Chapter 4

Modeling of International Tourists arrival for business and holiday To Thailand With Panel Data

There are different models in panel data estimation and these are pooled, fixed and random effects. The pooled model assumes that countries are homogeneous, while fixed and random effects introduce heterogeneity in the estimation. A decision should be made whether to use random or fixed model because individual effects are included in the regression. A random effects model is appropriate when estimating the model between a country and its randomly selected sample of trading partners from a large group (population). A fixed effects model is appropriate when estimating the model between a country and predetermined selection of trading partners. The fixed effects model cannot directly estimate variables that do not change over time because inherent transformation wipes out such variables.

. Despite the strengths of fixed and random effects estimators based on panel data, there remains two further shortcomings that needs to be dealt with. These are the potential endogeneity of the **x**j, as well as the loss of dynamic information. If there are persistence/ reputation effects that apply over time in tourist decision on holiday destinations, for example when tourists return to a particular destination when they had a good experience, then this might be a serious omission .To overcome this problem of endogeneity, an instrumental variable needs to be used for two approaches, namely Anderson and Hsiao's (1982) instrumental variable (IV) and

Arellano and Bond's (1991) two GMM estimators (first-step and second-step, respectively) have been used in this regard.

This chapter is a revised version from the original panel data paper which included two dependent variables namely the numbers of foreign visitors to Thailand and the numbers of visitors to Thailand from the ten major sending countries in the category of traveling for holiday purpose and in that for business purpose. The paper presented at the third Conference of The Thailand Econometric Society, Chiang Mai, Thailand in Appendix B. in 7 – 8 January 2010.

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.

Keywords: Thailand; tourism demand, Panel Unit Root Test, Panel Co-integration Test, Long-run relationship, Fixed effect, Dynamic effect

4.1. 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.

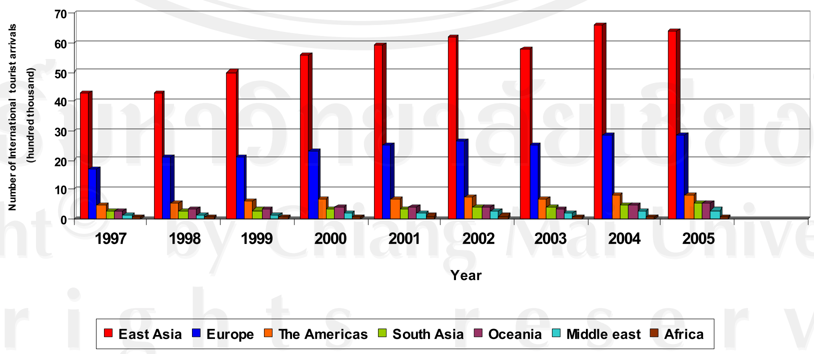
Each part of the country has its own special dishes, which visitors can explore as part of their adventurous journeys. Top-ranked hotels, resorts, and spas are ready to welcome visitors at most of the popular destinations in the Thailand, and the warm hospitality of Thai people is successful in impressing 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 followed, while the results of empirical estimation are presented in Section 3. Policy implications and some concluding remarks are given in Section 4.

Figure 4.1 International Tourist Arrivals to Thailand by Nationality



Source: Tourism Authority of Thailand (TAT)

Figure 4.2 Number of international tourist arrivals (DT) to Thailand from 1981 to 2007

Source: Tourism Authority of Thailand (TAT)

4.2. DATA AND EMPIRICAL METHODOLOGY

4.2.1. 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 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.

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). 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.

4.2.2. 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.

1. The concept and background of International Tourism Demand Model

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

$$Dt = f(\,Yt\ TCt\ \ RPt\ ERt) \qquad \text{(Eq. 1)}$$

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

$$\ln Dt = \alpha + \beta \ln Yt + \gamma \ln TC + \delta \ln RPt, + \varphi \ln Dt - 1 + \theta \ln ER + u\, t \qquad \text{(Eq. 2)}$$

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;

$\alpha, \beta, \gamma, \delta, \varphi, \theta$ = 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 modified from equation (2) and can be written as equation (3), (4) and (5).

$\ln DTit = \alpha + \beta \ln (Yit) + u\ it$ (Eq. 3)

$\ln DTit = \rho + \gamma \ln (TCit) + u\ it$ (Eq. 4)

$\ln DTit = \eta + \theta \ln(RPit) + u\ it$ (Eq. 5)

$\ln DTit = \mu + € \ln(ERit) + u\ it$ (Eq. 6)

where:

i = cross-section-data (the number of country arrival to Thailand)

t = time series data

ln D1it = 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 in original countries number i at time t;

$\ln TC_{it}$ = logarithm of price of Jet Fuel of original countries number i at time t;

$\ln RP_{it}$ = logarithm of relative prices in country of origin i compare to Thailand at time t;

$\ln ER_{it}$ = 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:

$$\ln DT_{it} = \alpha 1 + \beta 1 \ln (Y_{it}) + \beta 2 (D2*\ln(Y_{it})) + \beta 3 (D3*\ln(Y_{it})) + \beta 4 (D4*\ln(Y_{it})) + \beta 5 (D5*\ln(Y_{it})) + \beta 6 (D6*\ln(Y_{it})) + \beta 7(D7*\ln(Y_{it})) + \beta 8(D8*\ln(Y_{it})) + \beta 9(D9*\ln(Y_{it})) + \beta 10(D10*(\ln Y_{it})) + u_{it} \quad \text{(Eq. 7)}$$

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

$\ln DT_{it} = \alpha 3 + \beta 21 \ln(RP_{it}) + \beta 22(D2*\ln(RP_{it})) + \beta 23(D3*\ln(RP_{it})) + 24(D4*\ln(RP_{it})) + \beta 25(D5*\ln(RP_{it})) + \beta 26(D6*\ln(RP_{it})) + \beta 27(D7*\ln(RP_{it})) + \beta 28(D8*\ln(RP_{it})) + \beta 29(D9*\ln(RP_{it})) + \beta 30(D10*\ln(RP_{it})) + u_{it}$ (Eq. 9)

$\ln DT_{it} = \alpha 4 + \beta 31 \ln(ER_{it}) + \beta 32(D2*\ln(ER_{it})) + \beta 33(D3*\ln(ER_{it})) + 34(D4*\ln(ER_{it})) + \beta 35(D5*\ln(ER_{it})) + \beta 36(D6*\ln(ER_{it})) + \beta 37(D7*\ln(ER_{it})) + \beta 38(D8*\ln(ER_{it})) + \beta 39(D9*\ln(ER_{it})) + \beta 40(D10*\ln(ER_{it})) + u_{it}$ (Eq. 10)

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 $\beta1,..., \beta30$ and $\alpha1$, $\alpha2$ and $\alpha3$ = parameters to be estimated;

$\beta1,......., \beta10 > 0$, $\beta11,......., \beta20 < 0$ and $\beta21,......., \beta30 < 0$, and $\beta31,......., \beta40 < 0$. ;

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, 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)).

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. Kao

(1999) uses both DF and ADF to test for cointegration in panel as well as this test similar to the standard approach adopted in the EG-step procedures. Also this test start with the panel regression model as set out in equation (11).

$$Y_{it} = X_{it}\beta_{it} + Z_{it}\gamma_0 + \varepsilon_{it} \quad \text{(Eq.11)}$$

where Y and X are presumed to be non-stationary and: (see equation (2))

$$\hat{e}_{it} = \rho\,\hat{e}_{it} + v_{it} \quad \text{(Eq 12)}$$

where $\hat{e}_{it} = (Y_{it} - X_{it}\hat{\beta}_{it} - Z_{it}\hat{\gamma})$ are the residuals from estimating equation (1). To test the null hypothesis of no cointegrarion amounts to test H0 : $\rho = 1$ in equation 21I against the alternative that Y and X are conitegrated (i, e., H1: $\rho < 1$). Kao (1999) developed both DF-Type test statistics and ADF test statistics were used to test cointegration in panel also both DF-Type (4 Type) test statistics and ADF test statistics can present below that:

$$DF_{\rho} = \frac{\sqrt{N}T(\hat{\rho}-1) + 3\sqrt{N}}{\sqrt{51/5}}, \quad \text{(Eq. 13)}$$

$$DF_{t} = \sqrt{\frac{5t_{\rho}}{4}} + \sqrt{\frac{15N}{8}}. \quad \text{(Eq .14)}$$

$$DF_{\rho}^{*} = \frac{\sqrt{N}T(\hat{\rho}-1) + \frac{3\sqrt{N}\hat{\sigma}_{v}^{2}}{\hat{\sigma}_{0v}^{2}}}{\sqrt{3 + \frac{36\hat{\sigma}_{v}^{4}}{5\hat{\sigma}_{0v}^{4}}}}, \quad \text{(Eq.15)}$$

$$DF_{t}^{*} = \frac{t_{\rho} + \frac{\sqrt{6N}\hat{\sigma}_{v}}{2\hat{\sigma}_{0v}}}{\sqrt{\frac{\hat{\sigma}_{0v}^{2}}{2\hat{\sigma}_{v}^{2}} + \frac{3\hat{\sigma}_{v}^{2}}{10\hat{\sigma}_{0v}^{2}}}}, \quad \text{(Eq. 16)}$$

$$ADF = \frac{t_{ADF} + \sqrt{6N}\hat{\sigma}_v / 2\hat{\sigma}_{0u}}{\sqrt{\hat{\sigma}_{0v}^2 / 2\hat{\sigma}_v^2 + 3\hat{\sigma}_v^2 / 10\hat{\sigma}_{0v}^2}} \qquad \text{(Eq. 17)}$$

where:

N = cross-section data;

T = time series data;

$\rho^{\wedge}$ = co-efficiencies of (2);

$t\,\rho = [(\rho^{\wedge} - 1)\sqrt{(\Sigma^N_{i=1}\Sigma^T_{t=2}\, e^{\wedge *2}_{i\,t-1})}]/Se;$

$Se = (1/NT)\,\Sigma^N_{i=1}\Sigma^T_{t=2}(e^{\wedge *}_{i\,t} - \rho^{\wedge}\, e^{\wedge *}_{i\,t-1})^2;$

$\sigma u^{\wedge 2}$ = variance of u;

$\sigma v^{\wedge 2}$ = variance of v

$\sigma u^{\wedge}$ = standard deviation of u;

$\sigma v^{\wedge}$ = standard deviation of v;

$t_{ADF} = [(\rho^{\wedge} - 1)\,(\Sigma^N_{i=1}(e / Q_i\, e_i))^{½}]/ S_v.$

The various estimators available include with-and between-group such as OLS estimators and dynamic OLS estimators. OLS and DOLS are a parametric approach which DOLS estimators include lagged first-differenced term are explicitly estimated as well as consider a simple two variable panel regression model: (see detail calculated of OLS and DOLS in equation 18, 19,20 and 21).

$$Y_{i\,t} = \alpha_i + ß_i X_{i\,t} + \varepsilon_{i\,t} \qquad \text{(Eq. 18)}$$

A standard panel OLS estimator for the coefficient $ß_i$ given by :

$$ß^{\wedge}_{i,\,OLS} = [\Sigma^N_{i=1}\Sigma^T_{t=1}(X_{i\,t} - X^*_i)^2]^{-1}\,\Sigma^N_{i=1}\Sigma^T_{t=1}(X_{i\,t} - X^*_i)(Y_{i\,t} - Y^*_i) \qquad \text{(Eq. 19)}$$

where

i	=	cross-section data and N is the number of cross-section
t	=	time series data and T is the number of time series data

$\hat{ß}_{i\,OLS}$ = A standard panel OLS estimator

$X_{i\,t}$ = exogenous variable in model

X^{*}_{i} = average of X^{*}_{i}

$Y_{i\,t}$ = endogenous variable in model

Y^{*}_{i} = average of Y^{*}_{i}

Pedroni (2001) has also constructed a between-dimension, group-means panel DOLS estimator that incorporates corrections for endogeneity and serial correlation parametrically. This is done by modifying equation 22I to include lead and lag dynamics: (see equation 19).

$$Y_{i\,t} = \alpha_{i} + ß_{i} X_{i\,t} + \Sigma^{ki}_{j=-k} \gamma_{ik} \Delta X_{i,t-k} + \varepsilon_{i\,t} \qquad (\text{Eq. } 20)$$

where

$$\hat{ß}_{i,\,DOLS} = [N^{-1} \Sigma^{N}_{i=1}(\Sigma^{T}_{t=1} Z_{it} Z^{*}_{it})^{-1}(\Sigma^{T}_{t=1} Z_{it} \hat{Z}_{it})] \qquad (\text{Eq. } 21)$$

and where

i = cross-section data and N is number of cross-section data

t = time series data and T is number of time series data

$\hat{ß}_{i\,DOLS}$ = dynamics OLS estimator

$Z_{i\,t}$ = is the 2(K+1) x 1

$\hat{Z}_{it}$ = $(X_{i\,t} - X^{*}_{i})$

X^{*}_{i} = average of X^{*}_{i}

$\Delta X_{i,t-k}$ = differential term of X

The above methods were mostly developed by Pedroni (2000,2001). This research also focused on the OLS estimator and the DOLS estimator for estimating panel cointegration for modeling international tourism demand of Thailand.

4.2.3 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:

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

or unbalanced:

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

1.) Individual-Effects Model

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

$$y_{it} = \chi'_{it}\beta + \alpha_i + u_{it} \qquad \text{(Eq.22)}$$

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

$$E(\chi_{it}\alpha_i) = 0 \qquad \text{(Eq.23)}$$

If this condition fails, then OLS is inconsistent (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 equation (22) is true, however, OLS can be improved upon via a GLS technique. In either event, OLS appears a poor estimation choice. Condition equation (23) 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

$$d_{ij} = \begin{cases} 1 & \text{if} \quad i = j \\ 0 & \text{eles} \end{cases}, \text{ and } d_i = \begin{pmatrix} d_{i1} \\ \vdots \\ d_{in} \end{pmatrix} \qquad (\text{Eq.24})$$

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

$$\alpha_i = d'_i \alpha , \qquad (\text{Eq.25})$$

And

$$y_{it} = \chi'_{it} \beta + d'_i \alpha + u_{it} . \qquad (\text{Eq.26})$$

Observe that

$$E(u_{it} \mid \chi_{it}, d_{it}) = 0 , \qquad (\text{Eq.27})$$

So equation (26) is a valid regression, with d_i as a regressor along with χ_i.

OLS on equation (25) 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}.
- 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 (*Frisch-Waugh-Lovell theorem*). Stacking the observations together:

$$y = \chi\beta + Du + e, \qquad \text{(Eq.28)}$$

Then by the FWL theorem,

$$\hat{\beta} = (X'(I - P_D)X)^{-1}(X'(I - P_D)y) \qquad \text{(Eq.29)}$$

$$= (X^{*\prime}X^{*})^{-1}\,(X^{*\prime}y^{*}), \qquad \text{(Eq.30)}$$

where

$$y^{*} = y - D(D'D)^{-1}D'y \qquad \text{(Eq.31)}$$

$$X^{*} = X - D(D'D)^{-1}D'X. \qquad \text{(Eq.32)}$$

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

$$y^{*}_{it} = y_{it} - \bar{y}_i. \qquad \text{(Eq.33)}$$

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

$$y_{it} = \chi'_{it}\beta + \alpha_i + u_{it}, \qquad \text{(Eq.34)}$$

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

$$\frac{1}{T_i}\sum_{t=\underline{t}_i}^{\bar{t}_i} y_{it} = \frac{1}{T_i}\sum_{t=\underline{t}_i}^{\bar{t}_i} \chi'_{it}\beta + \alpha_i + \frac{1}{T_i}\sum_{t=\underline{t}_i}^{\bar{t}_i} u_{it} \qquad \text{(Eq.35)}$$

or

$$\bar{y}_{it} = \bar{\chi}'_i\beta + \alpha_i + \bar{u}_i. \qquad \text{(Eq.36)}$$

Subtracting, we find

$$y^*_{it} = \chi^{*\prime}_{it}\beta + u^*_{it}, \qquad \text{(Eq.37)}$$

which is free of the individual-effect u_i.

3.) Dynamic Panel Regression

A dynamic panel regression has a lagged dependent variable

$$y_{it} = \omega y_{it-1} + \chi'_{it}\beta + \alpha_i + u_{it}. \qquad \text{(Eq.38)}$$

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 srfeample mean of y_{it-1} is correlated with that of u_{it} The standard approach to estimate a dynamic panel is to combine first-differencing with IV or GMM. Taking first-differences of equation (38) eliminates the individual-specific effect:

$$\Delta y_{it} = \omega \Delta y_{it-1} + \Delta \chi'_{it} \beta + \Delta \alpha_{it}. \qquad \text{(Eq.39)}$$

$$E(\Delta y_{it-1} \Delta \alpha_{it}) = E((y_{it-1} - y_{it-2})(\alpha_{it} - \alpha_{it-1})) = -E(y_{it-1}\alpha_{it-1}) = -\sigma_e^2. \qquad \text{(Eq.40)}$$

However, if u_{it} is iid, then it will be correlated with Δy_{it-1} :
So OLS on equation (39) 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 $\Delta \alpha u_{it}$. Thus values of $y_{it-k}, k \geq 2$, are valid instruments.

Hence a valid estimator of α and β is to estimate (Eq.36) 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 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.

Table 4.1 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. $lnDT_{i\,t}$	1.67	0.95
2. $lnY_{i\,t}$	-0.39	0.34
3. $lnTC_{i\,t}$	-2.88	0.002
4. $lnRP_{i\,t}$	1.05	0.85
5. $lnER_{i\,t}$	-0.59	0.27
Breitung(2000)t*-Statistics		
1. $lnDT_{i\,t}$	-1.86	0.03
2. $lnY_{i\,t}$	-0.03	0.48
3. $lnTC_{i\,t}$	-1.18	0.033
4. $lnRP_{i\,t}$	-1.18	0.033
5. $lnER_{i\,t}$	1.19	0.88
Null : unit root (assumes individual unit root process)		
Lm, Pesaran and Shin (2003) W-Statistics		
1. $lnDT_{i\,t}$	1.19	0.88
2. $lnY_{i\,t}$	-1.39	0.09
3. $lnTC_{i\,t}$	3.25	0.999
4. $lnRP_{i\,t}$	1.18	0.88
5. $lnER_{i\,t}$	-0.13	0.44
Maddala and Wu (1999) and Choi (2001)		
ADF-Fisher Chi-square		
1. $lnDT_{i\,t}$	15.10	0.77
2. $lnY_{i\,t}$	37.40	0.01
3. $lnTC_{i\,t}$	3.07	0.999
4. $lnRP_{i\,t}$	16.93	0.65
5. $lnER_{i\,t}$	17.34	0.63
PP-Fisher Chi-square		
1. $lnDT_{i\,t}$	27.79	0.35
2. $lnY_{i\,t}$	9.62	0.97
3. $lnTC_{i\,t}$	1.24	0.99
4. $lnRP_{i\,t}$	13.11	0.87
5. $lnER_{i\,t}$	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.

Table 4.2: 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. $lnDT_{i\,t}$	8.52***	0.000
2. $lnY_{i\,t}$	-7.83***	0.000
3. $lnTC_{i\,t}$	-12.61***	0.000
4. $lnRP_{i\,t}$	-9.88***	0.000
5. $lnER_{i\,t}$	-5.41***	0.000
Breitung(2000)t*-Statistics		
1. $lnDT_{i\,t}$	-5.33***	0.000
2. $lnY_{i\,t}$	-3.47***	0.000
3. $lnTC_{i\,t}$	-10.79***	0.000
4. $lnRP_{i\,t}$	-6.27***	0.000
5. $lnER_{i\,t}$	-5.37***	0.000
Null : unit root (assumes individual unit root process)		
Lm, Pesaran and Shin (2003) W-Statistics		
1. $lnDT_{i\,t}$	-10.35***	0.000
2. $lnY_{i\,t}$	-8.09***	0.000
3. $lnTC_{i\,t}$	-11.56***	0.000
4. $lnRP_{i\,t}$	-7.93***	0.000
5. $lnER_{i\,t}$	-4.34***	0.000
Maddala and Wu (1999) and Choi (2001)		
ADF-Fisher Chi-square		
1. $lnDT_{i\,t}$	-118.07***	0.000
2. $lnY_{i\,t}$	93.56***	0.000
3. $lnTC_{i\,t}$	725.70***	0.000
4. $lnRP_{i\,t}$	89.23***	0.000
5. $lnER_{i\,t}$	51.57***	0.000
PP-Fisher Chi-square		
1. $lnDT_{i\,t}$	117.25***	0.000
2. $lnY_{i\,t}$	88.64***	0.000
3. $lnTC_{i\,t}$	725.58***	0.000
4. $lnRP_{i\,t}$	87.43***	0.000
5. $lnER_{i\,t}$	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.

4.3.2 The empirical results of panel cointegration test

Table 4.3. 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 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

Table 4.4 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. lnY_{it}	0.42*** (8.01)	1.98*** (27.30)
2. $lnTC_{it}$	-0.09 (-1.47)	-0.19*** (-4.30)
3. $lnRP_{it}$	0.39 (1.19)	1.05*** (9.23)
4. $lnER_{it}$	-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.

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 (LnERit) and the relative price (LnRPit) 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 LnRPit increases 1% is that the number of tourists from the ten countries arriving to Thailand increases 0.65%. When LnERit 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 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

Table 4.5 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.

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.

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

Table4.6 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.

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 *ceteris paribus*. 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 *ceteris paribus*. 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 Thailand, on average a *ceteris paribus*. 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 *ceteris paribus*.

Table 4.7. 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 significance at the 1 percent level.

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 *ceteris paribus*. 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 *ceteris paribus*. 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 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 *ceteris paribus*. 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 *ceteris paribus*. 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 *ceteris paribus*. 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 *ceteris paribus*.

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

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 *ceteris paribus*. 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 *ceteris paribus*. 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 *ceteris paribus*. 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 *ceteris paribus*. Finally, a 1%

Table 4.8. 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.

increase in the total number of tourist arrivals in original top ten countries for business purpose to Thailand last year, leads to a 0.80% increase in total number of tourist arrivals in original ten countries to Thailand, on average a *ceteris paribus*.

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 *ceteris paribus.*

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 (0.80 and 0.60). 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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Redundant Fixed Effects Tests Table 4.9.

Redundant Fixed Effects Tests				
Equation: Untitled				
Test cross-section fixed effects				
Effects Test		Statistic	d.f.	Prob.
Cross-section F		177.612850	(9,256)	0.0000
Cross-section Chi-square		534.654376	9	0.0000

Hausman Test Table 4.10

Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		252.944138	4	0.0000
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(Y)	2.364099	1.994103	0.001034	0.0000
LOG(TC)	-0.034751	-0.050790	0.000001	0.0000
LOG(RP)	-0.084675	0.661341	0.027793	0.0000
LOG(ER)	0.287062	-0.036100	0.009554	0.0009

Redundant Fixed Effects Tests Table 4.11

Redundant Fixed Effects Tests				
Equation: Untitled				
Test cross-section fixed effects				
Effects Test		Statistic	d.f.	Prob.
Cross-section F		254.066327	(9,256)	0.0000
Cross-section Chi-square		619.856229	9	0.0000

Hauaman Test Table 4.12

Correlated Random Effects - Hausman Test				
Equation: Untitled				
Test cross-section random effects				
Test Summary		Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random		478.668969	4	0.0000
Cross-section random effects test comparisons:				
Variable	Fixed	Random	Var(Diff.)	Prob.
LOG(Y)	2.192305	1.864048	0.000921	0.0000
LOG(TC)	-0.041036	-0.061458	0.000001	0.0000
LOG(RP)	-2.217726	-0.337597	0.024117	0.0000
LOG(ER)	1.066531	0.092782	0.008290	0.0000