel data in dependency on the total number of tourist arrivals from top ten source countries to Phuket, Thailand

From: computed

Variable	**Cross-section fixed**	Cross-section random	SCross-section fixed	SCross-section random
Constant	-5.06*** (-3.20)	-2.65*** (-1.82)	-4.36*** (-2.95)	-2.31*** (-1.68)
LNY	2.04** (9.13	1.70*** (8.30)	1.94*** (9.22)	1.64*** (8.48)
LNTC	-0.31*** (-6.17)	-0.27*** (-5.45)	-0.29*** (-5.97)	-0.25*** (-5.30)
LNRP	0.72*** (3.23)	0.85*** (3.89)	0.78*** (3.75)	0.89*** (4.35)
LNER	-0.04*** (-2.72)	-0.03** (-2.59)	-0.03** (-2.80)	-0.03*** (-2.67)
Sum squared resid	841.58	851.03	731.77	739.45
Adjusted R-squared	0.32	0.07	0.35	0.08
Durbin-Watson stat	0.49	0.48	0.47	0.46
F-statistic	65.42	37.37	74.80	42.48

Note: T- ratios are in parenthesis. A * denotes statistical significance at the 10 percent level. ** denotes statistical significance at the 5 percent level and *** denotes statistical significance at the 1 percent level.

For the total number of tourist arrivals from the top ten source countries (Germany, Taiwan, U.K., Sweden, Japan, Switzerland, Italy, South Korea, Hong Kong, and France) to Phuket, Thailand, with Log linear static panel data and Fixed Effects estimator assuming cross-section fixed (dummy variables), all variable coefficients seem significant but present unexpected signs in the origin countries real per capita, relative price, and nominal exchange rate of original countries to baht per dollars. A 1% increase in the origin countries' real per capita from GDP leads to a 2.04% decrease in the total number of tourist arrivals from the ten countries to Phuket, Thailand, on average a *ceterisparibus*. A 1% increase in total costs in the origin countries leads to a 0.31% increase in the total number of tourist arrivals from the ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in relative price from the ten countries leads to a 0.72% increase in the total number of tourist arrivals from the ten source countries to Phuket, on average a *ceterisparibus*. A 1% increase in the nominal exchange rate of the original ten countries leads to a 0.04% decrease in the total number of tourist arrivals from the ten countries to Phuket, on average a *ceterisparibus*.

For the total number of tourist arrivals from the top ten source countries to Phuket with Log linear adjustment for seasonal static panel data and Fixed Effects estimator assuming cross-section random, all variable coefficients seem significant, but present unexpected signs in total cost and nominal exchange rate of the original countries' to Baht per dollars . A 1% increase in the origins' real

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per capita from ten countries' GDP leads to a 0.27% decrease in the total number of tourist arrivals from the original ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in total cost in the ten countries leads to a 0.27% decrease in the total number of tourist arrivals from the ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in relative price from origins' ten countries, leads to a 0.85% increase in the total number of tourist arrivals from the original ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in the nominal exchange rate of the original ten countries leads to a 0.03% decrease in the total number of tourist arrivals from the ten source countries to Phuket, on average a *ceterisparibus*.

For the total number of tourist arrivals from the original top ten countries to Phuket with Log linear adjustment for seasonal static panel data and Fixed Effects estimator assuming cross-section fixed, most of the variable coefficients seem significant except in nominal exchange rate of the from ten countries, but present unexpected signs in relative price from the ten origin countries . A 1% increase in the origins' real per capita GDP leads to a 1.94% increase in the total number of tourist arrivals from the ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in the total cost origins' ten countries leads to a 0.29% decrease in the total number of tourist arrivals from the ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in the relative price from the original countries leads to a 0.78% increase in the total number of tourist arrivals from the original ten countries to Phuket, on average a *ceterisparibus*.

For the total number of tourist arrivals from the top ten source countries to Phuket, Thailand with Log linear adjustment for seasonal static panel data and Fixed Effects estimator assuming cross-section random, all variable coefficients seem significant but present unexpected signs in relative price and nominal exchange rate of the original countries' currency to Baht per dollars. A 1% increase in the origins' real per capita from ten countries' GDP leads to a 1.64% increase in the total number of tourist arrivals from the ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in total cost in the ten countries leads to a 0.25% decrease in the total number of tourist arrivals from the ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in the relative price from origins' ten countries leads to a 0.89% increase in the total number of tourist arrivals from the ten countries to Phuket, on average a *ceterisparibus*. A 1% increase in the nominal exchange rate of the ten source countries leads to a 0.03% decrease in the total number of tourist arrivals to Phuket, on average a *ceterisparibus*.

4. Conclusion of Research and Policy Recommendations

There are important conclusions and recommendations that emerge from the empirical analysis of the research.

When considering the ten major international source countries (Malaysia (4.51%), Japan (11.19%), South Korea (7.20%). U.K. (12.16%), U.S.A. (11.84%), Germany (10.84%), Taiwan (9.66%), Australia (8.40%), Singapore (12.86%), and Hong Kong (11.34%)) to Bangkok in the long run with fixed effect and random effect and fixed effect and in random effect after adjusting for seasonal effect, the estimated values of the income positive inelasticity (0.38,0.36) suggests that the economic conditions of international tourists who visit Bangkok have a low effect in determining tourism demand to Bangkok. They still consider tourism in Bangkok as a normal good, but the results show high effects in negative relatively price (-2.35, 1.40, - 2.34). That is, lower prices in the ten origin countries have much more effect in decreasing the number of tourists to Bangkok, and there still are rather high negative effects at the nominal exchange rate (-0.85, -0.25), which means an increase in nominal exchange rate in the ten countries has rather high effects to reduce international tourist numbers to Bangkok, but an increase in the total cost leads to little effect to increase international tourist numbers (0.32, 0.38, 0.33, 0.40) to Bangkok.

Considering the ten major international countries sending tourists to Chiang Mai (U.S.A. (16.91%), France (15.02%), Japan (13.28%), Germany (13.11%), U.K. (12.72%), Netherlands (7.41%), Malaysia (4.44%), Singapore (6.29%), Taiwan (6.53%), and Australia (4.29%)), in the long run with fixed and in random effect and fixed effect and in random effect after adjusting for seasonal effect, the estimated values of the income positive elasticity (3.70, 2.54, 3.76, 2.67) suggest that the economic conditions of international tourists who visit Thailand are highly affected in determining tourism demand in Chiang Mai and still consider tourism in Chiang Mai as luxury goods. The different result in random effect significant variables

compare to the result with fixed effect are total cost (0.09) and relative price (0.69, 0.61) which means that even though there still is an increase in total cost and relative price from the original ten countries, these effects are still incapable to cause a decrease in tourist numbers in Chiang Mai.

Considering the ten major countries sending tourists to Pattaya (Taiwan (11.22%), U.K. (11.52%), Hong Kong (10.89%), Japan (6.01%), South Korea (11.20%), U.S.A. (5.36%), Singapore (3.38%), Malaysia (3.01%), Germany (13.60%), and France (23.82%)) in the long run with fixed effect and in random effect and fixed effect and in random effect after adjusting for seasonal effect, the estimated values of the income positive inelasticity (0.30, 0.26) suggest that the economic conditions of international tourists who visit Pattaya are not affected much in determining tourism demand in Pattaya, and they still consider tourism in Pattaya as normal goods. The result still shows high effects in negative nominal exchange rate for tourism demand to Pattaya (-0.86, -0.53, -0.83) which means an increase in the nominal exchange rate in the ten original source countries rather highly affects a reduction in tourist numbers to Pattaya, but an increase in total cost (0.23, 0.24, 0.26) in the ten countries leads to little effect to increase tourist numbers to Pattaya.

Considering the ten major source countries for tourists to Phuket (Germany (14.93%), Taiwan (18.04%), U.K. (12.96%), Sweden (9.58%), Japan (11.14%), Switzerland (6.99%), Italy (7.41%), South Korea (6.97%), Hong Kong (6.88%), and France (5.12%)), in the long run with fixed effect and in random effect and fixed effect and in random effect after adjust seasonal effect, the estimated values of the income positive elasticity (2.04, 1.70, 1.93, 1.64) suggests that the economic conditions of tourists who visit Phuket are highly influential in determining tourism demand to Phuket as they still consider tourism to Phuket as luxury goods. The result also shows rather high effect in positive relatively price to tourism demand to Phuket (0.72, 0.85, 0.79, 0.89) that even though there is lower price in original ten countries compared to Thailand, it still does not effect increasing number of tourists from the ten countries to Phuket. The result still be rather low negative effect in total cost (-0.31, -0.27,-0.29,-0.25) for tourism demand from original ten countries which mean increase in total cost lead to low decrease international tourists number to Phuket. The result still show negative inelasticity effect in nominal exchange rate (-0.04, -0.03,) for tourism demand which means an increase in nominal exchange rate in the ten countries has rather limited effects to reduce tourist numbers to Phuket.

The estimated values of the income positive elasticity suggest that the economic conditions of the ten major source countries are a very important factor in determining tourism demand in Chiang Mai and Phuket. Therefore, it is important for policymakers to closely monitor the economic cycles in the original countries that send tourists to Chiang Mai and Phuket. It would also be very advisable to diversify risks by trying to capture potential international tourists from other markets. The ten major source countries to Bangkok are very sensitive to prices. According to the selected model, the estimated values for relative price in long-run elasticities are
-2.35, -1.40, and -2.34, respectively. Thus, suppliers must be careful with prices in order to maintain the competitiveness of their products.

The ten major source countries to Bangkok and Pattaya are also very sensitive to nominal exchange rate. According to the selected model, the estimated values for nominal exchange rate in long-run elasticities in Bangkok are -0.85, -0.25, and in Pattaya are -0.86, -0.53, -0.83, respectively. According to Thailand adopting a floating exchange rate, it would also be wise to look to diversify risks by trying promotional activities that encourage tourists from source countries to Bangkok and Pattaya. Promotional activities during the low season should be focused and tailored to targeted groups of international tourists.This includes the study of international tourists' consumer behavior as compared to what each of the provinces can offer. Even though the result in total cost from original major countries is still not decreasing major tourist numbers to Bangkok, Chiang Mai, and Pattaya, the estimated values for total cost should still be rather negative low effect in long run total cost
-0.31, -0.27,-0.29,and -0.25 in Phuket.

Attempts to increase revenue from the tourism industry in the four major provinces should not only come from the number of visitors, but there is a need to reposition the provinces as quality destinations by diversifying the market, quality improvement of the tourism products, and lengthening of the tourist season. The other avenue to increase

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revenue from the tourism industry is to link the tourism industry to the other economic sectors, such as agricultural sector by creating value added to agricultural products. There is a need to support tourism education and public awareness of the social and economic benefits, as well as the negative impacts from tourism in the four major provinces. Promotional efforts should use "Pull Strategy", with focused target international tourists, and be tailored to suit them. The four major provinces should be more proactive in anticipating the demand, and more aggressive in taking actions. Co-operation with surrounding tourism destinations in Thailand and neighboring countries would also be beneficial.

The conclusion drawn is that elasticities, over time, change with changes in incomes, prices, total cost and nominal exchange rate, with the consequences that tourism demand models that assume constant elasticities are misspecified, and that elasticities need to be updated regularly as outdated elasticities may mislead policy and marketing decision-makers.

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