ESTIMATING INTERNATIONAL TOURISM DEMAND FOR LAO PDR USING PANEL ARDL APPROACH

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MASTER OF ECONOMICS

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ABSTRACT

This paper investigates the significance influence of economic factors in determining international tourism demands in Laos PDR using panel ARDL approach .Data collected was from 8 countries in ASEAN region based on sample of 9 years (2005 to 2013) and macroeconomic force acting for a given time affecting 9 year rates of return for listed in Thailand, Vietnam, Cambodia, Singapore, Philippine, Malaysia, Brunei and Indonesia. The impulses of 8 ASEAN macroeconomic forces Dt, GDPt, TPt, and POt acting for a given time influence the demand of tourists with both a domestic effect and an outsider effect at same period. The method was used based on Pooled Mean Group Estimator (PMGE), Mean Group Estimator (MGE) and Hausman Test to find long run and short run relationship of international tourism demand for Laos PDR. To test whether or not the data was stationary this research used five methods, including the LLC(2002) panel unit root test, IPS (2003) panel unit root test, PP (2001) panel unit root test,ADF panel unit root test this study found out the long run relationship between factors affecting by using PMG. The results are as follows. Variable lnGDP, lnPO and lnTP have long run relationship and also have positive effect on the international tourism demand for Laos PDR, in other word, when GDP of origin countries increases, price of fuel increases, and demand of tourist arrival to

Laos increase too. The main variable rate is inversely proportional the GDP and shall be more effective on the supporting demand of foreign tourist arriving to Laos than Price of tourism and price of fuel. Also the result show that for short run relation between demand of tourism and determinant factors of lnGDP, lnPO and lnTP, those variable have short run relationship,in other word there is error term in the short run.so factors have significant to explain short run relationship.

Key Word: *Laos; International Tourism Demand, Panel unit root test, ARDL approach base on PMGE and MGE*

หัวข้อวิทยานิพนธ์ การประมาณการอุปสงค์นักท่องเที่ยวชาวต่างประเทศต่อประเทศลาวโดยวิธีการวิเคราะห์ พาแนล เออาร์ดีแอล

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บทคัดย่อ

ในการศึกษาครั้งนี้ได้ทำการศึกษาปัจจัยทางด้านเศรษฐกิจมหภาคที่เป็นปัจจัยสำคัญในการตัดสินและกำหนดทำให้นักท่องเที่ยวต่างประเทศเข้ามาเที่ยว สปป ลาว โดยการใช้ข้อมูลพาแนลมาทำการประมาณค่าด้วยวิธีเออาร์ดีแอล ขั้นตอนการรวบรวมข้อมูลได้ทำการเลือกกลุ่มประเทศในการศึกษาโดยกำหนดเอา 8 ประเทศในภูมิภาคอาเซียน เช่น ประเทศไทย เวียดนาม กัมพูชา สิงคโปร์ อินโดนีเซีย ฟิลิปปินส์ บรูไน และมาเลเซีย เชิงช่วงเวลาที่ทำการศึกษาระหว่าง 2005-2013 จำนวน 9 ปี งานวิจัยครั้งนี้ได้กำหนดตัวแปรตามได้แก่ ความต้องการของนักท่องเที่ยวต่างประเทศที่ต้องการเข้ามาเที่ยวใน สปป ลาว ส่วนตัวแปรอิสระประกอบด้วย จีดีพีต่อหัวคนของประเทศที่ต้องการเข้ามาเที่ยวลาว ต้นทุนราคาการท่องเที่ยว เชิงเป็นต้นทุนเช่น การใช้จ่ายในการท่องเที่ยวที่ประเทศปายทางก็คือประเทศลาว การใช้จ่ายค่าที่พัก อาหาร เป็นต้น และอีกปัจจัยหนึ่งที่เป็นตัวแปรอิสระก็คือ ราคาน้ำมันเครื่องบิน โดยราคาดังกล่าวได้มีการเปลี่ยนต้นทุนการเดินทางแต่ประเทศปายทางรอดต้นทาง การวิจัยครั้งนี้ได้นำใช้วิธีการศึกษาโดยวิธี Pooled Mean Group และ Mean Group มาทำการประมาณค่า พร้อมกันนั้นได้ใช้วิธีการเลือกรูปแบบ Model ที่ดีที่สุดในการมาประมาณค่าด้วยวิธี Hausman Test ซึ่งวิธี Pooled Mean Group และ Mean Group เป็นการประมาณค่าความสัมพันธ์ระยะสั้นและระยะยาวไปพร้อมๆกันในสมการเดียวกัน

ผลการศึกษาด้วยวิธีการทดสอบความนิ่งของข้อมูลด้วยวิธี LLC, IPS, PP และ ADF พบว่าข้อมูลที่นำมาประมาณค่ามีความนิ่งอยู่ในระดับที่แตกต่างกัน คือระดับ I(0) และ I(1) ส่วนผลการทดสอบการประมาณค่าความสัมพันธ์ระยะสั้นและระยะยาวระหว่างตัวแปรตามและตัวแปรอิสระด้วยวิธี PMG พบว่า lnGDP LnPO และ lnTP มีความสัมพันธ์ระยะยาวและมีความสัมพันธ์ในทิศทางเดียวกัน ส่วนการทดสอบความสัมพันธ์ในระยะสั้น ตัวแปรที่นำมาทำการวิเคราะห์ไม่มีความสัมพันธ์ทางด้านระยะสั้น ซึ่งอาจมีปัจจัยอื่นที่เป็นตัวกำหนดความสัมพันธ์ระยะสั้น สำหรับการประมาณค่าดว้ยวิธี MG พบว่าไม่มีความสัมพันธ์ทั้งระยะสั้นและระยะยาว ดังนั้นเมื่อทำการทดสอบรูปแบบ Model ที่เหมาะสมที่สุดในการนำใช้วิธีด้วยวิธี Hausman Test พบว่าวิธี ARDL ด้วยแบบ PMG มีความเหมาะสมที่สุด

จากผลการวิจัยการประมาณค่าความสัมพันธ์อย่างมีเงื่อนไขในอุปสงค์การท่องเที่ยวของนักท่องเที่ยวชาวต่างประเทศที่ต้องการมาเที่ยวลาวผลการศึกษาเชิงประจักรแสดงให้เห็นถึงการขึ้นอยู่แก่กันของความผันผวนอย่างมีเงื่อนไขของอุปสงค์การท่องเที่ยวในหลายคู่ประเทศ อย่างไรก็ตามผลของการขึ้นอยู่เชิงกันเกิดขึ้นกับทุกประเทศในภูมิภาคอาเซียนทั้งในทางเดียวกันและในทางตรงกันข้าม

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Chapter 1

Introduction

1.1 Principle and Rationale of Study

Over the past two decades, international tourism has achieved remarkably well, contributing substantially to general growth of world economy. The development of tourism industry is often a very significant strategy for the development of economic growth in developing countries and developed countries. Tourism industry generates various economic benefits, including increased foreign exchange earnings, employment, income and government revenues. The job expansion for increasing direct employment in travel and tourism is forecast to average 1.9 percent per year over the next decade, compared with 1.2 percent annual growth forecast for total jobs in the global economy (Turner & Sears, 2013). Moreover, tourism industry is the world-largest export earners generating US$ 1.3 trillion, representing 6 percent of the world's exports in 2013. International tourist arrivals climbed up 5 percent to 1,087 million from 1,035 in 2012. It is forecast to grow up 1.8 billion international tourists in 2030. The international tourism receipts ascended to 4 percent to US $ 1075 billion in 2012 (UNWTO, 2013).

The international tourism business has entered an interesting period for many countries in Asia between 1997-1998 (Lim,2003) while tourism developments can procure economic benefits. It can also negatively impact natural environments and socio-cultural conditions. Tourism can change traditional lifestyles and culture as a result of expanded income distribution due to increases in the number of tourists and capital flow. It has been suggested that tourism leads to less environmental destruction than some other sectors, such as manufacturing industry in cases where the natural environment is used as the tourism resource, i.e., in ecotourism, environmental conservation may be promoted.

After the party IV in 1986 set trends changed comprehensive and open cooperation with foreign tourism in the economy – the society of Lao People's Democratic Republic (Lao PDR) identified and announced the implementation of the development and promotion of tourism, culture, nature and history. In order accommodate tourism and other services, the government focused significantly on infrastructure by building roads, improving communication to the challenges, and connecting with neighbors to make visitors can integrate at regional and international levels. Tourism in Lao People's Democratic Republic (Lao PDR) generates various economic benefits such as job expansion in travel and tourism is forecast to average 1.9 percent per year over the next decade, compared with 1.2 percent annual growth forecast for total jobs in the global economy (Turner & Sears, 2013). Moreover, tourism is the world, export generating US$ 1.3 trillion, representing 6 percent of the world's exports in 2013. International tourist arrivals export in 2013 climbed up 5 percent to 1,087 million from 1,035 in 2012. It is forecast to grow up 1.8 billion in 2030. The international tourism receipts increased from 4 percent to US $ 1075 billion in 2012 (UNWTO, 2013). The tourism sector is now the second-largest income earner in Lao PDR after the mining sector, according to a recent report (Tourism Statistics, 2013**).** Given the significance of the sector, which generated about US$514 million last year, the government is committed to further develop facilities and service staff to attract more overseas visitors and the number of tourist arrivals amounted to about half this figure in 2012, up 22 per cent compared to the previous year. The number of tourist arrivals has increased continuously since the government launched the "Visit Lao PDR Year" campaign in 1999-2000, despite the recent global economic downturn. In 2006, 1.2 million people visited Lao PDR, rising to 1.6 million in 2008 and to 2 million in 2009, before rising to 2.5 million in 2010, 2.7 million in 2011 and 3.3 million in 2012. The government estimates that the number of tourist arrivals could reach 3.58 million next year, 3.74 million in 2015 and 4.5 million people in 2020.To achieve the goal of 3.74 million visitors in 2015, the Ministry of Information, Culture and Tourism has outlined seven priority programs. The programs include developing essential infrastructure at tourist sites and encouraging more business operators to cater for visitors, while an international promotional campaign will highlight the many attractions that Lao PDR aims to offer. There will be training and

development for government staff working in the tourism sector, as well as management training for business operators. Efforts will also be made to improve the skills of workers in the industry and the quality of the services they provide.

In order to understand more the below table displays number of tourist arrivalw in$Lao PDR in 1990 – 2011, and shows revenue besides that it shows revenue from 1990 until 2011 as following.

Table 1.1 The number of international arrivals to Lao PDR and revenue generated duréîg ôèe period of 1990 - 2011

Year	Number of tourist Arrival	Change (%)	Average Length of stay (Days)	Revenue from tourism
1990	14,400	-	-	-
1991	37,613	161	-	2,250,000
1992	87,571	133	-	4,510,000
1993	102,946	18.00	-	6,280,000
1994	146,155	42.00	-	7,557,000
1995	346,460	137	-	24,738,480
1996	403,000	16.00	3.30	43,592,263
1997	463,200	15.00	4.00	73,276,904
1998	500,200	8.00	3.70	79,960,145
1999	614,278	23.00	4.00	97,265,324
2000	737,208	20.00	4.00	113,898,285
2001	673,823	-8.60	5.20	103,786,323
2002	735,662	9.00	4.30	113,409,883
2003	636,361	-13.50	4.00	87,302,412
2004	894,806	41.00	4.30	118,947,707
2005	1,095,315	22.00	4.50	146,770,074
2006	1,215,106	11.00	4.50	173,249,896
2007	1,623,943	34.00	4.50	233,304,695
2008	1,736,787	7.00	4.25	275,515,758
2009	2,008,363	16.00	4.50	267,700,224
2010	2,513,028	25.00	4.50	381,669,031
2011	2,723,564	8.00	4.50	406,184,338

Source: Tourism Development Department, Lao PDR PDR 2011

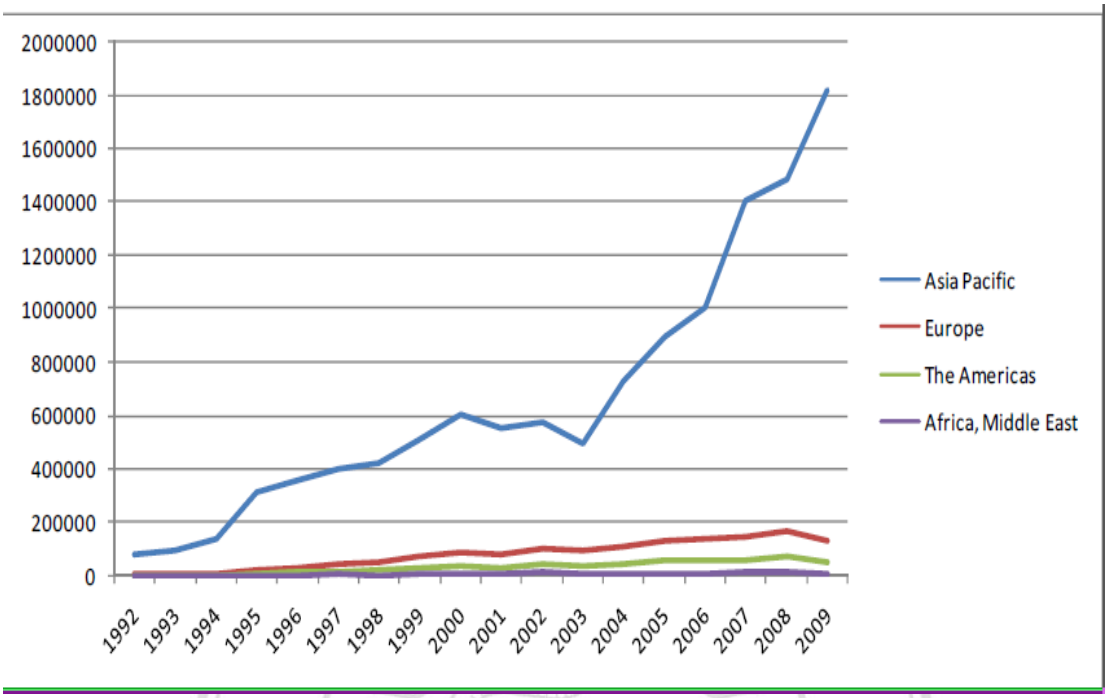

Figure 1.1 Number of Tourist Arrivals to Lao PDR by Region, 1992 – 2009

Lao PDR is an attractive destination for many reasons, including its natural beauty, rich cultural traditions and political stability. The country is now becoming more closely connected with the rest of the region as new roads and bridges are built across the Mekong River. Lao Airlines now flies to serve many countries in the region to helping region travel. There are three primary advantages including location, abundant natural resources and cultural based resources that support to promote the improvement of tourism in Lao PDR. Lao PDR is located near many popular tourist destinations of neighboring countries. Lao PDR shares land borders with Kingdom of Thailand (Thailand), Socialist Republic of Vietnam (Vietnam) and Kingdom of Cambodia (Cambodia). Travel agencies can easily provide package tours that combine these countries with Lao PDR. In addition, Lao PDR offers attractive natural environments such as mountainous areas and the Mekong River, as well as abundant wildlife, including freshwater dolphins. Lao PDR is, moreover, a multi-ethnic nation and a number of minorities live in the northern part of the country. These ethnic groups are living as permanent residents. Lao PDR is also known as home to two World Heritage Sites known as the town of Luang Prabang World Heritage Property and Vat Phou.

On the other hand, there are several disadvantages that may impede the development of tourism in Lao PDR because Lao PDR has relatively little international recognition and international access, as well as safety problems with internal transportation. Compared to its neighbors, Lao PDR is a less popular destination for the number of foreign tourists. No direct flights to Lao PDR from the principal developed nations, therefore overseas tourists must transit in Thailand, Vietnam, Cambodia or People's Republic of China (China). Safety problems with domestic flights are also a concern, as the country is lack of transport infrastructure but Lao PDR 's abundant resources may fulfill their potential tourism destination. So Lao PDR's abundant resources can be adopted to attract tourist to arrivals in Lao PDR. Largest numbers of tourist arrivals to Lao PDR are from Asia and Pacific region following by Europe, Americas, Africa and Middle East as shown on the following Figure 1 and Table 2.

Table 1.2 Market share of international tourist arrivals by region (%) 2000 – 2011**.**

Region / Year	Asia and Pacific	Europe	Americas	Africa and Middle East
2000	81.97	11.73	5.71	0.59
2001	82.11	11.98	5.10	0.81
2002	78.71	13.85	6.35	1.09
2003	78.29	14.75	6.21	0.75
2004	81.59	12.53	5.27	0.61
2005	82.1	11.99	5.48	0.42
2006	83.01	11.43	5.01	0.55
2007	86.61	9.09	3.78	0.51
2008	85.36	9.72	4.33	0.59
2009	90.65	6.48	2.66	0.21
2010	89.93	7.09	2.68	0.3
2011	90.49	6.67	2.57	0.27

Source: Tourism Development Department, Lao PDR PDR 2011

From the above information of international tourist arrivals, the market share of tourist arrivals to Laos PDR increased constantly from 2000-2011 with a percentage growth rate from 81.97% to 90.49. However, the number of visitor arrivals decreased slightly from 82.11% in 2001 to 78.71 in 2002 (in Table 2). Consequently, the main question of this research is to experiment the economic factors influencing the international tourism demand in Lao PDR. The research benefits will explain determinants of tourism demand of eight ASEAN members using PMG and PM methodologies. Applications for planning policies might be adopted to promote tourism industry in Lao PDR. The result outputs of the factor influencing the demand of tourist arrival in Lao PDR can be utilized as a source of knowledge for academic decisions, and entrepreneurs in the tourism industry.

However, in growing the international tourist's role of being the fuel for Lao PDR economy, there is very little attention on the study of factors that properly identity the tourist's decision to visiting Lao PDR and there has been nothing said about predicting the future flow of international tourist coming to Lao PDR; there has, however, been more studies giving attention to other Asian countries as well as in many Western and European countries. An increasing number of studies have struggled to understand behavior of the international tourism through the demand models, as can be seen in the following papers: Gonzalez and Moral (1995), Turner, L. W., & Witt, S. F. (2001), Dritsakis (2004), Narayan, P. K. (2004), Lim (1997), E.I.Lelwala and L.H.P. Gunaratne. (2008), Lim et al. (2009), Jintranun et al. (2011), Garín-Muñoz, Teresa.(2006),Aslan et al. (2008), Garin-Munoz and Montero-Martin (2007), Ouerfelli (2008), Song et al. (2003), Allen et al. (2009), Kusni et al. (2013), Asemota and Bala (2012).

1.2 Research Aim and Objective of Study

The main objective of this study aims to experiment the economic factors influencing the international tourism demand in Lao PDR).

The specific objectives are as following:

1. To determine factors affecting international tourism arrivals to Lao PDR of eight ASEAN members.

2. To employ the PMG and MG methods estimating the determinants of tourism demand of eight ASEAN members.

1.3 Expected Outcome of Study

In this paper study about Estimating International tourism demand for Lao PDR PDR This study will benefit as following:

1. The results will provide effective information for the public sector to increase the effectiveness of strategic plan to promote Lao PDR as a tourist destination, r in Lao PDR

2. The results will provide a source of knowledge information for investors, travel agent companies, private sector and public sector to promote tourism to draw foreign tourists and to use the international tourism demand model of eight ASEAN members. It will benefit for stakeholders.

Chapter 2

Theory and Literature Review

2.1 Theory

2.1.1 Classical demand theory

Most of tourism demands studies have included elasticity of demand in the framework of demand theory because tourists maximize tourism products through demand function. More critical value beyond the neoclassical theory, the theoretical Lancastrian model explores the individual consumption of specific feature through the consumer attains satisfaction and utility; this model provides the demand approach to tourism. Tourism demand is basically influenced by income, tourism price, exchange rate, transportation cost, and many other external factors about the extent to which changes in the demand result from each of the variables; these changes are predominantly for policy to analyze the effects of these variables in details.

A lot of existing tourism demand studies using econometric models are demonstrated in the form of elasticity of demand, which is defined as the percentage changes of endogenous variable (number of tourist arrivals) with respect to the exogenous variables (the demand determinants). An elasticity is greater than one, meaning the demand is elastic, modifies that the demand for tourism goods and services respond fractionally more than the movement of each of the explanatory variables. Similarly, if the income rises, holding other variables constant, the effects of all the relevant tourism business activities and tourist destinations are likely positive. Hence, increasing income reflects to the increase of tourism purchasing power in the destination country, similar to the effect of increasing income on the demand for most goods and services, which are called the normal goods in the tourism demand study; that is positively related to income. However, it is possible for a rising income to bring a drop in demand in the tourism market destination based on the tourism inferior goods (Sookmark, 2011).

On the other hand, if the elasticity is less than one, it implies that demand is inelastic. It represents that the demand for tourism products responds fractionally less than the changes of manipulated variables (Sookmark, 2011).

1) Income Effect

Income represents all the amount of consumers' purchases goods and services at the targeted tourist destination, which is a matter of research seeking to measure the effect of income changes on tourism demand. The measure of the effect of the income changes is calculated in the form of income elasticity, which is the ratio of the percent change with respect to the change in disposal income as shown in the following equation (Sookmark, 2011):

$$E_y = \frac{\%\text{change in tourist demand}}{\%\text{ change in disposable income}}$$

The sign of income elasticity is expected to be positive for all goods and services because the demand for basic goods and services should be income inelasticity, while luxury items (an item that raises fractionally more with growing income) should be elasticity as the special case of foreign travel, see Divisekera and Kulendran (n.a) and Monoz (2007). This finding leads to conclude that the estimated income elasticity of demand is positive and greater than one in which is supported by Crouch (1994).

However, if the destination country is affected tremendously by cost factors, given the availability of many destinations from which to choose, international tourism arrivals can be sensitive to the price based on their personal income. Therefore, income elasticity is properly a negative, which denotes inferior tourism destination (Divisekera & Kulendran, n.a), and (Chadee & Miezkowski, 1987).

2) Price effect

The price effect is more complex than the income effect. Price in this study refers to tourism price, which is the amount of money the tourists pay in the destination country (such as on accommodation, recreation, entertainment, foods, transportation, and so on).

The tourism price/relative price is the price between destinations and/or the price differences between destination country and origin country. Moreover, international tourism demand, exchange rate is normally the leading of making the price of tourism product changes. If the income changes, the price of tourism products change; this can be measured as the price elasticity of demand formulated as the following (Sookmark, 2011):

$$E_p = \frac{\%\ \text{change in quantity of tourism product demanded}}{\%\ \text{change in tourism product price}}$$

According to the standard law of demand in microeconomics, the product will be diminished in the future, hence E_p will be negative; that it, there is an inversion relationship between product's price and the demand for that product. Elastic demand indicates that the demand is sensitively respond exceeding the percentages of any price changes, while price inelasticity implies the demand is relatively not respond to the demand. Cross price elasticity is defined by Sookmark (2011) as shown form below:

$$E_{pc} = \frac{\%\ \text{change in demand for product A}}{\%\ \text{change in price of product B}}$$

Where A and B are close substitutes and one might expect E_{pc} to be positive and probably> 1 (Sookmark, 2011).

2.1.2 International Tourism Demand

The concept of tourism demand and forecasting, almost all forecasts involve predicting the tourism demand at the same point in the future. In this neoclassical conception of demand, the tourism perspectives include age, education, tastes, and previous experience with the product, advertisement, product innovation, government policy or new technology. As a luxury good, the demand for tourism tends to be quite elastic while the income elasticity of different tourism products can differ

considerably, as some recreation goods may actually show declining consumption with increasing income.

Demand forecasting in tourism research is reviewed from the perspective of method which is most appropriate to give research question, the time period specified and the information needs of managers. Factors which will govern the choice of method include the purpose, the time period being forecast, the degree of accuracy required, the availability of information, the forecasting environment and the cost of producing the forecast. Inaccuracies in forecasting result may result from five different factors: inappropriate model, incorrect use, error calculation in relationship in model, significant variables omitted and data used may have been inadequate or inappropriate. A review of quantitative, qualitative and technological forecasting of the techniques and the factors which influence tourism demand are also included.

Most econometric analyses of tourism demand have used single equation models. Relatively few studies have used a complete demand system to describe the allocation of travel expenditures among various categories of goods in a particular destination, or among various groups of destinations/holiday types by a particular tourism market (Fujii et al 1985, 1987; O'Hagan and Harrison 1984; Divisekera 1993, 1994; Pyo et al 1991; Smeral et al 1992; Syriopoulos et al 1993; White 1985). Archer (1976), Crouch (1994), Walsh (1996), Lim (1997), Inclair (1998), Lise and Tol (2002), McAleer (2001,2003), Narayan (2004), Chaitip et al (2006). Growth in international tourism is closely aligned to economic variables, which at both the microeconomic and macroeconomic levels influences the consumer's decision to undertake overseas travel.

Empirical research on international tourism demand has overwhelmingly been based on aggregate time series data which permits the estimation of income and price elasticity on inbound tourism (Lim, 1997, McAleer (2000, 2001) and Chaitip, et al (2006)). A simple origin-destination demand model for international tourism can be represented as follows:

$$D_t = f(Y_t, TC_t, P_t) \qquad (2.1)$$

Where:

D_t = is a measure of travel demand at time t ;

Y_t = is a measure of income of the tourist-generating or origin country at time t

TC_t = is a measure of transportation costs from the origin to destination country at time t

P_t = is a measure of tourism price of goods and services at time t

And assume that (+Yt), (-TCt), (-Pt) 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. Equation (3.1) can be expressed in log-linear (or logarithmic) form:

$$\ln D_t = \alpha + \beta \ln Y_t + \gamma \ln \{ F1_t \text{ or } F2_t \} + \delta \ln \{ RP_t, ER_t \text{ or } RER_t \}$$
$$+ \varphi \ln D_{t-1} + \theta \ln CP_t + u_t \qquad (2.2)$$

Where:

$\ln D_t$ = logarithm of short-term quarterly tourist arrivals (or demand) from the origin to destination country at time t

$\ln Y_t$ = logarithm of real GDP in origin country at time t

$\ln F1_t$ = logarithm of real round-trip coach, economy airfares, in Neutral Units of construction (NUC) between origin country and destination country at time t

$\ln F2_t$ = logarithm of real round-trip coach, economy airfares, in origin country currency between origin country and destination country at time t

$\ln RP_t$ = logarithm of relative prices (or CPI of destination country/CPI of origin country) at time t

$\ln ER_t$ = logarithm of exchange rate (origin country per destination country) at time t

$\ln RER_t$ = logarithm of real exchange rate [or CPI(destination country)/CPI(origin country)*1/ER] at time t

$\ln CP_t$ = logarithm of competitive prices [using CPI(destination country) /(other destination country)]

u_t = independently distributed random error term, with zero mean and constant variance at time t

And defined that 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).

2.2 Econometric Methods

2.2.1 Panel Data Analysis

A longitudinal, or panel data set is one that follows a given sample of individuals over time, and thus provides multiple observations on each individual in the sample (Hsiao, 2003). Panel data models have become increasingly popular among empirical studies due to the high capacity for capturing the complexity compared to cross-sectional or time-series data models. In other words, panel data can enrich empirical analysis in ways that may not be possible if we use only cross-sectional or time series data. A general linear panel model can be written as follows.

$$y_{it} = \alpha_i + x'_{it}\beta_{it} + \varepsilon_{it} \qquad i = 1,...; t = 1,...,T \qquad (2.3)$$

Where the subscript *i* denotes the cross-sectional dimension *t* denotes the time-series dimension. y_{it} represents the dependent variable, α_i is a scalar, x'_{it} represents the independent variable, β_{it} is the coefficient term, and ε_{it} is residual term. If each cross-sectional unit has the same number of time series observations, then we call it balanced panel. If the number of observations differs among panel members, we call such a panel as unbalanced panel (Baltagi, 2008).

2.2.2 Panel Unit Root Tests

The study of panel cointegration or a long term relationship in the panel cointegration model is the test of stationary data or panel unit root test, there are many methods to test panel unit root test for example Levin, Lim and Chu (LLC) method, Pesaran and Shin (IPS) method and Fisher-.Type Tests using Fisher-ADF and Fisher-PP, which are detailed below.

Consider a following AR (1) process for panel

$$y_{it} = \rho_i y_{it-1} + X_{it}^{'}\delta_i + \varepsilon_{it} \quad (2.4)$$

Where i = 1,2,…..,N is cross section units

t = 1,2,…..,T_i is time series units

and $X_{it}^{'}$ = Exogenous Variables

ρ_i = Autoregressive coefficients

ε_{it} = error term

If $|\rho_i| < 1$ y_{it} Has no unit root. Or panel data are stationary.

$|\rho_i| > 1$ y_{it} Has unit root. Or panel data are non-stationary

Assumptions of panel unit root test for the ρ_i, whit it different value. There are two assumptions underlying $\rho_i = \rho$ for all i and all cross section units. Including the panel unit root test by Levin, Lin and Chu (LLC) Test. Breitung Test methods and procedures Hadri Test This is a Common Unit Root Process

1) Tests with Common Unit Root Process

Considering assumptions assigned to ρ_i cross section of all units are equal. However, testing by Levin, Lin and Chu (LLC) Test and Breitung Test the null hypothesis has unit root but Hadri Test the main hypothesis has no unit root. This paper will use LLC test which details method as follows:

LLC Test consider to procedures for the Augmented Dickey-Fuller (ADF) as follows:

$$\Delta y_{it} = \alpha y_{it-1} + \sum_{j=1}^{p_i} \beta_{it} \Delta y_{it-j} + X_{it}^{'}\delta + \varepsilon_{it} \quad (2.5)$$

Where Δy_{it} = difference term of y_{it}

y_{it} = panel data

α = $\rho - 1$

$X_{it}^{'}$ = exogenous variable

ε_{it} = error term

Hypothesis testing panel unit root is.

$H_0 : \alpha = 0$ Has unit root

$H_1 : \alpha < 0$ Has no unit root

A. Levin, Lin and Chu Test

The LLC Test (Levin, Lin and Chu, 2002) perform regression to estimate parameters α agents (Proxies) for Δy_{it} and y_{it} . At Lag Order level, estimates the equation by the two equations to test Δy_{it} and y_{it} at lag term and exogenous variable X_{it} , the parameters that are estimated from regression are $\left(\hat{\beta}, \hat{\delta}\right) and \left(\dot{\beta}, \dot{\delta}\right)$

For the first equation, find the value $\Delta \bar{y}_{it}$ and Δy_{it} of equation (2.5) to solve Autocorrelations problem then rewrite as follows.

$$\Delta \bar{y}_{it} = \Delta y_{it} - \sum_{j=1}^{p_i} \hat{\beta}_{it} \Delta y_{it-j} - X_{it}^{'} \hat{\delta} \qquad (2.6)$$

Second equation find $\Delta \bar{y}_{it-1}$ from

$$\Delta \bar{y}_{it} = \Delta y_{it-1} - \sum_{j=1}^{p_i} \dot{\beta}_{it} \Delta y_{it-j} - X_{it}^{'} \dot{\delta} \qquad (2.7)$$

Finding represents value of $\Delta \bar{y}_{it}$ and $\Delta \bar{y}_{it-1}$ divided by the standard error as follows:

$$\Delta \tilde{y}_{it} = \left(\Delta \bar{y}_{it} / s_i\right) \qquad (2.8)$$

$$\tilde{y}_{it-1} = \left(\Delta \bar{y}_{it-1} / s_i\right) \qquad (2.9)$$

Where: s_i Standard Error has estimated each value in the ADF equation (2.5). The estimate of the coefficient α obtained as follows.

$$\Delta\tilde{y}_{it} = \alpha\tilde{y}_{it-1} + \eta_{it} \tag{2.10}$$

t - Statistic of $\hat{\alpha}$ is normal distribution, it can be found as follows.

$$t_{\alpha}^{*} = \frac{t_{\alpha} - (N\tilde{T})S_{N}\hat{\sigma}^{-2}se(\hat{\alpha})\mu_{m\tilde{T}^{*}}}{\sigma_{m\tilde{T}^{*}}} \rightarrow N(0,1) \tag{2.11}$$

Where t_{α}^{*} = t-statistic for $\hat{\alpha} = 0$

$\hat{\sigma}^{-2}$ = (Error Term) η

$se(\hat{\alpha})$ = standard error of $\hat{\alpha}$ and $\tilde{T} = T - (\sum_{i} p_i / N) - 1$

S_N = Average Standard Deviation Ratio, which is average Standard Deviation of each cross section data, estimate using Kernel.

$\mu_{m\tilde{T}^{*}}$ and $\sigma_{m\tilde{T}^{*}}$ = Adjustment term of mean and standard deviation

2) Tests with Individual Unit Root Processes

Panel unit root test with Im, Pesaran and Shin (IPS) Test and Fisher-Type Tests using ADF-Test and PP-Test to test the unit root of each cross section are conducted so ρ_i of each cross-section has a different value. This method included unit root test results of cross-section each for use as the panel unit root test. Therefore, the panel unit root test with IPS Test and Fisher-Type Tests will be tested unit root of time series data of each cross section. Then the study summarizes the results for the test panel unit root of all countries.

A. Im, Pesaran and Shin Test

Im, Pesaran and Shin test, (2003) using the Augmented Dickey-. Fuller (ADF) considers separately the cross section units as follows.

$$\Delta y_{it} = \alpha y_{it-1} - \sum_{j=1}^{p_i} \beta_{it}\Delta y_{it-j} - X_{it}^{'}\delta + \varepsilon_{it} \tag{2.12}$$

Null and alternative hypothesis are defined as:

$H_0 : \alpha_i = 0$ for i

$H_1 : \alpha_i = 0$ for $i = 1,2,\ldots..,N_1$

$$H_1 : \alpha_i < 0 \text{ for } i = \text{N+1,N+2,…..,N}$$

t- Statistic for test α_i is:

$$\bar{t}_{NT} = \left(\sum_{i=1}^{N} t_{iT_i}(p_i) \right) / N \tag{2.13}$$

Where $\bar{t}_{NT}$ has normal distribution and rewrite new equation.

$$W_{\bar{t}_{NT}} = \frac{\sqrt{N}\left(\bar{t}_{NT} - N^{-1} \sum_{i=1}^{N} E(\bar{t}_{it}(p_i)) \right)}{\sqrt{N^{-1} \sum_{i=1}^{N} \text{var}(\bar{t}_{it}(p_i))}} \rightarrow N(0,1) \tag{2.14}$$

B. Fisher-Type Tests using Fisher-ADF and Fisher-PP

Maddala and Wu (1999) using Fisher's ADF test which combine the p-value from unit root tests for each cross-section I to test for unit root in panel data

Where π_i (i =1,2,….,N) is p-value of testing the unit root of the cross section data i from all the cross section, N is a free variable U (0,1). - 2log π_i distribute by the chi-square and Degree of Freedom = 2, the statistical test was used.

$$p_\lambda = -2 \sum_{i=1}^{N} \log \pi_i \rightarrow x^2 2N \tag{2.15}$$

In the case of Choi (2001) given p_i (i = 1,2, ..., N) is the p - value of the unit root test's the cross section data i from all cross sections.

$$p_\lambda = -2 \sum_{i=1}^{N} \ln(p_i) \tag{2.16}$$

Statistical value test is:

$$Z = \frac{1}{\sqrt{N}} \sum_{i=1}^{N} \Phi^{-1}(p_i) \tag{2.17}$$

Where Φ is the standard normal cumulative distribution function

$$L = \sum_{i=1}^{N} \ln\left(\frac{p_i}{1 - p_i} \right) \tag{2.18}$$

Hypothesis testing panel unit root is.

$H_0 : p_i = 1$ Has unit root

$H_1 : p_i < 1$ Has no unit root

$H_1 : p_i = 1$ Has no unit root

2.3 Autoregressive Distribution Lags (ARDL)

Pesaran and smith (1998), Pesaran and Shin (1999) and Pesaran et al. (2001) studied and developed ARDL method based on two estimation methods used to analyze panel data model such as: Mean Group Estimator (MGE) and Pooled Mean Groups Estimator (PMGE), they are several methods such as first method, mean group estimator which contains averaging separate evaluation for each group in the panel data or panel model .Agreeing to the parameter's averages is provided consistence by estimator. In 1999, Pirotte shows that mean group estimator affords efficient long run estimates for big sample size. It lets the parameters to be generously independent across groups and does not show prospective homogeneity between groups. The second method estimate random effect, fixed effect and also GM methods. So these models force the parameters to be alike across countries and can inconsistent and misleading long run coefficient when the period is long that possible problem is exacerbated.

When imposing equality of the long term coefficient between countries, an intermediate estimator that allows the short term parameters to vary between groups proposed by Peraran et al. (1999).

2.3.1 Pooled Mean Group Estimator (PMGE).

A benefit of the Pooled mean group is that it can agree to the short-run dynamic specification to differ from country to country while making the long-run coefficients constrained to be the same. Additionally, unlike the Dynamic OLS (DOLS) and Fully Modified OLS (FMOLS), the PMG estimator highlights the modification dynamic between the short-run and the long-run. The causes for assuming that short-run dynamics and error variances should be the same trend to be

less compelling. Not imposing equality of short-run slope coefficients allows the dynamic specification to differ across countries.

From Jamilah M. M, Normaz W. I and Law S. H. (2012), Suppose panel data denote t = 1,2,…..,T and data group I = 1,2,….,N with estimate by the Autoregressive Distributed lag (ARDL) (p,q,q,…q)

$$y_{it} = \sum_{j=1}^{p} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q} \gamma_{ij}^{'} x_{i,t-j} + \mu_i + \varepsilon_{it} \qquad (2.19)$$

where y_{it} is a scalar explained variable, x_{it} is the k × 1 vector of independent variables for group *i*, μ_i represents the fixed effects, λ_{ij}'s are scalar coefficients of the lagged explained variables, $y_{ij}^{'}$'s are k × 1 coefficient vectors. The re-parameterized form of Equation (2.19) can be formulated as follows:

$$\Delta y_{it} = \phi_i y_{i,t-1} + \beta_i^{'} x_{i,t-1} + \sum_{j=1}^{p-1} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q-1} \gamma_{ij}^{'} x_{i,t-j} + \mu_i + \varepsilon_{it} \qquad (2.20)$$

The disturbance terms (ε_{it}) is explanatory distributed across i and t, with zero means and $\sigma_i^2 > 0$ variances. Additionally it is assumed that $\phi_i < 0$ for all *i*'s. Thus, there occurs a long-run relationship between y_{it} and x_{it} which is defined by:

$$y_{it} = \theta^{'} x_{it} + \eta_{it} i = 1, 2, ...N; t = 1, 2, ...T \qquad (2.29)$$

Where η_{it}'s are stationary with possibly non-zero means (including the fixed effects) and $\theta^{'} = -\beta_i^{'} / \theta_i$, is the k × 1 vector of the long-run coefficients. Hence, Equation (2.29) can be written as:

$$\Delta y_{it} = \phi_i \eta_{i,t-1} + \sum_{j=1}^{p-1} \lambda_{ij} y_{i,t-j} + \sum_{j=0}^{q-1} \gamma_{ij}^{'} x_{i,t-j} + \mu_i + \varepsilon_{it} \qquad (2.30)$$

Where ϕ_i is the error correction term coefficient measuring the speed of modification towards the long-run equilibrium and $\eta_{i,t-1}$ is the error correction term given by Equation (2.28) .This parameter is expected to be significantly negative, involving that variables return to a long-run stability.

The PMG method of estimation allows short-run coefficients, intercepts and error variances to vary across countries but constrains the long-run coefficients to be

equal. This implies that $\theta_i = 0$ for all *i's*, in order to estimate short-run coefficients and the common long-run coefficients.

2.3.2 Mean Group Estimator (MG)

Edward.,et al, (2007), Autoregressive Distributive Lag (ARDL) is an appropriate approach with the research that has less samples and this approach is very good to analysis the short run and long run relationship in one equation. Indeed, The form of panel dynamic specification of ARDL as follow

$$y_{it}=\sum_{j=1}^{p}\lambda_{ij}y_{i,t-j}+\sum_{j=0}^{q}\delta_{ij}^{'}X_{i,t-j}+\mu_i+\varepsilon_{it} \qquad (2.31)$$

Where number of group or cross section is i=1, 2,…, N and Time period t= 1,2, …, T

X_{it} are the vector of explanatory variables

δ_{it} are the coefficient vectors

λ_{it} are scalars, μ_i is the group specific effect

Time trends and other fixed repressors are included

Peasaran and Smith (1995), MG estimator allows differing across groups of the intercepts, slope of coefficients, and error variances.

$$\Delta y_{it}=\phi_i(y_{i,t-1} - \theta^{'}_i X_{it})+\sum_{j=1}^{p-1}\lambda_{ij}^{*}\Delta y_{i,t-1}+\sum_{j=0}^{q-1}\delta_{ij}^{'*}\Delta X_{i,t-j}+\mu_i+\varepsilon_{it} \qquad (2.32)$$

Where $\phi_i = -(1-\sum_{j=1}^{p}\lambda_{ij})$

$$\theta_i=\sum_{j=0}^{q}\delta_{ij}/(1-\sum_{k}\lambda_{ik}),\ \delta_{ij}^{*}=-\sum_{m=j+1}^{q}\delta_{im}\ ,\ \lambda_{ij}^{*}=-\sum_{m=j+1}^{p}\lambda_{im} \qquad (2.33)$$

j=1, 2,…, p-1

θ_i is error speed of adjustment term and if $\theta_i = 0$, there is no long run cointegration

If $\theta_i > 0$, there is no long run cointegration

If $\theta_i < 0$, there has long run cointegration

Pesaran and Smith (1998), The Mean Group estimator (MG) is common to have the panel data in both *T* (the number of time series observation), and the number of group represent by *N* . MG estimate are quite large and of the same order of magnitude. The examine this model is either evaluation *N* separate regression and

compute coefficient mean or pool the data and assume the slope coefficient and error variables are identical.

The MG estimators include mean of error correction coefficients and the other short run parameters, also it can be estimated consistently by the unweight average of individual coefficient

$$\hat{\phi}_{MG} = N^{-1}\sum_{i=1}^{N}\hat{\phi}_i, \hat{k}_{MG} = N^{-1}\sum_{i=1}^{N}\hat{k}_i \qquad (2.34)$$

Pesaran, Smith and Im (1996) and Pesaran (1998) have recommenced the variance of these estimators can be consistently examined along the lines example, in the case of $\hat{\phi}_{MG}$, a consistent estimator of the variance of $\hat{\phi}_{MG}$ is follow by:

$$\hat{\Delta}_{\phi} = \frac{1}{N-1}\sum_{i=1}^{N}(\hat{\phi} - \hat{\phi}_{MG})^2$$

The MG estimators are asymptotic distribution of $\hat{\phi}_{MG}$ because asymptotically equivalent as $T \to \infty$ and $N \to \infty$ such that $\sqrt{N}/T \to 0$. Suggested by Hsiao, Pesaran and Tahmiscioglu (1998)

$$\sqrt{N}(\hat{\phi}_{MG} - \phi) \square N(o, \Delta_{\phi})$$

Where ϕ = E(ϕ_i) and $\Delta_{\phi} = Var(\phi_i)$

2.4 Model Selection

(Pesaran et al., 1999) Hausman test is one of the best methods to choose or whether model reliable or effect in explain the best result or to do the judgment amount PMG and MG. The test of the method PMGE and MGE are familiar with Hausman test. If the true model is heterogeneity, PMGE is inconsistent; if the true model is homogeneity, MGE is inconsistent

$$H = (\hat{\beta}_b - \hat{\beta}_B)' D^{-1} (\hat{\beta}_b - \hat{\beta}_B) \qquad (2.35)$$

Null hypothesis of Hausman Test

H_o: Difference in coefficients not systematic $\lambda^2 > 0.05$

H_a: other regression $\lambda^2 < 0.05$

Correction for endogeneity and serial correction in FMOLS

Pedroni (2000) suggested the group means Fully Modified OLS(FMOLS) estimator that incorporates the Phillips and Hansen (1990) semi-parametric correction to the OLS estimator to eliminate the bias due to the endogeneity of the repressors. Also adjusts for the heterogeneity is likely the dynamics based on x and y. specially, the FMOLS statistic is:

$$\hat{\beta}_{i,FMOLS} = N^{-1}\sum_{i=1}^{N}(\sum_{t=1}^{T}(x_{it}-\bar{x}_i)^2)^{-1}(\sum_{t=1}^{T}(x_{it}-\bar{x}_i)y_{it}^{*}-T\hat{\gamma}_i) \quad (2.36)$$

Where

$$y_{it}^{*} = (y_{it}-\bar{y}_i)-\frac{\hat{\Omega}_{21i}}{\hat{\Omega}_{22i}}\Delta x_{it}$$

$$\hat{\gamma}_i = \hat{\Gamma}_{21i}+\hat{\Omega}_{21i}^{0}-\frac{\hat{\Omega}_{21i}}{\hat{\Omega}_{22i}}(\hat{\Gamma}_{21i}-\hat{\Omega}_{21i}^{0})$$

Where $\hat{\Omega}$ and $\hat{\Gamma}$ = covariance and sums of autocovariances obtained from the long run covariance

$\hat{\gamma}_i$ = term acts to correct for the effect of serial correlation

In contrast to the non parametric FMOLS estimators, Pedroni (2001) has also constructed a between – dimension, group-means panel Dynamic OLS(DOLS) estimator that incorporate corrections for endogeneity and serial correlation parametrically. This is done by modifying from the panel regression model to include lead and lag dynamics:

$$y_{it} = \alpha_i + \beta_i x_{it} + \sum_{j=-K_i}^{K_i}\Upsilon_{ik}\Delta x_{i,t-k} + e_{it} \quad (2.37)$$

Where

$$\hat{\beta}_{iDOLS} = \left[N^{-1}\sum_{i=1}^{N}(\sum_{t=1}^{T}z_{it}z_{it}^{'})^{-1}(\sum_{t=1}^{T}z_{it}\tilde{y}_{it}) \right]$$

And z_{it} = 2(K+1) X 1 vector of regressors

2.5. Literature Review

In this study of international tourism demand for Lao PDR using structure equation model and also this research collected related research which consists of the econometric methodology and research on tourism demand model as tools to study the following:

2.5.1 Research on tourism demand model

NikoLao PDR Dritsakis (2003) investigate a research article on long-run demand for tourism to Greece by two countries as such German and British. Data was collected by secondary data (yearly data) ,it covered time period 1960-2000 and also using a number of primary macroeconomic variables, with income of the people in origin countries, tourism prices in destination country, transportation cost and exchanges rates are employed.

The method was used to test the stationary data in this study is Augmented Dickey–Fuller test. This method is scanned in the univariate structure and the method to test cointegration investing Long –Run relationship based on Johansen's maximum likelihood and to estimate the number of cointegrating vectors of VAR model, for the estimate the short rung relationship is Error correction model (ECM). The result showed a long-run equilibrium relationship among international tourism demand; income, transportation cost and real exchange rate appear to be supported by the data used for the examined period. An important finding from the dynamic models presented is that the error correction terms are negative and statistically significant. All repressors in the VEC models are statistically significant; there is no evidence of any problems associated with serial correlation, functional form, normality or heteroscedasticity. Suggests the existence of an equilibrium long-run relationship among important economic variables determining international tourism demand

Sarath Divisekera (2003) conducted research that check the model which is applied of tourism demand and chosen alternative destinations countries for Australia. The methodology used to predictable models are in conformity with the basic assumes of consumer theory, homogeneity, and symmetry. There were several methods to Derived elasticity reveal substantial cross-demand effects, reflecting the diversity of tourist preferences. The results of study indicate substantial new data on the effects

and sensitivity of economic parameters on international tourism. Therefore, based on these findings should assist in formulating broad national policy measures directed towards maintaining and enhancing relative competitiveness enjoyed by individual destinations and in developing strategic policy initiatives to maximize gains from tourism.

Teresa Garın-Munoz (2006) studied tourism in the Balearic Islands. The purpose of this experimental research is to identify and measure the impact of the main determinants of international tourism flows. The data collected by the annual panel data set contains the number of tourists arrivals during the period time 1991–2003, and the main variable use which is a number of tourists arriving, the related price, price of crude oil and GDP. Methodology for estimate the dynamic model test for autocorrelation. This study found that estimated coefficient for the lagged dependent variable reflect to consumer loyalty to the destination and reflect to price of crude oil as a determinant of tourism demand arrival to Balearic Island. Several suggestion were made specially that the demand is heavily helpless on the progress of economic activity in each of the origin countries and heavily on the relative price when tourists living in the destination countries. This study also suggests that diversification of advertising and donation of high-quality services are some recommended measures of tourism policy.

Wanwasa Wirojanarome (2006) estimated foreign tourism demand in Thailand. There are various influences to tourists demand such as: account income level, transportation costs, relative prices level and exchange rate. The research uses a variety of methods to compare and analyze of panel unit root tests by the method of LLC test, Breitung test, Hardri test, IPS test, and Fisher-Type Tests using Fisher-ADF and Fisher-PP showed that the method of IPS test and Fisher-Type. The result of this study indicates panel cointegration tests by the method of Pedroni and Kao which showed that; first, the modeling of foreign tourism demand in Thailand had cointegration or relationship. Second the estimation of foreign tourism demand by the method of Group-Mean FMOLS showed that income level and exchange rate had the same direction with tourism demand, but relative price level and transportation costs had the opposite direction. The result of estimation of foreign tourism demand from individual country of origin by the method of FMOLS showed that income level was

in the same direction with tourism demand of all countries, but transportation costs had the opposite direction only in the case of Singapore tourism demand. Meanwhile relative price level had effect on tourism demand in 2 cases, the opposite direction in the case of South Korea, Republic of China (Taiwan), People's Republic of China, Australia and The United State of America, and the same direction in the case of Singapore and Japan, and exchange had the same direction only with tourism demand of Republic of China (Taiwan).

Prasert Chaitip (2008) study how the factor influencing international tourist demand. The data used include GDP, transportation cost and exchange rate. The method used panel cointegration techniques to test long run relationship as well as both the OLS estimator and DOLS estimate are used the five standard method test for Panel Unit Root Tests such as Levin, Lin and Chu (2002), Breitung (2000), Im, Pesaran and Shin (2003), Maddala and Wu (1999) and Choi (2001) and Handri (1999). The long-run results indicate (GDP) of India's major tourist source markets has a positive relationship impact on international tourism demand arrivals to India, for the transportation cost has positive impact too, and then the currency value has negative impact. Furthermore, most findings were consistent with economic theory and the implications of the model which can be used for policy making.

Christine Lim & Michael McAleer (2010) The purpose of this study investigates actions in the long-run demand for tourist arriving from two origin countries to visit Australia. The variable uses in this paper include tourist demand, transportation cost and exchange rate all most variable are seasonal data. Methodology test the stationary data or test the unit root used augmented Dickey-Fuller test for unit roots to test in the univariate context, and Johansen's maximum likelihood technique was used to test for cointegration and to estimate the number of cointegrating vectors. Error correction models (ECM) explain quarterly tourism demand by Hong Kong and Singapore for Australia.

Chaiboonsri (2010) An application to international tourism demand of Thailand This paper sought to find the long-run relationships between international tourist arrivals in Thailand and economic variables such as GDP, transportation cost and exchange rates during period of 1986 to 2007. Also this paper used five standard panel unit root tests such as LLC (2002) panel unit root test, Breitung (2000) panel

unit root test, IPS (2003) panel unit root test, Maddala and Wu (1999) and Choi (2001) panel unit root test and Handri (1999) panel unit root test. Moreover, the panel cointegration test based on Pedroni residual cointegration tests, Kao residual cointegration tests and Johansen fisher panel cointegration test were used to test in panel among the variables. The OLS estimator, DOLS estimator and FMOLS estimator were used to find the long-run relationship of the international tourism demand model for Thailand. The long-run results indicated that growth in income (GDP) of Thai's Asia major tourist source markets (Malaysia, Japan, Korea, China, Singapore and Taiwan) have a positive impact on international tourists arrival to Thailand. In addition, the transportation cost of these countries has negative impact on the number of international tourist arrivals to Thailand. Finally, Thailand's currency has positive impact on the number of international tourist arrivals to Thailand. Most of findings from this study were consistent with economic theory and the implications of the model can be used for policy making.

Ratanan Bunnag (2010) studied about Thailand's inbound tourism market is heavily dependent on Asia, in particular, Malaysia and Japan. These two countries have been and remain the two major sources of Thailand's international visitors. Therefore, a careful analysis of the demand and volatility of Malaysian and Japanese tourists is crucial to enhance Thailand's tourism policy. Various time series models will be used to construct univariate and multivariate tourism demand and volatility models for Malaysian and Japanese tourists to Thailand. This study can be used to compare with British and American markets. We can divide tourists into three groups (1) short haul such as Malaysian tourists (2) medium haul such as Japanese tourists (3) long haul such as British and American tourists. In the study of income elasticity of tourism demand in the long-run, we can conclude that (1) Malaysian tourism or short haul tourism is inelastic demand. (2) Japanese tourism or medium haul tourism, British and American tourism or long haul tourism are elastic demand. In this study, we will consider the volatility of international tourist arrivals to Thailand by employing a VAR model. VAR is widely used to manage the risk exposure of financial institutions and is the requirement of the Basel Capital Accord. Forecast VAR figures can be used to estimate the level of reserves required to sustain desired long term government projects and foreign exchange reserves. We can conclude that

the VAR of Malaysian tourists are higher than Japanese, British and American tourists. Finally, in this study, we will consider the volatility of international tourist arrivals to Thailand by employing the GARCHX and GJR-X model. The real exchange rate is used because it has a pervasive effect on the tourist budget. For the GARCHX model and GJR-X, the change in the real exchange rate can impact on the volatility of Japanese tourist arrivals to Thailand. But this does not have an impact on the volatility of tourist arrivals from Malaysia, the UK and the USA to Thailand

Edwin Muchapondwa (2011) experimented Modeling International Tourism Demand for Zimbabwe. This paper purpose to test cointegration finding the long run relationship, this research study during 1998 – 2005. The methodology uses the autoregressive distributed lag (ARDL) approach to cointegration, The results show that transport costs, has positive and significant impact on tourism demand for Zimbabwe, it mean the transportation cost changes in global income. For the suggestion government should be improvement of international tourism by pay attention about infrastructure to reduce travel costs as well as support tourism formation for attract more international tourists arriving for Zimbabwe country. Additionally, the government or the related organization can potentially raise international tourism demand for the country by supporting pleasant events in the country.

Fateh Habibi and Hossein Abbasinejad (2011) estimate the impact of the factor determinants of the international tourist arrivals to the Malaysia. The data use annual panel data set includes the number of arrivals, a number of possible explanatory variables, during the period 1998–2007, the method was used a dynamic model is estimated the demand of tourist to arrival in this country, The results found that the income, accommodation capacity and political stability have positive effects on European tourism demand in Malaysia. One of the main conclusions of the study is the significant value of the lagged dependent variable (0.52), which may be interpreted as a major word-of-mouth effect on tourism demand in Malaysia. In addition, the dynamic panel data estimation highlights the importance of the accommodation capacity as the most important factor in attracting more tourism to Malaysia.

E. M. Ekanayake (2012) analyzed the demand for tourist arrivals to the United States, using the panel cointegration technique. The study attempts to identify and measure the impact of the main determinants of inbound international tourism flows to the United States. The study uses annual data from 1986 to 2011 for tourist arrivals from 50 major countries of tourist origin. The panel unit root tests indicate all the variables are integrated of order one. The panel cointegration tests show that all seven test statistics reject the null hypothesis of no cointegration at the 1% significance level, indicating that the five variables are cointegrated. The results suggest that tourism demand to the United States must be considered as a luxury good and is highly dependent on the evolution of relative prices and cost of travel between origin and destination country. The results also show that tourism demand is elastic with respect to income but inelastic with respect to tourism price, real exchange rate, and travel costs.

2.5.2 Related research on econometric methodology

Pesaran (1997) tested an Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis. This paper examinations the practice of autoregressive distributed lag (ARDL) models for the analysis both long-run relationship and short run relationship zide. The method used in this study major variables of the order of the ARDL model, the OLS estimators of the short-run parameters are $\sqrt{T}$ -consistent with the asymptotically singular covariance matrix. These outcomes of this paper exposed strong evidence in favors of a reintegration of the traditional ARDL approach to time series econometric modeling. The ARDL approach has estimates of the long-run coefficients that are asymptotically normal nevertheless of whether the basic regressive are I(1) or I(0).

Nowak-Lehmann, et al (2006) studied the applicability of a commonly used dynamic model, the autoregressive distributed lag model (ARDL), is examined in a panel data setting. Second, Chile's advance of market shares in the EU market during time period of 1988 until 2002 is then investigated in this dynamic framework, testing for the effect of price competitiveness on market shares and finding for estimation methods that agree distributing with the problem of inter-temporal and cross-section correlation of the disturbances. To evaluation or examined to find out the coefficients of the ARDL model, FGLS is utilized within the Three Stage Feasible Generalized

Least Squares (3SFGLS) and the system Generalized Method of Moments (system GMM) methods. A calculation of errors is extra to climax the weakness of the model to problems related to fundamental model assumptions.

Zaidi, M. A. S, et al (2012) explore the role of recognized variables upon the inflow of foreign direct investment (FDI) in selected Middle East and North Africa countries (MENA). Used a panel ARDL model, or Pooled Mean Group Estimator (PMGE) offered by Pesaran et al. (1999), in which it allows to apprehension the long-run and short-run relationship between the variables of interest. This study focuses on some foundation variables that is the investment profile, internal conflict, democratic accountability, administration quality and military in politics. The empirical findings exposed that the investment profile, internal conflict, and government are positively and statistically significant in effecting the inflow of FDI. Therefore, in attracting foreign investors, the policy maker in MENA countries should device a FDI-friendly policies by supporting and continuing the quality of domestic institutions.

Goswami, G. G., & Junayed, S. H. (2006) utilized Autoregressive Distributed Lag Model (ARDL) even though differentiates between the short run and the long run effect lets both the intercepts and slopes to vary across countries. Additionally, the static panel estimation such as fixed-effects estimation (FE) cannot differentiate among the short run and the long run performance. To address the issue of short run heterogeneity and long run homogeneity of the estimated coefficients in a panel outline the pooled mean group estimator (PMGE), Pesaran, Shin, & Smith, 1999 has extended attractiveness in current days. In this study, we approximation the bilateral trade balance model for the US vis-à-vis her nineteen OECD trading partners for the period 1973q1-2004q4 using PMGE and discover that PMG achieves better than ARDL, FE, and MG estimators and offers significant and theoretically consistent result.

While all above studies use the time series data analysis, there are a lot of research papers using econometric methods based on panel data analysis due to its several advantages over time series data, such as 1) it provides researchers a massive data sets; 2) it increases the degree of freedom which properly avoid the spurious result; 3) it reduces the collinearity among explanatory variables; 4) it improves the efficiency of econometric estimation; 5) it specially permits researchers to examine a

number of important economic questions that cannot be addressed using cross-section or time series data and also from the previous study there is not researcher using Panel ARDL approach under PMG and MG model.

Many previous papers have surveyed the international tourism demand in various countries but for Lao PDR have been done only Phakdisoth and Kim, (2007). However, the author looked at the aggregate data instead of Thai tourists only but this paper would like to fill the gap to explore the demand of Thai tourists to Lao PDR both in the short and long runs. This paper applies an economic model for tourism demand, especially in solution with method panel data which will be useful for decision policies of different strategies as tourism increase. Accordingly, in order to investigate the determinants of the international tourism demand in Lao PDR and to measure and detect the most significant factors affecting the flow of international tourists by country of origin to Lao PDR, the technique is used based on Panel ARDL (Pooled mean group) approach to find the long-run relationship of the international tourism demand model.

Chapter 3

Methodology

3.1 Research Designs, Scope and Method

3.1.1 Scope of Study

This research focuses on the period of annual reports from 2005 to 2013.Most of the data used in this research are secondary data and also the countries analysis are ASEAN region major tourism market of Lao PDR such as Republic of Indonesia (Indonesia), Federation of Malaysia (Malaysia), Republic of Philippines (Philippines), Republic of Singapore (Singapore), The Kingdom of Thailand (Thailand), Nation of Brunei (Brunei), Socialist of Vietnam (Vietnam), and King of Cambodia (Cambodia) All of these countries have significant impact on the international tourism industry of Lao PDR. The variables used in this research are the number of intevnatmonal tourists' arrivals in Lao PDR, the GPD per capita (constant 2005) from selected Asian countries, the international price of aviation fuel, and the exchange rates of Lao PDR currency in comparison with selected Asian currencies.

3.1.2 Ãïncåðt Framework

Since 1950, there has been the concept framework of theories concerned with international tourist demand and but since 1972, Artus began investigation using the econometric method estimated international tourist demand which caused many researchers interested in international tourist demand function using the econometric method and statistical program seeking to answer how factors affect international tourist demand. There are many papers were reviewed, including Lim C(1997) Review of the international tourist demand model, Sara A et. al., (2005) studied demand for tourism in Portugal; E.I.Lelwala and L.H.P Gunaretne(2008) adopted modeling tourism demand; Choketarworn et. al., (2010) investigated international tourist arrival in Thailand and so on.

The previous studies about tourism in Lao PDR, conducted by Phakdisoth and Kim(2007); the authors identified exogenous variables covering communication, transportation, infrastructure, destination risk, bilateral trade and distance between country. So drawing from theories concern with factors influencing international tourist arrivals to Lao PDR, this thesis studies about international tourism demand by using the panel ARDL approach; Lao PDR tourism demand function can assume the Lao PDR equation of the international tourism demand in the ASEAN region as shown on the following:

$$D_{it} = f(GDP_{it}, PO_{it}, TP_{it}) \qquad (3.1)$$

Lao PDR equation on above (3.1) explains why the variables influence to demand of tourist arrivals in. The concept framework on figure 1 shows the process to determine about three selected factors at macro model of Lao PDR international tourism demand.

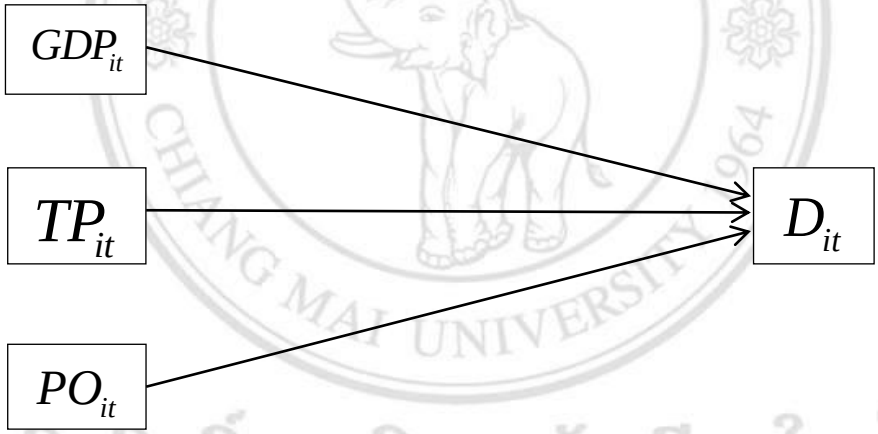

Figure 3.1 concept framework of analysis

From the figure of concept framework on figure 1, assume that (+ GDPit), (- TPit), (- POit) were influenced factors on Lao PDR international tourism demand. to determine for and these variables define that when GDP per capita of the original country at time t is increasing then the demand for international tourism is increasing concurrently. When the tourism price at time t is increasing then the demand for international tourism decreases too. And also when price of flue is increasing then the demand for international tourism is decreasing simultaneously.

3.2 Variables Used in Model

Influence of effect on international tourism demand in the Lao PDR country to consider the economic factors affecting tourism demand. The variables used in this study consist independence and dependence variables such as: dependent variable is international tourism demand; independent variables include income level of the population in origin country, the cost of traveling in price level comparison between Lao PDR and countries, foreign exchange rates will affect to travel decision of tourists from origin to destination countries. In a study converted into a form of Logarithm which details the variables as following:

A. Dependent Variable

The growing of tourism demand studies has attracted academic and professional researchers to draw various dependent variables, such as tourist arrivals, expenditures, departures, tourism receipts, travel demand, tourist visits, average length of stay, nights spend at tourist accommodation. These are found in Chaiboonsri et al. (2010), Song et al. (2009), Lee et al. (1996), Lim (1997), Sr and R.Croes (2000), Han et al. (2006), Alegre and Pou (2006), Gokvali (2007), and Allen et al. (2009). Lim (1997) review more published empirical tourism studies, which find that the most dependent variable used is tourism arrivals and departure followed by tourist expenditures and/or receipts.

The dependent variable is the international tourism demand (DT) including a number of foreign tourists arrival to Lao PDR in the unit.

Therefore, when converted to the form of the logarithm is.

lnDT = the Natural Logarithm of the number of tourists arrivals to Lao PDR
or international tourism demand in Lao PDR.

B. Independent Variable

The previous studies have endowed explanatory variables to explain the tourism demand. There are income variables, tourism prices or relative prices variable, transportation cost, exchange rate, substitute price and other qualitative factors used in the international tourism demand. In reviewing of international tourism demand models, Lim (1995) classifies independent variables into the following categories: income, relative price/tourism prices, transportation costs, exchange rates,

competing destinations/goods, seasonal factors, and other factor. More detailed relevant to those studies can be found in Witt and Witt (1995), Song and Witt (2000), and Louviere (2000). Therefore, there is enough reason to choose the variables in this study as reviewing more detailed below:

Independent variables are the factors influencing tourism demand of foreign tourists in Lao PDR as following:

1) GDP per capita

GDP per capita of origin country is the most leading exposure variable to explain the foreign travel demand as many empirical studies suggested. GDP per capita is very necessary to the tourism demand function, as reported by Lim (1997), Song and Witt (1997), and Dritsakis (2004). With reference to the demand theory, the relationship between income and quantity demand can possibly positive or negative based on the type of goods or services under consumer's consideration. Customers will consume more goods and services, when their income increases; vice versa, consumers consume less goods and services when their income decreases. However, tourism is a well-known considered as the luxury goods (Schiff & Becken, 2011).

GDP per capita in country of origin (Disposable tourism income of individual coming from origin country), can be explained that when GDP per capita of origin at time is increasing then demand for international tourism in Lao PDR is creasing simultaneously that is positive relationship.. So, when converted to the form of the logarithm as follows:

lnGDP = the natural logarithm of gross domestic product. Country's real per capita or income level of the population in the origin. (GDP at constant price 2005).

2) Tourism Price

The Tourism price, in the case of tourism, particularly represents two main prices , namely the cost of living in destination country (tourism price/relative price) and cost of travelling from origin country to destination country (transportation cost). These costs are very difficult to compute and find data from any specific database sources. Tourism price is the most critical concern on tourists' decision-makings to visit the destination country (Gonzalez, 1995). The tourism price is the price of bundle of goods and services bought by tourists, yet most of the countries do not have the tourism price index for goods and services purchased by tourists. Hence,

consumer price index is very common for using in many papers as a proxy, according to Asemota and Bala (2012), Song et al. (2009), Song et al. (2009), Song et al. (2003), Lee et al. (1996).

According to Dritsakis (2004) and Lim (2004), relative price is measured by the consumer price index (CPI) of the destination divided by the consumer price index (CPI) of the country of origin. Tourism price is the cost of travel between origin countries and destination countries (TP), including costs, average per person mmeasured in U.S. dollars. CPI Lao PDR / CPI origin country (Data from IMF and Bank of Lao PDR). This variable explains that when tourism price at time is increasing then demand for international tourism is decreasing that is negative relationship.

So, when converted to the form of the Natural Logarithm, it is:

lnTP = the natural logarithm of CPI Lao PDR / CPI origin country (Data from IMF and Bank of Lao PDR)

Foreign exchange rate is denominated currency (Nominal Exchange Rate) between Lao PDR and origin countries. The ER is the exchange rate between the foreign currencies of origin countries (LAK per 1 unit of currency origin countries). This variable explains that when exchange rate at time is increasing then demand for international tourism in Lao PDR is decreasing, that is negative relationship.

3) Price of fuel

The price of fuel likely transportation cost or price of ticket has been included in many published papers to understand international tourism demand. These can be seen at the works of A.Rodriguez et al. (2012), Divisekera and Kulendran (n.a), and Song et al. (2010). Generally, tourists always take into account on the travel cost from their home to the targeted tourist destination. The tourists' decision-makings usually consider about the cost of their travel based on their level of income. High price of transportation offered by airline is exposed to the strictly tourist's decision. This study includes this variable for exploring the determinant factors that impact on international tourism behavior reflecting Lao PDR as a destination choice.

So, when converted to the form of the Natural Logarithm, it is:

lnPO = the natural logarithm of price of Jet Fuel. This variable explain that when price of Fuel at time is increasing then demand for international tourism in Lao

PDR is decreasing, it is negative relationship (Data from Bureau of Transportation Statistics).

3.3 Data Collection

Based on the above methodology yearly data were collected from various sources as follows: the secondary data using annual data from the period 2005 to 2013, and 72 observations for analyzing international tourism demand. The data of both independent variables and dependent variable are collected from the Tourism Authority of Lao PDR (report 2011), the Bank of Lao PDR (BOL), and Immigration Bureau (Police Department).

Cross-section data of eight ASEAN countries including Republic of Indonesia (Indonesia), Federation of Malaysia (Malaysia), Republic of Philippines (Philippines), Republic of Singapore (Singapore), The Kingdom of Thailand (Thailand), Nation of Brunei (Brunei), Socialist of Vietnam (Vietnam), and Kingdom of Cambodia (Cambodia) consist of GDP per capita, exchange rates, prices of fuel, tourism prices and the number of tourist arrivals in Lao PDR.

Time series data are annual value data in total of 7 years of GDP per capita, exchange rates, prices of fuel, tourism prices and number of tourist arrivals from the period 2005 to 2011collecting from the World Bank, IMF, Department Tourism of Lao PDR. The identified sample of observations would be equal to N x T, that is 72 observations.

3.4 Research Methodology

This research of the tourist demand in Lao PDR was adopted econometric procedures to test the stationary of the data (Panel Unit Root Test) and to estimate using the total average (Pooled Mean Group: PMG).

3.4.1 Methodology and Data Description

This study performed quantitative analysis on the panel data. Panel data test for consistency time between series and cross sectional data. Before estimating data further, it is important to test whether or not panel data is stationary. Panel data are

often characterized as unstable (or non-stationary), and incorrect estimation of relationships by OLS led to false conclusion about relationship (spurious regression). There are many approaches to test panel unit root. This paper conducts the panel unit root tests based on the LLC test, IPS test, ADF test and PP test.

The hypothesis for panel unit root test in order to distinguish whether data are stationary or non-stationary and to determine the predictable data shown as follows:

Table 3.1 Hypothesis of testing the Unit root

Panel Unit Root Test			
Methodology	Null Hypothesis H0	Alternative hypothesis H1	Statistics value test
LLC test	Has unit root	Has no unit root	t - statistic
IPS test			t – statistic
PP test			t - statistic
ADF test			t – statistic

After the data was investigated by conducting statistical hypothesis tests, the results were compared and a selection process of the best t-statistic value relative to positions 1 or I(1) was identified (Im, Perasan and Shin 2003). Next the panel data was tested by using panel ARDL approach to estimate the long run relationships.

The following model is used to estimate tourism demand in Lao PDR PDR within the ASEN region:

$$\Delta \ln D_{it} = \phi_i \ln D_{i,t-1} + \beta_1' \ln GDP_{i,t-1} + \beta_2' \ln PO_{i,t-1} + \beta_3' \ln TP_{i,t-1} +$$
$$\sum_{j=1}^{p} \lambda_{ij} \ln D_{i,t-j} + \sum_{j=1}^{q} \delta_{ij}' \ln GDP_{i,t-j} + \sum_{j=1}^{q} \delta_{ij}' \ln PO_{i,t-j} + \sum_{j=1}^{q} \delta_{ij}' \ln TP_{i,t-j} + \varepsilon_{it} \qquad (3.2)$$

Where:

$\ln D_{it}$ = tourist arrivals (or demand) from the origin country i to destination country at time t

$\ln GDP_{it}$ = GPD per capita in origin country i at time t

$\ln TP_{it}$ = tourism prices i (or CPI of destination country/CPI of origin country) at time t

$\ln PO_{it}$ = price fuel's jet air plane i at time t

ϕ_{1i} = Speed of adjustment to long-term equilibrium

β_i = Long- run coefficient

λ = Short – run coefficient of lagged both of dependent and independent variables

To define the factors that influence on the international tourism demand, the function was tested for a long run relationship. In order to empirically investigate factors that influence Lao PDR international tourism demand including eight ASEAN countries, two main PMGE and MGE approaches which originated from panel data are used in this study. These approaches are investigated with different statistical features for fulfilling the objectives of this study.

3.4.2 Panel ARDL (Pooled Mean Group Estimator)

The PMGE provides statistical features including short-run coefficient, containing the intercepts, the speed of adjustment to the long term equilibrium value, and error term to be heterogeneous country through country. The following steps of panel ARDL (Pooled Mean Groups Estimator), were conducted to analyze short-term relationship, long-term relationship and speed of adjustment estimated by a group. The short-term, long-term and speed of adjustment to long run equilibrium in the international tourism demand model including dependent variable and independent variables can be explained under hypothetical process.

Table 3.2 Hypothesis testing the ARDL

Equation	$\Delta \ln D_{it} = \phi_i \ln D_{i,t-1} + \beta_1' \ln GDP_{i,t-1} + \beta_2' \ln PO_{i,t-1} + \beta_3' \ln TP_{i,t-1} + \sum_{j=1}^{p} \lambda_{ij} \ln D_{i,t-j} + \sum_{j=1}^{q} \delta_{ij}' \ln GDP_{i,t-j} + \sum_{j=1}^{q} \delta_{ij}' \ln PO_{i,t-j} + \sum_{j=1}^{q} \delta_{ij}' \ln TP_{i,t-j} + \varepsilon_{it}$
Hypothesis: H0 ε_{it}	No adaptive to balance short-run equilibrium in the long run.
Hypothesis:H1 ε_{it}	Adaptive to balance short-term equilibrium in the long run.
Statistic test	t- statistic
Criteria test Prob. < 0.1	0.0 – 0.10

3.4.3 Mean Group (MG Estimator)

Peasaran and Smith (1995) proposed the method of Mean Group (MG Estimator) to estimate the long run relationship. The MG estimator allows differing across groups of the intercepts, slope of coefficients, and error variances. The coefficient of long run parameter estimated by MG estimator

$$\beta_{1i} = 8^{-1} \sum_{i=1}^{8} \beta_{1i} \ , \ \beta_{2i} = 8^{-1} \sum_{i=1}^{8} \beta_{2i} \ , \ \beta_{3i} = 8^{-1} \sum_{i=1}^{8} \beta_{3i} \ , \ \beta_{4i} = 8^{-1} \sum_{i=1}^{8} \beta_{4i} \qquad (3.3)$$

3.4.5 Hausman Test

Hausman test is the best method to select whether model reliable or effect in explaining the best results or to decide statistical judgment among PMG and MG (Pesaran et al., 1999). The tests of PMGE and MGE are familiar with Hausman test. If the true model is heterogeneity, PMGE is inconsistent; if the true model is homogeneity, MGE is inconsistent shown as follows:

$$H = (\hat{\beta}_{MG} - \hat{\beta}_{PMG})' D^{-1} (\hat{\beta}_{MG} - \hat{\beta}_{PMG}) \qquad (3.4)$$

Null hypothesis of Hausman Test

H_o: Difference in coefficients not systematic $\lambda^2 > 0.05$

H_o: other regression $\lambda^2 < 0.05$

When the factors influencing of international tourism demand function were defined, the demand function will be tested. The concept framework of panel unit root analysis and panel ARDL (Pooled Mean Group) and Mean Group can be shown as follows:

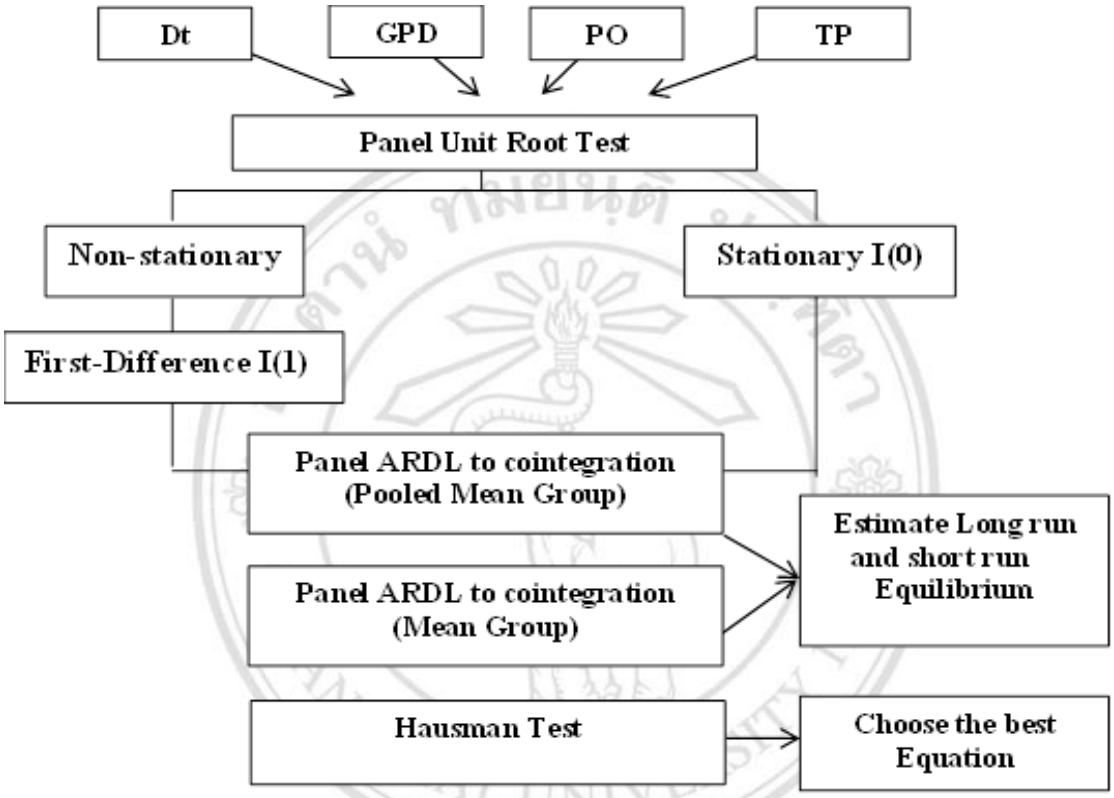

Figure 3.2 Methodology for analysis

Figure 3.2 the conceptual framework analysis can be estimated in to the following four steps:

Step 1: test the panel data by using panel unit root tests to test whether data are stationary or non-stationary using Lin and Chu Test or Im, Pesaran and Shin (IPS) Test and to know the data also can be adopted for an appropriate statistical approach.

Step 2: in case that the data both exogenous variables and endogenous variable are stationary by the order of integration is 0 or I(0) and, then data can be taken to estimate long-term relationship between exogenous variables and endogenous variable as shown on Table 1: Hypothesis of testing the Unit root..

Step 3: the data are not stationary I(1) , it can be solved by finding the first difference (1st Difference), which t-statistic value is less than the critical value. This means rejecting the null hypothesis that the data are stationary at that level as shown on Table 1: Hypothesis of testing the Unit root.

Step 4: estimate the data to determine short-term relationship, long-term relationship and speed of adjustment by panel ARDL (Pooled Mean Groups Estimator and Mean Groups Estimator), estimated by the group. The hypothetical relationships test between short-term, long-term and speed of adjustment to long run equilibrium, among both exogenous variables and endogenous variable of the international tourism demand model.

Chapter 4

Empirical Results

In this chapter, the analysis is conducted in four steps as the following:

Step 1: test the panel data by using panel unit root tests to test whether data are stationary or non-stationary using Lin and Chu Test or Im, Pesaran and Shin (IPS) Test and to know the data also can be adopted for an appropriate statistical approach.

Step 2: in case that the data both exogenous variables and endogenous variable are stationary by the order of integration is 0 or I(0) and, then data can be taken to estimate long-term relationship between exogenous variables and endogenous variable as shown on Table 1: Hypothesis of testing the Unit root..

Step 3: the data are not stationary I(1) , it can be solved by finding the first difference (1^{st} Difference), with t-statistic value that is less than the critical value. This means rejecting the null hypothesis that the data are stationary at that level as shown on Table 1: Hypothesis of testing the Unit root.

Step 4: estimate the data to determine short-term relationship, long-term relationship and speed of adjustment by panel ARDL (Pooled Mean Groups Estimator and Mean Groups Estimator), estimated by the group. The hypothetical relationships test between short-term, long-term and speed of adjustment to a long-run equilibrium, among both exogenous variables and endogenous variable of the international tourism demand model.

4.1 Result from Panel Unit Root Test

Panel unit root testing occurred from time series of the unit root testing. The main difference to time series testing of unit roots, it mean the panel unit root test had to consider asymptotic performance of the time-series (T) and the cross-sectional (N). The technique in which N and T touch to infinity is critical if one wants to conclude

the asymptotic performance of estimators and tests used for non-stationary panel data. There are some possibilities to handle the asymptotic.

Testing stationary panel data, there are many methods to test panel unit root as following: 1) LLC test, 2) IPS test, 3) PP test and 4) ADF test. The program was used computer software, if the data non-stationary or contains a unit root information will cause a spurious regression in order to avoid information with mean and variance that are not stationary in each different time period. The results of the test data is based on the probability value of significant Level, there are three levels of the statistically significant such as 99 percent, 95 percent and 90 percent. (α = 0.01, 0.05, and 0.10), respectively. if the value of t-statistic is not significant at a level or I (0), it will devalue (lag) down to first difference (1st different), respectively, until the the statistical value is statistically significance, it mean independent and dependent variables are stationary. The details are as follows.

4.1.1 Result from Panel Unit Root Test at Level

The result of unit root test can be divided in to two parts as follows: the first part is the LLC test, IPS test, ADF test and PP test at the Level I(0) to examine the panel data stationary or non-stationary shown as follows:

Table 4.1 Panel unit root test at order level

Variable	Panel Unit Root Test				Level
	LLC	IPS	PP	ADF	
lnDt	-2.26417	0.36018	19.2669	13.4844	Level
lnGDP	-1.19466	1.11097	14.3343	7.87946	Level
lnTP	-0.90763	1.23901	17.0205	11.0222	Level
lnPO	-7.20313***	-0.32664	54.6143***	20.7202**	Level

Source: Calculated

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses.

Dependent variable: demand of tourist (lnDt) , independent variable: GDP per capita (lnGDP), Tourism price (lnTP), Price of fluel (lnPO).

The table 4.1, shows estimating the panel data to find out the unit root are conducted by using Augmented Dickey-Fuller (ADF), Lin Levin, Chu (LLC), Im, Pesaran and Shin (IPS) Test and Phillips-Perron (PP). Most of them the null hypothesis is different to determine stationary of the data base on statistic value as such:

The null hypothesis of Philip - Perron (PP) test of panel unit root at levels is non-stationary, from the table 4.1 the result for logarithm of demand of tourist arrival to Lao PDR (lnDt), logarithm of GDP per capita of destination countries (lnGDP) and logarithm of tourism price (lnTP) exhibit a time trend and intercept. The Philip-Perron (PP) test accepts the null hypothesis it mean the panel data non stationary (has unit root) at level I(0). The PP statistic value of lnDt, lnGDP and lnTP are 19.2669, 14.3343 and 17.0205 representively which less than critical value. But the result for the logarithm of price of fuel (lnPO), which reveals a time and intercept. The PP test rejects the null hypothesis. It mean the panel data stationary at level I(0).

From the table 4.1 the null hypothesis of t-test at levels non- stationarity is performed using the Augmented Dickey-Fuller (ADF) test of panel unit roots. In addition, this result indicate the critical values at the 1%, 5% and10% levels significance. Testing panel unit root which is trend and intercept, results are shown as follow; the result for logarithm of demand of tourist arrival to Lao PDR (lnDt), logarithm of GDP per capita of destination countries (lnGDP) and logarithm of tourism price (lnTP). The Augmented Dickey-Fuller (ADF) test accepts the null hypothesis it mean the panel data non stationary (has unit root) at level I(0). The ADF statistic value of lnDt, lnGDP and lnTP are 13.4844, 7.87946 and 11.0222 represently which less than critical value. But the result for the logarithm of price of fuel (lnPO), which reveals a time and intercept. The ADF test rejects the null hypothesis. It means the panel data stationary at level I (0). Which statistic value greater than critical value 20.7202.

For the IPS and LLC test result indicate that each series accept the null hypothesis of unit root at levels. So lnDt, lnGDP and lnTP are non-stationary at levels I(0). On the other hand, there is only lnPO is strongly rejected at the 1% significance. Hence, the unit root tests in table 4.1 indicates that the series has unit root of order one.

4.1.2 Result from Panel Unit Root Test at First Different

If the data non-stationary at the levels I(0), next step testing unit root by using to conduct a panel unit root test with first differences. Because if the data stationary can help to make estimations and prediction because when the data is stationary, it is significant enough to explain the model and can be assumed to be nearly true. The next step show as follow:

Table 4.2 Panel unit root test

Variable	Panel Unit Root Test				Level
	LLC	IPS	PP	ADF	
lnDt	-8.44750***	-0.72254	57.0791***	27.105	1st difference
lnGDP	-6.06912***	-0.28759***	20.3798	38.1632*	1st difference
lnTP	-6.30394***	-0.19807***	18.9274**	36.0851***	1st difference
lnPO	-7.20313***	-0.32664	54.6143***	20.7202**	Level

Source: Calculated

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses.

Dependent variable: demand of tourist (lnDt), independent variable: GDP per capita (lnGDP), Tourism price (lnTP), Price of fluel (lnPO).

Table 4.2, Shows the results of the testing panel unit root test of the international tourism demand by using LLC (2002), Im-Peasaran-Shin (2003), ADF (2001) and PP (2003). These methods indicated that lnDt, lnGDP, lnOP and lnTP are at significant levels and accept the null hypothesis of the unit root. In conclusion, the results of the testing of these variables based on these methods are shown in Table 4.2. The LLC(2002) revealed that lnDt, lnGDP and lnTP are at significant levels and reject the null hypothesis of unit root test at 1st difference I(1) while the lnPO is at significant level and reject the null hypothesis of the unit root test at the level order I(0). The Im-Peasaran-Shin (IPS) result for logarithm of demand of tourist arrival to Lao PDR (lnDt), logarithm of GDP per capita of destination countries (lnGDP) and logarithm of tourism price (lnTP) exhibit a time trend and intercept. The IPS test

rejects the null hypothesis it mean the panel data stationary (has unit root) at level I(1). On other hand. the null hypothesis of t-test at levels nonstationarity is performed using the Augmented Dickey-Fuller (ADF) test of panel unit roots. In addition, this result indicate the critical values at the 1%, 5% and10% levels significance. Testing panel unit root which is trend and intercept, results are shown as follow; the result for logarithm of demand of lnDt, logarithm of lnGDP and logarithm of lnTP. The Augmented Dickey-Fuller (ADF) test rejects the null hypothesis it mean the panel data stationary (has no unit root) at level I(1). This means that the data can help to make estimations and prediction because when the data is stationary, it is significant enough to explain the model and can be assumed to be nearly true.

4.2. Result of the Statistical Investigating for a Long-run and a Short-run Relationship

The second part tests the relationship between the dependent variable and independent variables using the panel ARDL model under Pooled Mean Group Estimator (PMG) and Mean Group which examining the long run relationship and short run relationship between international tourism demand (lnDt) with lnGDP, lnOP and lnTP. The table below explains this clearly.

4.2.1 Result from panel ARDL Approach by using PMG Estimator

In order to estimate the model using Pooled Mean Group estimator (PMG), the relationship test between short-term, long-term and speed of adjustment to long run equilibrium, among dependent variable and independent variables of the international tourism demand model was estimated by using a group data. The interpretation results from the model showed a relationship between the factors influencing Lao PDR tourism demands. The statistical results can be divided in three output solutions as follows: 1) a judgment on adaptation to the long equilibrium (Error Correction Model) or $Ec_{i,t-1}$ 2) an explanation about positive or negative statistically relationship of dependent variable and independent variables, by investigating an informal interpretation of a p-value, based on a statistically significance level and 3) explaining statistic values in a short-run equilibrium or speed of adjustment. Statistic significant result can be compared by utilizing error correction term or $Ec_{i,t-1}$, as shown details shown on below table 4.3:

Table 4.3 Estimation of International tourism demand model by using PMGE

lnDt	Coef	Std.Err	Z-statistic	$P > \|Z\|$
Long - Run Coefficient				
lnGDP	2.463315***	.1359057	18.13	0.000
lnPO	0.5356962***	.0677245	7.91	0.000
lnTP	0.7363867***	.1409598	5.22	0.000
Short – Run Coefficient				
Δ ?	-1.027676	1.591162	-0.65	0.518
	-0.091838	0.1981687	-0.46	0.643
$\ln TP_{i,t-1}$	1.615864	1.09369	1.48	0.140
$\Delta \ln PO_{i,t-1}$				
Const	-11.54398*	4.271041	-2.70	0.007
$Ec_{i,t-1}$	-0.7774005***	0.1849474	-4.20	0.000

Source: Calculated

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses. Dependent variable: demand of tourist (lnDt)

Table 4.3, above presents the result of Pooled Mean Group Estimators (PMGE) using ARDL (1,1,1,1). The output indicated the long run coefficient between lnDt and institution variables by speed of adjustment, coefficient and error term. In the long run there are three institutions variables namely lnGDP, lnPO and lnTP. Those investigated variables are a significant positive relationship as shown on following:

From Table 4.3, the result indicated that lnGDP had the long-run relationship with lnDt and that judgment to adapt to the long equilibrium (Error Correction Model) or $Ec_{i,t-1}$ was a significant negative relationship at – 0.78 , for (Chaitip, Siriporn Kannitade .2014) and also had a positive relationship at p-value significant (0.000).

For the lnTP variable the result shows positive relationship in the long run and statistically significance.

For the lnPO variable, the result showed a significant positive relationship in the long run at p-value significant (0.000).

The speed of the adjustment explains that there is a long run and a short-run relationship. The result revealed by the coefficient of merging is about -0.78 and it is always a significant negative relationship, indicating that there is no mislaid variable bias. However, the result in the short-run in table 4.3, all variables are not statistically significance at 1%,5% and 10% in influencing the inflow of lnDt. It means there are other factors influencing to the tourism demand to arrivals in Lao PDR. This finding signals that international tourism demand for Lao PDR should consider the important of institution variables to lnDt in the long run.

4.2.2 Result From ARDL Approach by MG Estimator

The MG estimator allows differing across groups of the intercepts, slope of coefficients, and error variances. The coefficient of long run parameter estimated by MG estimator, on other word MG estimator relies on estimating N time-series regression and averaging coefficients. The interpretation of MG Estimator results from the model showed a relationship between the factors influencing Lao PDR tourism demands. The statistical results can be divided in three output solutions as follows: 1) a judgment on adaptation to the long equilibrium (Error Correction Model) or $Ec_{i,t-1}$ 2) an explanation about positive or negative statistically relationship of dependent variable and independent variables, by investigating an informal interpretation of a p-value, based on a statistically significance level and 3) explaining statistic values in a short-run equilibrium or speed of adjustment. Statistic significant

result can be compared by utilizing error correction term or $Ec_{i,t-1}$, as shown details shown on below table 4.4

Table 4.4 Estimation of International tourism demand model by using MGE

lnDt	Coef	Std.Err	Z-statistic	$P > \|Z\|$
Long-Run Coefficient				
lnGDP	-1.438168	5.311702	-0.27	0.787
lnPO	-1.2425	1.150831	-1.08	0.280
lnTP	-7.998904	9.971567	-0.80	0.422
Short – Run Coefficient				
$\Delta \ln GDP_{i,t-1}$	-105.6618	104.1096	-1.01	0.310
$\Delta \ln TP_{i,t-1}$	-1.323656	1.069223	-1.24	0.216
$\Delta \ln PO_{i,t-1}$	-43.12969	29.99663	-1.44	0.150
Const	-70.53151	67.03746	-1.05	0.293
$Ec_{i,t-1}$	-2.133183	1.305056	1.63	0.102

Source: Calculated

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses.

Dependent variable: demand of tourist (lnDt), independent variable: GDP per capita(lnGDP), Tourism price (lnTP), Price of fluel (lnPO).

Table 4.4, presented the result of Mean Group Estimators (PM) using ARDL (1,1,1,1). The output and indicated the long run coefficient between lnDt and institution variables by speed of adjustment, coefficient and error term. The results between MG and PMG showed no different to explain the value, so there are three institutions variables namely lnGDP, lnPO and lnTP that are not positive relationship and not significant at 1 per cent influencing the demand of foreign tourist arrivals (lnDt). The result of the long-run relationship shows no relationship because value of

the speed of adjustment positive it should be negative to significant, it is always a significant negative relationship, indicating that there is no mislaid variable bias.

4.3 Result From Hausman Test to Choose The Appropriate Model

Table 4.5 The Result of Hausman Test to choose best model

Independent Variable	Coefficients			
	(b) MG	(B) PMG	(b-B) Difference	Sqrt(diag(V_b-v_B)) S.E
lnGDP	-1.438168	2.463315	-3.901483	1.80e+14
lnPO	-1.2425	.5356962	-1.778196	3.91e+13
lnTP	-7.998904	.7363867	-8.735291	3.38e+14
Test name	Test statistic		Significant level for rejection of the null hypothesis	
Hausman test	0.00		1.0000	

Note: accept null hypothesis indicates that MG is inconsistent so that choose PMG

This paper uses the panel data model with the ARDL approach to coitegration based on Pooled Mean Group Estimator (PMGE) and Mean Group Estimator (MGE) model to investigate the determinants factors (economic factors) that affect international tourism demand in Lao PDR. The Hausman Test to choose which models are must appropriate.

According to the Hausman test results indicate that international tourism demand in Lao PDR PDR model use Pooled Mean Group cause Hausman test is a test of H0 : the PMGE would be consistent and efficient ,versus H1: that PMGE would be inconsistent so the result showed that the parameters which will be distributed Chi-square 0.00 statistic is small value which significant under 1% level, it indicating that PMG is consistent and better coefficient estimator. In the words from the table 4.3 and table 4.4, the Hausman can be used to determine whether the model between Pooled mean group estimator and Mean group estimator is more reliable and effective in explaining result. Therefore, the Hausman test results showed that P-value equal to 1.000 indicating the null hypothesis (Ho), and PMGE is the best model of those

appropriate and available. Performance is accept at a significant level of 1.000, it meaning that PMGE is most appropriate estimation of models used in this study. The more detail in the table below.

Table 4.6 Estimation of International tourism demand model by PMGE and MGE

Independent Variable	PMG	MG
Constant	-11.54398* (0.007)	-70.53151 (0.293)
lnGDP	2.463315*** (0.000)	-1.438168 (0.787)
lnPO	0.5356962*** (0.000)	-1.2425 (0.280)
lnTP	0.7363867*** (0.000)	-7.998904 (0.422)

Source: Calculated

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses.

Dependent variable: demand of tourist (lnDt), Independent variable: GDP per capita(lnGDP), Tourism price (lnTP), Price of fluel (lnPO).

Table 4.6, reports the Hausman test for testing the hypothesis of the long-run to be equal across all panel as stipulated by PMG model. Based on the calculated Hausman test can conclusions that the result conclude that the PMG estimator model is appropriate more than MG estimator model.

4.3.1 Panel Long Run Elasticity.

Table 4.7 shows the results of the long-term relationship with the Group Specific Estimates of tourist arriving to Lao PDR

Variable	Thailand	
	Coefficient	t-statistic
lnGDP	4.07***	2.24

lnPO	-0.55***	-2.73
lnTP	-3.80***	-1.91

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses

Table 4.7, shows the result of long run relationship with group specific estimates of tourist arriving to Lao PDR. There is long run relationship between GDP per capita of Thai tourist and demand of foreign tourist for Lao PDR positive and significant at 0.1 levels. But for the price of fuel (PO) likely transportation cost or price of ticket in Thailand had long run relationship with demand for tourism arrival for Lao PDR negative and significant at 0.1 level (t-statistic -2.73). the t-statistic value was significant around 1.4 up. Moreover, tourism price (cost of living) between origin country increase the number tourist arrive to Lao PDR had negative relationship and significant with demand tourism for Lao PDR.

Table 4.8 shows the results of the long-term relationship with the Group Specific Estimates of tourist's Vietnam tourist arrivals to Lao PDR

Variable	Vietnam	
	Coefficient	t-statistic
lnGDP	7.23***	34.24
lnPO	0.55***	20,20
lnTP	-2.61***	-17.00

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses

Table 4.8, shows the result of long-run relationship with group specific estimates of Vietnam tourist arrivals to Lao PDR. There was long-run relationship between GDP per capita of Vietnam tourist arrivals which demand tourist arrivals for Lao PDR was a significant positive relationship at 0.1 level. Also the price of fuel (PO) likely transportation cost or price of ticket increases but does not effect to demand tourism arriving to Lao PDR because the result indicated that lnPO had long-run relationship which demand for tourism arrivals for Lao PDR (lnDt) was a significant positive relationship at 0.01 level (t-statistic 20.20). The t-statistic value

will significant around 1.4 up. Moreover, tourism price (cost of living) in origin country had negative relationship with significant at 0.1 level (t-statistic: -17.00) with demand tourism for Lao PDR

Table 4.9 shows the results of the long-term relationship with the Group Specific Estimates of Malaysia tourist arrivals to Lao PDR

Variable	Malaysia	
	Coefficient	t-statistic
lnGDP	2.50***	0.19
lnPO	0.43	0.54
lnTP	-1.08	-0.09

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses

Table 4.9, shows the result of long-run relationship with group specific estimates of Malaysia tourist arrivals to Lao PDR. This empirical result GDP per capita of Vietnam tourist arrivals and demand tourist arrivals for Lao PDR a significant positive relationship at 10%. There was long-run relationship. With reference to the demand theory in the last previous pages, the relationship between income and quantity demand can possibly be positive or negative base on the type of goods or service under consumer's consideration. But the price of fuel (lnPO) likely transportation cost or price of ticket increases but price of ticket does not effect to demand tourism arriving to Lao PDR because the result indicated that lnPO had no long-run relationship with demand for tourism arrivals for Lao PDR (lnDt) and did not significant, it mean tourism price (cost of living) in origin country increases or decreases not effected with demand tourism for Lao PDR

Table 4.10 shows the results of the long-term relationship with the Group Specific Estimates of Philippine tourist arrivals to Lao PDR

Variable	Philippine	
	Coefficient	t-statistic
lnGDP	1.14***	2.19

lnPO	0.57***	2.45
lnTP	-1.37***	-0.67

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses

Table 4.10, shows the result of long-run relationship with group specific estimates of Philippine tourist arrivals to Lao PDR . This empirical result was GDP per capita of Philippine tourist arrivals (lnGDP) and demand tourist arrivals for Lao PDR (lnDt) a significant positive relationship at 0.1 level and had long-run relationship. With reference to the demand theory in the last previous pages, the relationship between income and quantity demand can possibly be positive or negative base on the type of goods or service under consumer's consideration. Customer will consume less goods and service when their income decreases. But the price of fuel (lnPO) namely transportation cost or price of ticket from origin country to destination country increases but price of ticket did not affect to demand tourist arrivals to Lao PDR, because the result indicated that lnPO had long-run relationship with demand for tourism arrivals for Lao PDR (lnDt) and a significant negative relationship. The tourism price, in the case of study particularly represents two main prices, namely the cost of living and cost of travelling in origin country to destination country increases it affected directly which demand tourism, Tourism price (lnTP) had a significant negative relationship at 0.1 level.

Table 4.11 shows the results of the long-term relationship with the Group Specific Estimates of Cambodia tourist arrivals to Lao PDR

Variable	Cambodia	
	Coefficient	t-statistic
lnGDP	3.94***	23.28
lnPO	-0.57***	-7.66
lnTP	1.05***	5.37

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses

This empirical result indicated that GDP per capita of Cambodia tourist arrivals (lnGDP) and demand tourist arrivals for Lao PDR (lnDt) was a significant positive relationship at 0.01 level and had long-run relationship. The result go with the demand theory, that the relationship between income and quantity demand can possibly positive or negative base on the type of goods or service under consumer's consideration. Customer will consume more goods and service when their income increases. But there was negative impact for the price of fuel (lnPO) namely transportation cost or price of ticket from Cambodia to Lao PDR effect directly to demand tourism of Cambodia arriving to Lao PDR simultaneously, because the result indicated that lnPO had long-run relationship with demand for tourism arrivals for Lao PDR (lnDt) and had a significant negative relationship at 0.1 level (t-statistical: -7.66). Furthermore, the result showed that the tourism price consisting of the cost of living and cost of travelling in Cambodia to Lao PDR or lnTP and lnDt had a significant positive long-run relationship at 0.1 level (t-statistical:5.37).

Table 4.12 shows the results of the long-term relationship with the Group Specific Estimates of Singapore tourist arrivals to Lao PDR

Variable	Singapore	
	Coefficient	t-statistic
lnGDP	0.88***	2.15
lnPO	-0.12***	-1.84
lnTP	-4.64***	-6.15

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses

This empirical result indicated that GDP per capita of Singapore tourist arrivals (lnGDP) and demand tourist arrivals for Lao PDR (lnDt) had a significant positive relationship at 0.1 level and had long-run relationship. The result showed correct answer with the demand theory, explaining the relationship between income and quantity demand. Transportation cost or price of ticket (lnPO) from Singapore to Lao PDR had long-run relationship with demand for tourism arrivals for Lao PDR (lnDt) and there was negative impact with significant at 0.1 level (t-statistical: -1.84).

Additionally, lnTP and lnDt had a significant negative long-run relationship at 0.1 level (t-statistical:-6.15).

Table 4.13 shows the results of the long-term relationship with the Group Specific Estimates of Indonesia tourist arrivals to Lao PDR

Variable	Indonesia	
	Coefficient	t-statistic
lnGDP	2.42***	7.65
lnPO	-0.46***	-4.01
lnTP	-1.37***	-1.48

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses

This empirical result indicated that GDP per capita of Indonesia tourist arrivals (lnGDP) and demand tourist arrivals for Lao PDR (lnDt) had a significant positive relationship at 0.1 level and had long-run relationship. The result indicated that lnPO had long-run relationship with demand for tourist arrivals for Lao PDR (lnDt) and there was negative impact with significant at 0.1 level (t-statistical: -1.84). As well, the tourism price, in the case of study particularly represents namely the cost of living and cost of travelling in Singapore to Lao PDR had a significant negative long-run relationship at 0.1 level (t-statistical:-1.48).

Table 4.14 shows the results of the long-term relationship with the Group Specific Estimates of Brunei tourist arrivals to Lao PDR

Variable	Brunei	
	Coefficient	t-statistic
lnGDP	5.70***	4.05
lnPO	0.29***	1.31
lnTP	-2.75***	-4.97

Note: *** indicate significance at the 1% level; ** at the 5% level; and* at the 10% level. Standard errors are in parentheses

Table 4.14, shows the result of long-run relationship with group specific estimates of Brunei tourist arrivals to Lao PDR. This empirical result indicated that GDP per capita of Brunei tourist arrivals (lnGDP) and demand tourist arrivals for Lao PDR (lnDt) was a significant positive relationship at 0.1 level and had long-run relationship. With reference to the demand theory in the last previous pages, the relationship between income and quantity demand can possibly positive or negative base on the type of goods or service under consumer's consideration. Customer will consume less goods and service when their income decreases. But the price of fuel (lnPO) namely transportation cost or price of ticket from origin country to destination country increases it not effect to demand tourism arriving to Lao PDR, because the result indicated that lnPO had long-run relationship with demand for tourism arrivals for Lao PDR (lnDt) and a significant positive relationship. Furthermore, the tourism price, consisting of the cost of living and cost of travelling in origin country to destination country had a significant positive relationship at 0.1 level and long-run relationship with demand for tourism arrivals for Lao PDR (lnDt).

Chapter 5

Conclusions

The study was conducted to investigate on economic factors influencing Lao PDR tourism demand including GDP per capita of the population in the origin countries (GDP), and tourism price (TP)which covered cost of living in destination country (tourism price/relative price) and cost of travelling from origin country to destination country and Price of fuel (PO). The study's main source of investigation foreign visitors covered eight ASEAN countries including Republic of Indonesia (Indonesia), Federation of Malaysia (Malaysia), Republic of Philippines (Philippines), Republic of Singapore (Singapore), The Kingdom of Thailand (Thailand), Nation of Brunei (Brunei), Socialist of Vietnam (Vietnam), and Kingdom of Cambodia (Cambodia). The method in this study used the panel ARDL approach was examined under Pooled Mean Group estimator and Mean Group estimator to explain behavior demand of foreign tourist arrivals in Lao PDR. This paper has explored the demand of foreign tourism using panel data of eight countries over the period 2005 to 2013. The following part explains the study result in summary.

5.1 The Result From Unit Root Test.

The results of the testing panel unit root test of the international tourism demand conducted by LLC(2002), Im-Peasaran-Shin (2003), ADF (2001) and PP (2003). These methods indicated that lnDt, lnGDP, lnOP and lnTP were accepted the null hypothesis shown significant levels of the unit root. In conclusion, the results of the testing of thesevariables based on these methods were shown in Table 4.2. The LLC(2002) revealed that lnDt, lnGDP and lnTP was accepted the null hypothesis shown significant levels of unit root test at 1^{st} difference I(1) and the lnPO was accepted the null hypothesis shown significant levels of the unit root test at the level order I(0). The results of Im-Peasaran-Shin (IPS) with a time trend and intercept were

done for natural logarithm of demand of tourist arrival to Lao PDR (lnDt), natural logarithm of GDP per capita of destination countries (lnGDP) and natural logarithm of tourism price (lnTP). The IPS test rejects the null hypothesis that means the panel data stationary (has unit root) at level I(1). On other hand, the null hypothesis of t-test at levels indicated nonstationarity performed by using the Augmented Dickey-Fuller (ADF) test of panel unit roots. In addition, this result indicated the critical values at the 1%, 5% and10% levels significance. For testing panel unit root with is trend and intercept, results were shown on chapter 4 including the results for natural logarithm of demand of lnDt, natural logarithm of lnGDP and natural logarithm of lnTP. The Augmented Dickey-Fuller (ADF) test rejects the null hypothesis that means stationary of the panel data (has no unit root) at level I(1). This means that the data can be adopted to make estimations because when the stationary data is significant enough to explain the model assumed to be nearly true.

5.1.1 Result from PMGE, MGE and Hausman Test

On the second part by conducting PMG, the results were shown on chapter 4 including lnGDP, lnPO and lnTP that had long-run relationship with a positive effect on the international tourism demand for Lao PDR. And the results of the long-run coefficient of lngdp, lnpo and lntp were experimented. The study found no short-run relationships the demand of tourist and determinant factors consisting lnGDP, lnPO and lnTP. The study indicated that lnGDP had the long-run relationship with lnDt. Adaptation for the long-run equilibrium (Error Correction Model) was found because $Ec_{i,t-1}$ is a significant negative relationship at – 0.78 at p-value significant (0.000). For the lnTP variable the result showed a significant positive relationship in the long-run at p-value significant (0.000).. For the case of lnPO variable, the result showed a significant positive relationship in the long-run at p-value significant (0.000).

The result of Hausman test was conducted for testing the hypothesis of the long-run to be equal across all panel data as stipulated by PMG model. Based on the calculated Hausman test conclusions can be summarized that the PMG estimator model MG estimator is appropriate more than another estimator.

5.1.2 Result from FMOLS

The results of FMOLS model were reported in the table 4.8 until table 4.12, representing the outcome of eight ASEAN countries as following:

The finding indicates that GDP per capita of each country in the ASEAN country had a significant positive impact on tourist arrivals to Lao PDR and also there were significant relationship in the long-run of GDP per capita of eight ASEAN countries on Lao PDR tourism demand. However, tourism is a well-known considered as the luxury goods as suggested by (Schiff & Becken, 2011), Phakdisoth and Kim (2007), Lim(1997), Dritsaki (2004), Choketarworn (2010), Chaitip and Chaiboonsri (2006).

Price of fuel (PO) represents namely transportation cost or price of ticket, tourist always take in to account on the travel cost from their hometown to target tourist destination. The decision making process of the tourists are usually think about the cost of travel based on their level of income. High price of transportation offered by airline is exposed to the strictly decision making process. This result indicated that price of fuel from Thailand; Cambodia, Singapore and Indonesia had a significant positive relationship at 10% level in the long-run. Moreover, for Vietnam, Malaysia, Philippine and Brunei, the price of fuel showed no effect on the tourist demand for Lao PDR. PO has a significant negative relationship in the long-run with Dt. The result can be adopted with reference to the tourism demand theory seen at the work of A.Rodriguez et al. (2012), Divisekera and Kulendran (n.a), and Song et al. (2010), Choketarworn (2010), Chaitip and Chaiboonsri (2006). Generally, tourists always take into account on the travel cost from their hometown to all targeted tourist destinations. The decision making process of the tourists are usually considered the cost of their travel bookings based on level of income. High price of transportation offered by airlines is exposed to the strictly decision making process that influenced to international tourism behavior to Lao PDR as a destination choice.

Tourism price, in case of tourism, particularly represent two main prices, namely the cost of living in destination country (tourism price/relative price) and cost of travelling from origin country of tourist arrivals to destination country (transportation cost). This empirical paper showed tourism price (TP) has long-run relationship with Lao PDR tourism demand of the numbers of tourist arrivals with a

significant negative relationship at 10% level in the long-run. But only Cambodia country had a significant positive relationship in the long-run. Tourism price is the most critical concern on its influents on decision making process of tourists visiting the destination country (Gonzalez, 1995). The tourism price is the price of bundle of goods and services bought by tourists, yet most of the countries do not have the tourism price index for goods and services purchased by tourists. Hence, consumer price index is very common adopting for experiments in many papers as a proxy, according to Asemota and Bala (2012), Song et al. (2009), Song et al. (2009), Song et al. (2003), Lee et al. (1996).

For the suggestion, firstly, the government should be focus on the tourism market promotion to attract the high income group of tourist arrivals, open-door policy concerning cooperation with foreign nation that focus on the sustainable cultural based tourism, natural based tourism and historical based tourism. The suggested tourism policy is very important to stimulate tourism industry in Lao PDR expanding the cooperation with eight ASEAN countries. Secondly, government should consider reducing transportation cost because price of ticket affected and determinants of tourism demand for major tourism market such as Thailand, Cambodia, Singapore, Indonesia and Brunei. Finally Lao PDR government should adopted tourism measures to control and to command the price of tourism, including price of living, relative price and price of traveling.

5.1.3 Recommendation for Further study

1. This research was observed at the big picture of eight ASEAN members hence the next study should be categorized countries in to various economic stakeholders, for example, in to agricultural based countries and socialist transforming countries.

2. The future research paper should focused on causality test by using Pool Mean Group (PMG) and Mean Group (MG) to estimate the relationship among those key variables.

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Appendix

1. Unit root test at Level I(0)

1.1 test unit root of international tourism demand (DTit)

Panel unit root test: Summary

Series: LNDIT

Date: 06/02/14 Time: 11:41

Sample: 2005 2011

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-Sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-2.26417	0.0118	8	48
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	0.36018	0.6406	8	48
ADF - Fisher Chi-square	13.4844	0.6371	8	48
PP - Fisher Chi-square	19.2669	0.2551	8	48

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

1.2 Unit root test of GDP per capita in each country

Panel unit root test: Summary

Series: LNGDPIT

Date: 06/02/14 Time: 11:51

Sample: 2005 2011

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-1.19466	0.1161	8	48
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	1.11097	0.8667	8	48
ADF - Fisher Chi-square	7.87964	0.9524	8	48
PP - Fisher Chi-square	14.3343	0.5738	8	48

** Probabilities for Fisher tests are computed using an asymptotic Chi

-square distribution. All other tests assume asymptotic normality.

1.3 Unit root test of Price of oil

Panel unit root test: Summary

Series: LNPOIT

Date: 06/02/14 Time: 11:56

Sample: 2005 2011

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.60516	0.0000	8	48
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.07186	0.1419	8	48
ADF - Fisher Chi-square	22.7274	0.1212	8	48
PP - Fisher Chi-square	25.2698	0.0652	8	48

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

1.4 Unit root test of Tourism Price

Panel unit root test: Summary

Series: LNTPIT

Date: 06/02/14 Time: 11:58

Sample: 2005 2011

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-0.90763	0.1820	8	48
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	1.23901	0.8923	8	48
ADF - Fisher Chi-square	11.0222	0.8081	8	48
PP - Fisher Chi-square	17.0205	0.3843	8	48

** Probabilities for Fisher tests are computed using an asymptotic Chi

-square distribution. All other tests assume asymptotic normality.

2. Unit root test at First difference I(1)

2.1 unit root test of international tourism demand

Panel unit root test: Summary

Series: D(LNDIT)

Date: 06/02/14 Time: 11:49

Sample: 2005 2011

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-7.23247	0.0000	8	40
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.89797	0.0288	8	40
ADF - Fisher Chi-square	31.1158	0.0130	8	40
PP - Fisher Chi-square	44.2918	0.0002	8	40

** Probabilities for Fisher tests are computed using an asymptotic Chi

-square distribution. All other tests assume asymptotic normality.

2.2 unit root test of GDP

Panel unit root test: Summary

Series: D(LNGDPIT)

Date: 06/02/14 Time: 11:53

Sample: 2005 2011

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-5.36661	0.0000	8	40
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-1.05193	0.1464	8	40
ADF - Fisher Chi-square	23.3140	0.1056	8	40
PP - Fisher Chi-square	32.3970	0.0089	8	40

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

2.3 unit root test of Tourism price

Panel unit root test: Summary

Series: D(LNTPIT)

Date: 06/02/14 Time: 12:02

Sample: 2005 2011

Exogenous variables: Individual effects

Automatic selection of maximum lags

Automatic lag length selection based on SIC: 0

Newey-West automatic bandwidth selection and Bartlett kernel

Balanced observations for each test

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin & Chu t*	-4.43895	0.0000	8	40
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-0.53780	0.2954	8	40
ADF - Fisher Chi-square	18.9371	0.2719	8	40
PP - Fisher Chi-square	26.3707	0.0490	8	40

** Probabilities for Fisher tests are computed using an asymptotic Chi -square distribution. All other tests assume asymptotic normality.

3. Pooled Mean Group Regression (Estimate results saved as pmg)

```
Pooled Mean Group Regression
(Estimate results saved as pmg)

Panel Variable (i): id                          Number of obs      =        64
Time Variable (t): year                         Number of groups   =         8
                                                Obs per group: min =         8
                                                              avg =       8.0
                                                              max =         8

                                                Log Likelihood     =  90.99193
------------------------------------------------------------------------------
      D.lndt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
ec           |
       lngdp |   2.463315   .1359057    18.13   0.000     2.196944    2.729685
        lnpo |   .5356962   .0677245     7.91   0.000     .4029586    .6684337
        lntp |   .7363867   .1409598     5.22   0.000     .4601105    1.012663
-------------+----------------------------------------------------------------
SR           |
          ec |  -.7774005   .1849474    -4.20   0.000    -1.139891   -.4149103
             |
       lngdp |
         D1. |  -1.027676   1.591162    -0.65   0.518    -4.146297    2.090945
             |
        lnpo |
         D1. |  -.0918386   .1981687    -0.46   0.643    -.4802422     .296565
             |
        lntp |
         D1. |   1.615864   1.093693     1.48   0.140    -.5277341    3.759462
             |
       _cons |  -11.54398   4.271041    -2.70   0.007    -19.91506   -3.172889
------------------------------------------------------------------------------
```

4. Mean Group Estimation: Error Correction Form (Estimate results saved as mg)

```
------------------------------------------------------------------------------
Mean Group Estimation: Error Correction Form
(Estimate results saved as mg)
------------------------------------------------------------------------------
------------------------------------------------------------------------------
      D.lndt |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
ec           |
       lngdp |  -1.438168   5.311702    -0.27   0.787    -11.84891    8.972577
        lnpo |    -1.2425   1.150831    -1.08   0.280    -3.498087    1.013087
        lntp |  -7.998904   9.971567    -0.80   0.422    -27.54282    11.54501
-------------+----------------------------------------------------------------
SR           |
          ec |   2.133183   1.305056     1.63   0.102    -.4246797    4.691046
             |
       lngdp |
         D1. |  -105.6618   104.1096    -1.01   0.310    -309.7128    98.38928
             |
        lnpo |
         D1. |  -1.323656   1.069223    -1.24   0.216    -3.419296    .7719832
             |
        lntp |
         D1. |  -43.12969   29.99663    -1.44   0.150     -101.922    15.66262
             |
       _cons |  -70.53151   67.03746    -1.05   0.293    -201.9225     60.8595
------------------------------------------------------------------------------
```

5. hausman mg pmg, sigmamore (Model selection)

```
. hausman mg pmg, sigmamore

                 ---- Coefficients ----
              |      (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
              |       mg          pmg         Difference          S.E.
-------------+------------------------------------------------------------
       lngdp |  -1.438168     2.463315       -3.901483        1.80e+14
        lnpo |    -1.2425     .5356962       -1.778196        3.91e+13
        lntp |  -7.998904     .7363867       -8.735291        3.38e+14
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtpmg
            B = inconsistent under Ha, efficient under Ho; obtained from xtpmg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                          =          0.00
                Prob>chi2 =      1.0000
```

6. Individual FMOLS Result (t-stats in parentheses)

Member	Variable	Coefficient	t-statistic
**********	**********	**********	**********
No.1	LNGDP	4.07	(2.24)
No.1	LNPO	-0.55	(-2.73)
No.1	LNTP	-3.80	(-1.91)
----------	----------	----------	----------
No.2	LNGDP	7.23	(34.24)
No.2	LNPO	0.55	(20.20)
No.2	LNTP	-2.61	(-17.00)
----------	----------	----------	----------
No.3	LNGDP	2.50	(0.19)
No.3	LNPO	0.43	(0.54)
No.3	LNTP	-1.08	(-0.09)
----------	----------	----------	----------
No.4	LNGDP	1.49	(2.19)
No.4	LNPO	0.57	(2.45)
No.4	LNTP	-1.37	(-0.67)
----------	----------	----------	----------
No.5	LNGDP	3.94	(23.28)
No.5	LNPO	-0.57	(-7.66)
No.5	LNTP	1.05	(5.37)
----------	----------	----------	----------
No.6	LNGDP	0.88	(2.15)
No.6	LNPO	-0.12	(-1.84)
No.6	LNTP	-4.64	(-6.15)
----------	----------	----------	----------
No.7	LNGDP	2.42	(7.65)
No.7	LNPO	-0.46	(-4.01)
No.7	LNTP	-1.37	(-1.48)
----------	----------	----------	----------
No.8	LNGDP	5.70	(4.05)

Member	Variable	Coefficient	t-statistic
**********	**********	**********	**********
No.8	LNPO	0.29	(1.31)
No.8	LNTP	-2.75	(-4.97)
----------	----------	----------	----------
**********	**********	**********	**********

7. PANEL GROUP FMOLS RESULTS

	Coefficient	t-statistic
LNGDP	3.53	(26.87)
LNPO	0.02	(2.92)
LNTP	-2.07	(-9.51)

Nsecs = 8 , Tperiods = 9 , no. regressors = 3

****

8. Variables to estimate the international tourism demand for Laos

Year	Id	DT	GDP	PO	TP
2005	1	603189	2689.953	52.91	0.999768
2006	1	675845	2813.027	60.38	0.979729
2007	1	949452	2946.296	66.92	0.958354
2008	1	891448	3014.545	100.53	0.939109
2009	1	1274064	2940.224	58.20	0.930843
2010	1	1517064	3163.904	70.03	0.907043
2011	1	1579941	3158.067	94.31	0.875271
2012	1	1937612	3352.529	97.73	0.864839
2013	1	2059434	3389.58	92.75	0.83085
2005	2	165151	699.4879	49.12	1.121213
2006	2	190442	740.0391	56.06	1.005468
2007	2	290584	784.252	62.13	1.041843
2008	2	351384	819.8815	93.34	1.191754
2009	2	296763	855.07	54.04	1.275378
2010	2	431011	900.4937	65.02	1.310031
2011	2	561586	946.8034	87.56	1.445207
2012	2	705596	986.0138	90.74	1.512253
2013	2	910164	1,029	86.11	1.515484

Year	Id	DT	GDP	PO	TP
2005	3	6609	5553.944	168.26	0.978444
2006	3	6846	5756.408	192.01	0.970104
2007	3	7937	6007.901	212.80	0.946951
2008	3	15625	6185.513	319.69	0.92769
2009	3	13816	5984.915	185.08	0.932774
2010	3	15427	6318.901	222.69	0.895181
2011	3	17702	6531.321	299.89	0.858749
2012	3	18872	6786.185	310.78	0.837317
2013	3	19023	6990.25	294.95	0.80379
2005	4	5247	1200.938	203.90	0.999786
2006	4	6433	1241.547	232.68	0.987669
2007	4	11401	1301.221	257.87	0.972338
2008	4	12647	1332.827	387.41	0.978044
2009	4	8331	1325.903	224.29	1.018071
2010	4	10341	1403.306	269.87	0.997873
2011	4	11847	1429.748	363.42	0.970693
2012	4	12455	1501.07	376.61	0.960586
2013	4	15333	1581.01	357.42	0.929889
2005	5	5179	471.1625	77.02	0.934521
2006	5	3888	514.264	87.90	0.99383
2007	5	4351	558.858	97.41	1.023748
2008	5	5482	587.9897	146.35	1.18894
2009	5	7530	580.0238	84.73	1.180671
2010	5	6908	605.168	101.94	1.15854
2011	5	7561	637.2626	137.28	1.135938
2012	5	9534	671.6363	142.27	1.121512
2013	5	11014	709.18	135.02	1.085424
2005	6	3868	29403.39	188.70	0.987543
2006	6	4511	30954.84	215.34	0.945872
2007	6	5486	32370.06	238.65	0.923902
2008	6	4866	31228.89	358.53	0.914373
2009	6	5286	30062.56	207.57	0.91957
2010	6	6087	33900.43	249.75	0.891954
2011	6	7130	34913.95	336.33	0.872688
2012	6	7544	34517.46	348.54	0.874954
2013	6	7997	36110.13	330.78	0.84236

Year	Id	DT	GDP	PO	TP
2005	7	2784	1273.465	278.66	1.099981
2006	7	2415	1324.467	318.01	1.059053
2007	7	2032	1388.606	352.43	1.078159
2008	7	2034	1451.558	529.46	1.099668
2009	7	3158	1498.007	306.53	1.152191
2010	7	2245	1570.153	368.82	1.142957
2011	7	3338	1650.629	496.68	1.11938
2012	7	3359	1731.653	514.71	1.119615
2013	7	3453	1810.31	488.48	1.126132
2005	8	385	25913.58	201.96	0.98443
2006	8	302	26556.3	230.47	0.93781
2007	8	234	26127.17	255.42	0.905923
2008	8	338	25186.32	383.72	0.859266
2009	8	267	24341.27	222.16	0.867869
2010	8	197	24589.28	267.30	0.821787
2011	8	354	24764.88	359.96	0.779301
2012	8	465	24947.1	373.03	0.736816
2013	8	576	25011.02	354.02	0.694331

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