การวิเคราะห์เชิงเปรียบเทียบอุปสงค์ต่อการท่องเที่ยวไทยของสหภาพยุโรป

นายสถิตย์ แถลงสัตย์

วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาศิลปศาสตรมหาบัณฑิต
สาขาวิชายุโรปศึกษา (สหสาขาวิชา)
บัณฑิตวิทยาลัย จุฬาลงกรณ์มหาวิทยาลัย
ปีการศึกษา 2552

COMPARATIVE ANALYSIS OF EU DEMAND FOR THAI TOURISM

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A Thesis Submitted in Partial Fulfillment of the Requirements
for the Degree of Master of Art Program in European Studies
(Interdisciplinary Program)
Graduate School
Chulalongkorn University
Academic Year 2009

Thesis Title	Comparative Analysis of EU Demand for Thai Tourism
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Field of Study	European Studies
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สถิตย์ แถลงสัตย์: การวิเคราะห์เชิงเปรียบเทียบอุปสงค์ต่อการท่องเที่ยวไทยของสหภาพยุโรป. (COMPARATIVE ANALYSIS OF EU DEMAND FOR THAI TOURISM) อ. ที่ปรึกษาวิทยานิพนธ์หลัก: รศ.ดร. ชโยดม สรรพศรี, 293 หน้า

งานศึกษานี้ศึกษาปัจจัยสำคัญที่กำหนดอุปสงค์ของนักท่องเที่ยวจากกลุ่มประเทศสหภาพยุโรป (อียู) ต่อการท่องเที่ยวของไทย พร้อมกับประมาณค่าความยืดหยุ่นของอุปสงค์ที่ประกอบด้วย ความยืดหยุ่นอุปสงค์ด้านราคา ความยืดหยุ่นของอุปสงค์ด้านรายได้ และความยืดหยุ่นอุปสงค์ไขว้ อีกทั้งงานศึกษานี้ได้ศึกษาพลวัตรของค่าความยืดหยุ่นอุปสงค์เหล่านั้นในช่วงระยะเวลาตั้งแต่ปี 1996 ไตรมาส 1 ถึงปี 2008 ไตรมาส 4 โดยในการประมาณค่าความหยืดหยุ่นดังกล่าว งานศึกษานี้ได้ใช้วิธีการทางเศรษฐมิติที่เรียกว่าโคอินทิเกรชั่น โดยวิธีการของ Engle-Granger (EG) และวิธีการของ Johansen นอกจากนี้เพื่อศึกษาพลวัตรของค่าความยืดหยุ่นของอุปสงค์เหล่านั้น งานศึกษาชิ้นนี้ได้ใช้วิธีการที่เรียกว่า Rolling Regression และ Recursive Ordinary Least Square (OLS) สำหรับกลุ่มประเทศตัวอย่างในการศึกษาครั้งนี้แบ่งเป็นสองกลุ่มคือ แบบจำลองของแต่ประเทศ 11 แบบจำลองและแบบจำลองของกลุ่มประเทศ 3 กลุ่มซึ่งจำแนกตามระดับรายได้

สำหรับผลการศึกษาเชิงประจักษ์พบว่า ค่าความยืดหยุ่นของอุปสงค์ด้านราคาที่ประมาณค่าโดยทั้งสองวิธีมีความยืดหยุ่นต่ำทั้งในแบบจำลองของแต่ละประเทศ 11 แบบจำลองและแบบจำลองสำหรับกลุ่มประเทศ 3 กลุ่ม อย่างไรก็ดี สำหรับค่าความยืดหยุ่นของอุปสงค์ด้านรายได้ในกลุ่มประเทศตัวอย่างสองกลุ่มพบว่ามีความยืดหยุ่นหรือยืดหยุ่นมาก ซึ่งสอดคล้องกับผลการศึกษาเชิงประจักษ์ของการศึกษาอื่นๆก่อนหน้า อย่างไรก็ดี ค่าความยืดหยุ่นของอุปสงค์ไขว้พบว่าแปรผันตามประเทศที่เป็นคู่แข่ง อนึ่งสำหรับพลวัตรของค่าความยืดหยุ่นของอุปสงค์ด้านราคาสำหรับทั้งสองกลุ่มตัวอย่างพบว่ามีไม่ยืดหยุ่นและมีค่าเข้าใกล้ศูนย์ ส่วนพลวัตรของค่าความยืดหยุ่นของอุปสงค์ด้านรายได้พบว่ายืดหยุ่นและมีโน้มเพิ่มขึ้นตลอดช่วงเวลาที่ศึกษา

จากผลการศึกษาเชิงประจักษ์สามารถสรุปเป็นข้อเสนอแนะเชิงนโยบายได้ดังนี้ ประการที่หนึ่ง สำหรับผู้กำหนดนโยบายการกระตุ้นการท่องเที่ยวผ่านการใช้นโยบายการลดราคาเพื่อมุ่งเน้นการเพิ่มขึ้นของจำนวนนักท่องเที่ยวจากยุโรปและเพิ่มรายได้จากการท่องเที่ยวให้กับประเทศไม่สามารถให้ผลที่มีประสิทธิภาพเนื่องจากค่าความยืดหยุ่นของอุปสงค์ด้านราคามีค่าต่ำผู้ดำเนินนโยบายควรกำหนดนโยบายที่มุ่งเน้นการส่งเสริมภาพลักษณ์ประเทศไทยในฐานะที่เป็นแหล่งท่องเที่ยวที่ตรงกับมูลเหตุและแรงจูงใจในการท่องเที่ยวของนักท่องเที่ยวชาวยุโรปมากกว่า เนื่องจากการกลับมาท่องเที่ยวซ้ำและการบอกเล่าต่อ (habit persistence and word-of-mount effects) เป็นปัจจัยสำคัญในการกำหนดอุปสงค์ของนักท่องเที่ยวจากยุโรปที่มีต่อการท่องเที่ยวของไทย สำหรับผู้ประกอบการด้านการท่องเที่ยวของไทยสามารถเพิ่มระดับราคาบริการการท่องเที่ยวขึ้นได้อีกเพื่อเพิ่มรายได้จากนักท่องเที่ยวชาวยุโรป โดยไม่มีผลกระทบด้านลบจากจำนวนนักท่องเที่ยวที่ลดลงอย่างมีนัยสำคัญ เนื่องจากระดับค่าความยืดหยุ่นอุปสงค์ด้านราคาที่ต่ำ ประการที่สอง จากผลการศึกษาเชิงประจักษ์ค่าความยืดหยุ่นอุปสงค์ด้านรายได้ ภาคการท่องเที่ยวของไทยมีระดับการเปิดรับความเสี่ยงจากภาวะเศรษฐกิจในประเทศยุโรปสูง อีกทั้งปัจจัยด้านรายได้เป็นปัจจัยภายนอกและมีความไม่แน่นอน นโยบายการส่งเสริมให้ประเทศไทยเป็นแหล่งท่องเที่ยวที่ต้องมาเที่ยว (a must-go destination) จึงเป็นนโยบายที่สุดในการรองรับการเสี่ยงดังกล่าวสำหรับผู้ดำเนินนโยบาย

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5087579920 : MAJOR EUROPEAN STUDIES

KEYWORDS : Tourism demand/ Thai tourism/ Cointegration analysis/ European Union/ Tourism demand elasticity

SATHIT TALAENGSATYA: COMPARATIVE ANALYSIS OF EU DEMAND FOR THAI TOURISM. THESIS ADVISOR: ASSOC. PROF. CHAYODOM SABHASRI, Ph.D., 293 pp.

This paper studied the determinants of European demand to Thai tourism, estimates the elasticities of demand – the price elasticity, the income elasticity and the cross-income elasticity - and also explored the dynamics of those elasticities over the sample period of 1996Q1-2008Q4. To estimate the elasticities of tourism demand, the cointegration analyses – the Engle-Granger (EG) method and the Johansen Cointegration Test – were employed. In additional to the two approaches, the Rolling Regresssion and the Recursive Ordinary Least Square (OLS) were utilised as analytical tools to investigate the dynamics of the European demand to Thai tourism. The samples in this study were divided into two groups – 11 country models and 3 income-group models.

Concerning empirical results, the price elasticity was found to be inelastic both in the country models and in the income-group model, according to the two means of estimation. Meanwhile, the income elasticity in two groups of samples, either in the country models or the income-group model, was found to be elastic or highly elastic. This was in line with empirical evidence suggested by the existing empirical literature. The cross-price elasticities were found to be mixed depending on the competitive destinations. Regarding the dynamics of the price elasticity overtime, for both the country models and the income-group models, were found to be inelastic and approaching zero, whereas those of the income elasticity were found be elastic and increasing overtime.

Based upon these findings, following policy recommendations were concluded. Firstly, on the policymakers' front, low tourism strategies were unlikely to be effective in attracting more European tourists and increasing tourism receipts given the inelastic price elasticity. Policies promoting Thailand's images as a tourism destination meeting European holidaymakers' motivations for travelling should be implemented. This was due to the fact that the habit persistence or the so-called word-of-mouth effects was a crucial and significant determinant of European demand to Thai tourism. On the other hand, for the Thai tourism entrepreneurs, they could increase some certain degrees of tourism products in order to gain more revenues with losing significant number of visitors. Secondly, provided the findings of the income elasticity, the Thai tourism sector was exposed to shocks affecting income levels of the tourism-generating countries and those were unpredictable. The best strategy to minimise uncertainties was to promote and create Thailand to be a "must-go tourism destination" as a mean to generate tourism income in the long-run.

Field of Study ....European Studies..... Student's Signature. สถิตย์ แถลงสัตย์

Academic Year ...2009..................... Advisor's Signature.......

ACKNOWLEDGEMENTS

The most primary debt goes to Assoc. Prof. Dr. Chayodom Sabhasri and Asst. Prof. Dr.Somprawin Manprasert who, respectively, introduced me to the Programme and kindly endorsed me, together with other members of the MAEUS Scholarship Committee 2007, to study on the academic year's full scholarship.

Additionally, I am especially grateful to Assoc. Prof. Dr. Chayodom Sabhasri, my thesis advisor, for his dedicated supervision, his coaching, his insightful comments and guidance throughout my period of studying.

I am also very grateful to all members of my thesis committee for their kind advice, constructive comments and significant contributions of ideas and motivations, which had materially improved my thesis.

My sincere gratitude is expressed towards my senior colleagues at the Bank of Thailand (BOT), Ms. Pranee Sutthasri, Mr. Suchot Piamchol, and Ms. Bunnaree Punnarach, for a helpful discussion and guidance.

I would like to thank a handful assistance of Ms. Jiraporn Choorat and Ms. Vanpima Khaunsuwan who also had given me a lot of advice, support and encouragement throughout the whole period of my study.

My deep sense of gratitude is also expressed to my beloved friends, Ms. Krissadee Boonsuaykwan, Ms. Suprisra Kankaew, Ms. Nalina Chaiya, Ms. Pimsai Fooklin, Ms. Wanwarin Panatapong, Mr. Chatchai Intawarn, and Mr. Yuthasak Kitisirimongkol, for their friendship and significant contribution to my thesis.

Heartfelt and grateful thanks go to my loving mother who has all along provided kind support and assistance during the time this study was written.

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CHAPTER I

INTRODUCTION

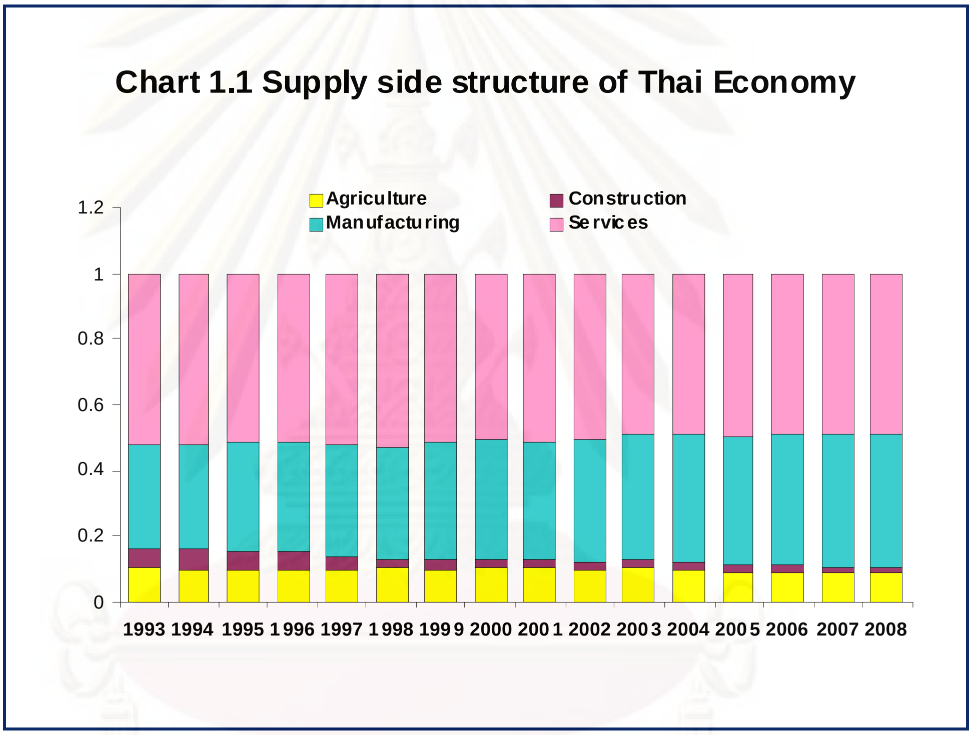
1. Background and Problem Review

"Amazing Thailand", a prominent tourism campaign, was launched in 1998 by the Tourism Authority of Thailand (TAT) to promote Thai tourism domestically and aboard. The campaign has been used to promote Thai tourism up until the present and there are many supportive schemes such as the so-called **"Amazing Thailand Amazing Value".** Notwithstanding, most of tourism campaigns employ pricing strategies with believes that they will improve either sales figures or tourism receipts. However, in the view point of economics, lower prices does not necessarily imply higher sale amount or tourism revenues as it depends primarily on the nature of goods and services offered. In other words, it likely relies primarily on the sensitivity of demand to changes in, for instance, prices or other demand determinants. To measure that sensitivity, in economics, the **elasticity (of demand)** is usually used.

This study is therefore to explore the elasticity of European demand to Thai tourism. The estimated elasticity of demand is accordingly to be fundamental data for both **the government sector and the private sector**, mostly stakeholders in tourism business in particular. On **the government side**, the estimated elasticity will probably be used, for example, in terms of planning and implementing appropriate tourism campaigns to attract more European tourists. Meanwhile, on **the private's side**, they can use such data in their pricing strategies in order to increase sales figures, for instance. However, prior to discussing the study's methodology in estimating tourism demand elasticity, the study will illustrate **the structure of services sector** in the Thai economy, together with some snapshots of the structure of European inbound tourism which to be elaborated in the subsequent chapter.

1.1 The services sector in the Thai economy

Since the country has its first **National Economic and Social Development Plan** in 1963, Thailand has focused mainly on the development of industrial or manufacturing sector in order to move from the agricultural-based economy towards more industrialised-based. Currently in the era of the tenth plan (2007-2011)[1] in a roll, Thailand has apparently shifted itself towards more industrial and services-based economy as evidenced by an increase in the shared value of the two sectors in the GDP which has already stood over 80 per cent as demonstrated in **chart 1.1**.

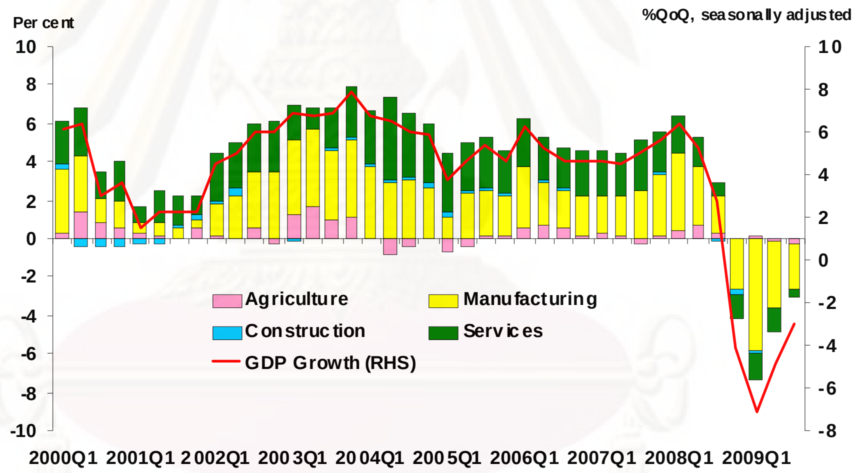


However, if sources of growth of the Thai economy are taken into account, the manufacturing sector is still the main driving engine, as displayed in **chart 1.2.** It is fairly obvious that although the shared value of the manufacturing sector's in the GDP is approximately only 40 per cent, its contribution to GDP growth is the highest .i.e. the sector is still much significant to the economy as a whole. In addition, during the current economic crisis period, 2008-2009, it is much clearly that the manufacturing sector drives the economy into the negative territory of GDP growth. On the other hand, it is pretty obvious that the significance of services sector in terms of contribution to the

[1] For more information please refer to http://www.nesdb.go.th/Default.aspx?tabid=139

GDP growth is still less than the manufacturing sector. Nonetheless, moving towards the services-based economy is significant to Thailand as it has various and crucial implications in terms of development, for instance, to move towards more services-based economy means that the country possesses sufficient infrastructure; additionally, the services-based economy, the country can rely on the value added creation which is significant and advantageous in terms of resource allocation and utilization. Notwithstanding, one of the sectors that has a potential to be developed further as a source of economic growth and income generating for Thailand is **"the sector of tourism and travel related services"**. This is the sector which Thailand has specialization and probably has a comparative advantage over a number of countries.

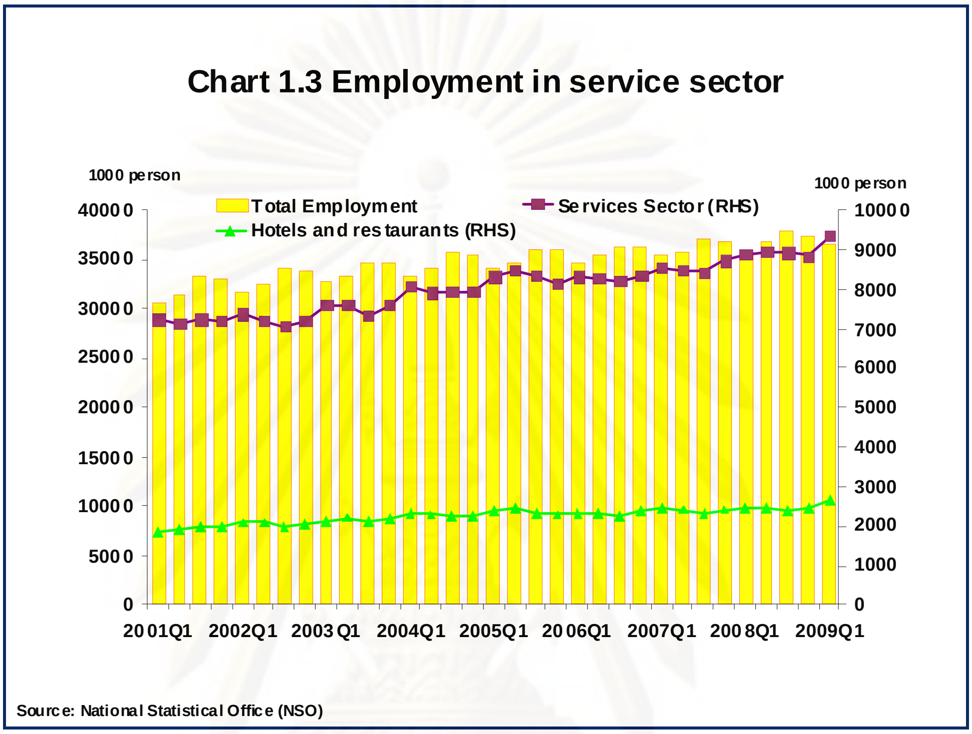
Chart 1.2 Contribution to GDP growth by sector



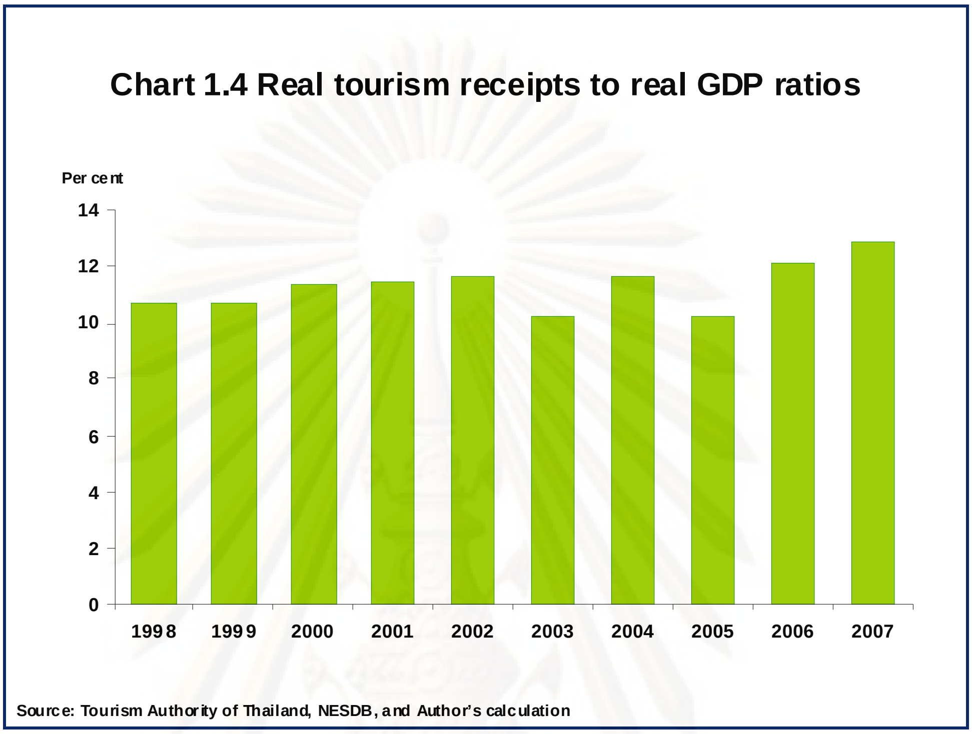
Sources: National Economic and Social Development Board (NESDB), and Author's calculation

Tourism services sector generates a large number of revenue to Thailand in each year and it accounts approximately for 10 per cent of total export values which equals to 5 per cent of the country's annual GDP. In addition, **its contribution to total employment is over 2 jobs or 6-7 per cent**. What's more, tourism receipts have helped support the current account deficit resulting from trade balance deficit.

As demonstrated in **chart 1.3**, if the whole services sector is considered, **it absorbs approximately 25 per cent of total employed labour**; meanwhile the hotels and restaurants sector alone absorbs about 6.5 per cent of total employed labour. However, the actual figure should be higher since there are many unregistered labour force or informal employed labour in the economy, especially in the services sector. Going forward, it is expected that the contribution of the services sector to employment would be higher according to its expansion and growing significance.



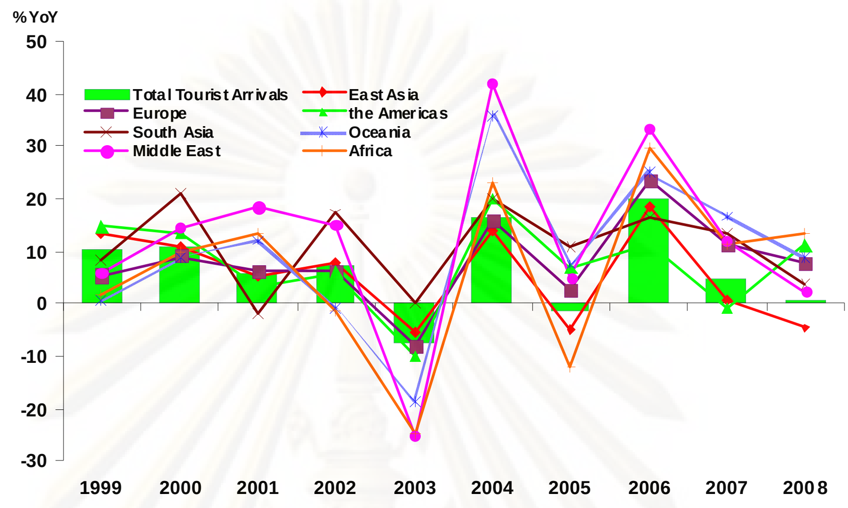
Regarding roles of income-generating of the tourism and travel related services sector, the sector has been an important source of foreign currency earning as evidenced by a growing of **the real tourism receipts to real GDP ratio** expressed in **chart 1.4.** This affirms the importance of the tourism services sector as one of the top export services sectors of the country. Nonetheless, owing primarily to shocks occurred at home and aboard, the ratio dropped in some periods, for instance, there were the so-called **Severe Acute Respiratory Syndrome (SARs)** outbreaks across the Asia continent resulting in a decline in a number of international visitors to Asia including Thailand. This leads to a sharp drop in the real tourism receipts to real GDP ratio from 11.2 per cent, the pre-2003 average ratio, to 10.3 per cent in 2003. Additionally, in 2004Q4 and 2005, tourist attractions in the southern region of Thailand were severely devastated by the tsunami outbreaks; consequently, there was a sharp drop in the tourist arrivals. This is evidenced by a great drop in the real tourism receipts to GDP ratios from 11.7 per cent in 2004 to 10.2 per cent in 2005. However, conditions of the Thai tourism sector gain a recovery in the following years as reflected by accelerated growth rates of the ratio from 10.2 per cent in 2005 to 12.2 and 12.9 per cent in 2006 and 2007, respectively.



Concerning external shocks, these shocks are, for example, the event of September 11 occurred in the United States leading to a significant decline of tourist arrivals from some tourism-generating regions, not only from the American continent, but also from other regions. Consequently, tourism receipts in absolute real terms in 2001 grow only a per cent (YoY) and this can also be reflected by the negative annual growth rates of the number of tourist arrivals classified according to tourism-generating regions as displayed in **chart 1.5**

According to **chart 1.5**, it is obvious that the SARs outbreaks hit the number of tourist arrivals from every tourism-generating region. In 2003, the growth rate of total tourist arrivals was contracted at 7.53 per cent relative to the previous year, meanwhile the growth rates of tourist arrivals from Middle East and East Asia were contract almost 25 per cent compared to the previous year.

Chart 1.5 Growth of international tourist arrivals from different regions to Thailand



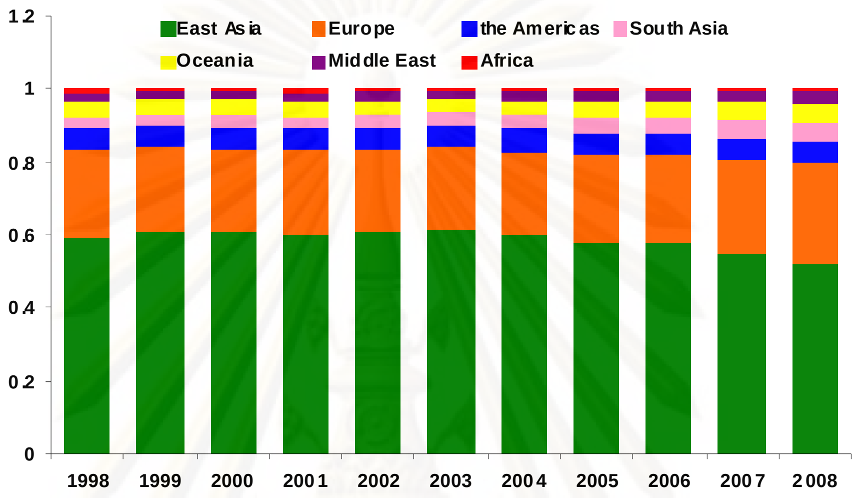
Sources: Tourism Authority of Thailand, Office of Tourism Development, and Author's calculation

Regarding inbound tourism conditions of Thailand, since the government launched the campaign **"Amazing Thailand"** in 1998 and other following supportive schemes later on to promote Thai tourism sector, the number of foreign tourist arrivals has continuously increased from on average 7.2 million person per annum in pre-1997 economic crisis period to on average 14.5 million person per annum in a decade later. Notwithstanding, the sector had been hit by both external and internal shocks as mentioned earlier, but fortunately those were temporary and died away. The sector currently is suffering from both domestic conditions and the global economic hardship. This can partially be reflected by a contraction of the number of international tourist arrivals in 2008 as demonstrated in **chart 1.5.**

With respect to the market structure of inbound tourists, according to **chart 1.6,** it suggests that **East Asia** and **Europe** are the two primary tourism generating regions for Thailand. To consider into details in terms of the absolute number of tourist arrivals, the majority of international tourist arrivals are from East followed by the European. However, if long-term trend is taken into account, it is apparent that a share of European tourist arrivals is increasing which contrasts to that of the East Asia. This trend mirrors a growing significance of the international tourist arrivals from Europe. According to the TAT, an increasing in the number of European tourist arrivals to

Thailand is due primarily to marketing strategies and other tourism campaigns after the project of Amazing Thailand was launched.

Chart 1.6 Shares of international tourist arrivals to Thailand

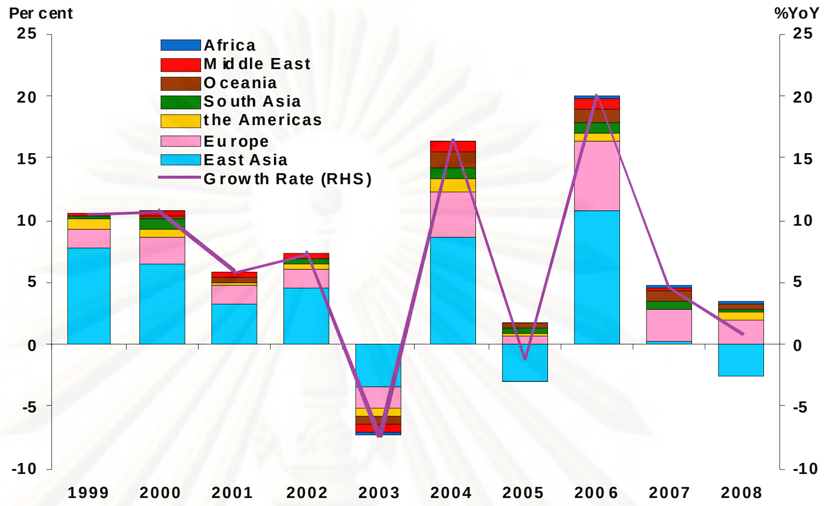


Sources: Tourism Authority of Thailand, Office of Tourism Development, and Author's calculation

Aside from considering only in terms of the absolute number of tourist arrivals, contributions to growth by each region should also be taken into account. According to chart 1.7, it is apparent that major sources of growth in international tourist arrivals to Thailand are East Asia and Europe, respectively. In addition, based on the calculation in chart 1.7, it can be indicated that East Asian tourists are more sensitive to shocks compared to European tourists in the following periods **(I)** SARs outbreaks in 2003 **(II)** Tsunami outbreaks in 2005 and **(III)** Thailand's domestic political turmoil in 2008. This is consistent with the information provided by Mr Jaruboon Pananond, an advisor to the Thailand Tourism Council[2]. He pointed out that tourists from East Asian region are more sensitive to shocks compared to tourists from other regions, Europe in particular.

[2] Mr Jaruboon Pananond is a former director of the Tourism Product Promotion Department of the Tourism Authority of Thailand (TAT) and he currently is the advisor to the Thailand Tourism Council. He was interviewed in August 2009.

Chart 1.7 Contribution to growth in the number of tourist arrivals to Thailand by tourism-generating regions

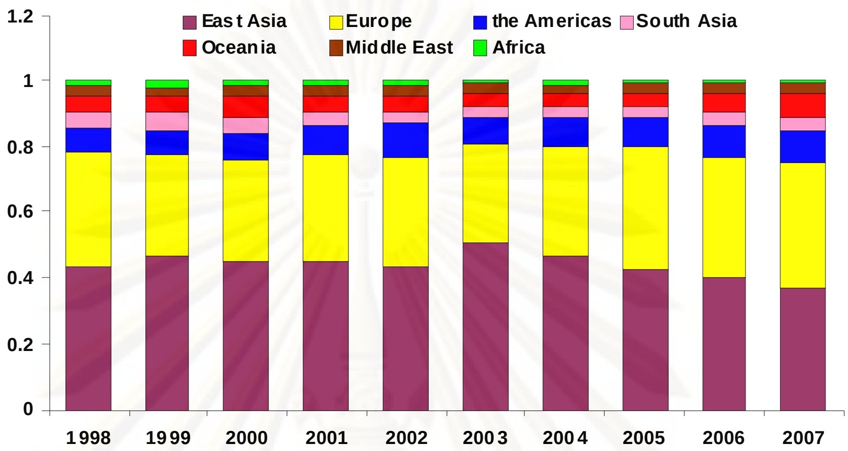


Sources: Tourism Authority of Thailand, Office of Tourism Development, and Author's calculation

Furthermore, over the decade of the Amazing Thailand campaign, Thailand has attracted high-end tourists, in particular from Europe and the Middle East. According to the contribution to growth in the number of tourist arrivals to Thailand, it is a great opportunity for Thailand to attract more European tourists since they will be a crucial source in driving growth in the Tourism sector going forward. As it is well acknowledged that European tourists generates high proportion of tourism receipts.

Regarding **the structure of international tourism receipts**, the figures are in tandem with the structure of the number of tourist arrivals i.e., over the period of 1998 to 2007, East Asia is a region that has the highest allotment of international receipts followed by Europe. Regarding the European region, the higher portion of the number of European tourist arrivals, the higher shares of tourism receipts they had generated. The higher share of tourism receipts generated by European tourists is also line with the data reported by the TAT that there is an increase in high-end European tourists travelling to Thailand as mentioned earlier.

Chart 1.8 Structure of tourism receipts of Thailand



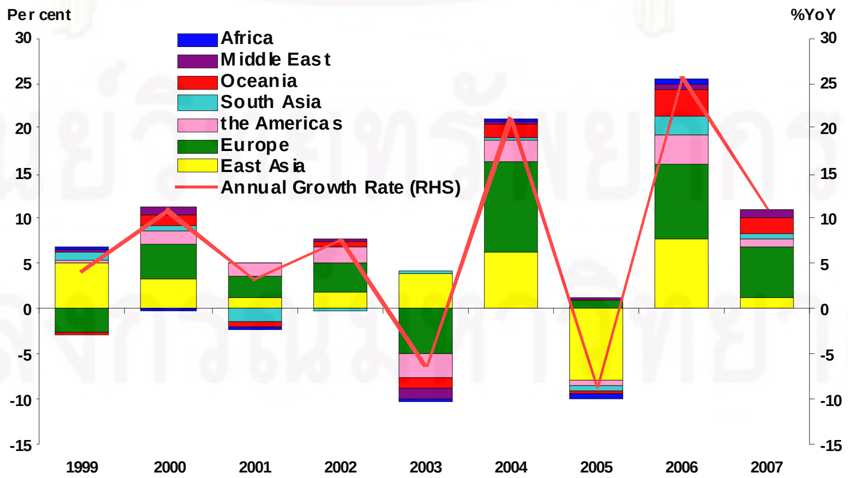
Sources: Tourism Authority of Thailand, Office of Tourism Development, and Author's calculation

Table 1.1 Annual growth rate of tourism receipts

Destination\Year	1999	2000	2001	2002	2003	2004	2005	2006	2007
East Asia	11.7	7.3	3.1	4.3	8.8	12.5	-16.7	17.9	3.4
Europe	-7.3	12.5	7.5	9.5	-14.9	33.2	3.2	22.6	15.5
All destinations	4.2	11.0	3.1	7.5	-6.1	21.0	-8.6	25.5	11.1

Sources: Tourism Authority of Thailand and Author's calculation

Chart 1.9 Contribution to international tourism receipts of Thailand



Sources: Tourism Authority of Thailand, Office of Tourism Development, and Author's calculation

Concerning the contribution to international tourism receipts of Thailand, it is in accordance with the allotment of international tourist arrivals i.e. **East Asia and Europe are still the two core contributors** to the international tourism receipts growth of Thailand. Over the period of 1999 to 2007, the contribution of the East Asia region becomes remarkably lower, on the contrary to that of Europe which becomes observable higher, as demonstrated in **chart 1.9**. In addition, if the annual growth rates of the tourism receipts, expressed in **table 1.1**, are taken into account, it is even more lucid that Thailand has earned international tourism receipts generated by Europe in increasing rates, on average. Meanwhile, if the annual growth rate of tourism receipts produced by East Asia is compared to that of Europe, it is obvious that Europe produces more impressive figures.

As far as a growing significance of Europe as a tourism-generating region for Thailand is concerned, European demand to Thai tourism should be examined for the benefits of both the public and private sectors.

2. Research Motivation

Currently, there is a growing pressure on trade in services liberalisation after **the General Agreement on Trade in Services (GATS)** was established on January 1, 1995. GATS is one of the three core pillars of the **WTO,** the other two are **the General Agreement on Tariffs and Trade (GATT) and the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS).** In addition, the pressure even becomes more intensive when developing or emerging countries negotiate and engage in bilateral **free trade agreements (FTAs)** with advanced countries. According to **the Services Sectoral Classification List**[3] of the GATS, it categorises trade in services[4] into 12 major sectors and one of them is **"Tourism and Travel Related Services"**. This

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[3] Please refer to World Trade Organisation, MTN.GNS/W/120
http://www.wto.org/english/tratop_e/serv_e/serv_e.htm

[4] The MTN.GNS/W/120 specifies that tourism and travel related services include **(A.)** Hotels and restaurants (incl. catering) **(B.)** Trave agencies and tour operators services **(C.)** Tourist guides services and **(D.)** Other

sector is potentially to be fully liberalised in the foreseeable future as tourism is one of the most important export services for every country, for instance, the international tourism generated over US$ 944 billion (□642) in 2008, or almost 30% of the world's exports of services, according to report by the Madrid-based organisation, **the World Tourism Organisation (UNWTO).**

Thailand, a member of the WTO, already signed both regional free trade agreements and bilateral free trade agreements with her various trading partners and a number of them have already become effective. Certainly, in every free trade agreement, a chapter of services liberalisation is normally contained as one element. For instance, **the ASEAN Free Trade Agreement (AFTA) and the ASEAN Framework Agreement on Services (AFAS)** with the objective of liberalisation trade in services in 7 sector[5] is designed to be the so-called GATS Plus agreement i.e. member countries must liberalise their trade in services even wider and deeper compared to what specified in the GATS. Within the AFAS framework, tourism services sector is even contained in a fast-track list of liberalisation i.e. the sector is among the first to be liberalised. This partially reflects that ASEAN envisages the significance of liberalising its own services sector. However, under the AFAS, tourism services is still highlighted primarily on **"Mode 2 of Supply or consumption aboard"** according to the WTO jargon, meanwhile supposed that Thailand engaged in the FTAs with the European Union (EU) bilaterally, a chapter on trade in services liberalisation, including tourism and travel related services, would be extended to cover all four modes of supply as **"GATS Plus Agreements"**. This implied that tourism services sector would not only be concentrated in mode 2 of supply, but also it would be possibly extended beyond what specified in the GATS. Thus, in order to reap the benefits of trade liberalisation, it is recommended that Thailand should have a good preparation regarding the services liberalisation, together with other related issues. This study is intended to provide basic information for the purpose of tourism policy formulation and determination appropriate strategies towards the European tourism market.

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[5] compose of Air Transport Services, Maritime Transport Services, Business Services, Construction Services, Financial Services, Tourism Services, and Telecommunications and ICT Services.

As mentioned earlier the elasticity of European demand to Thai tourism is to be quantified in this study, it is significant according to the following reasons. First of all, it is the fact that many businesses rely primarily on the number of tourist arrivals or tourism demand such as the hotels and restaurants business; therefore, the roles of managing, planning, and determining tourism strategies in order to meet the market demand is somewhat crucial. The ability to provide basic information such as tourism demand elasticity is probably the key factor in bringing about the success including in determining the healthy functioning of the economy. Next, regarding the issues of investment, it is well recognised that tourism services need fundamental infrastructure and other facilitators for tourists; however, investment, especially investment in infrastructure such as international airports, roads, and transportation systems requires long-term financial commitments and high sunk costs. Thus, the capabilities of providing information relevant to long-term demand for tourism related infrastructure are important to preclude such the high costs. Last but not least, the more accurate tourism data are provided, the more successful the government macroeconomic policies become since in formulating and implementing policies, especially policies pertinent to tourism the government needs to be equipped with precise data. Consequently, the harmonisation of macroeconomic policy framework should be obtained and achieved. Furthermore, provided the government’s clear and predictable economic policy objectives, the entrepreneurs and investors relying on tourism can operate or run their businesses without difficulties. Finally, having the accurate information about future tourism demand and fundamental data such as the tourism demand elasticity will equip the government in positioning itself and implementing optimal strategies to be able to compete in the world market.

3. Research Questions

The research questions of this study are as follows;

I. What are determinants of European demand to Thai tourism? Being able to answer this question is advantageous in terms of informing stakeholders in the tourism business, either public or private sectors, the tourism demand determinants so that they can plan and implement appropriate tourism policies and strategies towards the European tourism-generating countries.

II. Given the answer provided in the first question, this study is to explore further regarding what are the elasticities[6] of European tourism demand? If the question is answered, the nature of Thai tourism products with respect to the European demand will be disclosed. This is not only useful for policymakers, but also beneficial for the private sector, domestic tourism business in particular as they have another set of supportive tools in planning marketing strategies, for instance.

III. The last research question to be explored in this study is that do the estimated elasticities of European tourism demand vary overtime? Particularly in the period of 1996Q1 to 2008Q4[7]. If so, it will confirm a notion that the elasticity of demand should vary overtime according to changing consumers' behaviours. As a result, policymakers, together with private tourism stakeholders can accommodate appropriate policy stances.

4. Objectives

This study has a threefold purpose as follows;

I. To examine economic determinants of European demand to Thai tourism, together with explore the long-run or equilibrium relationships between the tourism demand and those determinants.

II. To estimate values of the long-run elasticity of European demand to Thai tourism.

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[6] The elasticity of demand composes of the price elasticity, the income elasticity, and the cross-price elasticity.

[7] Although the monthly data of the number of tourist arrivals are available since the January 1985, the data on the European front provided by the Eurostat are mostly available since January 1996 onwards. Therefore, the period of 1996Q1-2008Q4 is studied.

III. To explore the dynamics of the elasticity of European demand to Thai tourism over the period of 1996Q1-2008Q4.

5. Scope of Study

This study is to examine and establish **tourism demand models** for Thailand with respect to its **European tourism-generating countries** composing of Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, and United Kingdom[8]. In addition, these origin countries are to be divided into three groups of according to their Gross Domestic Product (GDP) per capita in Purchasing Power Standards (PPS)[9] as illustrated by **chart 1.10** below. With respect to the methodology and model specification, a dependent variable or a measure of tourism demand, in this study, is measured by the quarterly number of inbound European tourist arrivals to Thailand. The cointegration analyses by means of the Engle-Granger Residual Based Test and the Johansen Cointegration Test are the principal methods in estimating the elasticity of European demand to Thai tourism. Furthermore, to examine the dynamics of the elasticity of tourism demand over the period of 1996Q1-2008Q4, the method of recursive ordinary least square (OLS) and the rolling regression are to be employed.

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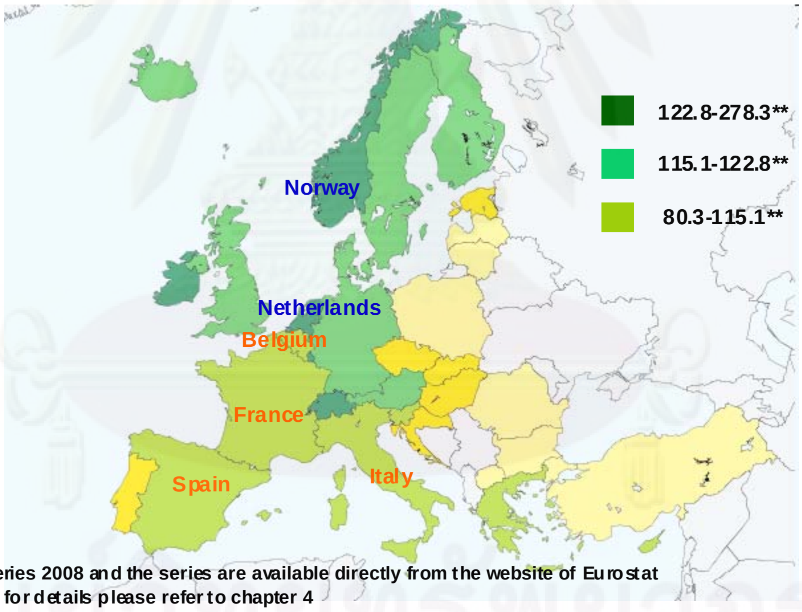
[8] The data of each tourism-generating country are based on the classification and aggregation of the Tourism Authority of Thailand (TAT) and Office of Tourism Development, Ministry of Tourism and Sports.

[9] The figures of GDP per capita in PPS terms are provided by the Eurostat; however, the classification in the study is the author's own. For further details, please refer to Chapter 4.

6. Expected Benefits

Since there are a great number of public and private stakeholders involving in the tourism services sector, the expected benefits of the study has therefore twofold. Firstly, on the public sector front, particularly for policymakers in the field of tourism and related arena, the estimated elasticity of tourism demand is expected to be another efficient tool for planning and setting the right tourism policy and strategies to attract more European tourists. Meanwhile, on the private sector front, the empirical results of the study should be useful, for example, in terms of planning their marketing strategies, sales promotion, and product development to meet European tourists' tastes and preferences. Last but not least, this study is intended to provide an overview of the Thai tourism sector for both the policymakers and the private sector.

Chart 1. 10 European tourism Generating Countries' GDP in Purchasing Power Standard Terms*



*Note: Series 2008 and the series are available directly from the website of Eurostat
**Indices for details please refer to chapter 4
Source: Eurostat

7. Theoretical Framework

Regarding the theoretical framework, the study employs the concepts of the elasticity of demand as the main theoretical guidance since the study aims at quantifying the long-run elasticity of European demand to Thai tourism. In economics, the elasticity is a measure of a percentage change of one variable due to changes in another variable, in other words, it is a measure of sensitivity of a particular variable to other variables. Thanks to this concept, the elasticity is frequently employed in empirical economic studies and in this study; the elasticity of demand is to be estimated by using the econometric methods. In order to estimate such elasticity, the methods of cointegration analyses are also to be employed. Finally, to specify tourism demand models properly, the consumer theory is to be mentioned as well.

8. Literature Review

Concerning a review of existing empirical literature on tourism demand modelling and forecasting, there are two categories of literature to be reviewed in this study, the so-called comprehensive reviews of empirical literature and individual empirical studies. These two types of study are to be reviewed respectively. As far as a method of conducting the review is concerned, those two categories of studies are to be reviewed with primarily focusing on methodologies, model specifications, and empirical results relating to the elasticity of tourism demand. Consequently, these findings are to be used in this study as guidance for modelling European demand to Thai tourism. The details are to be elaborated in Chapter 3.

9. Research Methodology

As mentioned partially earlier, the primary research methodology is quantitative economics i.e. the study employs econometric models by means of cointegration analyses as the main methodology in estimating European demand to Thai tourism. Regarding the cointegration methods, the Engle-Granger Residual Based Test and the Johansen Cointegration Test, are to be used to explore the long-run or equilibrium relationships among tourism demand and its determinants. Benefits of the two methods are, for example, preventing the so-called “spurious regressions”. However, due to some limitations of those methods, the study also utilises the method of **recursive ordinary least square or recursive (OLS)** and the **rolling regression** to investigate the evolution of the elasticity of European demand to Thai tourism. This is because it is believed that tourists’ behaviours should vary over time owing primarily to changes in tastes and preferences, including other demand determinants. The empirical results of the two are to be compared and to be used for policy recommendation.

CHAPTER II

PANORAMA ON INBOUND EUROPEAN TOURISM

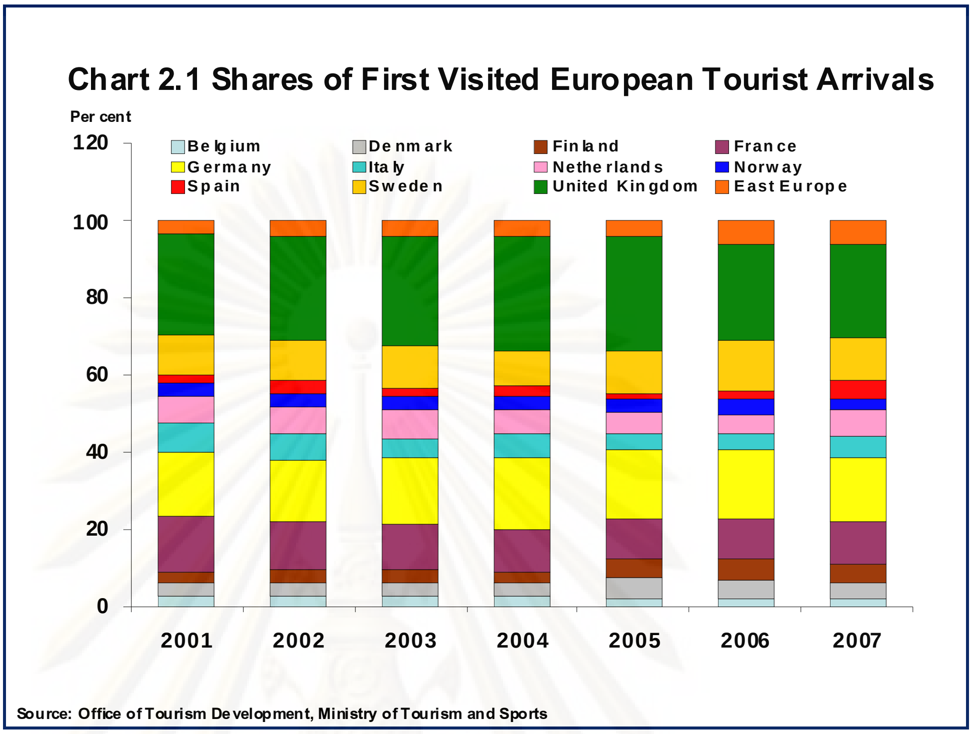
Europe is the second-largest tourist-generating region both in terms of absolute number of visitors and tourism receipts. However, in terms of **long-haul tourism**, **Europe is the most significant region for Thai tourism**. In the foreseeable future, Europe has a potential to become the most important source of income generating region for Thai tourism sector. It is therefore beneficial to analyse deeply regarding to European tourists' behaviour. This analysis will be in the first section of this chapter, meanwhile in the second section, obstacles and challenges of Thai tourism entrepreneurs in doing business in European countries are discussed.

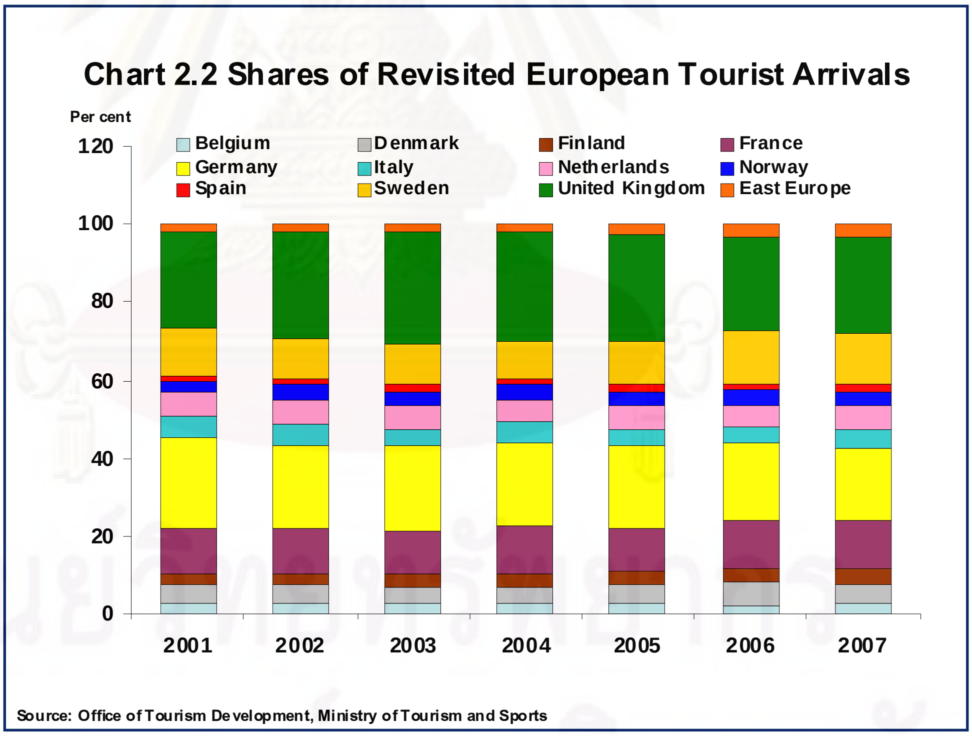
2.1 Inbound European Tourism: Main Features[10]

In order to analyse European tourists' behaviour in depth in the subsequent chapters, this section provides basic information regarding travelling pattern of European tourists. In the first section, the analysis is based on the information provided by the Office of Tourism Development, Ministry of Tourism and Sports, meanwhile in the later section; the analysis is to be conducted based upon the information provided by the *Eurostat.*

Firstly, regarding **the frequency of visit**, according to **chart 2.1**, it is obvious that the number of first-visited tourist arrivals is mostly from the major tourism-generating countries composing of **the United Kingdom, Germany, Sweden, France**, and **the Netherlands**. However, the share of the first-visited tourists from Britain is decreasing; meanwhile those figures of other countries are fairly constant. This provides some essential policy implications for Thai policymakers to maintain and also to increase the number of first-visited tourists from the UK since it is the largest European tourist-generating countries.

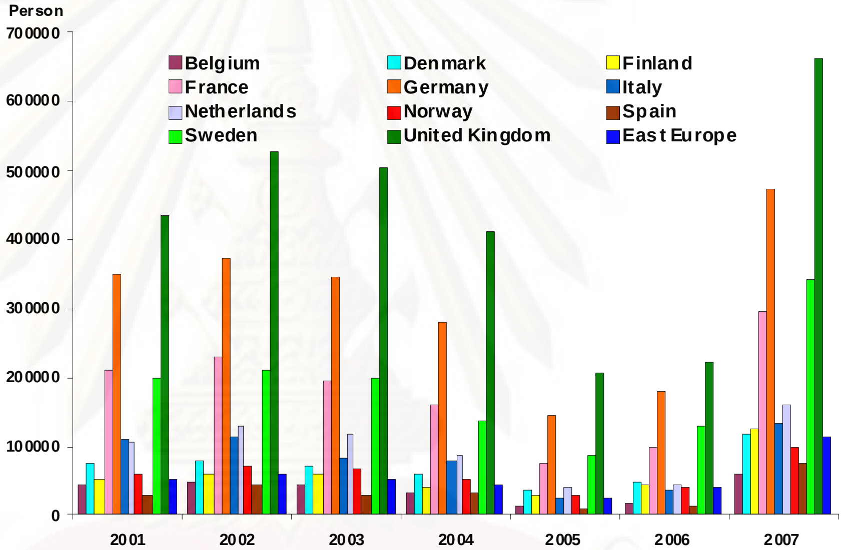
[10] The data are obtained from the Office of Tourism Development, Ministry of Tourism and Sports and they are available only from 1999to 2007; however, there is a problem of data compilation, it is therefore more appropriate to consider data available since 2001.





Secondly, with respect to shares of the number of revisited tourist arrivals to Thailand, according to **chart 2.2**, the figures paint the same pattern to those of the number of first-visited tourist arrivals demonstrated in **chart 2.1**. The major tourist-generating countries for the re-visitors are still the United Kingdom, Germany, Sweden, France, the Netherlands, and Italy. **Chart 2.2** illustrates almost constant shares in the number of re-visitors to Thailand, except in the case of Britain which the share slightly decreases over the period. This trend also posts some crucial policy implications regarding the **habit persistence** or the so-called **word-of-mount effects** of the European tourists. Based upon the figures displayed in **chart 2.2,** it is reasonable to hypothesize that there should be a considerably high degree of habit persistence. Notwithstanding, regarding the issue of habit persistence, it is about to be further empirically explored in the subsequent chapter.

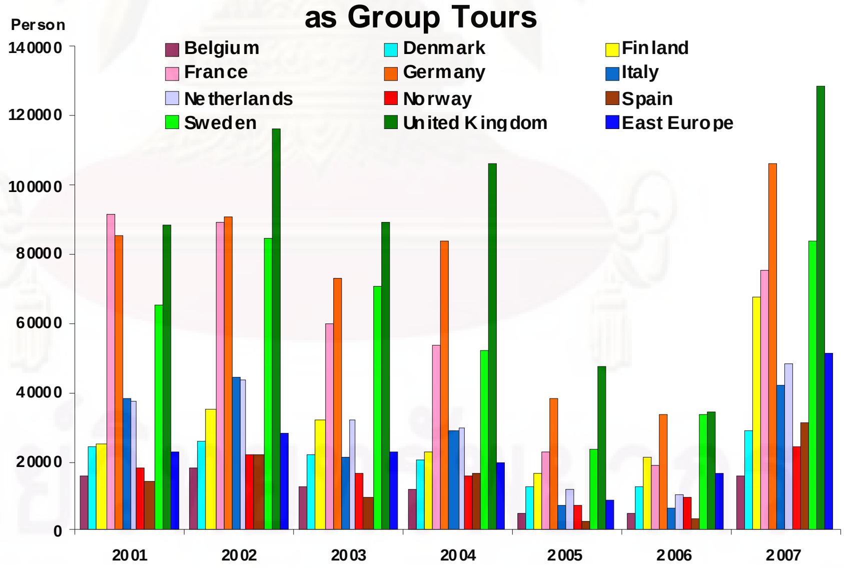
Chart 2.3 European Tourist Arrivals as Holiday Goers



Source: Office of Tourism Development, Ministry of Tourism and Sports

The next issue to explore the characteristics of European tourist arrivals to Thailand is about **purposes of visit**, according to **chart 2.3**, it presents the absolute number of European visitors to Thailand as holiday goers. The figures in this chart still affirm the fact that the United Kingdom, Germany, Sweden, France, the Netherlands, and Italy are the significant tourist-generating countries for Thailand. The number of European visitors also crucially varies according to shocks occurred the destination and other countries, for example, the number of European visitors was hit severely by the Tsunami outbreaks in 2005. Additionally, the number of European holiday-goers to Thailand exhibited in **chart 2.3** also includes those who visit neighbouring countries composing of Laos, Cambodia, and Vietnam In general, based on the European tourists' perception; they view tourism in Thailand and neighbouring countries as a single tourism destination. Provided this fact, some policy implications can be derived, for example, single tourism policy among these destinations, or common tourism campaigns can be particularly and together designed to attract more European visitors.

Chart 2.4 The Number of European Tourist Arrivals as Group Tours



Source: Office of Tourism Development, Ministry of Tourism and Sports

With respect to **an issue of travel arrangement**, **chart 2.4** displays the number of European tourist arrivals as group tours; meanwhile **chart 2.5** demonstrates the number of European tourist arrivals as non-group tours. However, the two figures share common facts that the United Kingdom, Germany, France, and Sweden are the main sources of tourists travelling to Thailand. In addition, over the period of 2001-2007, the two figures show that British tourists are the largest proportion engaging in the group tours as well as the non-group tours followed by Germany, France, and Sweden.

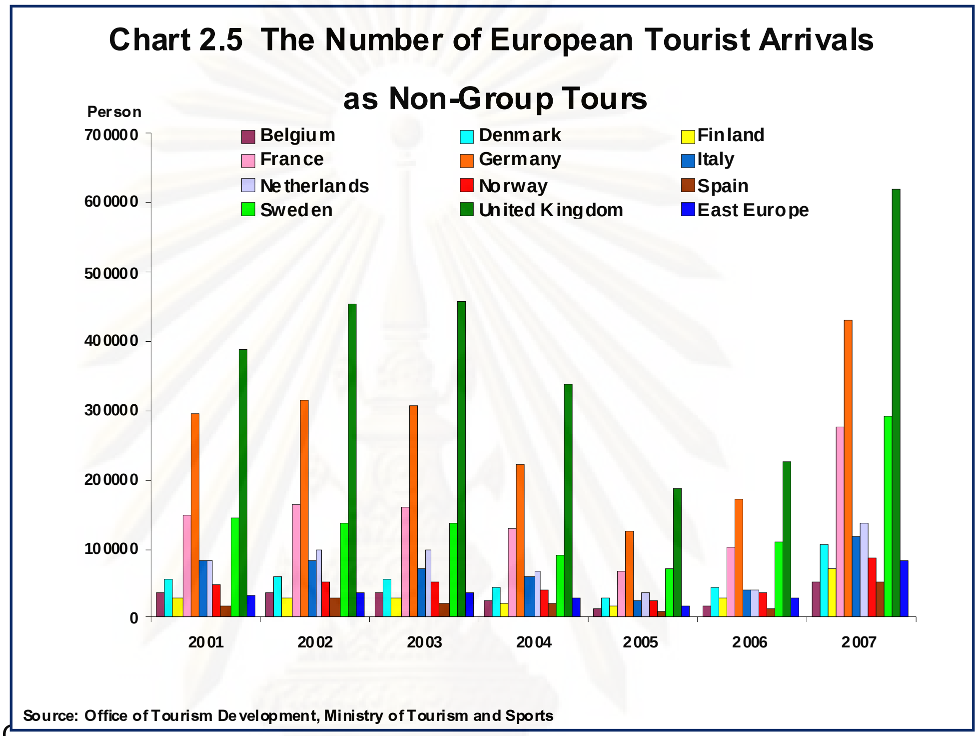
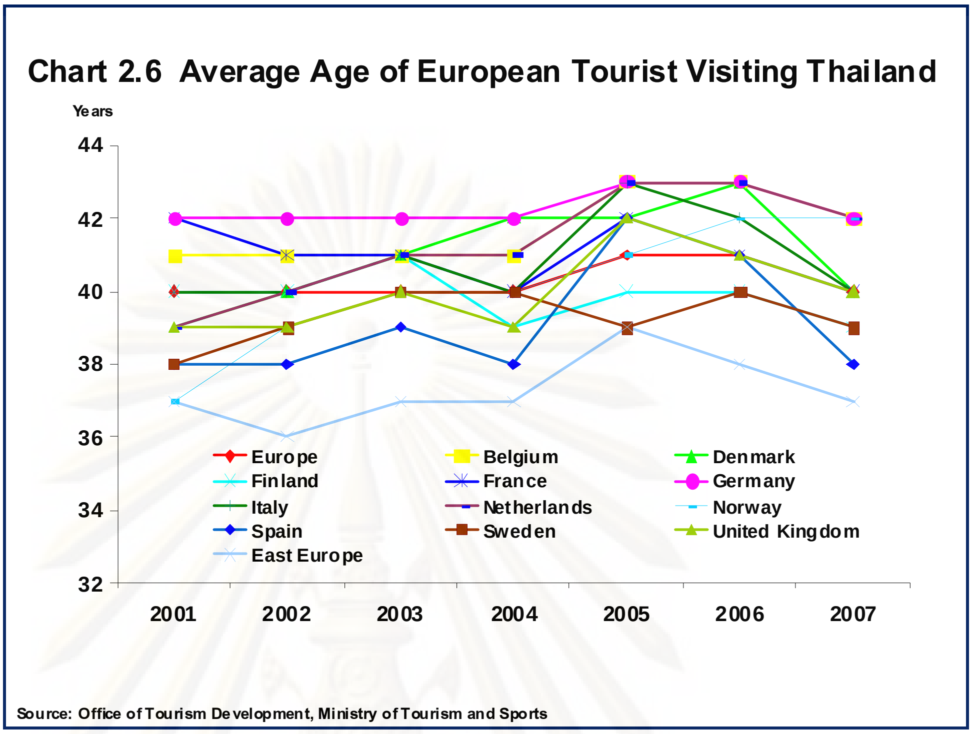


Chart 2.5 The Number of European Tourist Arrivals as Non-Group Tours

Source: Office of Tourism Development, Ministry of Tourism and Sports

Concerning **the average age of tourists visiting Thailand** during the period of 2001-2007 demonstrated in **chart 2.6**, the average age of European tourists is about 40 years. If all countries are taken into account, the range of ages is between 37 years old to 42 years old. Tourists from Germany and Norway have the highest average of age at 42 years old in 2007; meanwhile, the tourists from Spain and Eastern Europe have the lowest average of age at 37 years old. Analytically, the age average of tourists around 40 is relatively beneficial to Thailand since tourists at this age, they engage in the labour markets and possess a strong purchasing power. Some policy implications, marketing strategies in particular, should be drawn



In next session, **attitudes of the European towards tourism** are to be discussed[11]. As demonstrated in **chart 2.7** and **chart 2.8,** the most significant motivation for European holidaymakers in both 2008 and 2009 was "rest and recreation" accounting for 36 percent and 37 percent, respectively. Meanwhile, the second-largest proportion of them – 20 percent in 2008 and 19 percent in 2009 - revealed that "sun and beach" is their primary motivations for taking holidays. The third-largest proportion of the European holidaymakers reported that their main motivation for having holidays was visiting friends and/or relatives representing 16 percent and 17 percent in 2008 and 2009, respectively. According to these facts, they provide insightful policy implications for Thailand in attracting more European tourists since Thailand has all sea-sun-sand tourism resources corresponding to European holidaymakers' motivations. Nonetheless, having wonderful tourism natural resources is only the first order condition, other factors influencing tourists' decision-making such as safety in the designation are also

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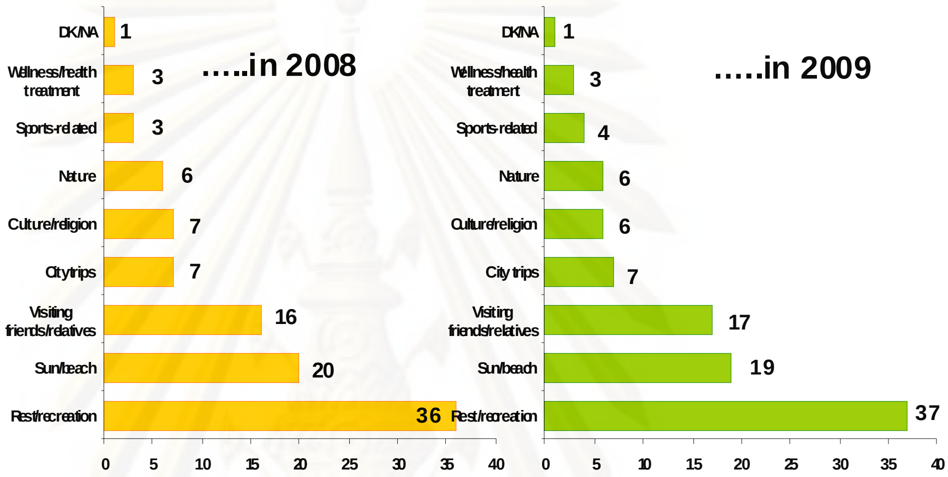
[11] The data are obtained from " **Flash Eurobarometer: Survey on the Attitudes of Europeans towards Tourism (Analytical Report Wave 2)**, March 2010 published by the European Comission

important. The Current domestically political chaos is one of the negative factors crowding out a significant proportion of the European tourists. This is an example posting challenges to Thai tourism policymakers.

Chart 2.7 The major motivation for EU citizens' main holiday trip

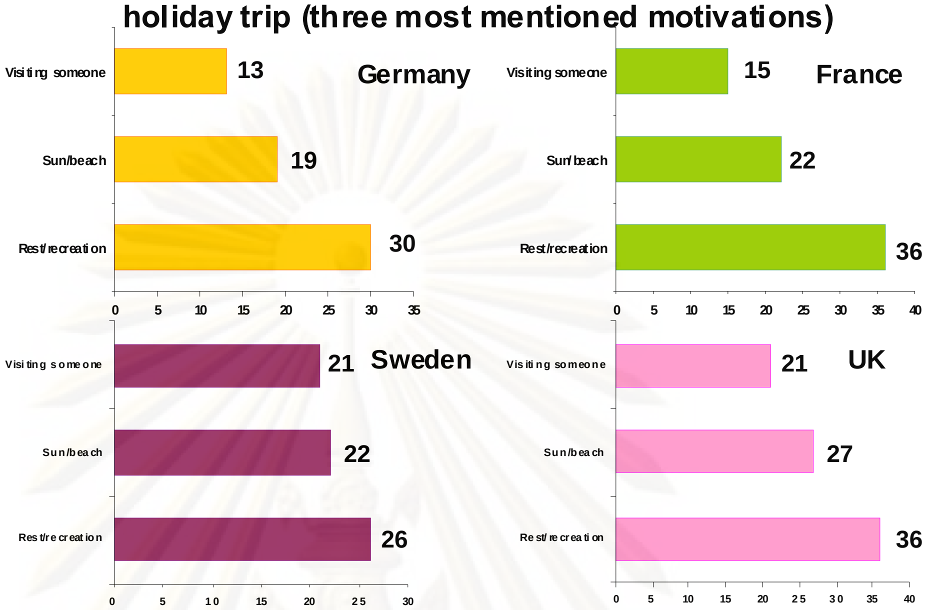


%, Base: respondents who made at least one holiday trip, EU27

Source: Flash Eurobarometer "Surveys on the attitudes of Europeans towards tourism wave 2- Analytical report", March 2010

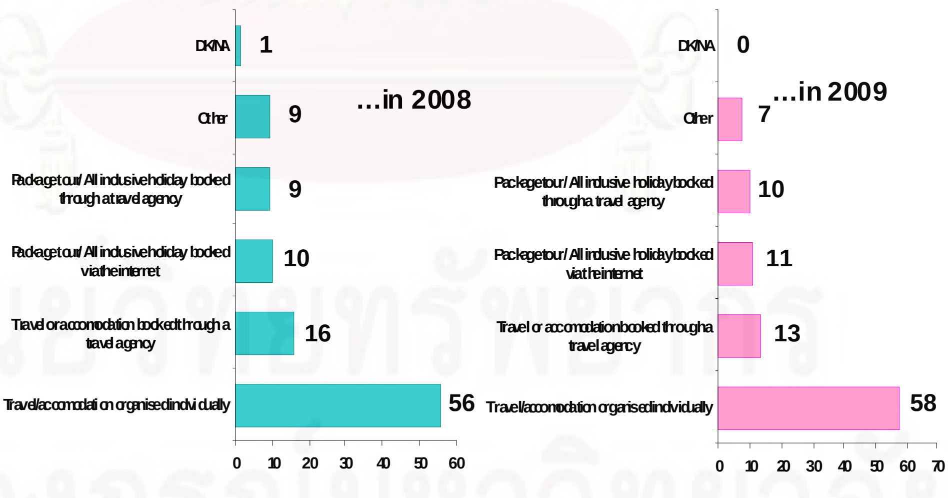
Given attitudes in each European country surveyed in chart 2.8, there are four selected countries composing of the United Kingdom, Germany, France, and Sweden – the major four tourist-generating markets for Thailand. The largest proportion of holidaymakers disclosed that their main motivation in taking holidays was "rest/recreation" accounting for 36 percent for the British and the French, 30 percent for the German, and 26 percent for the Swedish. Whereas, the second-largest proportion tourists in the four countries reported that "sun and beach" was their motivation in going on holidays – highest in the UK at 27 percent, 26 percent in Sweden, 22 percent in France, and 19 percent in Germany.

Chart 2.8 The major motivation for EU citizens' main holiday trip (three most mentioned motivations)



%, Base: respondents who made at least one holiday trip, EU27
Source: Flash Eurobarometer "Surveys on the attitudes of Europeans towards tourism wave 2- Analytical report", March 2010

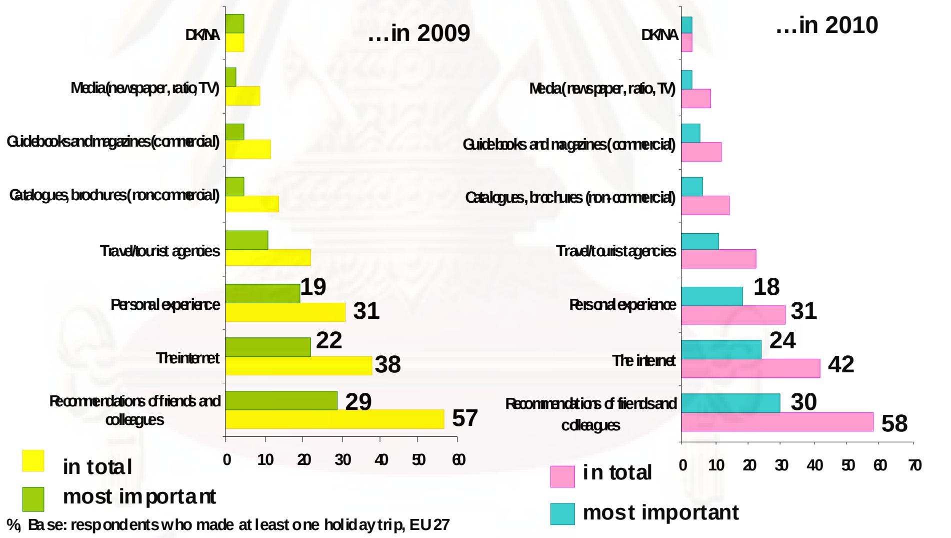
Chart 2.9 How EU citizens organised their main holiday trip



%, Base: respondents who made at least one holiday trip, EU 27
Source: Flash Eurobarometer "Surveys on the attitudes of Europeans towards tourism wave 2 - Analytical report", March 2010

Regarding an issue of **organising their holiday trips**, European tourists revealed that they relied mainly on themselves in organising their trips. Based upon the information provided in chart 2.9, it can be seen that the choice of "travel/accommodation organised individually" accounted for 56 percent and 58 percent in 2008 and 2009, respectively. Additionally, there is also an increasing trend of self-organisation of holiday trips in the foreseeable future. Meanwhile, the number of tourists relying on travel agencies is declining – only 16 percent and 13 percent in 2008 and 2009, respectively. These facts also provide some essential policy implications for both Thai policymakers and Thai tourism business stakeholders in providing accessible information for tourist, for example.

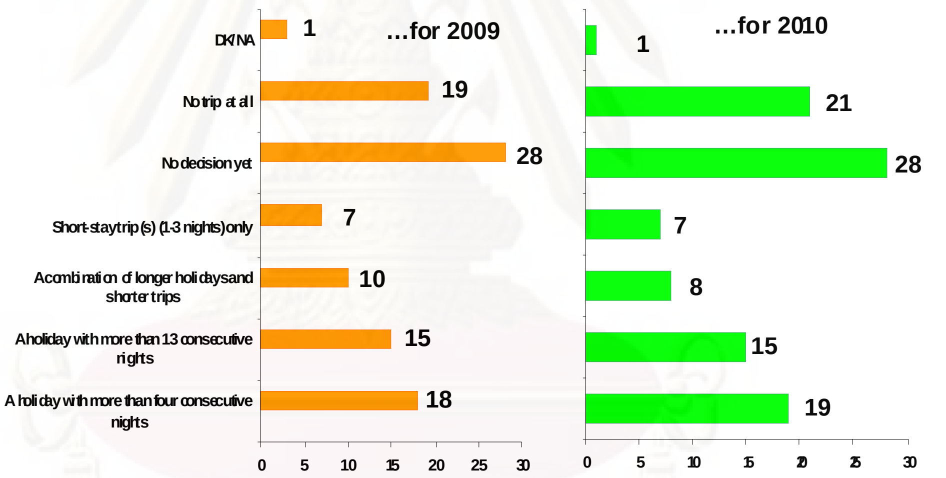
Chart 2.10 Information sources when deciding about holidays



Source: Flash Eurobarometer "Surveys on the attitudes of Europeans towards tourism wave 2- Analytical report", March 2010

With respect to **sources of information when deciding about going on holidays**, European tourists relied primarily on recommendations from friends and/or relatives. This choice accounted for 57 percent and 58 percent in 2008 and 2009, respectively, and among these figures, 29 percent and 30 percent in 2008 and 2009 mentioned that recommendations provided by friends and/or relatives were the most important source of information about tourism destination. The next source of information for European tourists according to chart 2.10 was the internet. This source of information accounted for 38 percent and 42 percent in 2008 and 2009, respectively and among these figures, 29 percent and 30 percent of them considered the internet as the most significant source of information relating to tourism destinations. Whereas, personal experience become as the third important source of tourism information, it accounted for 31 percent both in 2008 and 2009; in addition, 19 percent in 2008 and 18 percent in 2009 of the European tourists mentioned that this source is the most crucial. Provided the facts in **chart 2.10**, the **habit persistence** or the so-called **the world-of-mouth effect** should play significant roles in influencing European tourists' decision-making process.

Chart 2.11 European tourists' holiday plans

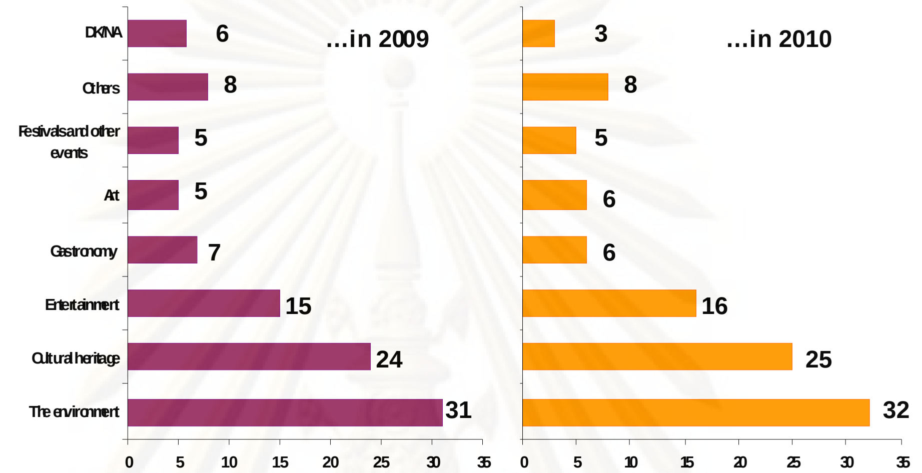


%, Base: respondents who made at least one holiday trip, EU27

Source: Flash Eurobarometer "Surveys on the attitudes of Europeans towards tourism wave 2- Analytical report", March 2010

The next issue is about **the European tourists' holiday plans**. According to **chart 2.11**, it revealed more or least travelling patterns of the European. It was obvious that a large proportion of holidaymakers planned to have holidays with more than 4 and/or 13 consecutive nights. These two plans together accounted for 33 percent and 34 percent in 2008 and 2009, respectively. This travelling pattern also provides crucial policy implications for Thailand in increasing tourism receipts, for example, the longer length of stays of the tourists, the more tourism receipts to be generated.

Chart 2.12 Attractions influencing the choice of destination



%, Base: respondents who made at least one holiday trip, EU27

Source: Flash Eurobarometer "Surveys on the attitudes of Europeans towards tourism wave 2- Analytical report", March 2010

The last issue to consider regarding the European tourists' behaviours is about **attractions influencing the choice of destinations**. According to **chart 2.12**, it was reported that the location's environment which is the overall attractiveness of the destination is the most crucial consideration in choosing tourism destinations and it accounted for 31 percent and 32 percent in 2009 and 2010, respectively. Meanwhile, cultural heritage and entertainment in the destination accounted for 24 percent and 15 percent in 2008, 25 percent and 16 percent, respectively.

Based upon the facts discussed above, they provide insightful aspects for policy implications; however, these issues are to be finally discussed in chapter 6.

2.2 Accessing to European Tourism Market: Obstacles and Challenges

As mentioned in the first section that Europe is the second largest tourism-generating region to Thailand, it is therefore advantageous to Thai tourism stakeholders to get access directly to the European domestic tourism market. Although currently Tourism Authority of Thailand (TAT) has already established offices across the region to promote, provide, and conduct tourism campaigns, a number of Thai tourism operators established offices in Europe are still limited. In addition, there is a potential that Thailand would engage in the Free Trade Agreement (FTA) with the European Union

(EU); consequently, it would be more accessible for Thai tourism entrepreneurs to establish offices and/or business branches to launch tourism campaigns directly in Europe. Notwithstanding, owing to the FTA is in process of negotiating, this section explores some policies constituting as trade hinders and obstacles, especially in the area of consumer affairs. This section discusses consequences and spill over effects of the EU package travel directive in the sphere of the EU consumer policy, to Thai tourism operators intending to run offices and/or branches in the EU.

2.2.1 Introduction to the Package Travel Directive

The so-called Package Travel Directive is classified as one type of the European Union laws entitled **"Directive"** granting the member states authority to add more rules in order to strengthen the laws in the national level. It is adopted in 1990, the Package travel Directive or the Council Directive 90/314/EEC was aimed at protecting European consumers as tourists having holidays.

Regarding the coverage of the directive, according to the European Commission - DG Health and Consumer Protection, it stipulates to cover pre-arranged holiday packages amalgamating at least two of the following elements; transport, accommodation, and/or other tourist services. European consumers/tourists engaging in package travels are protected based on the subsequent conditions; *"(I) package travels contained at least two of the above elements and (II) those packages cover a period more than 24 hours including overnight stay"* (DG Health and Consumer Protection, 2010)[12].

As far as the essence of the Directive is concerned, it stipulates rules relating to scope and coverage of package travel organisers and retailers' responsibilities relating to the performance of the services offered. Providing sufficient information to consumers/tourists at different points in time is also required by the Directive. It further contains requirements of issuing and providing travelling brochure available to consumers/tourists. Any content specified in the brochure must be clearly, precisely in indicating the price, destination, itinerary, and the means of transportation, type of

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[12] For more details, please refer to
http://ec.europa.eu/consumers/cons_int/safe_shop/pack_trav/index_en.htm

accommodation, meal plan, passport, and also visa requirements, health formalities, timetable for payment and the deadline for informing consumers in the events of cancellation. In addition, the Directive grants consumers/tourists right to cancel engagements in package travel provided that services providers seek to change the crucial elements of the arrangements agreed. Furthermore, the services providers cannot raise prices agreed during 20 days prior to departure.

The Directive also prescribes consumers/tourists' rights after departure regarding failure of the services providers to meet what specified in the arrangement agreed. Provisions on the security issues supplied by the services providers are also specified and this includes repayment of the price and repatriation of consumers/tourists in the case of the services providers' insolvency (DG Health and Consumer Protection, 2010)[13].

2.2.2 The Package Travel Directive as Behind-the-Border Trade Measures

Although the package travel directive aims mainly to protect European consumers as tourists against unfair practices in the tourism business, its consequences to tourism operators, especially foreign entrepreneurs, are pressing. Firstly, this rules is just the directive and it is subject to be changed in accordance with more restrict national laws. In addition, in setting up tourism operating offices in European countries, there are already relevant laws and regulations imposed on the issues. This implies that if Thai tourism stakeholders aspiring to operate the business in Europe have a large amount of burdens in studying and complying with both the EU laws and the relevant national laws and regulations. Secondly, according to requirements of the directive regarding responsibilities of the services providers either before or after arrangements agreed, it is implies that services-providing firms are required to have a exceptional sound financial status to cushion possible risks. Next, regarding the issue of providing

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[13] The full version of the Directive 90/314/EEC can be available at

http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31990L0314:EN:NOT clear and precise information for tourists, this requirement might post some difficulties in producing brochure in the different official language of the EU.

The discussions in this chapter are intended to provide some basic features of inbound European tourism and based on those, some interesting issues can be summarised as follows;

Firstly, regarding the major tourism-generating markets for Thailand based on the shares of absolute number of tourist arrivals, the United Kingdom, Sweden, France, the Netherlands, and Italy are the major markets for European visitors to Thailand. Meanwhile, based on the absolute number of revisited tourist arrivals, they paint indifferent conclusions in terms of the major markets for Thai tourism which are the United Kingdom, Sweden, Germany, France, the Netherlands, and Italy. Additionally, in terms of the absolute number of European holidaymakers' arrivals to Thailand, the United Kingdom, Germany, Sweden, France, and Italy are the major tourism-generating countries for Thailand. Based on these findings, the United Kingdom, Germany, Sweden, France, Italy, and the Netherlands are the major tourism-generating countries for Thailand. In addition, tourists from these countries have high degrees of habit of persistence and this should be reflected by statistical significance of the lagged dependent variables to be estimated in chapter IV.

Secondly, regarding holiday trip organisation, the findings illustrate that tourists from the major tourism-generating countries- the United Kingdom, Germany, France, Sweden- less depend on booking and organising holiday trips via travel agencies and group-tour agencies. However, there is an increasing of individually organising holiday trips relied primarily on tourism information obtained from friends and colleges, followed by the internet. Again, given this fact, the variable capturing the so-called word-of-mount effect which is a lagged dependent variable should be a statistically significant variable. It could be expected that the habit persistence or the word-of-mouth effect is to be one of the most crucial determinants of the European demand for Thai tourism. Moreover, providing precise and reliable tourism information online on the internet is necessary since based on the finding, the internet is the second important source for European tourists to get information for their holiday trips.

CHAPTER III

LITERATURE REVIEW

The study of international tourism demand modelling and forecasting has gained a high degree of interest continuously since 1960s as witnessed by an increasing in a number of studies and empirical research in this field. According to the existing empirical literature, there are ***three major popular methods*** in studying international tourism demand modelling**.** ***Firstly,*** a method which explores underlyings or determinants of tourism demand***.*** ***Secondly,*** a method which focuses primarily on with the capability of forecasting tourism demand models in forecasting and ***lastly*** a method which combines the two approaches together.

As far as the study of tourism demand modelling and forecasting is concerned, in the earlier period i.e. in 1960s, the study and research were largely based on traditional econometric modelling and forecasting methods which were considered as excessively restrictive in terms of diagnostic statistics. In addition, these restrictions could bring about a number of statistical problems such as spurious regressions (Song and Witt 2006). However, not until 1990s, various research interests along with the emerging of modern econometric techniques such as ***cointegration and error correction models (ECMs) analysis***, together with ***dynamic econometric models*** have been applied to the study in this field. This has significantly made new contributions to the study and research in this field since then (Li et al. 2005). To conclude, up until the present, it can be stated that the research and study of tourism demand modelling and forecasting depend substantially on the development in econometrics.

This chapter is to elucidate how the studies in tourism demand modelling has been developed, and also to present insightful empirical findings of existing empirical literature. Notwithstanding, those studies will be reviewed and emphasized primarily on causal methods i.e. methods exploring relationships between tourism demand and its determinants in order to accommodate the objective of the study in investigating underlyings of European demand to Thai tourism. By conducting the literature review, some theoretical and also practical aspects are expected to gain to be an incisive guidance for this study.

Regarding the organisation of the chapter, the first section will present findings of comprehensive reviews of existing tourism demand modelling and forecasting literature, and then in the second section, some empirical findings of recent studies on tourism demand modelling and forecasting employing cointegration analyses as a modelling methods will be presented.

3.1 Literature review of comprehensive reviews of tourism demand modelling and forecasting empirical studies

Due to a growing interest in the study of tourism demand modelling and forecasting, there have been hence many empirical studies on issues relating to tourism continuously published by various academic journals. To illustrate the development in this field, the so-called a comprehensive review is normally conducted, in this chapter, there are four selected literature to be focused on. These reviews almost cover the earlier period of the study of international tourism demand modelling and forecasting up to the present i.e. they cover the period of 1960s to 2000s. Concerning an approach of conducting a review, all papers will be highlighted mainly on their findings of methodologies and model specifications. This will, more or less, elucidate developments of studying in tourism demand modelling and forecasting.

Concerning the comprehensive reviews to be presented in this study, there are four studies as mentioned earlier composing of the studies conducted by **Witt and Witt (1995), Lim (1997, 1999), Li et al. (2005), together with Song and Li (2008).** Generally, a common objective of these studies was to explore new developments in the field of tourism demand modelling and forecasting. The structures of those reviews were also almost in the same style i.e. presenting stylised facts and then ending with conclusions. In the following section, findings and some interesting stylised facts of each study are to be elaborated in details.

To begin with, **methodologies and model specifications** in terms of **dependent variable choices**, or measures of tourism demand, all of the four papers unanimously found that either the series of the number of tourist arrivals or departures data were the most frequently used measure of tourism demand or dependent variables. Notwithstanding, there were also other variable choices such as tourist expenditure and tourist nights spent in a destination used in tourism demand modelling. According to **Lim (1997,1999),** empirically, there was no a single best measure of tourism demand in a particular destination, the variable choices therefore were subjected to statistical and economic significance, researchers' own judgments, data availability, and also other specific conditions for each destination and each tourism-generating country. Meanwhile, **Li e al. (2005)** suggested that there was an increasing trend of studying of **segmented or niche tourism markets.** This was evidenced by an increasing number of studies focusing either on tourist arrivals classified according to tourism purposes or ages. These sorts of studies would provide insightful information of tourist arrivals in a particular destination which would become useful for both the public and private sectors in terms of planning tourism policy and implementing the right marketing strategies. Whereas, in terms of destinations being studied, **Song and Li (2008)** found that **Asia** had gained more research interests. Provided all findings above, it can be concluded that the data number of tourist arrivals or departures were among the most frequently used in tourism demand modelling and forecasting; however, other variable choices were still used especially in the study of segmented or niche tourism markets.

On the **independent variable choice** side, **Witt and Witt (1995)** suggested that there was a particular group of economic determinants generally deployed in tourism demand models and those variables were income, own prices or tourism prices, substitute prices, transportation costs, exchange rates, dummy variables, and lagged dependent variables. Meanwhile, findings of the others relating to the independent variable choices were indifferent. In addition, **Witt and Witt (1995)** further proposed an interesting fact that most empirical studies did not include population as an explanatory variable although tourism demand, like demand for other goods, was expected to depend on population growth of tourism-generating countries as guided by the economic theory. A rationale of not including population into tourism demand models was due to a problem of *multicollinearity* since the empirical findings suggested that the variable had a strong correlation with income variables. In the following section, each determinant of tourism demand was to be elaborated further;

Firstly, **income variables,** as mentioned by **Lim (1997,1999),** the income variable was one of the foremost determinants of demand according to the consumer theory since it provided purchasing power for consumers to purchase goods and services, the variable hence was generally included in tourism demand models. Despite its various forms and definitions, the four reviews agreed that the so-called **discretionary personal income** defined as income left after expenditure on necessities and taxes was the best for the income variable. Unfortunately, the variable like discretionary personal income was too subjective and their data were usually unattainable. Practically, According to **Lim (1997, 1999),** other proxies were therefore used instead of discretionary income such as Gross Domestic Product (GDP), Gross National Product (GNP) or Gross National Income (GNI). Generally, these income variables were normally added into tourism models in per capita forms. Other forms of the income variable were also used such as real per capita consumption or recreational expenditure, foreign travel budget, destination budget share, supernumerary income, permanent income defined as a weighted average of current and lagged personal income, and manufacturing production index (MPI). Nonetheless, **Witt and Witt (1995)** viewed that income variables such as national income should be used only in the case of business trips. However, this suggestion is considered to restrictive. **Lim (1997, 1999)** additionally pointed out that an assumption of no money illusion i.e. a proportional increase in all prices and money income should leave demand for tourism unchanged, should be established. In summary, technically, in selecting the best fitting income variables however both economic criteria and statistical testing methods such as exploring relationships between income variables and tourism demand should be utilized rather than basing primarily on researchers' judgements as indicated by **Witt and Witt (1995)** regardless of holiday or business trips.

Secondly, **own price or tourism price**, according to the **Witt and Witt (1995),** one of the technical problems in the field of tourism demand modelling and forecasting was that there was no consensus of how best to measure tourism prices in a particular destination. Generally, it should be realized that the tourism price must represent costs of goods and services borne by tourists in a particular destination. Nevertheless, practically, it was well recognised that *an own price of tourism* should comprise of two elements, the first element was *costs of travel to a destination or transportation costs*, and the second was *the tourists' costs of living in a destination*. However, in most empirical studies the transportation cost variable was omitted and only was the tourists' cost of living included in tourism demand models. This was because including the variable might lead to a problem of *multicollinearity* although there was a theoretical justification to include the variable as one of the determinants for tourism demand. However, the problem might be in accordance with **Li et al. (2005)**'s remark, there was a lacking of precise measurements of travel costs i.e. there was no the universally accepted definition and the precise method of measurement. What's more, many empirical studies proved that the transportation cost variable had insignificant power of explanation. The own price variable in most of the empirical studies hence was restricted only to the costs of living for tourists in the destination. In practice, the variable was generally measured by a ratio of consumer price indices (CPI) of a destination and that of an origin country. This representation of the tourism price was justified due to the fact that there was no more appropriate data available. Regarding this issue, **Lim (1997, 1999)** proposed an insightful comment that this method must implicitly assume that representative households in a particular destination and foreign visitors had the same pattern of consumption; however, it fact typical tourists usually consumed different goods and services compared to average households; thus, biases of using CPI to measure costs of living for tourists might be incurred. Theoretically, there should be the tourist price index (TPI) measuring changes in prices of goods and services usually purchased by tourists. Unfortunately, such the index was unavailable for most countries hence the ratios of CPI were the best available proxy for tourism prices.

Thirdly, the next variable was a transportation cost. There were normally two empirical methods of including the variable. Firstly, there was a notion that the variable should be incorporated into tourism demand models as an additional component of the tourism price. This approach was led by **Lim (1997, 1999)** and this could be called **"the Australian School Approach".** Meanwhile, another method opted to omit the variable due to its insignificant power of explanation. This was also reflected by a downward trend of using the variable in tourism demand models. According to **Li et al. (2005)**, one of the possible explanations might be lacking of precise measurements of travel cost and therefore resulting in insignificant coefficient estimates. In tourism demand specifications, **Lim (1997, 1999)** suggested that the **transportation cost variable** should typically referred to round-trip travel costs or airfares of the economy class between a destination and origin countries. Nevertheless, practically, as mentioned earlier the actual costs actually borne by tourists could not be measured correctly.

Fourthly, **the exchange rate** was the next explanatory variable generally included in tourism demand specifications. According to **Witt and Witt (1995),** one of the crucial justifications of including the variable into the models was that tourists were generally much more sensitive to changes in exchange rate rather than changes in consumer price index (CPI) or costs of living in a destination. In addition, currently in the period of globalisation, the data of exchange rates are much more easily accessible compared to those of the costs of living which were partially reflected by the consumer price index. This notion was in tandem with that of **Lim (1997, 1999)** which suggested that tourists normally confronted with asymmetric of information; in other words, information on changes in price levels in tourism destinations was usually not known in advance by tourists. In addition, **Witt and Witt (1995)** also proposed that the exchange rate should be used either separately or together with the tourism price variable. However, including only exchange rate might mislead since the favourable exchange rate might be counterbalanced by high inflation rates in the destination. Existing empirical studies therefore suggested a precise form of modelling the tourists' cost of living variable that it should comprise of the own price element represented by the exchange-rate-adjusted consumer price index or together with a separate exchange rate variable, while only the exchange rate on its own could not be used solely as an explanatory variable.

Next, **the substitute price**[14], **Witt and Witt (1995)** found that there were two conventional approaches in incorporating the variable into tourism demand models i.e. firstly, it could be substitution between foreign destinations and domestic ones and secondly, it could be substitution between alternative foreign destinations or competing destinations and a destination under consideration. According to the former approach, the variable was normally specified in form of the tourists' cost of living in a destination relative to that of an origin country. The justification for modelling this form of substitution was that domestic tourism was normally considered to be the most

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[14] The variable was named here for simplicity and it did not necessarily reflect nature and characteristics of the variable itself since it could be either substitute or complement

competitive substitute for foreign tourism. However, effects of this approach were already incorporated in the tourism price variable. Whereas, the later approach was more sophisticated in terms of modelling since impacts of competition among foreign destinations were taken to account. The variable was usually specified in a form of the tourists' cost of living in the destination relative to weighted average costs of living in the competing destinations, or in a form of a separate weighted average substitute destination cost variable. To summarise, based on the findings of the four studies, not all empirical studies included the substitute price variables into models and the forms and definitions were varied.

Last but not least, the researchers found that other explanatory variables such as **dummy variables, trends,** and **marketing variables** were also mentioned or used as well. The dummy variables were included in the models to capture the effects of "one-off" events since these were anticipated to influence tourists' behaviours such as the oil crises, financial crises. Meanwhile, **the time trend variable** was generally added to represent a steady change in the popularity of a destination over time. The next frequently mentioned variable, marketing variables, all researchers found that they were rarely included in the tourism models since there was no related data available despite the fact that promotional expenditure disbursed by national tourism organisations was expected to play important roles in attracting foreign tourists. Lastly, a lagged dependent variable or an autoregressive term, the variable was added into the models to capture the tourists' **habit persistence** or **"the word-of-mouth effects"**. Empirically, such a variable was also used to explain conditions of supply constraints in tourism destinations.

In terms of findings relating to **data frequency**, **Song and Li (2008)** suggested that existing empirical literature on tourism demand modelling and forecasting frequently employed **annual data**, but they further gave a remark that if monthly or quarterly data were used, *the effects of seasonality* should be taken into account. This was somewhat crucial since seasonality might misguide true underlying of tourism demand for a particular destination. Nonetheless, in spite of the dominance of annual data, **Li et al. (2005)** found interesting facts that **monthly and quarterly** data had been used more frequently thanks to an increasing research interests in the seasonality of tourism demand. In addition, using either monthly or quarterly data could provide practitioners more numbers of samples resulting in more **degrees of freedom** in model estimations. This consequently led to creditability of estimated coefficients. This was in tandem with findings of **Lim (1997, 1999)** which suggested many existing studies employed annual data resulting in a small sample size; thereby it was difficult to obtain meaningful and biased estimated coefficient estimates. What's more, it was also *flexible to analyse the dynamics characteristics of tourism demand with sufficient observations*.

With respect to the findings of the reviews related to **methodologies and model specifications**, **Song and Li (2008)** suggested that for a purpose of policy recommendations, whether either evaluate the effectiveness of existing policies or implement new policy strategies*, a causal econometric modelling method* better provided causal relationships between the tourism demand and its determinants relative to its counterpart, *a non-causal method.* Meanwhile, in terms of modelling and functional forms, according to the majority of the reviewed papers, all researchers found that most empirical studies employed *a single-equation tourism demand model*, whereas a few studies used a complete system of demand equations such as *the Almost Ideal Demand (AID) System*. Meanwhile, regarding the functional forms, the four reviews suggested that **a double-log specification** was the most frequently used. According to **Lim (1997, 1999)**, *the majority of tourism studies or almost 81% used single-equation models with the double-log functional forms*. Although, according to **Li et al. (2005),** the performance of the double-log functional forms and other forms in comparison were still inconclusive, the popularity of using such a functional form arose from one of its advantages of providing derivable coefficients. However, *the estimated elasticity was assumed to be constant*. *The double-log functional form also generated correct coefficient signs corresponding to the economic theory*. Additionally, the double-log regressions might help reduce **the order of integration** of variables from **I(2)** to **I(1)** or help transform *non-stationary series to stationary ones*; consequently, **the cointegration analysis** can be applied.

A major advantage of cointegration and **ECM analysis** was disappearing of **spurious regression problems**; moreover, EMCs also overcome the problem of multicollinearity due to their *orthogonal regressors*. What's more, the researchers suggested that the traditional regressions, double-log or linear single equations, possess some drawbacks, for example, *elasticities derived from the traditional fixed-parameter* *framework were treated constant overtime which seem unrealistic*. This frequently led to failure of dynamic analysis of tourism demand and such models cannot be applied for short-run analysis. To rescue the problem of the traditional fixed-parameter framework, the researchers suggested the so-called *Time Varying Parameter (TVP)* by rewriting the regression in **the state space form (SSF)** and estimating by the **Kalman filter algorithm** should be employed. What's more, the paper also indicated that the TVP model was more appropriate tool in exploring the long run dynamics of tourism demand.

To sum up, most studies of tourism demand modelling and forecasting published before the 1990s relied primarily on *the classical regression analysis,* with *the Ordinary Least Square (OLS)* as the main estimation procedure. The demand models were normally specified as *the double-log single equation*. Economic theory was used to recommend what variables should be included in the demand models, while simple hypothesis testing statistics, such as the t-statistics and F-statistic based on the OLS estimates, were used to determine whether or not an individual explanatory variable or all explanatory variables was/were significant as determinants of tourism demand.

3.2 Related empirical work on tourism demand modelling and forecasting

To review individual empirical studies of tourism modelling and forecasting tourism demand, only will papers employed econometric method, together with having research theme relating to econometric analysis of tourism demand, be presented. In addition, typically, a large body of literature had been focused on the tourism demand analysis using regression techniques, and these studies had two strands. The first strand of research mainly concerned with the determinants or underlyings of tourism demand. The importance of this research approach was that it would provide useful and insightful evidence to understand tourists' decision-making process and consequently relevant policy implications for both public together with private sectors engaged in tourism businesses could be derived. The second strand of the study focused on tourism demand forecasting (Song and Wong 2003).

Likewise the conducting of the four comprehensive reviews presented in the earlier section, the individual empirical studies of tourism demand modelling and forecasting were presented in order according to methodologies and model specifications, together with empirical results relating to the elasticity of tourism demand.

To begin with data frequency, most studies employed annual data in their analyses, only some utilized more frequent data both quarterly and monthly data such as the studies of **Lim and McAleer (2001, 2003), Salman (2003), Mervar and Payne (2007),** and **Ouerfelli (2008)**. In addition, tourist destinations being studied were focused mainly on Asian countries. These were in accordance with the findings of the four comprehensive reviews discussed above.

Next, regarding **the dependent variable choices,** the number of inbound tourist arrivals was still the most popular option as the dependent variable as reflected by the fact that it was utilized by almost all practitioners, but with different frequency. One possible explanation of such popularity was, according to **Croe and Vanegas (2005),** because of a problem of data limitation. In addition, the statistics of the inbound number of tourist arrivals was usually collected and published by national authorities and also international tourism organisations worldwide; therefore, the data was easily accessible. Technically, the variable represented the real demand; therefore, no additional calculation needed. Additionally, in terms of modelling, the dependent variable was normally expressed in logarithmic form to capture the so-called *multiplicative time series effects*. This was particularly mentioned by **Lim and McAleer (2001),** for example. Notwithstanding, other dependent variable choices were also employed, for example, **Li et al. (2006)** used British real tourism spending per capita in tourism destinations as a measure of tourism demand. Meanwhile, **Mervar and Payne (2007)** employed the seasonally adjusted number of overnight stays by foreign tourist as a dependent variable. All in all, the deployment of the dependent variable in the reviewed empirical studies was in accordance with the findings of the comprehensive reviews. Details of the dependent variables definitions were demonstrated in **table 3.2**. However, as mentioned the first section, the choices of the dependent variable were normally and crucially constrained by the data availability in the destination under consideration.

On the explanatory variables' side, variables used in each model were still in line with the findings of the four comprehensive reviews. However, there were some differences among the studies depending on specific characteristics of tourism destinations and origin countries. Firstly, income variables, variable choices for income in most of the reviewed empirical studies were restricted to **national income variables** such as *Gross Domestic Product (GDP), Gross National Income (GNI) -- either real* *absolute terms or real per capita terms.* In spite of the fact that the discretionary personal income variable was favourable, practically, there were difficulties in obtaining such data. Empirically, other variables were also used, for example, **Lim and McAleer (2001)** employed *real private expenditure on consumption services per capita, and real private expenditure on consumer nondurables per capita*, for instance. Meanwhile, **Salman (2003)**[15] used *the industrial production index (IPI) or manufacturing production index (MPI)* of the USA, the UK, Germany, Denmark, and Norway as a proxy income variable. However, regarding these countries, the services sector had contributed relatively high shared value to their national income compared to the manufacturing sector; thus, employing the IPI or MPI as the proxy for income variable probably could not represent the income variable well enough.

Next, **the tourism price**, the variable had been specified in various forms and definitions. According to the majority of the studies, the variable was defined mainly as *real exchange rates between destinations and origin countries*. This was also in tandem with the findings of the comprehensive reviews discussed above. For example, **Dritsaka (2004)** defined the tourism price variable as ratios of the consumer price index (CPI) of a tourism destination to that of each of origin country adjusted by relevant bilateral exchange rates. Consequently, the so-called real exchange rates were obtained. Notwithstanding, other forms of the tourism price variables were also used, for instance, **Song et al. (2003a)** described the variable as a ratio of CPI of a tourism destination and that of an origin country adjusted by a ratio of exchange rates against the USD of the two. Whereas, **Marvar and Payne (2007)** employed the **real effective exchange rate (REER) indices** as the tourism price variable. Further details of forms and definitions of the tourism price variables were displayed in **table 3.2** at the end of the chapter.

The next frequently added variable into tourism demand modelling and forecasting was the so-called **substitute price variable**. According to the reviewed empirical studies, they could be roughly divided into two groups, adopting and not adopting the substitute price variable. In the context of international tourism demand

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[15] Salman (2003) studied tourism demand determinants for Sweden and aimed at estimating the long run relationship among tourism demand and its determinants. Origin countries focused on the studies were the USA, the UK, Germany, Finland, and Norway.

modelling and forecasting, the variable was normally restricted to tourists' competitive destination costs of living, but it might be specified in other different forms and definitions. For instance, **Song et al. (2003)** specified the variable as a weighted average price index of alternative estimations relative to the consumer price index of tourism-generating countries, meanwhile in a study conducted by **Li et al. (2006)**, the substitute price variable for a destination under consideration was expressed in terms of a weighted average of relative consumer prices of the other alternative destinations weighted by tourists' spending in those alternative destinations. Definitions and specifications in details were expressed in **table 3.2.** To sum up, including the variable into the models was beneficial in terms of examining the nature of tourism in other alternative destinations sharing the same tourism resources which was in turn important in terms of competitiveness.

Concerning **a transportation cost variable**, as mentioned in the first section that theoretically, tourism price should comprise of two elements, costs of travelling to a destination and costs of living for tourists in a destination. However, as suggested by the four comprehensive reviews discussed in the former section, the tourism price variable was restricted only one component which was the living costs. However, in some empirical studies of international tourism demand modelling and forecasting, the transportation cost variable was still incorporated into the models, for instance, apart from a conventional definition of the transportation cost such as average economy class round trip airfares, there were also other forms and specifications, for example, **Mervar and Payne (2007)** used the **average world oil prices per barrel in the USD terms** due to the fact that tourists visiting a destination relied mainly on land transports.

Last but not least, another explanatory variable normally added into tourism demand models was **a lagged dependent variable**. The main justification of including such a variable was to capture the so-called *tourists' expectation and habit persistence*. In addition, practitioners in the field of tourism demand modelling and forecasting, for instance, **Salman (2003)**, **Song et al. (2003), Song et al. (2003a), Crue and Vanegas (2005)** and **Mervar and Payne (2007)** used the lagged dependent variable to capture the so-called *"the-word-of-mouth effect"— the effect created by tourists' knowledge and experience about a particular destination by communicating among tourists as well as other channels of communication such as the internet*.

The final of set of variables generally included in tourism demand models composed of following variables **(I) dummy variables**, as suggested by **Salman (2003), Song et al. (2003), Mervar and Payne (2007),** the variables were usually included into tourism demand models to *capture the effects of shocks to tourism conditions*, both in a tourism destination and in origin countries. **(II) Trade volume**, according to **Song et al (2003),** the variable was included to tourism demand models to measure *economic strength, flows of economic relationships between a tourism destination and tourism-generating countries*, and **(III) other specific variables relating to tourism destinations**. However, another interesting fact of tourism demand modelling and forecasting was that it was anticipated that *marketing promotional expenditures disbursed by national tourism authorities of a particular destination* should influence tourists' decision making process and therefore should be included as one of the explanatory variables. Unfortunately, in practice, likewise the data of discretionary personal income, the data of marketing and promotional expenditure for specific tourism-generating country were not available, the variable hence was normally omitted.

As far as methodologies and model specifications were concerned, almost of the reviewed empirical studies employed *the cointegration analysis* as a primary tool of research. Prior to examining the long-term relationships among tourism demand and its determinants, it was necessary to investigate the so-called *order of integration* or to conduct tests for *unit roots* so as to indicate the nature of data. According to the reviewed studies, *the Augmented Dickey-Fuller (ADF) test* was the most single frequently used method in exploring unit roots; however, some researchers relied on more than one method in testing for unit roots, for instance**, Mervar and Payne (2007)** employed altogether *the Augmented Dickey-Fuller (ADF) test, the Phillips-Perron (PP) test, and the Kwiatkowski-Philips-Schmidt-Shin (KPSS) test* to explore *nonstationarity*. In addition, a test for seasonal unit roots was also used, for example, in a study of **Ouerfelli (2008)**. Regarding methods of estimation, there were two main approaches, *the Engle-Granger Two-Step approach and the Johansen's cointegration approach.* Notwithstanding, it was somewhat apparent that the later approach was more favourable for most of the studies. One possible explanation was that it could be used to explore *multiple cointegrating relationships among variables*. However, the methods such as the EG Two-Step approach, or the Johansen's cointegration test required data to be *integrated of order one, I(1)*, some practitioners therefore opted to utilized the so-called **autoregressive distributed lag models (ADLM)** which required no precondition in terms of modelling, but they yielded the same results. Furthermore, according to **Song et al. (2003)**, the ADLM could incorporate the error correction models (ECMs) -- a tool for a short-run analysis -- into tourism demand models in order to provide adjusted procedures in the short-run, prior to the long-run relationships among variables be obtained.

Meanwhile in terms of model specifications, all studies adopted *the single-equation analysis* which was in tandem with the findings of the comprehensive reviews discussed in the first section. Concerning functional forms, most of studies employed *the double-log specification*. For instance, **Lim and McAleer (2001, 2002, 2003),** along with **Ouerfelli (2008**), explained that the logarithmic form would be effectively in capturing the so-called *multiplicative effects* in the level of time-series data. In addition, **Song et al. (2003a)** suggested that *tourism demand elasticities could be acquired directly via estimated coefficients if the double-log specification was adopted*. Going forward, the double-log-single-equation model would be still popular due to its unique characteristics, but with greater and also wider economic applications. Brief conclusions were of methodologies and models specifications were displayed in **table 3.1.**

With regard to empirical findings, all studies affirmed that the variables used in tourism demand models such as the number of tourist arrivals, exchange rates, tourism prices, and income variables were *I(1) variables*. In terms of findings relating to the elasticities of demand, two types of them -- *the price elasticity of demand and the income elasticity of demand* -- were highlighted on. Concerning the price elasticity of demand, there were heterogeneous findings depending on tourism destinations and tourism-generating countries, for instance, **Lim (2002)** found that a value of tourism price elasticity of Malaysia for Australian tourism was highly elastic, meanwhile **Lim (2003)** pinpointed that a value of price elasticity of Singapore for Australian was found to be inelastic. In addition, in some cases, for example, **Song et al. (2003a)** found that estimated values of the price elasticity of demand of various tourism generating countries for Hong Kong tourism were varied from inelastic to highly elastic. With respect to the income elasticity of demand, all studies upheld that it was elastic. For instance, **Mervar and Payne (2007)** found that the income variable was the most important determinant for European tourism demand to Croatia. Additionally, the estimated **long-run income elasticity** is positive and highly elastic. This finding consequently reaffirmed a notion that tourism was luxurious by nature.

All in all, contributions of this study are therefore as follows; **(I)** it was a pioneered study relating to exploring determinants of European demand to Thai tourism, together with estimating the elasticity of tourism demand, accordingly. **(II)** In terms of methodologies and model specifications, although it made a few contributions to the study of tourism demand modelling and forecasting, the study had made an attempt to apply simple tools, namely **rolling regressions** and **recursive ordinary least square (OLS) estimations** in estimating the so-called time-varying tourism demand elasticities. This was intended to be additional tools for analysing the dynamics of European demand to Thai tourism.

Table 3.1: Conclusions of methodologies and model specifications

Study	Data Frequency	Origin Countries/Region Focused	Functional Form/Modelling and Forecasting Methods	Forecasting Exercise	Research theme	Empirical results with respect to tourism demand elasticity
Lim and McAleer (2001)	Quarterly	Hong Kong, and Singapore/Australia	VAR CI/VECM	No	Cointegration analysis of quarterly tourism demand	Elastic long-run income elasticity
Lim and McAleer (2002)	Annual	Malaysia/Australia	CI	No	Cointegration Analysis of annual tourism demand	-
Lim and McAleer (2003)	Quarterly	Singapore/Australia	OLS and CI	No	Comparison of OLS and cointegration results	Inelastic income and price elasticities
Salman (2003)	Monthly	Sweden	CI	No	Cointegration analysis of tourism demand	-
Song et al. (2003)	Annual	7 origin countries such as Australia, Japan, Korea, etc./Thailand	ADLM ARIMA CI/ECMs	Ex ante	Econometric modelling and forecasting	Income, own price, substitute price, and trade volume were found to be significant
Song et al. (2003a)	Annual	16 origin countries such as Australia, Canada, France, etc./Hong Kong	General-to-specific approach/ADLM	Ex ante	Econometric modelling and forecasting	Varied price elasticity, highly elastic income elasticity, and varied substitute price elasticity, but mostly elastic
Song and Wong (2003)	Annual	Hong Kong	TVP	No	Econometric analysis using TVP model	-
Dritsakis (2004)	Annual	Greece	ADLM	No	Econometric analysis of tourism demand	-

Table 3.1: Conclusions of methodologies and model specifications

Study	Data Frequency	Origin Countries/Region Focused	Functional Form/Modelling and Forecasting Methods	Forecasting Exercise	Research theme	Empirical results with respect to tourism demand elasticity
Croe and Vanegas (2005)	Annual	Aruba	Linear and log-linear ADLM	No	Econometric analysis of tourism demand	-
Li et al. (2006)	Annual	Britain	TVP-ECM TVP ADLM VAR ECMs	Forecasting competition	Forecasting with a TVP error correction model	-
Mervar and Payne (2007)	Quarterly	European Union members/Croatia	ADLM	No	Econometric analysis of tourism demand	Highly elastic long-run income elasticity
Ouerfelli (2008)	Quarterly	Tunisia	CI/ECMs	Ex ante	Econometric analysis of tourism demand	Highly elastic long-run income and relative price elasticities

Source: Author's own classification

Table 3.2: Illustrations of methodologies and model specifications

Study	Dependent variable	Independent Variable					
		Income	Tourism price		Substitute price	Lagged Dependent Variable	Other Variables/Dummy Variables
			Tourists' costs of living component	Transportation cost			
Lim and McAleer (2001)	Seasonally-unadjusted quarterly tourist arrivals	Real GDP per capita, real private consumption expenditure per capita, real private expenditure on consumption services per capita, real private expenditure on consumer nondurables per capita at constant prices	$\log\left(\frac{CPI\,(destinatio\ n)}{CPI\,(origin)}\right)$, and $\log\left(\frac{CPI\,(destinatio\ n)}{CPI\,(origin)}\frac{1}{ER}\right)$	The economy round-trip airfares to Sydney	No	No	No
Lim and McAleer (2002)	The number of annual tourist arrivals	Real GDP per capita, real private consumption expenditure per capita at constant prices	$\log\left(\frac{CPI\,(destinatio\ n)}{CPI\,(origin)}\right)$, and $\log\left(\frac{CPI\,(destinatio\ n)}{CPI\,(origin)}\frac{1}{ER}\right)$	Round-trip coach economy class airfares from Kuala Lumpur to Sydney	No	No	No
Lim and McAleer (2003)	The number of quarterly tourist arrivals	Real GDP per capita	$\left(\frac{CPI\,(destinatio\ n)}{CPI\,(origin)}\frac{1}{ER}\right)$, and $\left(\frac{CPI\,(destinatio\ n)}{CPI\,(Competitiv\ edes)}\frac{1}{ER}\right)$	Real round-trip normal coach economy class airfares from Singapore to Sydney	No	No	No
Salman (2003)	The number of monthly tourist arrivals	Industrial Production index	$\frac{CPI^{destination}}{CPI^{origin}}\frac{1}{EX_i}$	No	No	Yes	Exchange rate, dummy variables such as Chernobyl acc., etc.
Song et al. (2003)	The number of annual tourist arrivals	Annual constant GDP (1995=100)	$\frac{CPI^{destination}}{CPI^{origin}}\frac{1}{EX_i}$	No	$\sum_{j=1}^{n}\frac{CPI_j}{EX_j}w_j, w_j=\frac{TTA_j}{\sum_{j=1}^{n}TTA_j}$	Yes	Trade volume, dummy variables such as oil crises, Asian Financial Crisis
Song et al. (2003a)	The number of annual tourist arrivals	The index of real GDP (1995=100)	$\frac{CPI^{destination}}{CPI^{origin}}\frac{EX_i}{EX_{destination}}$	No	$\sum_{j=1}^{n}\frac{CPI_j}{EX_j}w_j, w_j=\frac{TTA_j}{\sum_{j=1}^{n}TTA_j}$	Yes	Dummy variables such as the first oil crisis, the Asian financial crisis.

Table 3.2: Illustrations of methodologies and model specifications

Study	Dependent variable	Independent Variable					
		Income	Tourism price		Substitute price	Lagged Dependent Variable	Other Variables/Dummy Variables
			Tourists' costs of living component	Transportation cost			
Song and Wong (2003)	The number of annual tourist arrivals	Index of GDP (1995=100)	$\frac{CPI^{destination}}{CPI^{origin}} \frac{EX_i}{EX_{destination}}$	No	$\sum_{j=1}^{n} \frac{CPI_j}{EX_j} w_j, w_j = \frac{TTA_j}{\sum_{j=1}^{n} TTA_j}$	No	No
Dritsakis (2004)	The number of total tourist arrivals	Real GDP per capital, real private consumption expenditure per capita, and real private expenditure on consumption services per capita	$\log\left(\frac{CPI\,(destination)}{CPI\,(origin)}\right)$,and $\log\left(\frac{CPI\,(destination)}{CPI\,(origin)}\frac{1}{ER}\right)$	The average economy class airfare prices of different airport companies from the origin country to Athens	No	No	No
Croe and Vanegas (2005)	The number of annual tourist arrivals	Real GDP, Real GDP per capita	$\frac{CPI^{destination}}{CPI^{origin}} \frac{1}{EX_i}$	No	No	Yes	7 dummy variables such as political instability in the Middle East in 1992, etc.
Li et al. (2006)	Real tourism spending per capita in the destination	Index of household disposable income per capita at constant prices	$\frac{CPI^{destination}}{CPI^{origin}} \frac{1}{EX_i}$	No	$\sum_{j=1}^{n} \frac{CPI_j}{EX_j} w_j, w_j = \frac{Spending_j}{\sum_{j=1}^{n} Spending_j}$	No	Dummy Variables are oil crisis and the Gulf War
Mervar and Payne (2007)	The number of quarterly foreign tourist overnight tourist stays	Seasonally- adjusted real GDP	REER calculated with PPI and/or CPI	The average world oil price per barrel in USD	No	Yes	Dummy variables such as politically-related events in 1995, 1999
Ouerfelli (2008)	The number quarterly of tourist arrivals	GDP per capita	$\frac{CPI_{destination}}{EX_i}$,or $\ln CPI_{destination} - \ln EX_i$	No	$\sum_{j=1}^{n} \frac{CPI_j}{EX_j} w_j, w_j = \frac{TTA_j}{\sum_{j=1}^{n} TTA_j}$	No	Tourist offer factor/seasonal factor

Source: Author's own classification

CHAPTER IV

METHODOLOGY

After some basic ideas and concepts of tourism demand modelling are discussed in the last chapter, in this chapter is about to present methodology of modelling European tourism demand for Thai tourism. As mentioned in earlier in the first chapter, the objectives of this study are to explore determinants of European demand to Thai tourism and also to quantify tourism demand elasticities to be powerful and insightful tools not only for policymakers, but also for other stakeholders in the tourism sector.

On the policymakers' side, tourism demand elasticities can be used in planning tourism strategies, determining and assessing the nature and impact of various factors such as internal and external shocks to the sector. Additionally, the policymakers can also employ elasticities to analyse and monitor tourism market conditions, firms and household behaviour and this information can also be utilized to stimulate the tourism sector. Regarding the entrepreneurs' side, firms in the tourism sector can employ elasticities in devising marketing strategies successfully, together with guiding the firms' decisions on pricing, sales promotions, designing tourism products, and also product development. Due to its significance, tourism demand modelling exploring elasticities therefore has attracted applied economists and practitioners in other fields to study and conduct empirical research as mentioned in the last chapter.

The methodology of estimating elasticities of European demand to Thai tourism is to be elaborated in this chapter. To obtain reliable elasticities, the study adopts two methods of estimating -- the Engle-Granger (EG) cointegration test and the Johansen cointegration test. These two procedures will provide the so-called long-run elasticities resulting from the fact that these procedures are generally employed to exploring long-run or equilibrium relationship among economic variables. The results produced by the two methods are also to be compared.

Finally, the organisation of the chapter will be as follows. The theoretical framework of demand including a definition of demand, market demand and the elasticity of demand will be discussed. In the second part, concepts of unit root testing are to be discussed followed by concepts of two methods of testing for cointegration, the Engle-Granger (EG) residual based approach and the Johansen cointegration testing approach. In the third section, data description and estimation procedure are to be presented.

4.1 Theoretical Framework

Regarding the first section of this chapter, some basic concepts of demand are about to be mentioned.

4.1.1 Definition of demand

In order to analyse tourism demand, a standard definition of demand should be discussed first to function as a framework for further discussion. In economics, ***demand*** for a particular goods or services is generally defined as the amount of the goods or services that consumers ***want to and be able to purchase*** *at all prices*, *ceteris paribus*, and this can be represented by the following equation[16];

$$Q_i = f(P_i)$$
$$Q_i = \alpha + \beta P_i; \alpha, \beta \in R \qquad (4.1)$$

where $\boldsymbol{Q_i}$ is quantity demanded of goods or services

$\boldsymbol{P_i}$ is a set of goods or services prices

Conceptually, *equation (4.1)* denotes *an inverse relationship* between own prices of goods or services and quantity demanded in accordance with ***the law of demand*** which simply states that if there is a rise in price of a particular goods, quantity demanded for that goods will decline, or vice versa, provided other things remaining equal *(Tucker, 2008:52)*. As a result, a sign of the own price's coefficient *(β)* is typically negative.

Regarding ***tourism demand,*** it is ideally defined as *the amount of goods and services that tourists are willing and able to buy in certain conditions and time periods*. Nonetheless, this definition generates some problems in practice as there are difficulties in measuring tourism demand appropriately thanks to a complexity of the tourism sector, so there is on consensus on how the best to measure tourism demand. Notwithstanding, in the existing empirical literature, the number of tourist arrivals is the most frequently used as a proxy to measure demand for tourism in a particular destination *(Witt and Witt, 1995), (Li et al., 2005), and (Song and Li, 2008)*. As being

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[16] In this study, quantity demanded *(Q)* and price *(P)* are assumed to have a linear relationship.

guided by the existing empirical literature on tourism demand modelling in the last chapter, the study adopts the European quarterly number of tourist arrivals to Thailand as a measure for European demand to Thai tourism i.e. the dependent variable and the tourism demand is further assumed to depend on the ***tourism price*** defined as the real exchange rate *(RER)* index between Thailand and each of the European tourism generating country *i*, provided other things remaining equal and this relationship is represented by the following equation:

$$TA_{it} = f(RER_{it})$$
$$TA_{it} = \alpha + \beta_i RER_{it}; \alpha, \beta_i \in R \qquad (4.2)$$

where ***TA_{it}*** is the quarterly number of tourist arrivals of European country *i* to Thailand in period *t.*

RER_{it} is the real exchange rate index between Thailand and each of the European tourism generating country *i* in period *t.*

According to *equation (4.2)*, based on the law of demand, an inverse relationship between tourism demand and tourism prices should be witnessed. In other words, it means that if the *RER* increases or appreciates, the number of tourist arrivals will decline or vice versa, *provided that other things remaining equal.*

In fact, there are other determinants, apart from the own price of a good influencing consumers' demand. Those determinants are, for example, income, prices of related goods, *substitute or complementary,* consumers' expectation, seasonality, tastes and preferences, cultural attitudes, and the composition of population *(Stiglitz and Walsh 2006)*. However, the most three essential determinants are the ***own price, income, and prices of related goods*** which can be represented by *equation (4.3);*

$$Q_{it} = f(P_{it}, Y_{it}, P_{it}^{s}, P_{it}^{c})$$
$$Q_{it} = \alpha + \beta P_{it} + \delta Y_i + \eta P_{it}^{s} + \gamma P_{it}^{c}; \alpha, \beta, \delta, \eta, \gamma \in R \qquad (4.3)$$

where Q_{it} is quantity demanded of goods or services in period *t*

P_{it} is a set of own prices of goods or services in period *t*

Y_i is income

P_{it}^{s} is a set of prices of substitute goods or services in period *t*

P_{it}^{c} is a set of prices of complementary goods or services in period *t*.

According to *equation (4.3)*, it embraces additional demand determinants which are income and prices of related goods, as mentioned earlier, the sign of the own price's coefficient is normally negative, as guided by *the law of demand*, whereas the sign of the income variable should be positive. Additionally, the sign of substitute price should be positive, meanwhile the sign of complementary price should be negative. In accordance with *equation (4.3),* if the tourism demand function is added more determinants, it is expressed as *equation (4.4).*

$$TA_{it} = f(RER_{it}, Y_t, MY_{it}^{RER}, SG_{it}^{RER}, PH_{it}^{RER}, ID_{it}^{RER})$$

$$TA_{it} = \alpha + \beta_1 RER_{it} + \beta_2 Y_t + \beta_3 MY_t^{RER} + \beta_4 SG_t^{RER} + \beta_5 PH_t^{RER} + \beta_6 ID_t^{RER}; \alpha, \beta_i \in R \qquad (4.4)$$

Where $\boldsymbol{TA_{it}}$ is the quarterly number of tourist arrivals of the European country *i* to Thailand in period *t*

$\boldsymbol{RER_{it}}$ is the real exchange rate index between Thailand and each of the European tourism generating country *i in period t*

$\boldsymbol{Y_i}$ is income of tourism generating country *i* in period *t*

$\boldsymbol{MY_t^{RER}}$, $\boldsymbol{SG_t^{RER}}$, $\boldsymbol{PH_t^{RER}}$, and $\boldsymbol{ID_t}^{RER}$ are the real exchange rate indices between Malaysia, Singapore, the Philippines, and Indonesia and each of the European tourism generating country *i* in period *t*, respectively.

Nonetheless, the theoretical concepts discussed above present only basic ideas of individual demand, meanwhile tourism demand, in general, implicitly means market tourism demand rather than individual tourism demand; hence, it is necessary to understand concepts of market demand. These are to be presented in the next section.

4.1.2 Market Demand: Some Basic Concepts

Fundamentally, **the market demand function**, likewise the individual demand function, exhibits a relationship between price and quantity demanded. Specifically, it displays that market quantity demanded is inversely related to market price. By definition, the market demand for a particular good is the summation of the entire individual demand in the market at each price, in other words, all individual demand curves in the market are added horizontally *(Gillespie 2007).* To present fundamental notions of market demand in details, a few assumptions are to be established for a purpose of simplicity. First of all, let's assume there are ***two goods***, ***X*** and ***Y***, and only ***two agents*** in the economy. The agents' demand functions for the goods in the economy are given by *equation (4.5) and equation (4.6)*, respectively;

$$x_1 = d_x^1(P_x, P_y, I_1) \quad (4.5)$$
$$x_2 = d_x^2(P_x, P_y, I_2) \quad (4.6)$$

where x_1 is the demand function of the 1st agent

x_2 is the demand function of the 2nd agent

P_x is prices of good x

P_y is prices of good y

I is income variables for each agent

Those demand functions are based on a few assumptions as follows. Firstly, it is assumed that the agents encounter *the same set of prices,* $\boldsymbol{P_x}$ *and* $\boldsymbol{P_y}$, and they are *price takers*, implying the *market is competitive*. Secondly, each agent's demand depends only on his/her own income. Based on these assumptions, the market demand for goods ***x*** is simply the total of each agent's quantity demanded, *holding* P_y, I_1 *and* I_2 *constant.* It is represented by the following equation;

$$X = x_1 + x_2 = d_x^1(P_x, P_y, I_1) + d_x^2(P_x, P_y, I_2)$$
$$X = D_x(P_x, P_y, I_1, I_2) \quad (4.7)$$

where the demand function $\boldsymbol{D_x}$ denotes the market demand function for good ***X.*** Hence, it is apparent that the market demand is determined by the variables $\boldsymbol{P_x, P_y, I_1,}$ ***and*** $\boldsymbol{I_2}$. Thus, it can be concluded that the market demand function for a particular good, $\boldsymbol{X_i}$, is the horizontal summation of individual's demand curves for that goods, as displayed by *equation (4.8);*

$$X_i = \sum_{j=1}^{m} X_{ij} = D_i(P_1, \ldots, P_n, I_1, \ldots, I_m) \quad (4.8)$$

After some basic theoretical concepts of demand are presented, in the next section, a simple but powerful tool for economic analyses, the so-called elasticity of demand is to be discussed. In general, elasticity is an economic device devising to summarize how changes in one variable affect other variables and for the elasticity of demand, it describes how changes in one of the demand determinants such as income could affect quantity demand both direction and magnitude. In other words, the elasticity of demand is a measurement of sensitivity of quantity demand to changes in the determinants of demand. Practically, the concepts of elasticity of demand have been used extensively in both theoretical and empirical economic analyses.

In addition, as an analytical tool for economists and non-economists, the elasticity of demand is used as a tool to, for example, analyse consumers' behaviour, nature of goods and services, or even changes in total revenues resulted from price setting. Regarding applications to tourism demand analyses, the elasticity of demand is useful in studying tourists' behaviour which is not only useful for tourism policymakers in planning country's tourism strategies, but also beneficial for domestic tourism agencies and tour operators in planning their marketing strategies. To gain a better understanding of the elasticity of demand, the following section is to be devoted in discussing both theoretical concepts and applications to tourism demand analyses.

4.1.3 The elasticity of demand: some theoretical concepts

As discussed above, the elasticity of demand explores the sensitivity of demand to various demand determinants, such as price, income, and prices of other associated products. Technically, the elasticity of demand measures percentage change in the quantity demanded to percentage change in the demand determinants such as the own price or income, or it simply explores percentage change in one variable resulting from a one percent change in another (Pindyck and Rubinfeld 2005). To illustrate the concepts of the elasticity of demand, let's assume that the variable ***Y*** depends on the variable ***X***, in other words, variable ***Y*** is endogenously determined by the variable ***X*** according to a linear demand function, then the relationship can be expressed as follows;

$$Y = f(X) \tag{4.9}$$

Given the relationship between ***Y*** and ***X***, the elasticity of ***Y*** with respect to ***X*** which is generally denoted by $\eta_{y,x}$ is defined as

$$\eta_{y,x} = \frac{\%\Delta Y}{\%\Delta X} = \frac{\frac{\Delta Y}{Y} \times 100}{\frac{\Delta X}{X} \times 100} = \frac{\partial Y}{\partial X}\frac{X}{Y} \tag{4.10}$$

Hence, according to *equation (4.10),* it is obvious that elasticity consists of two components, the partial derivative terms or the slope of a function, and the ratio of the two variables. The former provides the information of direction of changes in dependent variable ***Y*** due to changes in the variable ***X***, whereas the later adjusts for unit differences, and it makes elasticity become unit-less.

After the elasticity of demand is computed, there are two key issues to consider, a sign and a magnitude of the result. Regarding the sign of the elasticity of demand, if it turns to be negative, it implies an inverse relationship between the quantity demanded and the demand determinants. Meanwhile, if the sign is positive, it implies a direct relationship between the quantity demand and the demand determinants. With respect to the magnitudes of calculated elasticities, they generally measure sensitivity of quantity demand to the demand determinants is, for example, if the calculated elasticity is less than one, then it implies that the quantity demanded would change less than the determinants do, and the demand is said to be inelastic.

When the concepts of the elasticity of demand are discussed, there are three different types of them composing of the price elasticity of demand, the income elasticity of demand, and the cross price elasticity of demand. In the next section, some basic concepts of these three different types are to be presented.

4.1.3.1 Price Elasticity of Demand

Theoretically, the price elasticity of demand is defined as a measure of the relative price sensitivity of the demand curve or the sensitivity of the quantity demanded to a change in the own price of the good *(Hands 2004)* and the definition can be expressed in form of the mathematical equation as the following equation;

$$\eta_{Q,P} = \frac{\%\Delta Q}{\%\Delta P} = \frac{\frac{\Delta Q}{Q}\times 100}{\frac{\Delta P}{P}\times 100} = \frac{\partial Q}{\partial P}\frac{P}{Q} \qquad (4.11)$$

The estimated price elasticity of demand is normally negative which shows an inverse relationship between percentage changes in quantity demanded, $\boldsymbol{Q^d}$, in response to percentage changes in the own price, ***P***. This is owing to the fact that the partial derivative element is usually negative according to *the law of demand*, except in case of ***Giffen's goods***. With respect to *the magnitude of the price elasticity* i.e. its absolute size, when the price elasticity is more than one in magnitude, it is said to be *price elastic*, meanwhile if the price elasticity is less one in magnitude, demand is said to be *price inelastic* (Pindyck and Rubinfeld, 2005).

The most witnessed economic application of the price elasticity of demand is the total revenue analysis. Given the assumption of maximising profit, then the firm managers would like to maximise total revenue and they would want to know how sensitive their products are and if they want to set their new selling prices, then what would be the outcome, as the impact of changes in price on revenue depends on the price elasticity of demand. For the firms, the estimation of the price elasticity of demand is thus crucial in formulating pricing strategies, for example, they should lower price if demand is price elastic, or increase price if demand is price inelastic so as to maximize total revenue.

A deep analysis of inter-relation between price elasticity and total tourism receipts would help predict what will happen to tourism receipts when tourism price changes. In general, Total revenue (TR) is defined as price times quantity *(PxQ)* and considering total revenue accruing to a firm, a change in price has two offsetting effects i.e. a reduction in price has the direct effect of reducing total revenue for the commodity, but it will also result in an increase in quantity sold, which increases total revenue. However, when these two opposing effects are taken into account, total revenue form a commodity price change may increase, decrease, or remain unchanged. These consequences on total revenue depend on how responsive quantity demanded is to a change in price, which is measured by the elasticity of demand. In addition, the relationship between total revenue and elasticity of demand may be established by differentiating total revenue (PxQ) with respect to price (P) using the product rule of differentiation and noting that Q is a function of P, according to *equation (4.12)*

$$TR = f(Q)$$
$$TR = PxQ \tag{4.12}$$

$$\frac{\partial TR(Q)}{\partial P} = Q + P \cdot \frac{\partial Q}{\partial P} \tag{4.13}$$

Dividing *equation (4.13)* both sides by Q gives *equation (4.14)*

$$\frac{\frac{\partial(P \cdot Q)}{\partial P}}{Q} = 1 + \frac{\partial Q}{\partial P \cdot \frac{P}{Q}} = 1 + \eta_{x,y} \tag{4.14}$$

$$\left[\frac{\partial(P \cdot Q)}{\partial P}\right] \cdot \left[\frac{P}{(P \cdot Q)}\right] = 1 + \eta_{x,y} \tag{4.15}$$

$$\varepsilon_{TR,P} = 1 + \eta_{x,y} \tag{4.17}$$

Likewise the general definition of elasticity of demand, the total revenue elasticity measures the percentage change in total revenue for percentage change in price. As demonstrated in *equation (4.17)*, the sign of $\varepsilon_{TR,P}$ depends on whether $\eta_{x,y}$ is greater or less than minus one. If it is great than minus one, demand is inelastic and $\varepsilon_{TR,P}$ is greater than zero. Thus, price and total revenue move in the same direction; an increase in P leads to an increase in total revenue. In contrast, if $\eta_{x,y}$ is less than one, demand is elastic, and $\varepsilon_{TR,P}$ is less than zero, so an increase in P is associated with a decrease in total revenue. If elasticity of demand is unitary, $\eta_{x,y}$ equals minus one, then $\varepsilon_{TR,P}$ equals zero. Total remains unchanged for a price change. The percentage change in quantity exactly offsets any percentage change in price. These relationships can be concluded as displayed in **table 4.1.**

Table 4.1: Response of Total revenue to a price change

Demand,	Price	Total Revenue (TR=PxQ)
Elastic, $\varepsilon_{Q,P} < -1$ or $\varepsilon_{TR,P} < 0$	Decreases	Increases
	Increases	Decreases
Inelastic, $\varepsilon_{Q,P} > -1$ or $\varepsilon_{TR,P} > 0$	Decreases	Decreases
	Increases	Increases
Unitary $\varepsilon_{Q,P} = -1$ or $\varepsilon_{TR,P} > -1$	Decreases	Unchanged
	Increases	Unchanged

Source: Author's own classification

Regarding applications to tourism demand analysis, the price elasticity is somewhat simplistic but crucial information for tourism policymakers in terms of setting and formulating a country' s tourism policies and strategies including evaluating the effectiveness of those policies and strategies. For example, given the tourism demand is measured by the number of tourist arrivals to Thailand and the tourism price is measured in terms of the real exchange rate (RER) between Thailand and each of the tourism generating country in Europe, if the RER appreciates, it means that the number of European tourist arrivals will decline according to the magnitude of the calculated elasticity, *provided that other thing remaining equal.* Hence, the price elasticity as an economic tool is important for policy guidance. In addition, the information of price elasticity, *provided that other thing remaining equal*. Hence, the price elasticity as an economic tool is important for policy guidance. In addition, the information of price elasticity is also significant to the private sector, mainly entrepreneurs in tourism-related services, since the information could be taken into account in setting strategies to attract more tourists and to enhance more price competitiveness relative to other destinations in the region.

4.1.3.2 Income Elasticity of Demand

The income elasticity of demand measures the sensitivity or responsiveness of quantity demanded, Q^d, to changes in income, in other words, it expresses percentage change in the quantity demanded to percentage change in income and it is defined as follows;

$$\eta_{Q,Y} = \frac{\%\Delta Q}{\%\Delta Y} = \frac{\frac{\Delta Q}{Q}\times 100}{\frac{\Delta Y}{Y}\times 100} = \frac{\partial Q}{\partial Y}\frac{Y}{Q} \qquad (4.18)$$

Regarding *the sign of a calculated income elasticity of demand*, if it is positive, then it means that an increase in consumers' income results in an increase in quantity demanded for any given good, or vice versa and theoretically, the good with a positive income elasticity of demand is said to be *"normal good"*. In general, normal goods can be categorized further into *necessary and luxurious goods*. Meanwhile, if the income elasticity of demand is negative, it means that an increase in income leads to a fall in quantity demanded for any given good, and vice versa, and the good is said to be *"inferior good"*.

With respect to *the magnitude of the income elasticity*, if it is *greater than one*, regardless of the sign, then *the good is said to be luxury* implying that demand is fairly sensitive to changes in income. On the other hand, if the calculated income elasticity of demand is less one, the good is known as a necessity, or demand is not sensitive to changes in income. These concepts are displayed **in table 4.2.**

Table 4.2: Classification of Goods and Services according to income elasticity	
Income elasticity	Classification
$\varepsilon_{Q,Y} = (\partial Q/\partial Y)(Y/Q) = \partial \ln Q/\partial \ln Y > 0$	Normal good
$\varepsilon_{Q,Y} = (\partial Q/\partial Y)(Y/Q) = \partial \ln Q/\partial \ln Y < 0$	Inferior good
$\varepsilon_{Q,Y} = (\partial Q/\partial Y)(Y/Q) = \partial \ln Q/\partial \ln Y > 1$	Luxuries
$\varepsilon_{Q,Y} = (\partial Q/\partial Y)(Y/Q) = \partial \ln Q/\partial \ln Y < 1$, but > 0	Necessities

Source: Author's own classification

Practically, a good understanding of the income elasticity is considered important to both policymakers and a private sector, likewise the price elasticity of demand, especially tourism related-services entrepreneurs. Regarding the policymakers, especially those who in charge of planning and implementing a country's tourism strategies, to have good information of income elsticities of tourism-generating countries, they can plan and implement the tourism strategies effectively, for example, if Thai tourism policymakers can quantify income of elasticities for tourism-generating countries such as Britain, France, Germany and others in Europe, they can assess that how much the number of tourists would decline as the global financial crisis hit these counties severely. The policymakers therefore can prepare to accommodate or mitigate those external shocks accordingly. In addition, if the economies of those countries enter to a recovery period, the policymakers can also assess how the situation would benefit the tourism sector. Meanwhile, the income elasticies can provide advantages for the private sector as well, especially tourism-related services firms, for example, in forecasting future sales, cash flow, and profits.

4.1.3.3 Cross-Price Elasticity of Demand

As mentioned earlier, demand for a particular good or services can be influenced by prices of related goods and services whether substitutes or complimentary; hence, it is crucial to examine degrees of relationship between them. This can be done by employing the cross price elasticity of demand which measures sensitivity of demand of one good to changes in prices of other related goods and services.

In tandem with the two definitions of elasticity discussed above, the ***cross-price elasticity of demand*** measures changes in quantity demanded of one good, let's say good X, in responsive to changes in prices of the other good, assumed to be good Y, expressed in the following equation;

$$\eta_{Q_x,P_y} = \frac{\%\,\Delta Q_x}{\%\,\Delta P_y} = \frac{\frac{\Delta Q_x}{Q_x}\times \mathbf{100}}{\frac{\Delta P_y}{P_y}\times \mathbf{100}} = \frac{\partial Q_x}{\partial P_y}\frac{P_y}{Q_x} \tag{4.19}$$

Regarding *the sign of a calculated cross-price elasticity*, if it is positive, it means that demand for one good increases when the price of another related good increases, or vice versa, then two goods are said to be *substitute.* Meanwhile, magnitudes of the calculated elasticity values imply degrees of substitution between the two goods, in other words, the greater calculated elasticity values are obtained, the easier for consumers to switch to another product. On the other hand, if the cross price elasticity of demand is negative, it exhibits that two goods under consideration are *complementary*. This means that an increase in the price of one good results in a fall in the quantity demanded of the other.

The cross-price elasticity of demand, in the context of tourism economics, is generally used as a tool to analyse competitiveness of a country as a destination for tourists relative to its neighbours or other countries. This study will also use the cross-price elasticity as a tool to analyse Thailand's competitiveness in attracting tourists from Europe relative to countries composing of Malaysia, Singapore, the Philippines, and Indonesia which share the common tourism resources.

Table 4.3: Classification of Goods and Services according to cross-price elasticity

Cross-price elasticity	**Classification**
$\varepsilon_{Qx,Py} = (\partial Q_x/\partial P_y)(P_y/Q_x) = \partial \ln Q_x/\partial \ln P_y > 0$	Substitutes
$\varepsilon_{Qx,Py} = (\partial Q_x/\partial P_y)(P_y/Q_x) = \partial \ln Q_x/\partial \ln P_y = 0$	Unrelated
$\varepsilon_{Qx,Py} = (\partial Q_x/\partial P_y)(P_y/Q_x) = \partial \ln Q_x/\partial \ln P_y < 0$	Complements

Source: Author's own classification

4.2 Empirical Framework and Strategy

In this section, estimation procedure and strategy are to be discussed. First of all, the theoretical concepts of unit root testing and then methodological concepts of cointegration analyses will be presented accordingly.

It is widely accepted that most macroeconomic time series are trended over time and they typically have an underlying rate of growth which may or may not be constant, for example GDP, price or the money supply all trend to grow at a regular annual rate.

These variables are exposed to a problem *nonstationarity*. Trended time series can potentially create major problems in empirical econometrics due to *spurious regressions or incorrect conclusions*. One of the most adopted solutions to mitigate such problems is to difference the series successively until *stationarity* is obtained and then use the stationary series for regression analysis (Asteriou and Hall 2007). However, prior to difference the time series data under consideration, it is necessary to be informed about their unit roots i.e. how many times the series need to be differentiated to achieve stationarity. In the section, methodologies of testing for unit roots are presented.

4.2.1 Unit Root Tests for Stationarity

Stationary and non-stationary time-series data

The first step in establishing time-series econometric models is necessarily to explore characteristics of the data whether they are ***stationary*** or ***nonstationary.*** Formally, a time series y_t is considered to be stationary if its ***mean*** and ***variance*** are constant overtime, together with if the ***covariance*** between two values from the series depends only on the length of time separating the two values, and not on the actual times at which the variables are observed i.e. the time-series y_t is stationary if it meets the following criteria:

$$E(Y_t) = \mu$$

$$\mathbf{var}(Y_t) = \sigma^2 \qquad \text{(Constant variance)}$$

$$\mathbf{cov}(Y_t, Y_{t-s}) = \mathbf{cov}(Y_t, Y_{t+s}) = \gamma_s \qquad \text{(Covariance depends on } \boldsymbol{s}\text{, not } \boldsymbol{t}\text{)}$$

It should be noted that the stationary conditions here is ***weak-form stationarity***, also called ***covariance stationarity*** (Kenneth G, 2005). Whereas, the time-series y_t is considered to be ***nonstationary*** if it does not meet one or more of those conditions.

Practically, in dealing with time-series data, it is crucial to distinguish between stationary and nonstationary data since if nonstationary time series data are used in econometric modelling, it is extremely exposed to the so-called ***spurious regressions***, implying no genuine relationship among variables in the regression equations, and those variables are primarily driven by trends without any relationships. Regarding symptoms of spurious regressions, they usually have particularly high R^2 values, together with significant estimates *of t statistics*, but the results may have no economic meaning. This is owing to the inconsistent OLS estimates leading to invalidity of the tests of statistical inference (Asteriou and Hall, 2007).

A time series might suffer from nonstationarity for several reasons. First, it might contain a deterministic time trend or deterministic seasonal patterns. This is fairly obvious for tourism time series data which keep repeating themselves the same pattern in every period. Second, it might be possible that the series contains unit roots or structural breaks. Consequently, to avoid spurious regressions, the unit root testing can detect the presence of nonstationary time series. If a unit root is present, there is a sign of nonstationarity. However, if there is a combination among non-stationary series, and a stationary conintegration relationship is obtained, then the regression equation implies the meaningful economic relationship *(Fiaris, 1995).*

Theoretically, it is necessary to test for the ***order of integration*** or ***unit roots*** of each variable to be used in the econometric models in order to identify whether it is stationary or non-stationary and how many time the series need to be differenced to obtained stationarity. To test for the presence of unit roots or test for the order of integration, there are various econometric tools, but normally, there are three popular approaches, namely the ***Dickey-Fuller (DF) test*** or the ***Augmented Dickey-Fuller (ADF) test***, ***Phillips-Perron-type (PP) test***, and the ***Kwiatkowski, Phillips, Schmidt, and Shin (KPSS) test***. In this study, all three types of the testing are to be employed to explore the characteristics of tourism data. Employing the three methods of testing for unit roots is about to provide robust conclusions regarding the nature of the data.

The first method of testing for unit roots to be mentioned in this chapter is ***the DF test***. The DF test tends to gain more popularity relative to other tests owing to its simplicity and its more general nature (Fiaris, 1995:p. 28). ***The DF test*** to be emphasized here is based on ***the first order autoregressive or AR (1) model***. Under the ***AR(1)*** model, the hypothesis that Y_t process is nonstationary and can be tested by setting the null hypothesis $H_0: \beta_1 = 1$ implying that the ***AR(1)*** process or Y_t has a unit root against the alternative hypothesis H_1: $\beta_1 < 1$ implying that the ***AR(1)*** process or Y_t is stationary, according to *equation (14.4)*[17].

$$
\begin{aligned}
&Y_t = \beta_0 + \beta_1 Y_{t-1} + u_t \qquad ;u_t \sim i.i.d.(0,\sigma^2) \\
&H_0 : \beta_1 = 1 \\
&H_1 : \beta_1 < 1 \qquad (4.20)
\end{aligned}
$$

However, the *equation (4.20)* is normally modified to obtain easier version by subtracting Y_{t-1} from both sides. Let's $\delta = \beta_1 - 1$; then the following equation is obtained:

$$
\begin{aligned}
&\Delta Y_t = \beta_0 + \delta Y_{t-1} + u_t \qquad ;u_t \sim i.i.d.(0,\sigma^2) \\
&H_0 : \delta = 0 \\
&H_1 : \delta < 0 \qquad (4.21)
\end{aligned}
$$

In line with the former version illustrated in *equation (4.20)* the ***modified version of the DF test*** for a unit autoregressive root tests the null hypothesis H_0: $\delta = 0$ implying that Y_t has a stochastic trend against the one-sided alternative hypothesis H_1: $\delta < 1$ implying that Y_t is stationary. Then the outcome of the OLS t-statistic testing $\delta = 0$ in the *equation (4.21)* is called the ***Dickey Fuller statistic.*** Nonetheless, the DF test specified in ***AR(1)*** model cannot capture all the serial correlation in Y_t for some series resulting in autocorrelation of the error term owing to the misspecification of the dynamic structure of Y_t. In addition, the use of the DF distributions is based on the assumption that u_t is distributed as ***IID*** $(0, \sigma^2)$ or ***'white-noise'*** which is invalid. It is therefore more appropriate to extend the ***AR(1)*** to higher orders of autoregressive models. The extension of the Dickey-Fuller test to the p^{th} order autoregressive or ***AR(p)*** model results in the ***augmented Dickey-Fuller (ADF)*** test implying that more lags of ΔY_t are added, as demonstrated in *equation (4.22)* and the optimal lag length ***p*** are generally estimated by using the ***Bayes information criterion (BIC)***, also called ***the Schwarz***

---

[17] Hereafter, the disturbance term, u_t, is assumed to be identically and *independently distributed (i.i.d) process*. If this assumption is violated, then the limiting distributions and critical values obtained by Dickey-Fuller cannot be assumed to hold (Holden and Perman 2007)

information criterion (SIC), or the ***Akaike information criteria (AIC)*** (Stock and Watson, 2003)***.***

$$\Delta Y_t = \beta_0 + \delta Y_{t-1} + \phi_1 \Delta Y_{t-1} + \phi_2 \Delta Y_{t-2} + ... + \phi_p \Delta Y_{t-p} + u_t \qquad ; u_t \sim i.i.d.(0, \sigma^2) \qquad (4.22)$$

Conventionally, similar to the DF test, the ADF test for a unit autoregressive root tests the null hypothesis H_0: $\delta = 0$, Y_t has a stochastic trend, against the one-sided alternative hypothesis H_1: $\delta < 1$, Y_t is stationary as displayed in *equation (4.22)* and the ***ADF statistic*** is the outcome of the OLS t-statistic testing $\delta = 0$. Whereas, if Y_t exhibit trending behaviour, the alternative hypothesis that Y_t is stationary around a deterministic linear time trend, "***t***", or the observation number, then the variable ***t*** should be added as an additional regressor. The ADF becomes

$$\Delta Y_t = \beta_0 + \alpha t + \delta Y_{t-1} + \phi_1 \Delta Y_{t-1} + \phi_2 \Delta Y_{t-2} + ... + \phi_p \Delta Y_{t-p} + u_t \qquad ; u_t \sim i.i.d.(0, \sigma^2) \qquad (4.23)$$

where α is an unknown coefficient and, as usual, the ***ADF statistic*** is the OLS t-statistic testing $\delta = 0$ in *equation (4.23)* Under the alternative hypothesis that the series is stationary around a linear deterministic time trend, the null hypothesis is that the series has a unit root, whereas the alternative is that it is ***trend stationary***[18] *(Stock and Watson 2003).*

Apart from the ADF test, there are other two approaches as mentioned earlier, and one of them is ***the Phillips-Perron (PP) Unit Root Tests***. As it is explicitly stated, one of the essential assumptions of the DF test is that the error term is *white noise*, or independently and identically distributed, in other words, the error terms are statistically independent and have a constant variance. To take care of the problem of autocorrelation in the error terms, the lagged difference terms are added as the explanatory variables, and this new version of the DF test is called the ADF test as mentioned earlier. Hence, when using the ADF test in practical, the assumption of independently and identically distributed of the error terms must be assured. To relax the assumptions concerning the distribution of error terms, Phillips and Perron (1988) therefore developed a generalization of the ADF test procedure that allows for fairly mild

---

[18] Note that a deterministic time trend can be specified in many forms depending on nature and characteristics of data, for example, it could be quadratic.

assumptions concerning the distribution of errors i.e. they employed ***nonparametric statistical methods*** to refrain from the problem of autocorrelation without adding more lagged difference terms *(Gujarati and Porter 2009).*

The final test for stationarity to be mentioned in this chapter is ***the KPSS test***. The KPSS test was reversed the approach o f hypothesis testing in ***the Dickey-Fuller test*** and ***the PP test*** for stationarity which can be exemplified as follows;

$$y_t = \alpha + \beta t + \gamma \sum_{i=1}^{t} x_i + \varepsilon_t, t = 1...T \quad (4.24)$$

$$y_t = \alpha + \beta t + \gamma X_t + \varepsilon_t \quad (4.25)$$

Where ε_t is stationary series and x_t is independently and identically distributed with zero mean and unit variance. Given the fact that X_t is ***I(1)***, y_t is nonstationary if γ is not zero. In testing for stationarity, the hypotheses of the KPSS test are;

$$H_0: \gamma = 0$$

$$H_1: \gamma \neq 0 \quad (4.26)$$

It is obvious that the test of hypotheses of the KPSS is opposite that of the DF test and the PP test which normally test for the null hypothesis, in this case, $\gamma < 1$ against the alternative hypothesis $\gamma = 1$. The coefficients α and β can be estimated by OLS, under the null hypothesis (Green, 2007).

After a unit root test is established, ***an order of integration*** is obtained automatically. Technically, the ***order of integration*** is generally recognized as the number of time-series process need to be differenced to be stationary. For example, if Y_t is taken the first difference, then it becomes stationary, the series Y_t is said to be ***integrated of order 1***, or ***I(1).*** Normally, stationary series are said to be integrated of order zero or ***I(0).*** Generally, if nonstationary time series Y_t has to be differentiated ***d*** times to make it become stationary, that is, the time series Y_t is said to be ***integrated of order d***, or $Y_t \sim I(d)$ (Gujarati and Porter, 2009)***.***

In general, unit root testing is a prerequisite for cointegration analysis since testing for cointegration requires the same order of integration of nonstationary variables. After the order of integration for each variable is obtained, the next procedure is to test for cointegration among the variables.

4.2.2 Cointegration Tests for Long-Run Relationships

The concepts of cointegration deal with long-run equilibrium or long-run relationships among nonstationary variables. As mentioned earlier, to obviate spurious regressions, nonstationary time-series are generally not included in econometric models; however, there is an exception in a case of cointegration (Hill et al. 2008). According to ***Engle and Granger's concept of cointegration***, if there are two nonstationary economic variables, let's say x_t and y_t, which are in the same economic system, there should be an attractor or cointegration relationship that keep the two variables moving together in the long run (Song and Witt 2000).

Normally, when the concepts of *cointegration* among variables are mentioned in economics, economists tend to look for a long-run, or equilibrium relationship among them. Technically, if there are two time-series, X_t and Y_t, then they are said to be cointegrated if there exists a parameter β such that $u_t = Y_t - \beta_1 - \beta_2 X_t$ is stationary. The important reason of deploying the method of cointegration analysis is straightforward i.e. to avoid confrontation with spurious regression problems. Regarding the issue of testing for cointegration, there are many approaches for modelling and testing, but this study will employ two approaches, ***Engle-Granger (EG) or Augmented Engle-Granger (AEG) cointegration approach***, and ***the Johansen cointegration approach***. Those two methods of testing are to be used as tools to explore long-run relationships between tourism demand and its selected economic determinants. In addition, based on the equilibrium relationships, the regressions can also be employed to examine European tourists' demand underlyings for Thai tourism. In the next section, concepts and methodologies of both EG and Johansen cointegration are to be elaborated.

4.2.2.1 Engle-Granger Approach

Regarding the Engle-Grange (EG) approach or generally known as the Engle-Granger residual-based approach or the Engle-Granger two-stage method, in order to test whether the time-series X_t and Y_t are cointegrated is equivalently to test whether the error terms $u_t = Y_t - \beta_1 - \beta_2 X_t$ are stationary. Practically, since the error terms u_t cannot be observed directly, they are estimated by the OLS residuals, e_t, instead. That is, the terms $e_t = Y_t - b_1 - b_2 X_t$, to be used to test for stationarity by the ADF test. Loosely speaking, the EG test for cointegration is equally the test of the stationarity of estimated OLS residual series. The test of stationarity of the residuals is based on the following equation:

$$e_t = \alpha + \beta t + \gamma e_{t-1} + \sum_{i=1}^{p-1} \gamma_i \Delta e_{t-1} + \psi_t \qquad ; \psi_t \sim i.i.d.(0, \sigma^2) \qquad (4.27)$$

The equation (4.27) is general form for a unit root testing since it contains both of the trend component and the constant term. Additionally, the issue of whether to include the trend component and/or the constant term can be guided by the appearance of the terms $e_t = Y_t - b_1 - b_2 X_t$. Hence, the hypotheses to test for cointegration are:

H_0: *the series are not cointegrated* (or equivalently, residuals are nonstationary)

H_1: *the series are cointegrated* (or equivalently, residuals are stationary)

In spite of its straightforward, the EG approach can be extended further to model short-run disequilibrium by using so-called the ***error correction models (ECMs)***, the ECMs are employed to estimate the error terms, e_t, to obtain the $e_{t-1} = Y_{t-1} - b_1 - b_2 X_{t-1}$ speed of adjustment towards equilibrium. Given the terms $e_t = Y_t - b_1 - b_2 X_t$, it can be transformed to

$$\Delta Y_t = \gamma_0 \Delta X_t - (1 - \alpha) e_{t-1} + v_t \qquad (4.28)$$

It should be noted that given Y_t and X_t are *I(1),* and they are integrated or, $u_t \sim I(0)$, then the *equation (4.28)* becomes I(0), and consequently, standard ***t***-and ***F-tests*** are applicable for statistical inferences.

Technically, due to some limitations of the Engle-Granger approach, for example, one could encounter a problem of simultaneous equations bias if the causality between the dependent and independent variables runs in both directions. Additionally, the Engle-Granger approach is confined to explore only one cointegrating relationship i.e. what the Engle-Granger two-stage method detects is only an ‘average’ cointegrating vector over a number of cointegrating vectors. This is somewhat restrictive and unrealistic, although, in fact there could be more one cointegrating relationships if the long-run model associates with more than two variables in the system. Therefore, the EG method is somewhat a restrictive tool of analysis if there exists multiple cointegrating relationships (Song and Witt 2000). To amend the defects of the EG approach; ***the Johansen cointegration approach*** will be employed.

4.2.2.2 Johansen cointegration approach[19]

Regarding the *Johansen approach*, it extends the limitations of the Engle-Granger approach i.e. from a single cointegrating relationship to multivariate ones. Generally, the Johansen's approach is *a vector autoregressive (VAR)* based approach. In order to illustrate the methodology, the study will start with a set of variable $\boldsymbol{y_t}$ and given that these variables have integrated of order one or *I(1)* variables. A system of VAR with ***p*** lags containing the variables is to be set up as follows;

$$y_t = \delta + A_1 y_{t-1} + \ldots + A_p y_{t-p} + \varepsilon_t \qquad (4.29)$$

where $\boldsymbol{y_t}$ is an *nx1* vector of the variables

$\boldsymbol{\varepsilon_t}$ is an *nx1* vector of innovations

To be applicable in terms of modelling, the VAR in *equation (4.29)* must be expressed in a vector error correction model (VECM) in the following form;

$$\Delta y_t = \delta + \prod y_{t-p} + \sum_{i=1}^{p-1} \Gamma_i \Delta y_{t-i} + \varepsilon_t \qquad (4.30)$$

where

$$\Pi = \sum_{i=1}^{p} A_i - I$$

$$\Gamma_i = -\sum_{j=i+1}^{p} A_j$$

By *equation (4.30)* the Π matrix is interpreted as the long-run coefficient matrix, as in the long-run, all the $\Delta \boldsymbol{y_{t-i}}$ terms is to be zero, and the expected value of the innovation terms is also zero.

Accordingly, the test for cointegration between the variables is based on the rank of the Π matrix via its eigenvalues and given the fact that the rank of a matrix is equal to the number of its characteristic roots or eigenvalues that is not zero. If the coefficient matrix $\boldsymbol{\Pi}$ has reduced rank ***r<n,*** where *n* is the number of the variables, then

---

[19] In this study will focus on core issues of the methodology, for more details please refer standards econometrics textbooks

there are *nxr* matrices α and β each with ***rank r*** such that $\Pi = \alpha\beta'$ and $\beta' y_t$ is stationary. Given *r* is the number of cointegrating relationships, and the β provides the cointegrating vectors, whereas α provides the amount of each cointegrating vector entering each equation of the VECM, or the adjustment parameters.

With respect to the Johansen's methodology of testing for cointegration, it proposes two different likelihood ratio tests, ***the trace test*** and ***the maximum eigenvalue test,*** shown in equations (4.31) and (4.32) respectively.

$$J_{trace} = -T \sum_{i=r+1}^{n} \ln(1-\hat{\lambda}_i) \qquad (4.31)$$

$$J_{\max} = -T \ln(1-\hat{\lambda}_{r+1}) \qquad (4.32)$$

where ***T*** is a sample size, *r* is the number of cointegrating vector under the null hypothesis

λ_i hat is the estimated value for the *i* th ordered eigenvalue form the Π matrix.

If the test statistic is greater than the critical value from Johansen's tables, reject the null hypothesis that there are *r* cointegrating vectors in favour of the alternative that there are *r+1* (for J_{trace}) or more than *r* (for J_{max}). The testing is conducted in a sequence and under the null, r =0,1,…,n-1 so that the hypotheses for J_{trace} are following;

H_0: $r = 0$ versus H_1: $0 < r \leq n$ (4.33)

H_0: $r = 1$ versus H_1: $1 < r \leq n$

H_0: $r = 2$ versus H_1: $2 < r \leq n$

… … …

H_0: $r = n-1$ versus H_1: $r = n$

The first test involves a null hypothesis of no cointegrating vectors (corresponding to Π having zero rank). If the null hypothesis is not rejected, a conclusion of no cointegrating vectors would be drawn and the test would be done. However, if H_0: $r = 0$ is rejected, the null that there is one cointegrating vector, in other words, H_0: $r = 1$, would be conducted serially. Hence, the value of r is continually increased until the null cannot be longer rejected.

To illustrate the process of conducting the Johansen's approach in testing for cointegration for the given 1< rank (Π) < *n*, the following process is elaborated.

Supposed that there are *r* conintegrating vectors, then the Π matrix is considered to be the product of two matrices, $\boldsymbol{\alpha}$ and $\boldsymbol{\beta'}$ of dimension *(nxr)* and *(rxn),* respectively;

$$\Pi = \alpha\beta'$$

In this study, the system contains at most 7 variables composing of the quarterly number of tourist arrivals, tourism price, income, and four substitute price variables, and hence elements of the $\boldsymbol{\Pi}$ **matrix** could be expressed as follow;

$$\Pi = \begin{pmatrix} \pi_{11} & \pi_{12} & \pi_{13} & \pi_{14} & \pi_{15} & \pi_{16} & \pi_{17} \\ \pi_{21} & \pi_{22} & \pi_{23} & \pi_{24} & \pi_{25} & \pi_{26} & \pi_{27} \\ \pi_{31} & \pi_{32} & \pi_{33} & \pi_{34} & \pi_{35} & \pi_{36} & \pi_{37} \\ \pi_{41} & \pi_{42} & \pi_{43} & \pi_{44} & \pi_{45} & \pi_{46} & \pi_{47} \\ \pi_{51} & \pi_{52} & \pi_{53} & \pi_{54} & \pi_{55} & \pi_{56} & \pi_{57} \\ \pi_{61} & \pi_{62} & \pi_{63} & \pi_{64} & \pi_{65} & \pi_{66} & \pi_{67} \\ \pi_{71} & \pi_{72} & \pi_{73} & \pi_{74} & \pi_{75} & \pi_{76} & \pi_{77} \end{pmatrix} \qquad (4.34)$$

Supposed that ***r* = *1*** for simplicity, so that there is one cointegrating vector, then $\boldsymbol{\alpha}$ and $\boldsymbol{\beta}$ will be (7x1) as displayed in the following equation;

$$\Pi = \alpha\beta' = \begin{pmatrix} \alpha_{11} \\ \alpha_{12} \\ \alpha_{13} \\ \alpha_{14} \\ \alpha_{15} \\ \alpha_{16} \\ \alpha_{17} \end{pmatrix} \begin{pmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} & \beta_{17} \end{pmatrix} \qquad (4.35)$$

Given the system contains at most 7 variables as mentioned above and supposed that there is one cointegrating vector, r = 1. Then $\boldsymbol{\Pi y_{t-k}}$ will be illustrated by;

$$\Pi y_{t-k} = \begin{pmatrix} \alpha_{11} \\ \alpha_{12} \\ \alpha_{13} \\ \alpha_{14} \\ \alpha_{15} \\ \alpha_{16} \\ \alpha_{17} \end{pmatrix} \begin{pmatrix} \beta_{11} & \beta_{12} & \beta_{13} & \beta_{14} & \beta_{15} & \beta_{16} & \beta_{17} \end{pmatrix} \begin{pmatrix} y_1 \\ y_2 \\ y_3 \\ y_4 \\ y_5 \\ y_6 \\ y_7 \end{pmatrix}_{t-k} \qquad (4.36)$$

Given *equation (4.36)*, it is possible to express a separate equation for each variable $\Delta \boldsymbol{y}_t$, and it is normally that the equation is expressed in a normalized form of a particular variable, so that the coefficient on the variable in the cointegrating vector becomes one. For example, normalising on $\boldsymbol{y}_1$ would yield the conintegrating term in the equation for $\Delta \boldsymbol{y}_1$ as follows;

$$\alpha_{11} = \left(y_1 + \frac{\beta_{12}}{\beta_{11}} y_2 + \frac{\beta_{13}}{\beta_{11}} y_3 + \frac{\beta_{14}}{\beta_{11}} y_4 + \frac{\beta_{15}}{\beta_{11}} y_5 + \frac{\beta_{16}}{\beta_{11}} y_6 + \frac{\beta_{17}}{\beta_{11}} y_7 \right)_{t-k} \qquad (4.37)$$

As mentioned earlier that the Johansen cointegration approach primarily bases on a vector autoregressive (VAR), the Johansen method is therefore somewhat sensitive to choices of the lag length of the VAR model and the number of lags chosen will directly affect the validity of the test results. The criteria used to determine the lag structure of the VAR model are thus crucial. In practice, a practical problem with estimating a VAR *(p)* model is that we would like to include as much information as possible for the purposes of forecasting and policy analysis, but degree of freedom will quickly run out as more variables are introduced. Therefore, the process of lag length selection is very important for the specification of a VAR model. If the lag length *p* is too small, a lag leads to omitted variables, so biases remaining coefficients, and likely leads to serially correlated errors. In addition, the model cannot represent correctly the Data Generating Process (DGP). On the other hand, if *p* is too many, lack of degrees of freedom can be a problem leading to over-parameterized the model and OLS estimation is biased (Asteriou and Hall 2007).

To determine the lag length of the VAR model, practitioners normally begin with the longest possible lag length permitted by the sample. Notwithstanding, in empirical econometrics studies, there are following criteria frequently used, *Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), Final Prediction Error (FPE), Hannan-Quinn Information Criterion, and Sequential Modified LR Test Statistics Criterion.* However, in this study will rely primarily on Akaike Information Criterion (AIC) and partially on Schwarz Bayesian Criterion (SBC) which are calculated from;

$$AIC = -\frac{Tm}{2}(1+\ln 2\pi) - \frac{T}{2}\ln|\Sigma| - (m^2 p + mq + 2m) \qquad (4.38)$$

$$SBC = -\frac{Tm}{2}(1+\ln 2\pi) - \frac{T}{2}\ln|\Sigma| - \frac{1}{2}(m^2 p + mq + 2m)\ln(T) \qquad (4.39)$$

where $|\Sigma|$ is the determinant of the variance/covariance matrix of the estimated errors

m is the number of parameter in the full system

π = 3.1416.

In the lag-length selecting context, the highest AIC and SBC are preferred.

As expressed in *equation (4.22),* the vector error correction model (VECM) does not encompass deterministic components such as trend or dummy variables. Regarding the Johansen cointegration approach, particularly provided in *the Eviews 6 software package*, there are three forms of testing assumptions relating to deterministic trend;

Assumption I: assuming no deterministic trend in data which can be further divided into two categories;

(1) No intercept or trend in CE or test VAR

(2) Intercept (no trend) in CE-no intercept in VAR

Assumption II: allowing for linear deterministic trend in data which also can be classified into two categories as follows;

(3) Intercept (no trend) in CE and test VAR

(4) Intercept and trend in CE-no trend in VAR

Assumption III: allowing for quadratic deterministic trend in data as follows;

(5) Intercept and trend in CE-linear trend in VAR

According to the three main forms of testing discussed above, the deterministic elements could be encompassed into cointegrating equations as one of the five above sub-alternatives;

Alternative (1): the time series $\boldsymbol{y_t}$ does not have deterministic trends and long-run cointegration equations do not have intercepts which can be denoted by the following equation;

$$\prod y_{t-p} + \psi D_t = \alpha\beta' y_{t-p}$$

Theoretically, this alternative is generally employed and applied to differenced data. Notwithstanding, econometric models are rarely tested by this specification as the majority of economic time series are integrated; in addition, those models tend to encompass either a trend or an intercept or even both of them; hence, this equation is unlikely to be employed in econometric models.

Alternative (2): the time series $\boldsymbol{y_t}$ does not have deterministic trends but cointegrating equations have intercepts as displayed in the following equation;

$$\prod y_{t-p} + \psi D_t = \alpha(\beta' y_{t-p} + \mu)$$

where □ represents an *(n x1)* vector of intercepts

This type of specification normally relates to data that do not have linear trends, but may have stochastic trends such as financial time series data. Meanwhile tourism data do not fall into this alternative since they demonstrate trending behaviour.

Alternative (3): the time series $\boldsymbol{y_t}$ are assumed have deterministic trends whereas cointegration equations have only intercepts which is represented by the following equation;

$$\prod y_{t-p} + \psi D_t = \alpha(\beta' y_{t-p} + \rho_0) + \alpha_{\perp}\gamma_0$$

where $\alpha_{\perp}$ represents an *n x (n-r)* matrix such that $\alpha' \alpha$ = 0

This specification is viewed as the most commonly used specification in economics since in the long-run or in equilibrium; trend components of economic variables are normally not present. Additionally, practitioners in tourism demand modelling have accepted that tourism demand models tend to fall into this alternative (Kim and Song, 2000).

Alternative (4): this specification assumes that both the time series y_t and cointegrating equations have linear trends as displayed in the following equation;

$$\prod y_{t-p} + \psi D_t = \alpha(\beta' y_{t-p} + \rho_0 + \rho_1 t) + \alpha_{\perp}\gamma_0$$

The specification of *alternative (4)* is normally considered in relevant to demand for durable goods and also consumers' habit persistence behaviour. With regard to tourism demand models, the existing empirical literature suggest that there is no supporting evidence affirming long-run or equilibrium tourism demand models contain trend components.

Alternative (5): the final alternative assumes that variables in levels form have quadratic trends, but cointegration equations have linear trends as showed in the following equation;

$$\prod y_{t-p} + \psi D_t = \alpha(\beta' y_{t-p} + \rho_0 + \rho_1 t) + \alpha_{\perp}(\gamma_0 + \gamma_1 t)$$

Practically, it has been acknowledged that this type of specification is difficult to justify on economic concepts, particularly when variables in logarithmic forms are used in the cointegrating equations since in the long-run equilibrium, they do not show an increasing or decreasing rate in the long-run equilibrium (Song and Witt 2000).

Provided the five different alternatives, the next crucial issue is which one of them should be employed. In practice, there is no explicit criterion, but it is generally based on a rule of thumb, i.e., economic interpretations of the estimated long-run cointegrating vectors such as signs and magnitudes, together with statistical criteria are used as guidance. Notwithstanding, in this study, *the alternative (3)* will be selected as a form of testing for cointegration.

Basically, parameters in econometric models may be random rather than being determined by specific variables and this can be regarded as modelling or adding stochastic component into equations; additionally, it also reflects that fact that different observations might yield varied estimated parameters. Notwithstanding, the conventional estimation methodologies as discussed earlier have limitations due primarily to their own underlying assumptions, one of them are the constancy of estimated coefficients. Such models with an assumption of constant parameters are however somewhat unrealistic in the context of tourism demand modelling. To explore the dynamics of tourism demand elasticity, the study is to adopt *the method of recursive ordinary least square (OLS)* and *rolling regression.*

Regarding the recursive least square, it deals with iterated estimation employing larger subsets of the sample data. To illustrate the methodology, suppose that there are ***k*** coefficients to be estimated in the ***b*** vector, and then the first ***k*** observations are used to form the first estimate of ***b***. The next observation is then added to the data set and ***k+1*** observations are used to compute the second estimate of **b.** This process is repeated until all the ***T*** sample points have been used, yielding ***T-k+1*** estimates of the **b** vector. With respect to the recursive residuals, this process shows a plot of the recursive residual about the zero line. Plus and minus two standard errors are also shown at each point. Residual outside the standard error bands suggest instability in the parameters of the equation (Eviews 6 User's Guide II 2007).

According to Song and Witt (2000), recursive OLS is a useful tool to examine the evolution of tourism demand characteristics, especially to examine changes in the regression coefficients over the sample period. However, it suffers form some problems in practice, for instance, the estimation depends largely on the length of the sample. If the sample is relatively small, the values of the parameters estimated by recursive OLS may exhibit structural changes in the early part of the sample, nonetheless this does not necessarily mean that the structure of the model is unstable. To examine the structural instability of the tourism demand models, the *Eviews 6 software package* is used to estimate coefficients for models.

Rolling Regression

Apart form the method of recursive OLS, the method of rolling regression is another useful tool to explore the dynamics of tourism demand elasticity. Theoretically, the estimated coefficients from the method of rolling regression provide the time-varying properties of the regression. Although the estimated results are time-varying in the sense of average values of estimation windows (through a particular length of time), those results provide insightful direction or evolution of tourism demand elasticity, in the case of this study.

For a window of width k < n < T, the rolling linear regression model is

$$\underset{(nx1)}{y_t(n)} = \underset{(nxk)}{X_t(n)}\underset{(kx1)}{\beta_t(n)} + \underset{(nx1)}{\varepsilon_t(n)}, t = n,...,T \qquad (4.40)$$

where observations in $\boldsymbol{y_t(n)}$ and $\boldsymbol{X_t(n)}$ are n most recent values from times $\boldsymbol{t-n+1}$ to $\boldsymbol{t}$

And then OLS estimates are to be computed for sliding windows of width $\boldsymbol{n}$. With regard to an issue of determining a width of rolling windows ***"n"***, it will be 32 quarters, 36 quarters, and 40 quarterly; however, for wider rolling windows, there are insufficient number of observations. It is statistically required that the number of observations in performing a regression analysis should be at least 30 observations to obtain robust conclusions.

4.2.3 Data Description

In the study, data are collected from various authorative sources. To begin with the data of the dependent variable, the series of quarterly international tourist arrivals by country of residence to Thailand are collected from the Annual Statistics Report published by *the Tourism Authority of Thailand (TAT)* and the website of *the Office of Tourism Development, Ministry of Tourism and Sports*, whereas the series of the quarterly number of European tourist arrivals of substitute destinations are collected from *the CEIC database*. All of the series are treated for season effects using *the X-12* seasonal adjustment method of the United States Census Bureau.

Regarding the data of explanatory variables, the Thai consumer price index (CPI) data are collected from Ministry of Commerce (MoC)'s website, whereas the data of consumer price indices of substitute destinations are collected form *the CEIC database and Bloomberg*. Meanwhile, the data of Harmonised Index of Consumer Price (HICPI) are obtained from the website of Eurostat. In addition, the data of the exchange rates are obtained from the Bank of Thailand (BoT)'s website. Income variables in real terms composing of gross domestic product (GDP), gross national income (GNI), gross national disposable income, and final consumption expenditure are also collected from the website of *Eurostat.* French real GDP and household consumption expenditure data are collected from the National Institute of Statistics and Economic Studies (INSEE). In accordance with the dependent variable, seasonal variables are adjusted by the approach of *X-12* method provided by *the Eviews 6 software package* owing to the fact that some variables usually contain seasonal patterns. The rationale of removing seasonality embedded in those variables is that seasonality is driven by non-economic factors. Additionally, seasonally adjusted data also disclose the true underlying of the series *(Stewart 2005).*

A dependent variable

As guided by the literature review, data of the number of quarterly tourist arrivals from the European countries to Thailand classified by country of residence are used as the dependent variables. The range of the data is from *1996Q1 to 2008Q4*. According to the data providers, there are also other variables such as the series of international tourist arrivals by nationality and mode of transport, the series of average length of stay of international tourist arrivals, and the series of international tourist arrivals to Thailand by nationality at international airport, tourism receipts, or tourist expenditure collected by those tourism authorities. Notwithstanding, the series of international arrivals to Thailand by country of residence should serve to be the dependent variable in this study are as follows;

(1) The data of the number of tourist arrivals are real variables rather than nominal one such as tourism revenue or tourist expenditure. They hence represent a real demand.

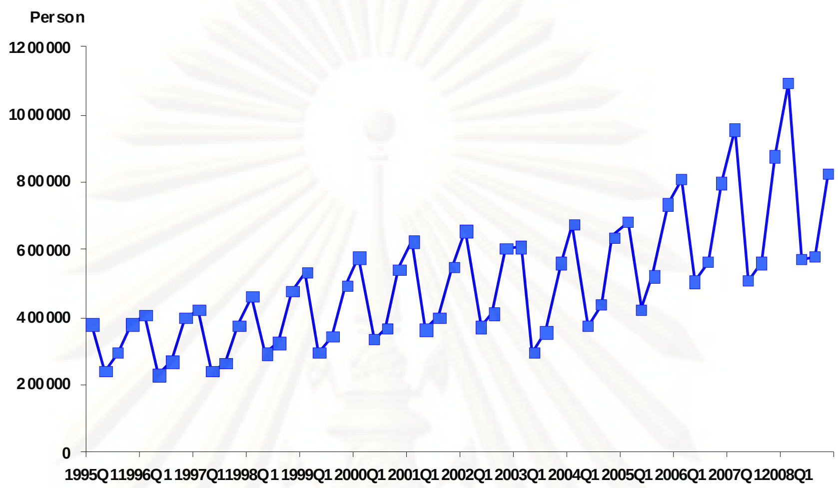
(2) The variable is consistently available and its frequency is high.

(3) The series are probably more appropriate to be explained by explanatory variables since tourists visiting Thailand do not necessarily come from their own countries those they have nationalities.

(4) The promotional efforts disbursed by the Thai tourism authorities generally aim at the country basis rather than the national basis.

And according to *chart 4.1*, it is remarkable that one of the unique characteristics of the tourism data is its seasonality; however, since one the objectives of this study is to explore underlying factors determining European tourism demand to Thailand are; hence, in the testing for cointegration, the seasonally adjusted data are used. To conduct seasonal adjustments, *the method of X-12* provided by the econometric software package, *Eviews 6* is used.

Chart 4.1 Seasonality of the Number of European Tourist Arrivals to Thailand



Source: Tourism Authority of Thailand, Office of Tourism Development

Independent Variables

In general, tourism demand determinants comprise of many variables both economic and non-economic. However, according to **Vanhove (2005),** the tourism demand determinants should be confined to those variables that drive and constraint consumers' demand for holiday and travel in a particular destination. Additionally, those determinants are expected to provide reasonable explanation relating to that fact that why there is a high propensity to consume tourism in some destinations, meanwhile there is not in others. Furthermore, he added that there should be aware of differences between the determinants along with other motivations and consumers' behaviour. Conceptually, motivations are considered as individuals' internal needs and these are normally expressed as the needs, wants, and desires in daily lives. This partially influences consumers' tourism choices. In practice, information on how consumers make their tourism choices is useful for both policymakers and entrepreneurs owing to the fact that the information will help stakeholders in the tourism sector have a better understanding the internal psychological process in making holiday choices between assorted tourism destinations. Regarding factors influencing the process of consumers' decisions in choosing tourism destinations, **Meddleton and Clarke (2001)** classified those factors into heterogeneous categories as follows;

(1) Economic factors

(2) Comparative prices

(3) Demographic factors

(4) Geographical factors

(5) Socio-cultural attitudes to tourism

(6) Mobility

(7) Government/regulatory

(8) Media communications

(9) Information and communication technology

However, apart from these categories, there might be other factors influencing tourism demand and in this study will focus only on the economic factors. According to the literature in the last chapter, the category of the economic factors can explain 80 per cent of tourism demand.

To choose the independent variables for the tourism demand models, the study employs some theoretical criteria, both economic and statistical ones. Regarding ***the economic criteria***, those variables must be according to the consumers' theory and be supported by relevant economic theories as mentioned in the first section of the chapter. In addition, those variables also have to fulfil ***statistical criteria***, for example, the explanatory variables must significantly correlate with the dependent variable since if those variables highly correlate with the dependent variable, it shows some power of explanation of movements in the dependent variable. The degrees of inter-relationship between any two variables, assumed to be *x* and *y*, are normally measured by ***the correlation coefficient*** which measures the strength or degree of linear association between the two variables (Gujarati and Porter 2009). Any value of correlation coefficients must lie between -1 and 1. If the correlation between any two variables equals to 1, it implies that those two variables have *perfectly positive correlation*; on the other hand, if that between the two variables is -1, it implies that those two variables have *perfectly negative correlation* (Hill et al. 2008). Whereas if the correlation coefficient between any two variables is zero, it means that those variables are *independent* to each other. Theoretically, the correlation coefficient is calculated according to the following formula *(Diebold, 2007);*

$$\rho_{x,y} = \frac{\sigma_{xy}}{\sigma_x \sigma_y} = \frac{Cov(x,y)}{\sqrt{Var(x)Var(y)}} \qquad (4.41)$$

where $\boldsymbol{\rho}$ is the correlation coefficient

Cov is the covariance

$\boldsymbol{\sigma}$ is the standard deviation (S.D.)

In addition, to explore characteristics of the explanatory variables, the study utilizes *the NBER-type analysis of cross-correlations with reference series* and the reference series in this study is the number of tourist arrivals. With a helpful tool of analysis, it then can identify the behaviour of the explanatory variables with respect to the dependent variable whether they are leading, coincident or lagging. Since it is viewed that the number of tourist arrivals should exhibit ***a forward-looking*** characteristic to reflect tourists' expectation i.e. tourists' behaviour in planning tourism in advance or at least the variable should perform a leading behaviour with respect to some tourism demand determinants such as tourism price, or income. ***The cross-correlation analysis*** as mentioned earlier can identify the behaviour of the explanatory variables whether they are lagging, coincident, or leading with respect to the quarterly number of tourist arrivals and the cross-correlation with reference series is generally calculated according to the following formula[20];

$$\rho_{1i}(k) = \frac{Cov(z_{1t}, z_{it-k})}{\sqrt{Var(z_{1t})Var(z_{it})}}, i = 1,..., N. \qquad (4.42)$$

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[20] Based on the BUSY PROGRAM USER-MANUAL published online by the Euro-area Economy Modelling Centre (EEMC) downloadable

where $\rho_{1i}(k)$ is the cross-correlation with reference series at any lag *k*.

Cov is the covariance

z_{it} is the reference series.

The cross-correlation is to be calculated with *the* ***BUSY programme***[21], and then the ***BUSY*** output file displays the contemporaneous cross-correlation and the maximum cross-correlation together with its lag. And if that maximum is turned to be *k* positive, then this indicates a leading behaviour of *series i* with respect to series 1, or vice versa. This analysis is to be used as an additional tool in dealing with lag-length determination.

After all the independent variables are tested for correlation and cross-correlation with respect to the dependent variable, the independent variables to be included in the models of European demand to Thai tourism consist of tourism price or own price, income variables, substitute price variables, and dummy variables. In next section, a further discussion is to be elaborated.

Regarding the tourism demand determinants in this study, it should begin with the ***tourism price***. The variable is defined as the ***real exchange rate (RER) index*** between each of the European tourism-generating country and Thailand. As discussed in the last chapter, there are various definitions of the tourism price variable and there is no universal definition accepted among tourism demand modelling practitioners. Notwithstanding there is a widely accepted notion that the variable should comprise of two elements, the costs of travelling to a destination and the costs of living for tourists in a destination. The former element is usually represented by the average economy airfare between a tourism-generating country and a destination, or the average of world crude oil prices. However, the majority of empirical literature had found that the transportation cost is lack of explanatory power or had statistical insignificance. Hence, in general, tourism demand models contain only the later element, the costs of living for tourists. In this study, the RER is used to be the tourism price variable since it captures both differences in costs of living between the European generating country and Thailand, the relative of consumer price indices. In addition, the specification takes the roles of exchange rates into account.

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[21] The BUSY programme is free software which was developed by the Euro-area Economy Modelling Centre (EEMC) and downloadable via http://eemc.jrc.ec.europa.eu/

To calculate RER[22] index, it firstly requires the ***nominal exchange rate (NER) index*** and ***relative price index (RPCI)*** to be calculated which can be demonstrated by;

$$NER_{it} = \frac{\left(\frac{CUR_{it}}{THB_t}\right)}{\left(\frac{CUR_{it}}{THB_t}\right)_{2005}} \times 100 \qquad (4.43)$$

where (CUR_{it}/THB_t) = the unit of European generating countries' currencies per *Thai Baht* and a base year for the NER is 2005.

Then, the next step is to calculate the RPCI;

$$RPCI_{it} = \frac{\left(\frac{CPI_{it}}{CPI_{TH}}\right)}{\left(\frac{CPI_{it}}{CPI_{TH}}\right)_{2005}} \times 100 \qquad (4.44)$$

where CPI_{it} = the harmonised indices of consumer price (HICP) of the European generating countries

CPI_{TH} = the Thai consumer price index (CPI)

After the two elements are calculated, the RER index is displayed in the following equation:

$$RER_{it} = \frac{NER_{it}}{RPCI_{it}} \qquad (4.45)$$

where, ***RER*** = real exchange rate index,

NER = nominal exchange rate index, and

RPCI = relative price index

The second explanatory viable is ***the income variable***, there are four variable choices for the income variable composing of ***the net national disposable income per***

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[22] The methodology of calculating based on the Thai manuscript by Mathine Suphasawatkul "Real Effective Exchange Rate Index (REER): Concepts, Calculations, and Applications to Thailand". Bank of Thailand.1999.

capita, ***Gross National Income (GNI) per capita, and Gross Domestic Product (GDP) per capita***, ***real Final Consumption Expenditure.*** For France, there are two income variable choices constitute of ***GDP index*** and ***household consumption expenditure.*** All income data are expressed in *real Euro (€) terms*. These variables to be used and the best fitted variable will be incorporated into the model.

The next explanatory variable is ***the substitute price***[23]. In this paper, Malaysia, Singapore, the Philippines, and Indonesia are selected to be competitive destinations. These destinations are selected based on an assumption that European tourists are considering destinations in South East Asia for their long-haul holidays. In addition, these destinations are also selected on the basis of having common sea-sun-sand tourism resources. The variable is represented by the ***real exchange rate (RER)*** index of those destinations, Malaysia Ringgit, Singapore Dollar, the Philippines Peso, and Indonesia Rupiah with respect to each of the European tourism-generating country's currency. To construct the RER index for each of competitive destination, it bases on the methodology of constructing the tourism price variable, to obtain the RER index as substitute price variables, it should start with a calculation of the NER index followed by a calculation of the relative price index (RPCI) as follows;

$$NER_{it}^{SUB} = \frac{\left(\dfrac{CUR_{it}}{CUR_{it}^{SUB}}\right)}{\left(\dfrac{CUR_{it}}{CUR_{it}^{SUB}}\right)_{2005}} \times 100 \qquad (4.46)$$

where, NER_{it}^{SUB} is the nominal exchange rate index of the competitive destination ***i*** in period *t*

CUR_{it}/CUR_{it}^{SUB} is the exchange rate ratio between the European tourism generating-countries *i* in period *t* and the competitive destination ***i***

Whereas the RPCI is calculated as follows;

(4.47)

[23] The variable can empirically be either substitute or complementary depending on its nature, but in this study, it is named "substitute variable" for convenience.

$$RPCI_{it}^{SUB} = \frac{\left(\dfrac{CPI_{it}}{CPI_{it}^{SUB}}\right)}{\left(\dfrac{CPI_{it}}{CPI_{it}^{SUB}}\right)_{2005}} \times 100$$

where, $\boldsymbol{CPI_{it}}$ is the harmonised indices of consumer price (HICP) of the European generating countries

$\boldsymbol{CPI_{it}^{SUB}}$ is the consumer price index (CPI) of competitive destination ***i***

Then the RER index for substitute destinations is;

$$RER_{it}^{SUB} = \frac{NEER_{it}^{SUB}}{RPCI_{it}^{SUB}} \quad (4.48)$$

where, $\boldsymbol{RER_{it}^{SUB}}$ is a real exch[illegible]e of the competitive destination ***i***

$\boldsymbol{NER_{it}^{SUB}}$ is a nominal exchange rate of competitive destination ***i***

$\boldsymbol{RPCI_{it}^{SUB}}$ is a relative price index

The last set of the explanatory variables is a set of ***dummy variables***. These variables are to be added to help explain the effects of the so-called one-off events or shocks to the Thai tourism sector which result in changes or fluctuations in the number of European tourist arrivals to Thailand between 1996Q1 to 2008Q4. During this period, there are many events that potentially influence the decision-making process of European tourists to visit Thailand, and these events are as follows;

(1) *Asian financial crisis* in 1997

(2) The attack of the World Trade Centre in New York on September 11, 2001

(3) Twelve of the European countries formally adopted *the Euro* in 2002

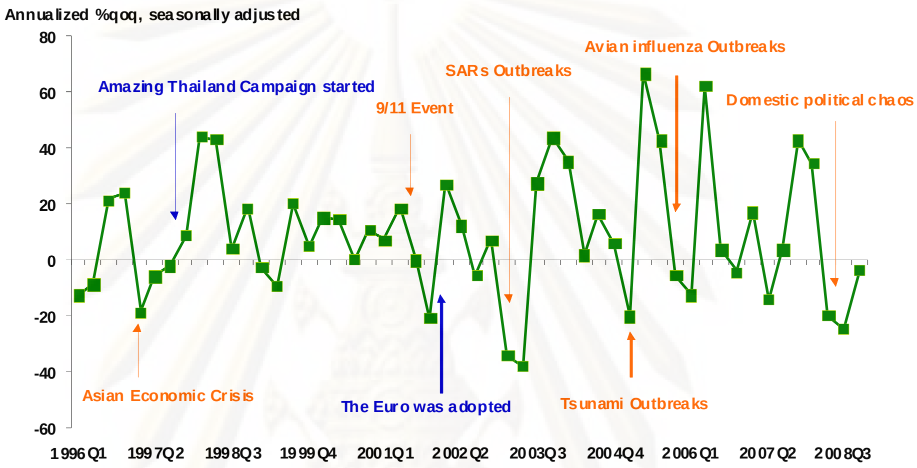
(4) The outbreaks of the *Severe Acute Respiratory Syndrome (SARs)* in 2003

(5) The outbreaks of the *Tsunami* which destroyed the tourism resources in the southern region of Thailand in 2005

(6) The consequences of domestic political chaos and the seizure of the international airport in Bangkok in 2008

It cannot be denied that these continuous series of shocks influence the tourism sector as displayed by *chart 4.2.* And in table 1, it summarises all of variables in this study.

Chart 4.2 Chronology of European Tourist Arrivals to Thailand from 1996Q1 to 2008Q4



Source: Tourism Authority of Thailand, Office of Tourism Development and Author's own calculation

Table4.4 Summary of Dependent and Independent Variables together with Sources

Variable	Proxy	Data Description	Source
Tourist arrivals	TA	The quarterly number of European tourist arrivals to Thailand	Tourism Authority of Thailand and Office of Tourism Development
Tourism price	Price	The real exchange rate (RER) index between Thailand and each of the European tourism generating country	Ministry of Commerce (MoC), CEIC database, Bloomberg and Eurostat
Income			
Gross Domestic Product	GDP	The real GDP per capita of the European tourism generating countries	Eurostat
Gross National Income	GNI	The real GNI per capital in Euro terms of the European tourism generating countries	Eurostat
Net National Disposable Income	Gross	The real Gross national disposable income per capital in Euro terms of the European tourism generating countries	Eurostat
Final Consumption Expenditure	Final	The real final consumption expenditure per capital in Euro terms of the European tourism generating countries	Eurostat
Household Consumption Expenditure	HH	The real household consumption expenditure per capital in Euro terms of the European tourism generating countries	The National Institute of Statistics and Economic Studies (INSEE) of France
Substitute Price			
Malaysia's real exchange rate index	MY^{RER}	The real exchange rate (RER) index between Malaysia and each of the European tourism generating country	Bank of Thailand (BoT), CEIC database, Bloomberg, and Author's calculation
Singapore' s real exchange rate index	SG^{RER}	The real exchange rate (RER) index between Singapore and each of the European tourism generating country	Bank of Thailand (BoT), CEIC database, Bloomberg, and Author's calculation
Philippines' real exchange rate index	PH^{RER}	The real exchange rate (RER) index between Philippines and each of the European tourism generating country	Bank of Thailand (BoT), CEIC database, Bloomberg, and Author's calculation
Indonesia' real exchange rate index	ID^{RER}	The real exchange rate (RER) index between Indonesia and each of the European tourism generating country	Bank of Thailand (BoT), CEIC database, Bloomberg, and Author's calculation

4.2.4 Model Specification

To explore the European demand for Thai tourism and also estimate tourism demand elasticities accordingly, the tourism-generating countries are to be classified into two groups as follows;

(1) 11 individual tourism demand models for 11 European tourism-generating countries composing of Belgium, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Spain, Sweden, United Kingdom.

(2) 3 tourism demand models for three groups of countries classified according GDP per capita in *Purchasing Power Standards (PPS)*[24]

A. **A group of high-income countries** (the volume index of GDP per capita in Purchasing Power Standards (PPS) ranging between 123.1 and 271.4) composing of *Norway and the Netherlands*

B. **A group of middle-income countries** (the volume index of GDP per capita in Purchasing Power Standards (PPS) ranging between 113.9 and 123.1) composing of *Britain, Germany, Belgium, Finland, Sweden, and Denmark*

C. **A group of low-income countries** (the volume index of GDP per capita in Purchasing Power Standards (PPS) ranging between 80.1 and 113.9) composing of *Italy, France, and Spain*

Regarding the second group, *the dependent variables, or the series of quarterly number of tourist arrivals* of each group is calculated by adding up the number of tourist

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[24] According the Eurostat, the volume index of GDP per capita in Purchasing Power Standards (PPS) is expressed in relation to the European Union (EU-27) average set to equal 100. If the index of a country is higher than 100, this country's level of GDP per head is higher than the EU average and vice versa. In addition, basic figures are expressed in PPS, i.e. a common currency that eliminates the differences in price levels between countries allowing meaningful volume comparisons of GDP between countries.

arrivals from each member of the group to obtain a total number to represent the dependent variable of that group of countries as follows;

$TA_{high\text{-}income} = TA_{Norway} + TA_{Netherlands}$

$TA_{Middle\text{-}income} = TA_{Britain} + TA_{Germany} + TA_{Belgium} + TA_{Finland} + TA_{Sweden} + TA_{Denmark}$

$TA_{Low\text{-}income} = TA_{Italy} + TA_{France} + TA_{Spain}$

where TA is the quarterly number of tourist arrivals to Thailand (4.49)

Meanwhile, the independent variables compose of *the tourism price represented by the real exchange rate (RER) index*, *income variables, substitute price variables, and dummy variables.* To begin with the first independent variable, the tourism price, it is defined as *the real exchange rate (RER) index* between Thailand and each group of countries. For example, *the RER index* between Thailand and the high-income countries is defined as follows;

$$NER_{it} = \frac{\prod_{i=1}^{2}\left(\frac{CUR_{it}}{THB_t}\right)^{w_i}}{\prod_{i=1}^{2}\left(\frac{CUR_{it}}{THB_t}\right)^{w_i}_{2005}} \times 100 \quad (4.50)$$

$$NER_{it} = \frac{\left[\left(\frac{CUR_{1t}}{THB_t}\right)^{w_1} \times \left(\frac{CUR_{2t}}{THB_t}\right)^{w_2}\right]_t}{\left[\left(\frac{CUR_{1t}}{THB_t}\right)^{w_1} \times \left(\frac{CUR_{2t}}{THB_t}\right)^{w_2}\right]_{2005}} \times 100 \quad (4.51)$$

where CUR_{it}/THB_t is units of a tourism-generating country's currency *i* per *THB*

w_i is a share of tourist arrivals of a tourism-generating country *i* to Thailand and $w_1 + w_2 = 1$

$$RPCI_{it} = \frac{\left[\frac{CPI_1^{w_1} \times CPI_2^{w_2}}{CPI_{TH}}\right]_t}{\left[\frac{CPI_1^{w_1} \times CPI_2^{w_2}}{CPI_{TH}}\right]_{2005}} \times 100 \quad (4.52)$$

where CPI_1, CPI_2 are harmonised indices of consumer price of country 1 and 2, respectively.

CPI_{TH} is the Thai consumer price index

w_i is a share of tourist arrivals of a tourism-generating country *i* to Thailand and $w_1+w_2 = 1$

$$RER_{it} = \frac{NER_{it}}{RPCI_{it}} \quad (4.53)$$

where, RER = real exchange rate index,

NER = nominal exchange rate index, and

RPCI = relative price Index

The next independent variable is *the income variables*, as mentioned earlier, there four income variable choices to be used in this study, and for example, to construct a composite income variable for the second group of modelling, the total income variable is defined as weighted income by shares of the quarterly number of tourist arrivals of each country to Thailand, for example;

$$GDP_{high-income} = w_{Norway} \cdot GDP_{Norway} + w_{Netherlands} \cdot GDP_{Netherlands} \quad (4.54)$$

where w_i is share of the quarterly number of tourist arrivals to Thail untry *i* and $w_{Norway}+w_{Netherlands} = 1$

With respect to *the substitute price variables*, they are defined as *the RER index between each of competitive destinations which are Malaysia, Singapore, the Philippines, and Indonesia and each group of European countries*, respectively. Conventionally, to calculate *the RER index*, it must start with the calculation of *the NER index* and, for example, the calculation of *Malaysia's NER index* is expressed as follows;

$$NER_{MY} = \frac{\left[\left(\frac{CUR_{1t}}{MYR_t}\right)^{m_1} \times \left(\frac{CUR_{2t}}{MYR_t}\right)^{m_2}\right]_t}{\left[\left(\frac{CUR_{1t}}{MYR_t}\right)^{m_1} \times \left(\frac{CUR_{2t}}{MYR_t}\right)^{m_2}\right]_{2005}} \times 100 \quad (4.55)$$

where CUR_{it}/MYR_t is units of a tourism-generating country's currency *i* per *Malaysia Ringgit*

m_i is a share of tourist arrivals of a tourism-generating country *i* to Thailand and $m_1 + m_2 = 1$

Regarding methods of calculating *PRCI and RER index* of competitive destinations are the same as those of Thailand, but their weights depend on the quarter number of European tourist arrivals in each destination.

Functional form

Instead of defining demand function is linear form as *equation (1)*, the power functional form of demand function is used to demonstrate a multiplicative relationship as demonstrated in *equations (14.56) and (14.57)* According to the existing empirical literature in tourism demand modelling***, double-log, log-log, or log-linear models*** have been used widely owing to one of their attractive characteristics which are *derivable elasticities*. Generally, this type of functional form is used to convert multiplicative relationships into additive ones; therefore, to employ the double-log model in estimating tourism demand functions, it is crucial to establish *the assumption of multiplicative relationships among the variables*. To elaborate why elasticities can be derived from coefficients of the double-log models, a common specification, ***the Cobb-Douglas production function***, will be used to illustrate as an example (Gujarati and Porter 2009). Given the following the equation,

$$Y = e^{\alpha} X^{\beta} e^{\varepsilon} \qquad (14.56)$$

or equivalently,

$$\mathbf{log} Y_i = \alpha + \beta \mathbf{log} X_i + \varepsilon_i \qquad (14.57)$$

Since the elasticity of ***Y*** with respect to ***X*** is defined as the percentage change in ***Y*** associated with a 1% change in ***X***, the derivable elasticity of ***Y*** with respect to ***X*** is,

$$\frac{dY}{dX}\frac{X}{Y} = \frac{X}{Y} e^{\alpha} \beta X^{\beta - 1} e^{\varepsilon} \qquad (14.58)$$

According to *equation (14.58)*, obviously, $\boldsymbol{\beta}$ is the elasticity of ***Y*** with respect to ***X.*** Then, it is apparently that the double-log model yields coefficients which can be interpreted as ***elasticities*** of the dependent variable with respect to each explanatory variable *(Stewart 2005).* However, it should be remarked that the derivable elasticities from the double-log model are assumed to be ***constant***; consequently, the double-log has the alternative name as ***a constant elasticity model*** and computed elasticities from different models are able to be comparable *(Ramanathan 2002).*

Concerning applications of the double-log model to the tourism demand function, such a functional form gains popularity in applied econometric studies due largely to the following reasons, to begin with, most of the previous empirical studies suggest that the relationship between tourism demand and its determinants can be best expressed as a double-log linear function. In addition, an application of the double-log specification directly generates estimated coefficients of the explanatory variables to be interpreted as demand elasticities (Song and Witt, 2003). Thus, the relationship between elasticity and the model specification can be described as follows;

$$\ln TA_{it} = \alpha + \beta_1 \ln Price_{it} + \beta_2 \ln Income + \beta_3 \ln MY_{RER} + \beta_4 \ln SG_{RER} + \beta_5 \ln PH_{RER} + \beta_6 \ln ID_{RER} + dummies + \varepsilon_t \quad (14.59)$$

Where **TA_{it}** is the quarterly number of tourist arrivals of each European country *i* at time *t.*

Price is the real exchange rate index between Thailand and each of the European country *i* at time *t.*

Income is the income variables which can be real GDP per capita, real GNI per capita, real net national disposable income per capita, or real final consumption expenditure per capita of each of the European country *i* at time *t*

MY_{rer}, SG_{rer}, PH_{rer}, ID_{rer} are the real exchange rate indices between Malaysia, Singapore, the Philippines, and Indonesia and each of the European country *i* at time *t,* respectively.

Dummies are dummy **variables**

Lastly, regarding an issue of expected statistical signs of estimated regression output, it is to be discussed as in details as follows;

To begin with **the price elasticity of demand**, theoretically according to the consumer theory discussed in chapter 3, the price of a particular good is normally and negatively related to quantity demanded of that good, provided that other things remaining equal, i.e. if the price of the good goes up, the quantity demanded of that good decreases, or vice versa. Therefore, it is rational to expect the estimated signs of the price elasticity of demand to be negative. However, that is not always the case for the price elasticity of demand since in some cases it could be positive. There is a case called **“Giffen good”** which the substitution effect is totally dominated by the income effect, i.e. if the price of good increases, quantity demanded of the good also goes up.

Secondly, regarding **the income elasticity of demand**, also based upon the consumer theory presented in chapter 3, *the estimated signs should be positive* since the quantity demanded is normally and positively related to consumers’ income levels, i.e. consumers’ income increase leading to a rise in quantity demanded, or vice versa, *ceteris paribus*. Additionally, according to findings suggested by the existing literature on tourism demand modelling and forecasting, the income elasticity estimated from tourism demand functions is normally elastic or highly elastic. This also reflects the luxurious nature of tourism products.

Next, **the cross-price elasticity or substitute price elasticity**, technically, the estimated or expected sings of the cross-price elasticity can be either negative or positive depending on the nature or characteristics of goods or services under investigation. In a case of the cross-price elasticity in this study, it is expected probably to be negative reflecting that tourism in Thailand and tourism in other competitive destinations- Malaysia, Singapore, the Philippines, and Indonesia- are complementary. This is due to the fact that European holidaymakers usually consider these countries as a single tourism destination.

Last but not least, concerning the expected signs of **the lagged dependent variable** measuring the habit persistence or the so-called word-of-mouth effects, its expected sign should be positive. This is because of the fact that there is a proportion of revisited tourists returns to Thailand and there also is another proportion of tourists visiting Thailand due to recommendations and suggestions from friends and relatives.

Finally, with respect to the expected signs of dummy variables representing shocks occurred in the destination and also in tourism-generating countries, the expected signs of these variables therefore should be negative.

CHAPTER V

EMPIRICAL RESULTS

In order to examine the determinants of European demand to Thai tourism, explore the long-run elasticities of the tourism demand, and investigate the evolution together with the dynamics of those elasticities, the study utilizes **the cointegration analyses, the rolling regression, along with the recursive ordinary least square (OLS).** Corresponding to the methodologies and estimation procedures described in the last chapter, this chapter is to present related empirical findings.

Regarding the organisation of the chapter, empirical findings of each model of tourism-generating country composing of Belgium, Britain, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Spain, and Sweden, respectively, are demonstrated in the first section. Then, empirical findings of three country groups composing of high-income, middle-high-income and middle-income are presented in the following section. In each model, there are empirical results of the following tests:

(I) The three conventional unit root tests composing of **the Augmented Dickey-Fuller (ADF) test, the Phillips-Perron (PP) test,** and **the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test.**

(II) **The Engle-Granger Residual-Based Cointegration Test**

(III) **The Johansen Cointegration Test**

(IV) **The Rolling Regressions**

(V) **The Recursive Ordinary Least Square (OLS)**

These empirical results are to be used as analytical tools for policy implications in the next chapter. As the empirical results are considered to be useful for both public and private sectors, they therefore should be crucially underscored. However, prior to reporting empirical results of the tests mentioned above, the results of **correlation and cross-correlation tests** used to explore degrees of linear relationships between the dependent variable --tourism demand-- and the explanatory variables are firstly described.

1. Empirical results of the correlation and cross-correlation tests

As discussed in the last chapter regarding the issue of selecting explanatory variables for tourism demand modelling and forecasting, especially in order to scrutinise how much those variables can explain variations in the tourism demand -- the number of European tourist arrivals to Thailand, it is therefore necessary to analyse relationships between them.

Table 5.1 reports results of **the correlation test**, overall, they are satisfactory as all independent variables to be used in the models are strongly correlated with the dependent variables i.e. almost all correlation coefficients are higher than 0.5. Additionally, they have correct signs corresponding to the economic theory. This reflects that these explanatory variables will provide meaningful economic interpretations and contribute significant power of explanation in the models. However, in the Italian model, most explanatory variables, apart from income variables, are not substantially correlated with the dependent variable as expected. These results are in tandem with those of the Swedish model. This demonstrates that variations in the tourism price, together with substitute price variables, do not significantly and meaningfully contribute to explanations of variations in the Italian and Swedish tourist arrivals to Thailand. In other words, the tourism demands from Italy and Sweden are not sensitive to changes in the price variables, both in the destination and substitute destinations.

In addition, if details of each variable are taken into account, it is somewhat remarkable that the own price variables in every model show tender linear relationships with the dependent variables. This is anticipated to affect the power of explanation of those own price variables in each of the tourism demand model significantly. Meanwhile, it is apparently that income variables display strong correlation with the reference series in every country model. This implies that they will meaningfully contribute to explanation in movements of the number of European tourists to Thailand. Regarding the substitute price variables, the degrees of correlation are assorted, for instance, in some country models such as Belgium, Britain, France, Germany, Norway, and Spain, the substitute price variables are anticipated to play significant role in explaining the European demand to Thai tourism.

Theoretically, **the correlation coefficients** report only preliminary degrees of linear relationships among variables. To measure causal relationships between tourism demand and its determinants, advanced regression analyses and complex modelling techniques are necessary and these techniques are to be discussed in the next section. Nonetheless, prior to moving to such analyses, there is still another preliminary testing in diagnose the nature of tourism data with respect to the reference series which is **the**

cross-correlation test and relating empirical results of the test are displayed in **table 5.2.**

Generally, it is perceived that tourism data are **forward-looking** as consumers, or tourists in the context of this study, are assumed to be rational using all available information in making decisions in choosing tourism destinations. To examine such behaviour of the data used in the study, the explanatory variables are tested against the number of tourist arrivals series, a reference series, relying on **the BUSY software package.**

Table 5.1 Correlation coefficients between the number of European tourist arrivals and independent variables

Independent Variable	Belgium	Britain	Denmark	Finland	France	Germany	Italy	Netherlands	Norway	Spain	Sweden
Price	-0.70	-0.58	-0.51	-0.58	-0.61	-0.66	-0.14	-0.50	-0.66	-0.56	-0.37
GDP	0.91	0.97	0.60	0.76	0.41	0.83	0.51	0.54	0.90	0.68	0.66
GNI	0.90	0.95	0.57	0.77	-	0.89	0.56	0.59	0.89	0.68	0.66
Gross	0.91	0.95	0.55	0.78	-	0.88	0.56	0.60	0.90	0.69	0.66
Final	0.90	0.95	0.51	0.67	-	0.43	0.49	0.58	0.90	0.66	0.67
HH	-	-	-	-	0.66	-	-	-	-	-	-
MY^{RER}	-0.71	-0.67	-0.45	-0.58	-0.63	-0.69	-0.13	-0.47	-0.71	-0.56	-0.30
SG^{RER}	-0.71	-0.80	-0.38	-0.56	-0.62	-0.68	-0.13	-0.44	-0.71	-0.55	-0.21
PH^{RER}	-0.70	-0.65	-0.51	-0.58	-0.59	-0.67	-0.14	-0.50	-0.67	-0.56	-0.41
ID^{RER}	-0.74	-0.55	-0.63	-0.67	-0.63	-0.61	-0.17	-0.64	-0.67	-0.58	-0.59

Source: Author's calculation

Table 5.2: Cross-correlation coefficients between the number of European tourist arrivals and independent variables

Independent Variables	Belgium			Britain			Denmark			Finland		
	r_0	r_{max}	$t_{max}^{(1)}$	r_0	r_{max}	$t_{max}^{(1)}$	r_0	r_{max}	$t_{max}^{(1)}$	r_0	r_{max}	$t_{max}^{(1)}$
Price	-0.06	0.56	4	0.06	0.38	-2	0.33	0.48	-1	-0.21	0.66	4
GDP	0.30	0.45	1	-0.08	0.52	3	0.56	0.56	0	0.30	0.36	-1
GNI	0.24	0.41	1	-0.18	-0.37	-4	0.55	0.55	0	0.41	0.41	0
Gross	0.32	0.33	1	0.00	-0.47	-4	0.49	0.53	1	0.36	0.43	-1
Final	0.07	0.22	-4	0.01	0.32	2	0.69	0.89	1	0.21	0.40	-1
MY^{RER}	-0.06	0.58	4	-0.09	0.40	-3	-0.05	-0.40	3	-0.24	0.70	4
SG^{RER}	-0.05	0.57	4	-0.09	-0.35	2	-0.22	-0.33	2	-0.24	0.72	4
PH^{RER}	-0.06	0.56	4	0.03	0.43	-3	0.20	0.48	-2	-0.21	0.71	4
ID^{RER}	-0.22	0.65	4	-0.22	0.38	-4	-0.09	-0.54	2	-0.37	0.59	4

Table 5.2(cont.): Cross-correlation coefficients between the number of European tourist arrivals and independent variables

Independent Variables	France			Germany			Italy			the Netherlands		
	r_0	r_{max}	$t_{max}^{(1)}$	r_0	r_{max}	$t_{max}^{(1)}$	r_0	r_{max}	$t_{max}^{(1)}$	r_0	r_{max}	$t_{max}^{(1)}$
Price	-0.26	0.85	4	0.14	0.32	3	-0.11	0.81	4	0.21	0.57	4
GDP	0.30	0.30	0	0.34	-0.50	4	0.43	0.43	0	0.34	0.60	3
GNI	-	-	-	0.52	0.60	-1	0.18	0.27	1	0.14	0.22	4
Gross	-	-	-	0.26	0.35	-1	0.25	0.44	2	0.14	0.28	4
Final	-	-	-	0.09	-0.20	4	0.17	0.31	3	0.45	0.45	-1
HH	0.21	0.24	-2	-	-	-	-	-	-	-	-	-
MY^{RER}	-0.27	0.84	4	0.05	0.44	3	-0.11	0.81	4	0.16	0.60	4
SG^{RER}	-0.25	0.84	4	0.11	0.57	3	-0.11	0.81	4	0.09	0.74	4
PH^{RER}	-0.25	0.85	4	0.07	0.41	3	-0.11	0.81	4	0.20	0.60	4
ID^{RER}	-0.35	0.72	4	-0.31	-0.31	0	-0.27	0.78	4	-0.12	0.27	-3

(1) The + (-) sign refers to a lead (lag) with respect to the reference series.

Source: Author's calculation

Table 5.2 (cont.): Cross-correlation coefficients between the number of European tourist arrivals and independent variables

Independent Variables	Norway			Spain			Sweden		
	r_0	r_{max}	$t_{max}^{(1)}$	r_0	r_{max}	$t_{max}^{(1)}$	r_0	r_{max}	$t_{max}^{(1)}$
Price	0.06	0.31	-2	-0.18	0.79	4	0.44	0.44	0
GDP	0.07	0.10	4	0.32	0.39	2	0.15	0.28	2
GNI	0.02	0.13	4	0.10	0.37	4	0.21	0.29	2
Gross	0.02	0.14	4	0.32	0.39	1	0.18	0.27	2
Final	0.03	0.20	-4	0.32	0.38	1	0.12	0.21	2
MY^{RER}	-0.09	0.30	-3	-0.18	0.80	4	0.31	0.37	-1
SG^{RER}	-0.07	0.32	4	-0.19	0.80	4	0.29	0.30	-1
PH^{RER}	0.00	0.42	-3	-0.19	0.80	4	0.34	0.38	-1
ID^{RER}	-0.40	-0.51	1	-0.22	0.82	4	0.07	0.27	-2

(1) The + (-) sign refers to a lead (lag) with respect to the reference series.

Source: Author's calculation

According to **table 5.2**, the results are somewhat mixed -- there are both leading and lagging indicators. However, the majority of tourism data of the tourism-generating countries indicate that they are **forward-looking** as expected. For example, in the Spanish model, all variables express leading characteristics with respect to the reference series and the variables such as the own price, GNI, and the substitute price variables lead the tourism demand for four quarters or a year, the longest leading period. This reflects that Spanish tourist arrivals to Thailand at period *t* are influenced by the tourism price in the period *t-4*, for example. In addition, the independent variables in the models of Belgium, Denmark, France, Germany, Italy, and the Netherlands, also apparently display leading behaviour with respect to reference series. Meanwhile, in the British and Swedish models, almost explanatory variables are considered lagging with respect to the reference series. For instance, the tourism price lags behind the reference series for two quarters, whereas GNI and the net disposable income variable lag for a year in the British model. For instance, the own price variable in every model, on average, leads the reference series for four quarters implying that today tourism price will take effect in a year later, provided that other things being equal. While, the income variables, particularly GDP, leas the reference series for two or three quarters and this means that, for instance, an increase in GDP of the European countries in this period, it will take on average two or three quarters to affect the number of European tourist arrivals to Thailand.

To sum up, provided the leading behaviour of the tourism data, concerning the policymakers' side, in order to achieve objectives of increasing both of the number of tourist arrivals and tourism receipts, the forward-looking behaviour of European tourist must be realised in conducting tourism policy and strategy. Being forward-looking means that in choosing tourism destination, especially long haul, holidaymakers base their decisions on all available information and choose tourism destination accordingly, and this provides some preliminary policy implications as follows;

(I) Tourism policy should be forward-looking corresponding to tourists' behaviour and be more proactive to deal with the dynamics of nature of the tourism sector. Relying upon conventional policy frameworks and standard marketing strategies may not achieve the objective of increasing the number of tourist arrivals, together with boosting tourism receipts, for example. In addition, the country's competitiveness might be deteriorated. To be concrete, for instance, in periods of an economic downturn such as in the recent period – 2008 and 2009, tourists' income or purchasing power is normally affected or declined, based upon the empirical findings, it could foresee that the number of European tourist arrivals to Thailand would drop three or four quarters going forward. To pre-empt such a decline, tourism policymakers should implement proactive measures to maintain Thailand status as a must-visit destination.

(II) To ensure the effectiveness of such tourism policy and strategy, there should be other tools such as the elasticity of tourism demand which will be presented in the following section to be policy guidance and assess the success of policy implementation.

One of the objectives of this study is to explore causal relationships between the European tourism demand and its determinants. What's more, in the first section of this chapter, preliminary investigations of those relationships are partially conducted; however, more advanced analyses are still needed. In the next section, therefore, robust empirical results of more advanced econometric tests composing of the cointegration analyses, the recursive Ordinary Least Square (OLS), and the rolling regressions will be presented.

As discussed in the last chapter, prior to proceeding the conintegration analyses, it is crucial to explore the so-called order of integration of the time-series data. The three methods of testing for unit roots composing of **the ADF test, the PP test, and the KPSS test** are used to analyse the nature of the data utilized in the study. In addition, employing the three methods of testing is expected to provide robust empirical results of nonstationarity of the data. Concerning criteria in choosing an optimal lag length for the ADF test, the study bases primarily upon the so-called **Schwarz Information Criterion (SIC)** and **the Eviews 6 software package** is used to conduct the tests of unit roots.

2. Empirical results for Belgian model

Concerning reports of empirical results of individual country models, it is to be started with **the Belgian model**, **table 5.3A** displays test statistics of unit roots of the variables in their logarithmic level and the table is divided into two models: **"intercept, no trend" and "intercept and trend"**. Choosing between the two, the study employs **graphical examinations** as a primary guidance. With respect to **the dependent variable** -- the number of Belgian tourist arrivals to Thailand, it exhibits trending behaviour over the sample period and the series therefore falls into the model of **"intercept and trend".** Likewise, **the income variables** also display obvious trending patterns, they should be thus categorised into the model of **"intercept and trend"** as well. Meanwhile, **the tourism price** variable hardly exhibits a noticeable trend – it instead aimlessly and arbitrarily wanders over the sample period. The variable thus is assigned to the model of **"intercept, no trend"**. Similarly, **the substitute price variables** also show the same pattern with the own price variable, so they are classified into the same model.

Based on the test statistics in **table 5.3A,** the results **of the ADF test** are presented first. Nevertheless, before proceeding to identify the probable order of stationarity, it is recommended to examine **the optimal lag-length of the ADF test** in the first place, to achieve so the study employs **the so-called Schwarz Information Criteria (SIC)** as a tool, as discussed in the earlier section. With respect to the outcome, the test statistics for all the variables in their logarithmic levels and for the two alternative models are presented in **table 5.3A and table5.3B**. The results clearly indicate that each of the series is **nonstationary in its logarithmic level**. In order to proceed to apply the cointegration tests, such nonstationarity must be abolished. To obtain stationary series, it is suggested by the economic theory to take **first differences** to all variables. The empirical results after taking first differences to the variables are demonstrated in **table 5.3C and 5.3D.** By conducting such differences, the series obviously removes the nonstationary components in all cases and the null hypothesis of nonstationarity is apparently rejected at the 5percent significance level suggesting that **they are integrated of order one, I(1), as expected.**

Whereas, in **table 5.3A and 5.3B**, results of **the Phillips-Perron (PP)** unit root test are also displayed. The outcome is however not fundamentally different from the respective ADF tests. Analytically, the results from the tests in the levels of the variables noticeably point to the presence of a unit root in all cases. In addition, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, **suggesting that the series are integrated of order one, I(1)** and a summary is displayed **in table 5.3C and 5.3D.**

Concerning the results of **the KPSS test**, they are somewhat mixed compared to the two methods. According to **table 5.3A and table 5.3B**, the test statistics point to nonstationarity, except the tourism price and the real exchange rate of Malaysia with respect to Belgium. After taking differences however the nonstationarity of the two is removed implying that they are integrated of order one, I(1). Notwithstanding, provided that the empirical results of the three tests, the majority report nonstationality of all variables and they are all I(1) variables; consequently, the cointegration analyses can be applied. Additionally, the empirical results of the unit root tests are also in tandem with those reported by the existing empirical literature discussed in chapter 3.

Table 5.3A: Unit root test statistics for economic variables in logarithmic levels for Belgian model

Variables	ADF test		Lag length of ADF[25]	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-2.0114	-3.2995	1	-1.6543	-2.4722	0.8224	0.0901
Independent variables							
1. Price	-0.8081	-1.4127	1	-1.1397	-1.7954	0.6139	0.1156
2. Income variables							
2.1 GDP	-1.0424	-2.6524	4	-1.0459	-2.0130	0.9208	0.0581
2.2 GNI	-1.0881	-2.7771	3	-1.0736	-2.6707	0.9069	0.0590
2.3 Gross	-1.1287	-2.2391	0	-1.1123	-2.5984	0.9014	0.0677
2.4 Final	-0.4379	-0.0837	3	-0.6334	-1.2407	0.9446	0.0846
3. Substitute price variables							
3.1 MY^{RER}	-1.1534	-2.0555	0	-1.1723	-2.1483	0.0993	0.0993
3.2 SG^{RER}	-1.0081	-1.9384	0	-1.0081	-2.0741	0.1041	0.1041
3.3 PH^{RER}	-1.0585	-1.8984	0	-1.0690	-1.9723	0.8185	0.1111
3.4 ID^{RER}	-1.6898	-1.6345	0	-1.7288	-1.6345	0.1599	0.1599

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

[25] The criteria of selecting lag length depending on the Schwarz Information Criterion (SIC) provided by the Eviews 6 software package. Selecting the lag length is considered to be a critical practical issue for the implementation of the ADF test due in part to the following reasons. First, if there are too few numbers of lag lenths, then the remaining autocorrelation in the errors will bias the test. On the other hand, if there are too many numbers of lag lengths, then the power of the test will suffer. However, in general with regard to the practical issue, the Monte Carlo experiments suggest it is better to error on the side of including too many lags (Asterio and Hall, 2007).

Table 5.3B: Summary of unit root test statistics for economic variables in logarithmic levels for Belgian model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstationary	Nonstationary	Stationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Stationary
2.2 GNI	Nonstationary	Nonstationary	Stationary
2.3 Gross	Nonstationary	Nonstationary	Stationary
2.4 Final	Nonstationary	Nonstationary	Stationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Stationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Stationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Stationary

Table 5.3C: Unit root test statistics for economic variables in log-difference for Belgian model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-5.4653	-5.4550	0	-5.151	-5.1392		
Independent variables							
1. Price	-6.8605	-6.8017	0	-6.8580	-6.7972	0.0869	0.0808
2. Income variables							
2.1 GDP	-6.4840	-6.5005	0	-6.6026	-6.6018		
2.2 GNI	-8.2255	-8.2330	0	-8.1596	-8.1731		
2.3 Gross	-8.5311	-8.5906	0	-8.4217	-8.4808		
2.4 Final	-10.2468	-9.8752	2	-10.2468	-39.8732		
3. Substitute price variables							
3.1 MY^{RER}	-6.8197	-6.7564	0	-6.8161	-6.7511		
3.2 SG^{RER}	-6.7141	-6.6442	0	-6.7142	-6.6442		
3.3 PH^{RER}	-6.8863	-6.8238	0	-6.8856	-6.8226	0.0876	0.0835
3.4 ID^{RER}	-5.0584	-5.1282	0	-4.8955	-4.8899		

****Note***: Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.3D: Summary of unit root test statistics for economic variables in log-difference for Belgian model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(0)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(0)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(1)	I(1)	I(0)
2.4 Final	I(1)	I(1)	I(0)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(0)
3.2 SG^{RER}	I(1)	I(1)	I(0)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(0)

Given all of the time-series data are **nonstationary and integrated of order one, I(1)**, in the subsequent section, empirical results of the two methods of cointegration analyses, **the Engle-Granger (EG) approach and the Johansen's method**, are presented.

2.1 Empirical findings of the cointegration analyses for the Belgian model

2.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

As explicitly declared in the first chapter that one of the objectives of this study is to examine the determinants of the European demand to Thai tourism, together with estimate the long-run tourism demand elasticities, in the following section, the empirical results of the first method of the cointegration analysis, the Engle-Granger (EG) test, are presented.

According to **equation (5.1)**, it expresses the long-run relationship between **the tourism demand (TA^{BE}) – the number of Belgian tourist arrivals to Thailand** – and **its economic determinants**. In the model, the explanatory variables compose of the tourism price, real Belgian GDP per capita, the real exchange rates between the currencies of Malaysia, the Philippines, along with Indonesia and the euro, respectively, and the dummy variables as follows;

$$\ln TA^{BE} = -12.61 - \underset{(-0.35)}{0.16\ln Price} + \underset{(3.27)}{2.04\ln GDP} - \underset{(-0.50)}{0.11\ln MY^{RER}} + \underset{(1.48)}{0.45\ln PH^{RER}}$$

$$- \underset{(-1.50)}{0.10\ln ID^{RER}} + \underset{(2.40)}{0.38\ln TA^{BE}(-4)} + 0.03DUMMY02 - 0.05DUMMY03 \qquad (5.1)$$

*Note: t-statistics in parentheses

Adjusted R-squared = 0.83

To be assured however that the long-run relationship between the tourism demand and its determinants really exists, a residual series of equation (5.1) must be stationary. To conduct a test for stationarity of the series, likewise, the tests of unit roots, the ADF test and the PP test, are employed and the outcome of testing are reported in **table 5.3E**. To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.3E**, the two tests apparently indicate that **the null hypothesis of no cointegration** is firmly rejected at all significance levels.

Table 5.3E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-5.4147	-5.4816	0	-5.4529	-5.4710

****Note****:* The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.3E**, **the long-run relationship** between the Belgian tourism demand and its economic determinants is hence attested. Consequently, the next issue of interest is **the estimation of the elasticity of demand**. By looking back to **the long-run equation (5.1)** shows that the estimated elasticities composing of **price elasticity, income elasticity, and substitute price elasticities** have correct signs corresponding to the economic theory.

Concerning **the price elasticity** in the Belgium long-run model, it is reported **less than one in the absolute terms** denoting that Belgian tourism demand is **price inelastic**. In other words, the tourists are somewhat insensitive to changes in the real exchange rate defined in the model as, for instance, a **1** per cent increase in the price would **crowd out** the number of Belgian tourist arrivals only **0.16** per cent, or vice versa.

Meanwhile the **income elasticity** is reported higher than one indicating that Thai tourism is considered luxurious for the Belgian tourists. The result is line with the most of the findings of most empirical literature. According to equation (5.1), the income elasticity of 2.04 signifies that **a rise** in the Belgian real GDP per capita of **1** per cent would increase the arrivals of Belgian tourists of approximately **2.04** per cent, or vice versa.

With respect to **the cross-price elasticities**, equation (5.1) shows that **the Philippines** is considered as **substitute tourism destinations** for **Thailand.** In addition, according to the estimated elasticities, a **1** percent rise in the Thai tourism price would generate **0.45** per cent of Belgian tourist flows to the Philippines, respectively. This is probably because Thailand and the substitute destination share common tourism resources. Whereas **tourism in Malaysia and Indonesia** is considered **complement to tourism in Thailand** and according to the estimated elasticity, a **1** percent increase in the tourism price in Thailand would result in a decline of **0.11 percent and 0.10 percent** of Belgian visitors to Malaysia and Indonesia, respectively.

Additionally, to measure the effects of **disseminating the EURO** in the market as a new national currency for Belgium, the variable named **DUMMY02** is included into the model. According to **equation (5.1),** it reports that the circulation of the new currency helps increase the number of Belgian tourist arrivals to Thailand. Meanwhile, the **SARs outbreaks** in 2003 as captured by the **DUMMY03** crowd the number of tourist arrivals out approximately 0.05 per cent.

2.1.2 Empirical results of the Johansen cointegration test

Another tool in exploring the long-run relationships for the Belgian model is **the Johansen Cointegration Test** and provided that all of the time-series data are integrated of order one or I(1), the test therefore can be applied to those time-series data. Regarding choosing optimal lag length, **the Akaike Information Criterion (AIC)** is used for choosing those lags for VAR models. As reported in **table 5.3F**, the criterion suggests four optimal lags to be included in the VAR model.

Table 5.3F: Test statistics for the length of lags of VAR in Belgian model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	297.9789	NA	1.28e-14	-12.12412	-11.85124	-12.02100
1	604.5457	510.9446	2.86e-19	-22.85607	-20.67300*	-22.03109*
2	651.7264	64.87343	3.51e-19	-22.78026	-18.68701	-21.23342
3	704.1694	56.81328	4.38e-19	-22.92372	-16.92029	-20.65502
4	790.2711	68.16390*	2.12e-19*	-24.46963*	-16.55601	-21.47906

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 percent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 5.3G: Trace tests for cointegrating vectors for the Belgian model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	82.1607	69.8189	0.0038
r $\leq$ 1	r $\leq$ 2	47.7764	47.8561	0.0509

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.3H: Maximum eigenvalue tests for cointegrating vectors for the Belgian model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	34.3843	33.8769	0.0435
r $\leq$ 1	r $\leq$ 2	25.8136	27.5843	0.0828

*Mackinnon-Haug-Michelis (1999) P-values

Based on the lag length suggested earlier, the Johansen cointegration test is conducted by using **Eviews 6 software package**. The cointegration relationships among variables are established by using two likelihood ratio tests, **a trace and maximum eigenvalue tests** and they are reported in **table 5.3G** and **table 5.3H.** The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first column of the two tables should be rejected.

Firstly, If **the trace statistics test** in **table 5.3G** are taken into account, it suggests that the hypothesis that there is 1 cointegrating relationship (r=1) cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 per cent significance level. Therefore, the λ_{trace} statistics suggest that there is only one cointegrating relationship in the Belgian model.

Table 5.3I: Long-run coefficients of Belgian demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.7792 (0.5500)
GDP	3.5717 (0.2061)
PH^{RER}	0.9808 (0.3713)
ID^{RER}	-0.0561 (0.0434)

*Standard Errors in Parentheses

Secondly, according to **the maximal eigenvalue test** expressed in **table 5.3H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 34.38, greater than the critical values at the 5 per cent significance level of 33.88. The λ_{max} statistics suggest that, there is one cointegrating relationship among the variables in the Belgian model.

To sum up, based on the two tests, it can conclude that there are at most one cointegrating relationship existing among the variables in the Belgian demand to Thai tourism.

As reported by the λ_{max} and λ_{trace} tests in **tables 5.3G** and **table 5.3H**, the variables in the Belgian demand models have at most five cointegrating relationships. **Equation (5.2)** normalised on the dependent variable shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

$$\ln TA^{BE} = \underset{(-1.04)}{-0.78\ln Price} + \underset{(9.44)}{3.57\ln GDP} - \underset{(4.97)}{1.20\ln MY^{\text{REมR}}} - \underset{(-0.84)}{0.60\ln PH^{RER}} - \underset{(-2.56)}{0.22\ln ID^{RER}} \qquad (5.2)$$

*Note: t-statistics in parentheses

All variables have economically meaningful signs and statistical significance, except the insignificant t-statistics of the own tourism price, and the tourism price of the Philippines. According to **equation (5.2)**, **the price elasticity** is inelastic in line with that value reported by the method of Engle-Granger (EG). Its estimated coefficient designates that a per cent rise in the tourism price in Thailand would result in a 0.98 per cent decrease in the Belgian tourist arrivals. Meanwhile, it seems to be that the income variable, real GDP per capita, is the most important determinant for tourism demand from Belgium. The estimated **income elasticity** is 7.97 which is considered highly elastic and it also indicates that a 1percent increase in Belgian real GDP per capita results in a 7.97percent increase in Belgian tourist arrivals to Thailand.

Regarding the cross-price elasticities, based on the estimated coefficients in equation (5.2), it reports that tourism in the alternative destinations, Malaysia, Singapore, and the Philippines are recognised substitute for tourism in Thailand. The result is in line with that reported by the EG method, particularly tourism in Malaysia and Singapore.

Chart 5.1A: Recursive price elasticity for Belgian model

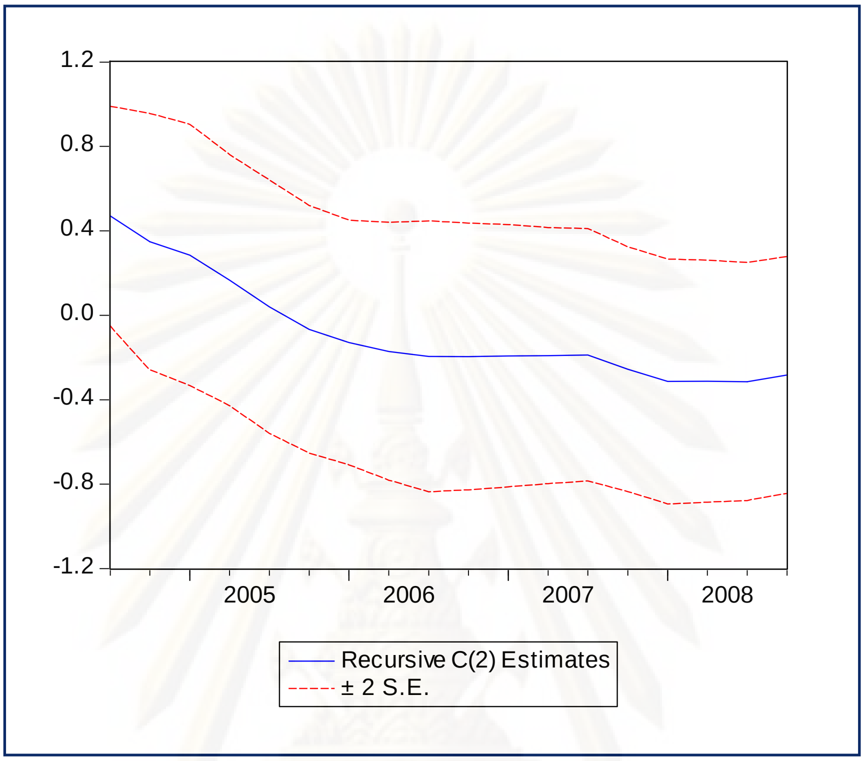
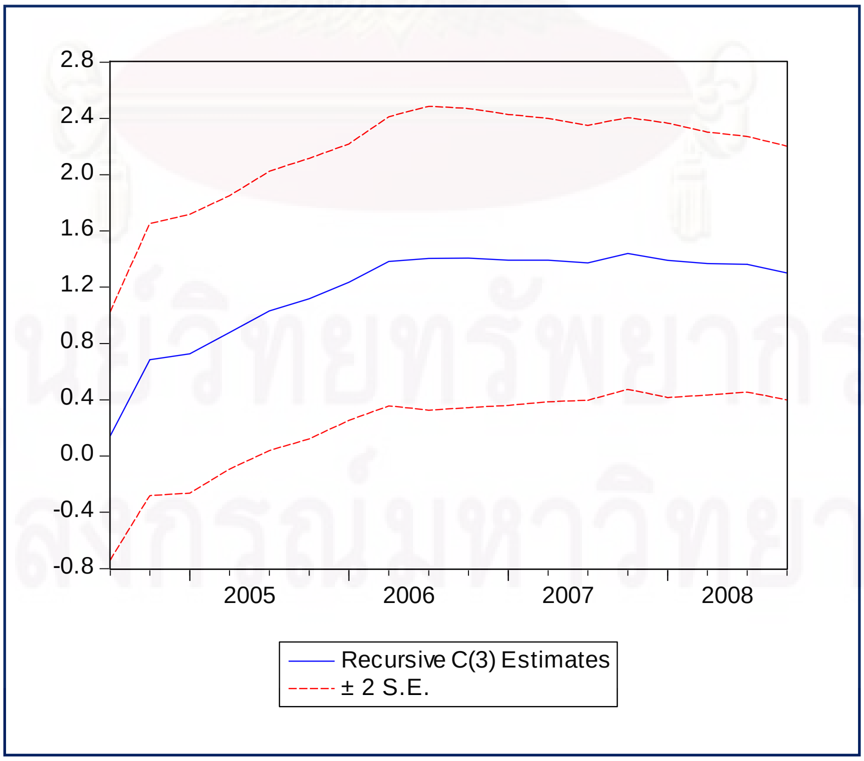
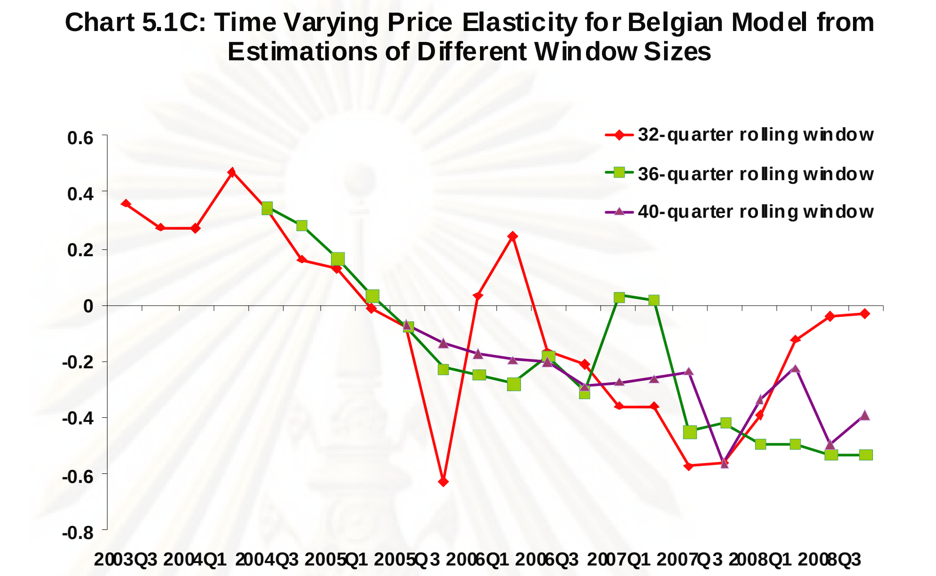
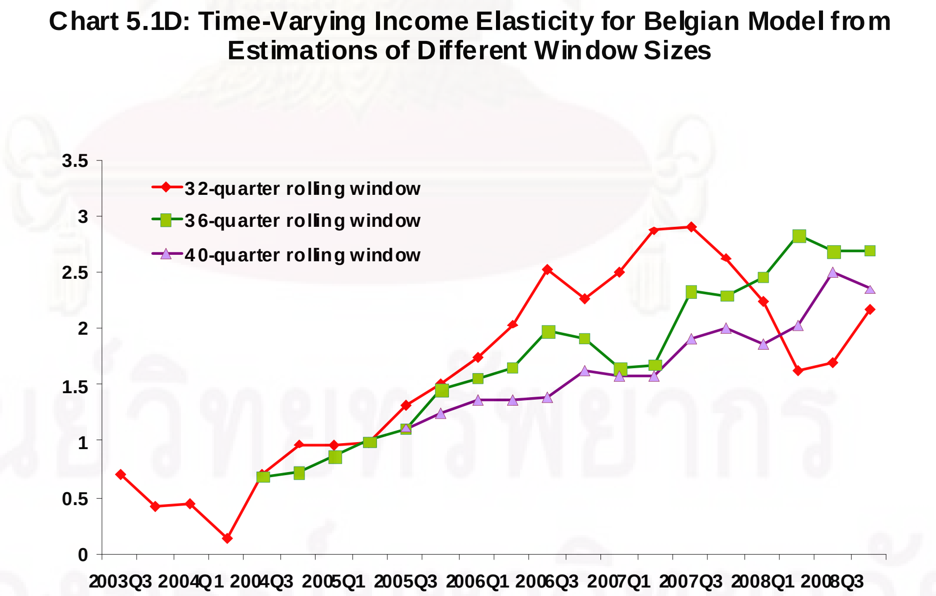


Chart 5.1B: Recursive income elasticity for Belgian model





Source: Author's calculation



Source: Author's calculation

2.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for Belgian model

As the last objective of the study is to explore the evolution of the European demand to Thai tourism overtime, the study therefore employs the two approaches as outlined basic concepts and methodologies in the last chapter. The either two or one of them is utilized as tools to observe and analyse developments of trends of the inbound tourism demand elasticities.

With respect to empirical results of the method of **recursive ordinary least square (OLS)**, exhibited in chart 5.1A, they report that, based the time-series over the period of 1996Q1-2008Q4, the own price elasticity of the European tourism demand had slightly declined and become stable in a negative territory approximately -0.2. In addition, over the period, **the price elasticity of the Belgian model** rarely experience dramatic shifts. Meanwhile, the dynamics of the variable reported by **the method of rolling regression** are not fundamentally and significantly different from those reported by its counterpart. **The price elasticity** had displayed a downward trend over time according to the three rolling windows as demonstrated in chart 5.1C. In sum, the two methods show that the price elasticity of Belgian demand is inelastic, in other words, it is somewhat irresponsive to changes in costs of living in the tourism destination, Thailand.

Regarding **the dynamics of the income elasticity** of the Belgian model, **the method of recursive OLS** reveals that it had increased over time and recently showed a stable condition, moving roughly at 1.4 as demonstrated in chart 5.1B. This is line with the results reported by **the approach of rolling regression** based on the OLS estimation of three different window sizes. Nonetheless, the elasticity clearly expresses upward trends over the sample period compared to the method of recursive OLS and final values of the income elasticity is moving approximately at 2-2.5. These findings affirm that fact that Thai tourism is recognised luxurious. Additionally, they also help endorse the luxurious nature of tourism products suggested by the empirical findings of existing literature.

3. Empirical results of British model

By following the same outline of the Belgian model, in the subsequent section, the empirical findings of the British model are presented. The statistics of the **tests for unit roots** of all variables in their logarithmic level are demonstrated in **table 5.4A** and, like the Belgian model, the table is divided into two models: **"intercept, no trend" and "intercept and trend".** In dealing with the two models of testing, graphical examinations are applied. Concerning **the dependent variable**, it shows a clear pattern of trending behaviour over the sample period of **1996Q1-2008Q4**. Hence, it is appropriate to categorise the series into the **"intercept and trend"** model. Likewise, **the income variables**' patterns are not fundamentally different from the British tourism demand, they are thus classified into the same model. Meanwhile, with respect to **the tourism price variable**'s behaviour, there is an unlikely observable trend. Similarly, **the substitute price variables** also show no trending behaviour, **the own price and substitute price variables** are therefore put in the same category of **"intercept, no trend"** model.

Regarding the findings of the unit root tests reported in **table 5.4A,** the results **of the ADF test** are presented first. In performing the ADF test, **the optimal lag-length** should be established in the first place before identifying an appropriate order of stationarity. To accompany such a recommendation of testing, in line with the Belgian model, **the Schwarz Information Criterion (SIC)** is used as a tool. When the outcome of the test is taken into account, **table 5.4A** and **table5.4B** show the test statistics for all the variables in their logarithmic levels, along with for the two alternative models are presented. The results clearly indicate that all variables are nonstationary in their logarithmic levels, except the series of GDP, and the real exchange rates of Malaysia with respect to the United Kingdom. To make the cointegration tests applicable, such nonstationarity must be abolished. To gain stationary series for the rest, the economic theory suggests taking **first differences** to all of the nonstationary variables. The results after taking first differences to the variables are demonstrated in **table 5.4C** and **table 5.4D**. By conducting such differences, the nonstationary components were entirely removed from the series under investigation and the null hypothesis of nonstationarity is apparently rejected at the 5 percent significance level suggesting that they are **integrated of order one, I(1)**, line with the findings reported in the Belgian model.

Contrast to the results reported by the ADF test, **the Phillips-Perron** unit root test reports that all the variables are nonstationary as also demonstrated in **table 5.4A** and **table 5.4B.** To acquire the stationary data, the first-difference is conducted and the series robustly reject the null hypothesis of the presence of a unit root, suggesting that the series are **integrated of order one, I(1)** and a summary is displayed in **table 5.4C** and **table 5.4D**. Based on the results of the two tests, there is sufficient evidence in supporting nonstationarity of the series.

Concerning the results of **the KPSS test**, they are somewhat mixed similarly to those suggested by the ADF test. According to **table 5.4A** and **table 5.4B**, the test statistics point to nonstationarity of the series of the British tourist arrivals, GDP, Final Consumption Expenditures, and the series of real exchange rates of Malaysia, Singapore, and Philippines with respect to Britain, respectively. Meanwhile, the rest is found to be stationary. After taking differences however the nonstationary components are not completely removed, the Final Consumption Expenditure and the real exchange rate of Philippines with respect to Britain are found to be **I(2) variables**.

Table 5.4A: Unit root test statistics for economic variables in logarithmic levels for British model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-1.4966	-1.7671	1	-1.5580	-0.2220	0.9256	0.2283
Independent variables							
1.Price	-2.4964	-1.4822	0	-2.5749	-1.5372	0.4080	0.1688
2. Income variables							
2.1 GDP	-1.7227	-3.5259	0	-2.7692	-3.4786	0.9626	0.1950
2.2 GNI	0.0821	-2.3103	0	0.1309	-2.0910	0.9727	0.1106
2.3 Gross	-0.9077	-2.9603	0	-0.4171	-2.7244	0.9665	0.1312
2.4 Final	-2.7235	-3.3870	0	-4.9227	-3.1002	0.8904	0.2048
3. Substitute price variables							
3.1 MY^{RER}	-2.9951	-2.2429	1	-2.3995	-1.5724	0.4693	0.0947
3.2 SG^{RER}	-2.3157	0.7265	1	-2.1206	-0.2471	0.6557	0.1195
3.3 PH^{RER}	-1.9758	-0.4219	0	-2.0444	-0.6945	0.4746	0.1847
3.4 ID^{RER}	-2.5098	-1.9971	0	-2.5983	-2.2110	0.2945	0.1540

****Note*:** Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.4B: Summary of unit root test statistics for economic variables in logarithmic levels for British model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstationary	Nonstationary	Nonstationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Stationary
2. Income variables			
2.1 GDP	Stationary	Nonstationary	Nonstationary
2.2 GNI	Nonstationary	Nonstationary	Stationary
2.3 Gross	Nonstationary	Nonstationary	Stationary
2.4 Final	Nonstationary	Nonsstationay	Nonstationary
3. Substitute price variables			
3.1 MY^{RER}	Stationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationay	Nonstationay	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Stationary

Table 5.4C: Unit root test statistics for economic variables in log-difference for British model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-7.7285	-4.4900	2	-8.0916	-0.3547	0.1841	0.1110
Independent Variables							
1. Price	-4.8291	-5.3124	0	-4.6805	-5.0156	0.3912	0.0603
2. Income variables							
2.1 GDP	-9.3861	-9.3106	0	-9.7467	-11.1284	0.3659	0.1050
2.2 GNI	-7.3163	-6.6790	0	-7.2672	-6.5341	0.1487	0.1305
2.3 Gross	-6.6505	-6.4977	1	-8.6185	-7.9107	0.1368	0.1369
2.4 Final	-8.5008	-7.0304	2	-8.6411	-24.0197	0.4826	0.2025
3. Substitute price variables							
3.1 MY^{RER}	-4.3509	-4.7762	0	-4.3933	-4.7762	0.2752	0.0719
3.2 SG^{RER}	-3.5448	-4.4336	0	-3.8205	-4.5928	0.4223	0.1092
3.3 PH^{RER}	-2.6299	-3.4310	2	-4.4648	-4.7261	0.4712	0.0664
3.4 ID^{RER}	-5.3087	-5.5132	0	-5.3004	-4.3620	0.3065	0.0470

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.4D: Summary of unit root test statistics for economic variables in log-difference for British model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(1)
Independent variables			
1.Price	I(1)	I(1)	I(0)
2. Income variables			
2.1 GDP	I(0)	I(1)	I(1)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(1)	I(1)	I(0)
2.4 Final	I(1)	I(1)	I(2)
3. Substitute price variables			
3.1 MY^{RER}	I(0)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(2)	I(1)	I(2)
3.4 ID^{RER}	I(1)	I(1)	I(0)

According to the findings of the unit root tests, it can be concluded the time-series data in the British model are **nonstationary** and **integrated of order one, I(1).** Given this, the two methods of cointegration analyses, **the Engle-Granger (EG) Approach and the Johansen's Method**, can be applied and in the following sections, empirical results of the two are presented, accordingly.

3.1 Empirical findings of the cointegration analyses for the British model

3.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

To examine **long-run relationships** among the variables in the British model, the findings of the method of Engle-Granger (EG) are firstly presented. The Johansen cointegration test is then subsequently displayed.

The long-run relationships between **the British tourism demand (TA^{UK})** measured by the number of British tourist arrivals to Thailand and its economic determinants are expressed in **equation (5.3)**. In the model, the explanatory variables compose of the tourism price, real British GDP per capita, the substitute price variables, a lagged dependent variable, and a dummy variable and they are displayed together as follows;

$$\ln TA^{UK} = -7.65 - 0.13\ln Price + 1.61\ln GDP + 0.02\ln MY^{RER} - 0.12\ln SG^{RER}$$
$$(-0.96) \quad (3.97) \quad (0.12) \quad (-0.48) \qquad \textbf{(5.3)}$$
$$+0.52\ln TA^{UK}(-4) - 0.11DUMMY03$$
$$(5.13)$$

Adjusted R-squared = 0.97

*Note: t-statistics in parentheses

Following the same procedure in the Belgian model, to make sure that **the long-run relationships** between the tourism demand and its determinants really exist as specified in **equation (5.3),** a residual series obtained from the equation must be tested for stationarity. To conduct such a test for stationarity of the residual series, likewise, the tests of unit roots, **the ADF test and the PP test**, are employed and findings of the test are displayed in **table 5.4E**. The null and alternative hypotheses in the test for the EG residual based test for cointegration are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according **to table 5.4E,** the two tests apparently denote that the null hypothesis of no cointegration is strong rejected at all significance levels.

Table 5.4E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-6.5417	-6.4727	0	-6.6873	-6.5924

**Note:* The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Provided the outcome reported in **table 5.4E**, the long-run relationship between the British tourism demand and its economic determinants is hence attested. The next issue is to explore derivable elasticities of demand provided the long-run tourism demand, as usual; those compose of **the price elasticity, the income elasticity, and the cross-price elasticity**. As reported, all of the elasticities of demand are corresponding to what the economic theory suggests. Details are to discuss in the following section.

Firstly, **the price elasticity** in the British long-run model, it is recorded less than one, as reported in the former model, in the absolute terms of **0.13** reflecting that the British tourism demand is also **price inelastic**. In other words, the tourists are somewhat insensitive to changes in the real exchange rate defined in the model. The elasticity of 0.13 means that a **1** percent change in the tourism price brings about a **0.13** percent decline in the number of British tourist arrivals to Thailand.

Next, **the income elasticity** registers at **1.61**, which is higher than one signifying that the tourism in Thailand is considered **luxurious** for the Britons. The finding is tandem with that reported in the Belgian model and this is also in line with the most findings of existing empirical literature. The value of 1.61 implies that **a rise** in the British real GDP per capita of **1** per cent **increases** the arrivals of British tourist arrivals to Thailand of approximately **1.61** percent.

Then, as far as **the cross-price elasticity** is concerned, in the model there are those of Malaysia and Singapore. They are recorded at **0.02 and -0.12**, respectively. Provided the estimated elasticities, tourism in **Malaysia** is recognised **substitute** for Thailand, meanwhile tourism in **Singapore** is perceived as **complementary** to tourism in Thailand. These findings are in tandem with the results reported in the Belgian model. The **cross-price elasticity of 0.02** implying that a **1** per cent **rise** in the Thai tourism price generates **0.02** per cent of **British tourist flows to Malaysia** instead of coming to Thailand. Whereas, the cross-price elasticity of **-0.12** of Singapore means that, for instance, a **1** percent **increase** in Thai tourism price leads to a **0.12 decline** of British tourist arrivals to Singapore. The same explanation of logistics mentioned in the Belgian model might also be applicable for this case.

Last but not least, to measure the so-called the **word-of-mount effects** or **habit persistence** of the British tourists, the lagged terms of dependent variable is included into the tourism demand model. According to **equation (5.3)**, it is reported that **the habit persistence** is one of the factors crucially determining the Britons' decisions in visiting Thailand.

Finally, the variable named DUMMY03 is included to capture the effects of the **SARs outbreaks** in 2003. The empirical results report that the outbreaks significantly crowd out the British tourists visiting Thailand.

2.1.2 Empirical results of the Johansen cointegration test

Similar to the requirement of the EG method, Johansen cointegration analysis stipulates that all of the time-series are **integrated of order one, I(1).** Given the requirement is fulfilled; the Johansen cointegration analysis can be applied to those time-series data. Before conducting such a test, it is however necessary to choose an **optimal lag length *(p)*** for the VAR model. According to test statistics demonstrated in **table 5.4D**, the study will rely on **the Akaike Information Criterion (AIC)** in choosing optimal lags for VAR models and it suggests four optimal lags to be included in the model.

Table 5.4D: Test statistics for the length of lags of VAR in British model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	412.9595	NA	1.06e-16	-16.9149	-16.6421	-16.8119
1	738.0145	541.7583*	1.10e-21	-28.4172	-26.2342*	-27.5923*
2	783.8455	63.0176	1.43e-21	-28.2852	-24.1919	-26.7384
3	843.8009	64.9516	1.30e-21	-28.7417	-22.7382	-26.4730
4	919.2383	59.7212	9.83e-22*	-29.8432*	-21.9296	-26.8526

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 percent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

In tandem with the Belgian model, based on the lag length suggested earlier, the Johansen cointegration test is conducted via **Eviews 6 software package**. The cointegration relationships among variables are established by using two likelihood ratio tests, the trace and maximum eigenvalue tests and they are reported in **table 5.4G** and **table 5.4H**. The inference is the same as one specified in the Belgium model i.e. if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

There are likely to be **six cointegrating relationships** exist among the variables in the British model according to a report by the trace statistics since the calculated λ_{trace} is greater than the critical values at 5 percent significance level and consequently a null hypothesis of seven cointegrating relationships exist cannot be rejected.

Table 5.4G: Trace tests for cointegrating vectors for the British model

Trace statistics			Critical values	Prob*
Null	Alternative	Trace	95percent	
r = 0	r = 1	273.4512	95.7537	0.0000
r ≤ 1	r ≤ 2	177.6473	69.8189	0.0000
r ≤ 2	r ≤ 3	105.3657	47.8561	0.0000
r ≤ 3	r ≤ 4	63.9662	29.7971	0.0000
r ≤ 4	r ≤ 5	28.8504	29.7970	0.0003
r ≤ 5	r ≤ 6	6.4274	3.8415	0.0112

*Mackinnon-Haug-Michelis (1999) P-values

Additionally, there are also **six cointegrating relationships** exist according to the maximal eigenvalue test expressed in **table 5.4H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 95.80, greater than the critical values at the 5 percent significance level of 40.07.

In conclusion, based on the two statistics reported by the two tests above, it can be summarised that there are at most **seven cointegrating relationships** exist in the British among the variables in the model of British demand to Thai tourism.

Table 5.4H: Maximum eigenvalue tests for cointegrating vectors for the British model

Maximum eigenvalue statistics			0.05	
Null	Alternative	Maximum Eigenvalue	Critical values	Prob*
r = 0	r = 1	95.8039	40.0776	0.0000
r ≤ 1	r ≤ 2	72.2816	33.8769	0.0000
r ≤ 2	r ≤ 3	41.3994	27.5843	0.0005
r ≤ 3	r ≤ 4	35.1158	21.1316	0.0003
r ≤ 5	r ≤ 6	22.4231	14.2646	0.0021
r ≤ 6	r ≤ 7	6.4274	3.8415	0.0112

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.4I: Long-run coefficients of British demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.9046 (0.5290)
GDP	2.3157 (0.1480)
MY^{RER}	0.5184 (0.1792)
PH^{RER}	-0.5191 (0.2898)
ID^{RER}	-0.0172 (0.0879)

*Standard Errors in Parentheses

According to the λ_{max} and λ_{trace} tests in **tables 5.4G** and **table 5.4H**, the variables in the British tourism demand models have at most seven cointegrating relationships. As a result, **the long-run relationship** among variables could be subsequently established in **equation (5.4)** and the equation is normalised on the dependent variable demonstrating the equilibrium relationship as follows;

$$\ln TA^{UK} = \underset{(-0.53)}{-0.90\ln Price} + \underset{(0.15)}{2.32\ln GDP} + \underset{(0.18)}{0.52\ln MY^{RER}} - \underset{(0.30)}{0.52\ln PH^{RER}} \underset{(0.09)}{-0.02\ln ID^{RER}} \quad (5.4)$$

*Note: standard error in parentheses

As specified in **equation (5.4)**, the explanatory variables compose the tourism price, the real British GDP per capita, and the substitute price variables. Almost all variables have economically meaningful signs and statistical significance. With respect to **the elasticity of the tourism price**, it is recorded at **0.90** in absolute terms, and this is somewhat **inelastic**. It means that a **1 percent increase** in the Thai tourism price brings about a **0.90 percent** decline in the number of British visitors to Thailand, vice versa. Additionally, the result of the price elasticity is in line with that reported by the EG method.

Meanwhile, **the income elasticity** is found to be **elastic** reported the value of **2.32**. Similar to the former interpretations, **the income elasticity of 2.32** implies that a **1 percent increase** in the real GDP generates a **2.32 percent** of the British tourist flows to Thailand, or vice versa. This is in line with the result reported by the EG method discussed earlier. In addition to the tourism price variable, it is obvious that the income variable is another crucial determinant of the British tourism demand.

With respect to **the cross-price elasticity of demand**, the equation (5.4) reports that, in tandem with the findings demonstrated by the EG method, **tourism** in **Malaysia** is considered **substitute** for Tourism in Thailand. This is might because Malaysia shares the same sea-sun-sand tourism resources with Thailand. As a result, British tourists have various choices for their holidays. Meanwhile, tourism in **the Philippines** and **Indonesia** are recognised as complementary to Thai tourism.

Chart 5.2A: Recursive price elasticity for British model

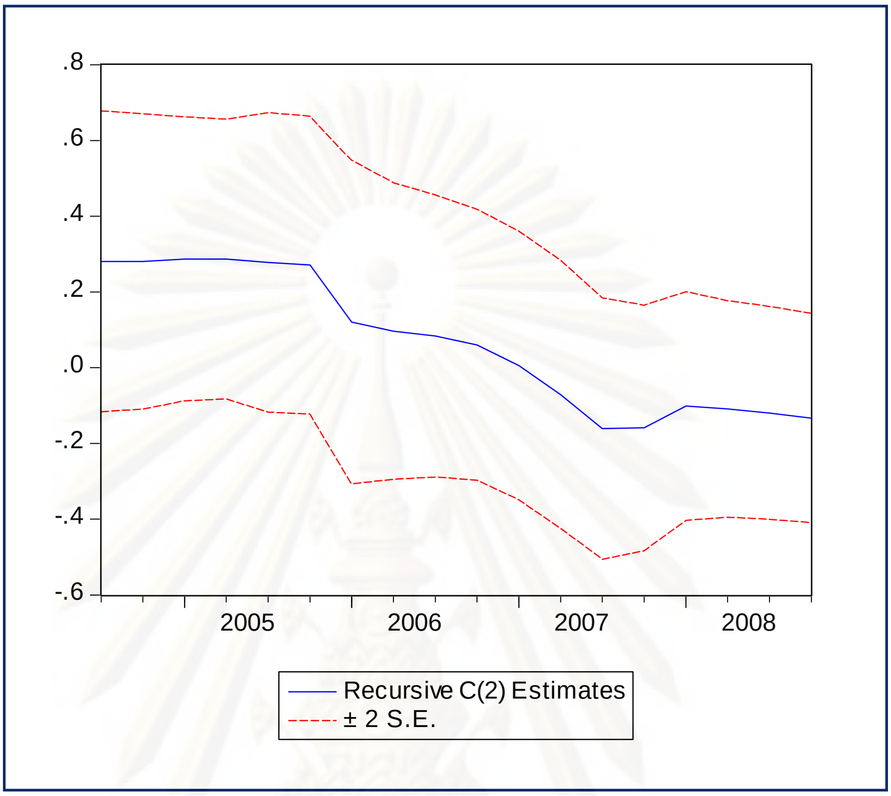
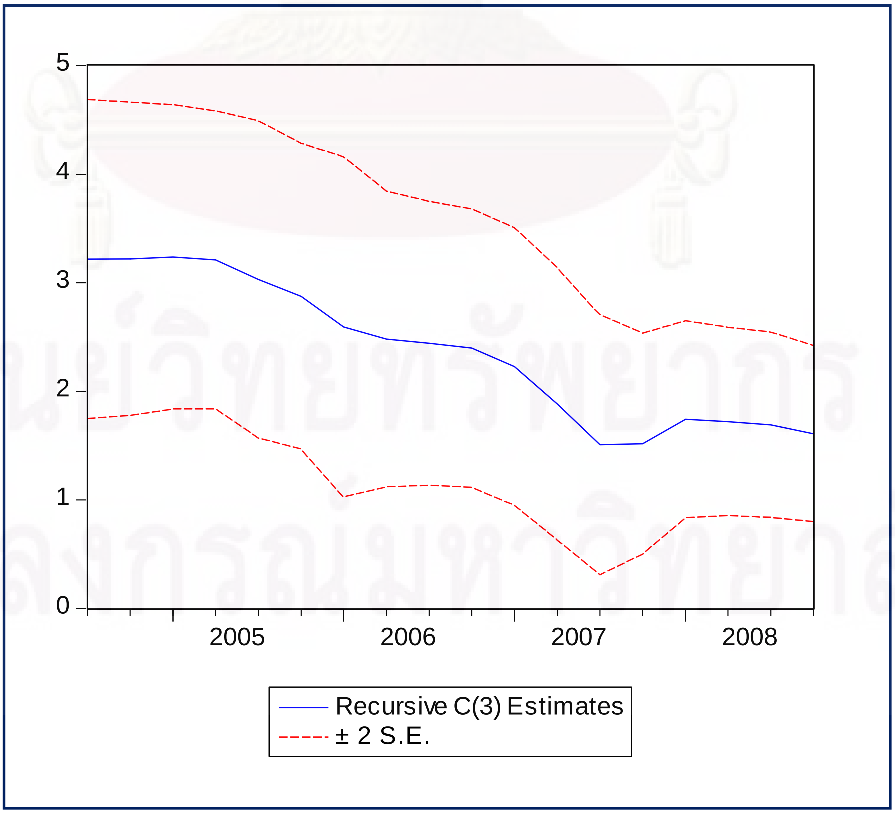


Chart 5.2B: Recursive income elasticity for British model



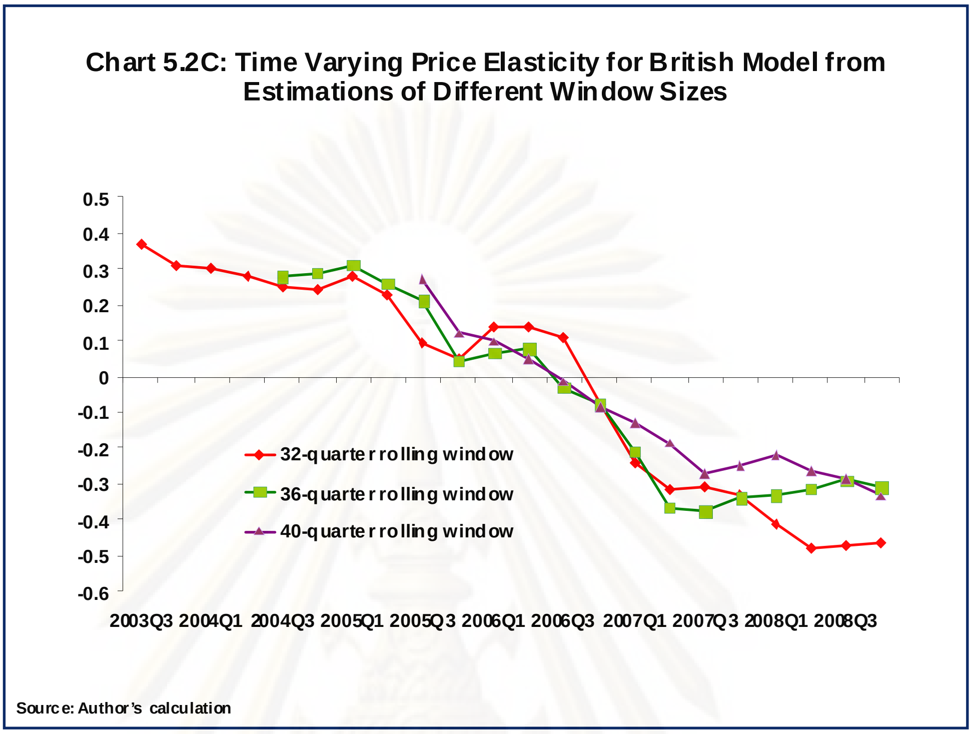


Chart 5.2C: Time Varying Price Elasticity for British Model from Estimations of Different Window Sizes
0.5
0.4
0.3
0.2
0.1
0
-0.1
-0.2
-0.3
-0.4
-0.5
-0.6
32-quarter rolling window
36-quarter rolling window
40-quarter rolling window
2003Q3 2004Q1 2004Q3 2005Q1 2005Q3 2006Q1 2006Q3 2007Q1 2007Q3 2008Q1 2008Q3
Source: Author's calculation

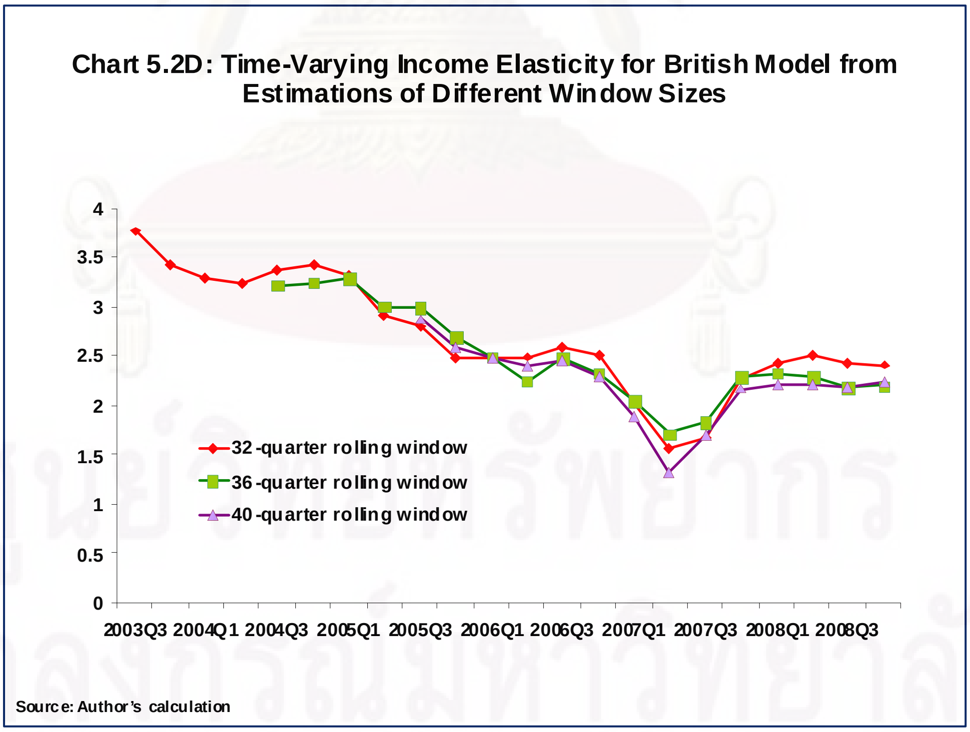


Chart 5.2D: Time-Varying Income Elasticity for British Model from Estimations of Different Window Sizes
4
3.5
3
2.5
2
1.5
1
0.5
0
32-quarter rolling window
36-quarter rolling window
40-quarter rolling window
2003Q3 2004Q1 2004Q3 2005Q1 2005Q3 2006Q1 2006Q3 2007Q1 2007Q3 2008Q1 2008Q3
Source: Author's calculation

3.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for British model

To investigate the dynamics of the price and income elasticities of demand in the British model, similarly to the Belgian model, the study employs the methods of **Recursive Ordinary Least Square (OLS)** and **the rolling regressions**

To begin with, **the dynamics of the price elasticity** of British tourism demand demonstrated in **chart 5.2A** and **chart 5.2C** show downward trends. Concerning the recursive price elasticity, its final value is moving around -0.1, whereas the rolling regressions report that the final values of the elasticity is between -0.3 and -0.5. Based on the findings of the two approaches, it can be concluded that **the price elasticity is inelastic.**

Regarding the dynamics of **the income elasticity** estimated by both the method of **recursive OLS** and **the rolling regressions**, they report that it had declined over time, similar to the price elasticity and recently, all value showed a stable condition. moving roughly at 1.4 as demonstrated in **chart 5.1B**. This is line with the results reported by the approach of rolling regression based on the OLS estimation of three different window sizes. Nonetheless, the elasticity clearly expresses upward trends over the sample period compared to the method of recursive OLS and final values of the income elasticity is moving approximately at 2-2.5. These findings affirm that fact that Thai tourism is luxurious. Additionally, they also help endorse **the luxurious nature of tourism products** suggested by the empirical findings of existing literature.

4. Empirical results of Danish model

Similar the two country models, **the dependent variable**- the quarterly number of Danish tourist arrivals to Thailand- is categorised into **the "intercept and trend"** model as the data displays a strong trending behaviour according to a graphical examination. Meanwhile, **the own price variable**, together with **the substitute price variables**, is classified into **the "intercept, no trend"** model as that fact that those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

According to empirical results of tests for unit roots reported in table 5.5A, there are three the results of the three tests and the results **of the ADF test** are to be presented first and followed by the other two. Akin to the two country models presented earlier, **the Schwarz Information Criterion (SIC)** is used to be a criterion to choose optimal lags for the ADF test. Regarding the outcome, the test statistics for all the variables in their logarithmic levels and for the two alternative models --both "intercept, no trend" and "intercept and trend"-- are presented in **table 5.5A** and **table5.4B**. The ADF test point to a conclusion that all variables are nonstationary. As usual, to abolish the nonstionarity existed in all of the variables; those variables are taken first differences. The test statistics after taking first differences to the variables are demonstrated in **table 5.5C** and **table 5.5D**. The statistics clearly denote that the nonstationarity is removed from all variables, and the null hypothesis of nonstationarity is apparently rejected at the 5 percent significance level suggesting that they are **integrated of order one**, **I(1)**, the reported results are in tandem with the former two country models.

Meanwhile, the results of **the Phillips-Perron (PP)** unit root test are also displayed in **table 5.5A** and **table 5.5B**. The outcome is however not fundamentally different from the ADF tests. In addition, it is obvious that the results from the tests in the levels of the variables noticeably point to the presence of a unit root in all cases. In addition, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, suggesting that the series are **integrated of order one, I(1)** and a summary is displayed in **table 5.4C** and **table 5.4D**.

In contrast to the findings of the two method presented above, **the KPSS test** reports mixed results of nonstationarity. According to **table 5.5A** and **table 5.5B**, the test demonstrates that the dependent variable, the real GDP per capita, the real GNI per capita, the real Net National Disposable Income per capita, and the real exchange rate of Indonesia with respect to Denmark are already stationary. Concerning the rest of the variables, it is necessary to take first differences to obtain stationarity. After taking first differences, the nonstationarity embedded in those variables is disappreared implying that they are **integrated of order one, I(1).**

To proceed to apply the cointegration analyses with the time-series data above, it is necessary that all of them must be integrated of order one or I(1). Notwithstanding, based on the findings of the two tests -- the ADF test and the PP test, it should be therefore sufficient to believe that all variables conform to the requirement of the cointegration tests, regardless the mixed unit root findings of the KPSS test.

Table 5.5A: Unit root test statistics for economic variables in logarithmic levels for Danish model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-2.1132	-2.9665	1	-1.6004	-1.3125	0.8479	0.1250
Independent variables							
1.Price	-1.9243	-2.1133	0	-2.0254	-2.3161	0.6392	0.0989
2. Income variables							
2.1 GDP	-1.1130	-2.2756	0	-1.0949	-2.4030	0.9146	0.0783
2.2 GNI	-0.6526	-2.5246	0	-0.5938	-2.5764	0.9237	0.1162
2.3 Gross	-0.7267	-2.0435	0	-0.7011	-2.1681	0.9205	0.1379
2.4 Final	-0.5394	-2.1483	0	-0.4990	-2.1681	0.9031	0.1894
3. Substitute price variables							
3.1 MY^{RER}	-1.4588	-1.9344	0	-1.6678	-2.3651	0.6127	0.0590
3.2 SG^{RER}	-1.3695	-2.7151	3	-1.2348	-2.2041	0.7081	0.0975
3.3 PH^{RER}	-2.1642	-2.3369	3	-1.6405	-1.7433	0.6328	0.1203
3.4 ID^{RER}	-2.0765	-1.7359	0	-2.2521	-1.7359	0.4314	0.1492

****Note**:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.5B: Summary of unit root test statistics for economic variables in logarithmic levels for Danish model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstationary	Nonstationary	Stationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Stationary
2.2 GNI	Nonstationary	Nonstationary	Stationary
2.3 Gross	Nonstationary	Nonstationary	Stationary
2.4 Final	Nonstationary	Nonstationary	Nonstationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Stationary

Table 5.5C: Unit root test statistics for economic variables in log-difference for Danish model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-2.0033	-2.4714	4	-2.4355	-2.4387	0.1540	
Independent Variables							
1. Price	-5.1148	-5.1208	0	-4.4239	-6.3025	0.1131	0.0729
2. Income variables							
2.1 GDP	-8.1927	-8.1552	0	-8.1855	-8.1484	0.1337	
2.2 GNI	-8.7846	-8.6807	0	-8.7934	-8.6624	0.1194	
2.3 Gross	-8.0832	-7.9935	0	-8.0494	-7.9636	0.1138	
2.4 Final	-7.8918	-7.8104	0	-7.8756	-7.7999	0.1040	0.1011
3. Substitute price variables							
3.1 MY^{RER}	-5.3952	-5.3515	0	-5.3739	-5.3258	0.0569	0.0553
3.2 SG^{RER}	-5.4766	-5.3845	0	-5.5684	-5.4781	0.0961	0.0957
3.3 PH^{RER}	-3.1847	-3.3043	2	-4.8318	-4.7403	0.1410	0.0855
3.4 ID^{RER}	-4.1710	-4.2544	0	-4.1505	-3.8194	0.1385	

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.5D: Summary of unit root test statistics for economic variables in log-difference for Danish model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(0)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(0)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(1)	I(1)	I(0)
2.4 Final	I(1)	I(1)	I(1)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

4.1 Empirical findings of the cointegration analyses for the Danish model

4.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In subsequent sections, the long-run relationships among the variables in the model are to be explored by employing the two methods of cointegration analyses, similarly to Belgian and British Models. In the following section, the empirical results of the first method, **the Engle-Granger (EG) test**, are presented.

As demonstrated in **equation (5.5)**, it expresses **the long-run relationship** between **the tourism demand (TA^{DK})** – the quarterly number of Danish tourist arrivals to Thailand – and its **economic determinants**. In this model, the explanatory variables compose of the tourism price, real Danish GDP per capita, the real exchange rates between the currencies of Malaysia, along with the Philippines, and the currency of Denmark, respectively, and the lagged dependent variables.

$$\ln TA^{DK} = -6.14 \underset{(-0.03)}{-0.01\ln Price} \underset{(2.55)}{+1.06\ln GDP} \underset{(-2.53)}{-0.31\ln MY^{RER}} \underset{(1.00)}{+0.15\ln PH^{RER}} \underset{(9.19)}{+0.73\ln TA^{DK}(-4)} -0.04DUMMY03 \qquad (5.5)$$

Adjusted R-squared = 0.98

*Note: t-statistics in parentheses

Theoretically, to make sure that the long-run relationship between the tourism demand and its determinants really exists, **a residual series** of **equation (5.5)** must be tested for stationarity. To conduct a test for stationarity of the series, likewise, the tests of unit roots, **the ADF test and the PP test**, are employed and the outcome of the test is reported in **table 5.5E**. Subsequently, to test a hypothesis of cointegration, likewise the former two country models, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

In the way with the one-tail unit root tests, according to **table 5.5E**, the two statistics apparently demonstrate that the null hypothesis of no cointegration is firmly rejected at all significance levels.

Table 5.5E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-7.8069	-7.7556	0	-8.8579	-9.1822

****Note****:* The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.5E** above, the long-run relationship between the Danish tourism demand and its economic determinants is genuine. Then, after the long-run relationship among the variables is established, **the elasticity of tourism demand** is to be investigated accordingly. Given **the double-log functional form**, the coefficients in the long-run equation (5.5) are considered as the derived elasticity. In the equation, there are price elasticity, income elasticity, and substitute price elasticities and these have meaningfully and correct signs corresponding to the economic theory. Each of them is to be elaborated as follows;

Firstly, **the price elasticity** is calculated less than one, at 0.01, in the absolute terms, similar to that in the Belgian and British model. This denotes that Danish tourism demand is **inelastic**. In other words, it can be said that the tourists are somewhat insensitive to changes in the real exchange rate or the tourism price defined in the model. The price elasticity of 0.01 implies that **a surge** in the Thai tourism price of **1 percent** leads to **a decrease** of Danish tourist arrivals of **0.01 percent**, or vice versa.

Meanwhile **the income elasticity** is registered somewhat higher than one, at **1.06**, which signifies that Thai tourism is considered **luxurious** for the Danish. The result is line with the most of the findings of most empirical literature. According to equation (5.5), the income elasticity of 1.06 implies that **a rise** in **the Danish real GDP** per capita of **1 percent raises** the arrivals of Danish tourists of approximately **1.06 percent,** or vice versa.

Then **the cross-price elasticities**, equation (5.5) shows that tourism in **Malaysia** is perceived as complementary to tourism in Thailand, contrast to the findings of the former two country models. Whereas, tourism in the Philippines is still considered as substitute for that in Thailand and this is in line with the results of the two country models. It is additionally suggested that if the **Thai tourism price rises 1 percent**, the number of Danish visitors to Malaysia also **drops 0.31 percent**, whereas the number of Danish tourists to the Philippines **increase 0.15 percent**, or vice versa.

Last but not least, it is obvious that the variable capture **the habit persistence** or the so-called **word-of-mount effects** is one the crucial determinants of Danish tourism demand. The coefficient of **0.73** indicates a high degree of habit persistence.

Finally, in order to capture effects of **the SARs outbreaks** to the number of Danish tourist arrivals, the variable named **DUMMY03** is included into the model. According to equation (5.5), it reports that outbreaks adversely affect the tourism conditions and also crowd the number of Danish tourists out approximately 0.04 per cent in 2003.

4.1.2 Empirical results of the Johansen cointegration test

Another tool in exploring the long-run relationships for the Danish model is the Johansen Cointegration Test. Similar to the EG method, all of the time-series data are required to be integrated of order one, I(1), the test therefore can be applied to those time-series data. Likewise, the two country model, **the Akaike Information Criterion (AIC)** is used for choosing **optimal lags for VAR models** and it suggests four optimal lags to be included in the VAR model as displayed in the following table.

Table 5.5F: Test statistics for the length of lags of VAR in Danish model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	439.3871	NA	3.54e-17	-18.0161	-17.7432	-17.9130
1	748.2319	514.7413	7.18e-22	-28.8430	-26.6599*	-28.0180
2	801.9472	73.85848	6.71e-22	-29.0394	-24.9462	-27.4926
3	863.9361	67.15469	5.62e-22	-29.5806	-23.5772	-27.3119
4	967.8678	82.27927*	1.30e-22*	-31.8694*	-23.9558	-28.8789*

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 percent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

According to the lag length suggested earlier, **the Johansen cointegration test** is conducted via **Eviews 6 software package**. As usual, the cointegration relationships among variables are established by using two likelihood ratio tests, **the trace and maximum eigenvalue tests** and they are reported in **table 5.5G** and **table 5.5H**. The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

Table 5.5G: Trace tests for cointegrating vectors for the Danish model

Trace statistics			Critical values	Prob*
Null	Alternative	Trace	95percent	
$r = 0$	$r = 1$	282.9271	95.75366	0.0000
$r \leq 1$	$r \leq 2$	191.8077	69.81889	0.0000
$r \leq 2$	$r \leq 3$	115.7441	47.85613	0.0000
$r \leq 3$	$r \leq 4$	63.03112	29.79707	0.0000
$r \leq 4$	$r \leq 5$	29.54493	15.49471	0.0002
$r \leq 5$	$r \leq 6$	7.102908	3.841466	0.0077

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.5H: Maximum eigenvalue tests for cointegrating vectors for the Danish model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	91.1194	40.0776	0.0000
$r \leq 1$	$r \leq 2$	76.0636	33.8769	0.0000
$r \leq 2$	$r \leq 3$	52.7130	27.5843	0.0000
$r \leq 3$	$r \leq 4$	33.4862	21.1316	0.0006
$r \leq 4$	$r \leq 5$	22.4420	14.2646	0.0021
$r \leq 5$	$r \leq 6$	7.10291	3.84147	0.0077

*Mackinnon-Haug-Michelis (1999) P-values

If the trace statistics test in **table 5.5G** are taken into account, it suggests that the hypothesis that there is **6 cointegrating relationships** (r=6) cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 percent significance level. Therefore, there are likely be six cointegrating relationships in the Danish model based on the λ_{trace} statistics.

Next, based on **the maximal eigenvalue test** presented in **table 5.5H,** it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 91.12, greater than the critical values at the 5 percent significance level of 40.08. The λ_{max} statistics also suggest that there are **6 cointegrating relationships** among the variables in the model.

Table 5.5I: Long-run coefficients of Danish demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-1.3013 (0.3476)
GDP	3.6808 (0.0942)
MY^{RER}	-0.6895 (0.0810)
PH^{RER}	1.3340 (0.2022)
ID^{RER}	-0.2146 (0.0294)

*Standard Errors in Parentheses

In summary, based on the statistics of the two tests, it can draw a conclusion that there are **6 cointegrating relationships** existing among the variables in the model of Danish demand to Thai tourism.

$$TA^{DK} = \underset{(-3.74)}{-1.30}Price + \underset{(39.07)}{3.68}GDP - \underset{(-8.51)}{0.69}MY^{RER} + \underset{(6.60)}{1.34}PH^{RER} - \underset{(-7.30)}{0.21}D^{RER} \qquad (5.6)$$

*Note: t-statistics in parentheses

Given the results of the test discussed earlier, the long-run coefficients of the model of Danish demand to Thai tourism are expressed in **equation (5.6).** The equation demonstrates that almost all variables have economically meaningful signs and statistical significance. As reported in **equation (5.6)**, **the price elasticity** is somewhat elastic in contrast to the value reported by the method of Engle-Granger (EG).

Its estimated coefficient of **1.30**, in absolute terms, designates that a **1 percent rise** in the tourism price in Thailand results in **a 1.30 percent decrease** in the Danish tourist arrivals to Thailand. Additionally, the income variable, real GDP per capita, are likely to be the most important determinant for tourism demand from Denmark. This is in line with the results of the former two country models. The **income elasticity** of 3.68 is

highly elastic indicating that **a 1 percent rise** in Danish real GDP per capita results in **a 3.68 percent increase** in the number of tourist arrivals to Thailand.

Regarding **the cross-price elasticities**, based on the estimated coefficients in **equation (5.6)**, it reports that tourism in the alternative destinations, **Malaysia**, and **Indonesia**, is recognised as **complementary** to tourism in Thailand, whereas tourism in **the Philippines** is considered as **substitute** for tourism in Thailand. The result is in line with that reported by the EG method.

Chart 5.3A: Recursive price elasticity for Danish model

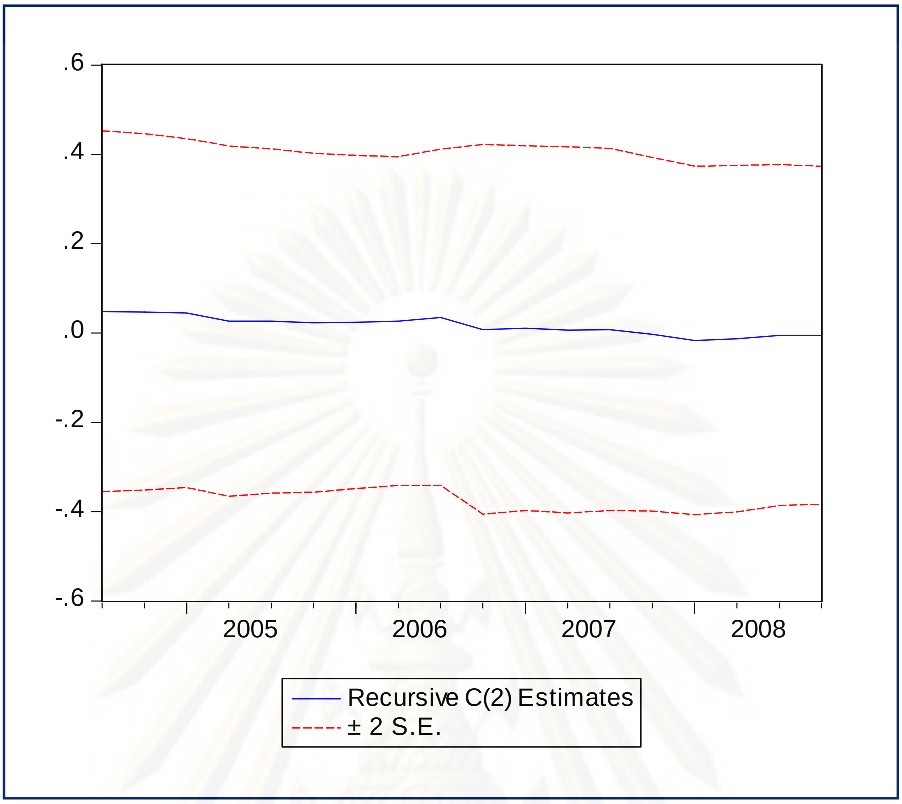


Chart 5.3B: Recursive income elasticity for Danish model

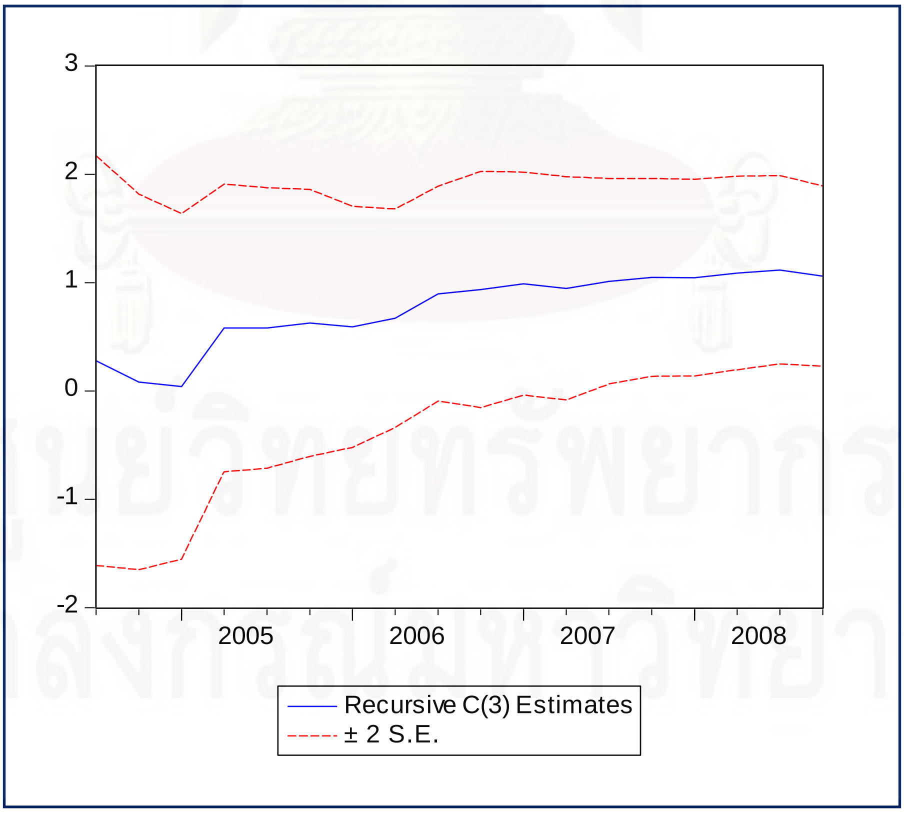
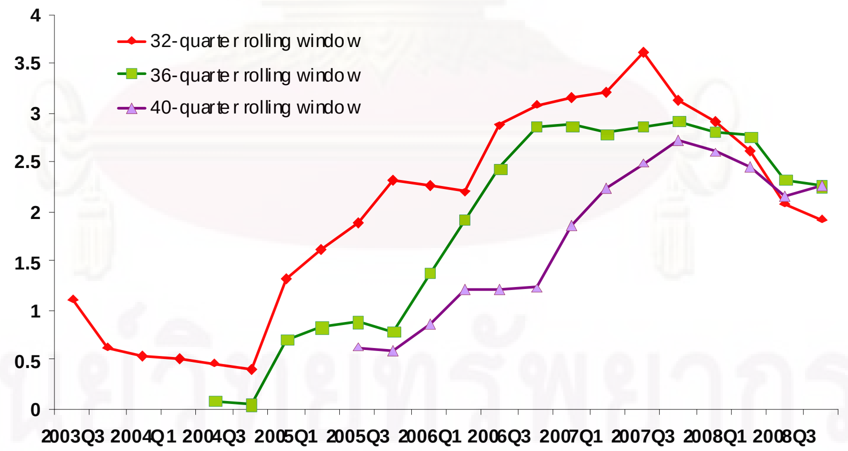


Chart 5.3C: Time-Varying Price Elasticity for Danish Model from Estimations of Different Window Sizes

Source: Author's calculation

Chart 5.3D: Time-Varying Income Elasticity for Danish Model from Estimations of Different Window Sizes



Source: Author's calculation

4.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for Danish model

Following the two country models, **the methods of Recursive Ordinary Least Square (OLS)** and **the approach of rolling regression** are used to explore the evolution of the Danish demand to Thai tourism overtime.

Regarding the empirical results of **the method of recursive ordinary least square (OLS)** exhibited in chart 5.3A and chart 5.3B, they report that, based the time-series over the period of 1996Q1-2008Q4, **the price elasticity** had showed a sign of stability approximately close to zero in negative territory. Meanwhile, the dynamics of the variable reported by the method of rolling regression are not fundamentally and significantly different from that reported by its counterpart. **The price elasticity** had displayed a downward trend over time according to the **three rolling windows** as demonstrated in **chart 5.3C** and those values became stable in negative territory close to zero. In sum, the two methods show that the price elasticity of Danish demand is inelastic, in other words, it is somewhat irresponsive to changes in costs of living in the tourism destination, Thailand. The results are also in line with the former two countries.

Regarding the dynamics of **the income elasticity** of the Danish model, the method of recursive OLS reveals that it had slightly increased over time showed a stable condition, moving roughly at 1 as demonstrated in **chart 5.3B.** This is line with the results reported by **the approach of rolling regression** based on the OLS estimation of three different window sizes. Nonetheless, the elasticity clearly expresses upward trends over the sample period compared to the method of recursive OLS and final values of the income elasticity slightly decreased to approximately around 1.5-2. These findings affirm that fact that Thai tourism is recognised luxurious. Additionally, they also help endorse the luxurious nature of tourism products suggested by the empirical findings of existing literature.

5. Empirical results of Finnish model

In tandem with the former two country models, **the dependent variable**- the quarterly number of Finnish tourist arrivals to Thailand- falls into **the "intercept and trend" model** as the series displays a strong trending behaviour according to a graphical examination. Meanwhile, **the own price variable**, together with **the substitute price variables**, is classified into **the "intercept, no trend" model** as that fact that those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

Regarding the findings of the unit root tests reported in **table 5.6A** and **table 5.6B**, the procedure of testing is in tandem with the former country models. In table 5.6A and table5.6B, they display the test statistics for all the variables in their logarithmic levels, along with for the two alternative models, "**intercept, no trend" and "intercept and trend"**. The results clearly indicate that all variables are nonstationary in their logarithmic levels, except the series of real Final Consumption Expenditure per capita. To be able to apply the cointegration tests, such characteristics of nonstationarity of those variables must be disappeared. To achieve stationarity, first differences are conducted. The results after taking first differences to the variables are demonstrated in **table 5.6C** and **table 5.6D**. By conducting such differences, the nonstationary components are entirely removed from the series under investigation and the null hypothesis of nonstationarity is apparently rejected at the 5 percent significance level suggesting that they are **integrated of order one**, **I(1) variables**.

Next, the findings of **the Phillips-Perron (PP)** unit root test are also displayed in **table 5.6A** and **table 5.6B**. The outcome is in line with the respective ADF tests. Empirically, the results from the statistics in the levels of the variables noticeably point to the presence of a unit root in all cases, except the series of the real Final Consumption Expenditure per capita. However, for the rest of the variables, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, suggesting that they are **integrated of order one,** or **I(1)** and a summary is displayed **in table 5.6C** and **table 5.6D**.

Concerning the results of **the KPSS test**, they are still somewhat heterogeneous compared to the two methods. According to **table 5.6A** and **table 5.6B**, the test statistics point to nonstationarity, except the series of real GDP per capita, real GNI per capita, and the real Net National Disposable Income per capita. Nonetheless, after taking differences, the nonstationarity of the variables is removed implying that **they are integrated of order one, I(1).**

Table5.6A: Unit root test statistics for economic variables in logarithmic levels for Finnish model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	1.0105	-0.9112	2	0.8864	-2.0047	0.8631	0.1964
Independent variables							
1.Price	-1.5590	-1.8666	0	-1.1689	-1.8666	0.8144	0.1092
2. Income variables							
2.1 GDP	-1.6921	-2.1885	0	-1.6921	-2.0869	0.9343	0.1011
2.2 GNI	-1.9795	-1.5285	1	-1.7334	-2.3044	0.9371	0.1059
2.3 Gross	-1.8102	-2.0632	0	-1.8102	-1.7977	0.9357	0.1162
2.4 Final	1.4094	-3.5266	4	-0.1236	-3.5266	0.9651	0.2112
3. Substitute price variables							
3.1 MY^{RER}	-1.1566	-2.0193	0	-1.1771	-2.1174	0.8064	0.0976
3.2 SG^{RER}	-0.9946	-1.8847	0	-0.9946	-2.0279	0.7928	0.1038
3.3 PH^{RER}	-1.0768	-1.7983	0	-1.0887	-1.8752	0.8138	0.1138
3.4 ID^{RER}	-1.7898	-1.6517	0	-1.8438	-1.9346	0.7657	0.1624

****Note:*** Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstationary	Nonstationary	Nonstationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Stationary
2.2 GNI	Nonstationary	Nonstationary	Stationary
2.3 Gross	Nonstationary	Nonstationary	Stationary
2.4 Final	Stationary	Stationary	Nonstationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.6C: Unit root test statistics for economic variables in log-difference for Finnish model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-10.3293	-10.5216	1	-7.9258	-9.3348	0.3172	0.1811
Independent Variables							
1. Price	-6.7851	-6.7358	0	-6.7806	-6.7296	0.0907	0.0810
2. Income variables							
2.1 GDP	-7.5143	-7.7496	0	-7.5149	-7.7496		
2.2 GNI	-10.1391	-10.4629	0	-9.8230	-10.2330		
2.3 Gross	-8.4904	-8.8495	0	-8.4520	-8.8417		
2.4 Final			3			0.1471	0.1479
3. Substitute price variables							
3.1 MY^{RER}	-6.7866	-6.7283	0	-6.7826	-6.7227	0.0739	0.0702
3.2 SG^{RER}	-6.6741	-6.6055	0	-6.6746	-6.6060	0.0959	0.0956
3.3 PH^{RER}	-6.8460	-6.7927	0	-6.8457	-6.7919	0.0934	0.0860
3.4 ID^{RER}	-4.9135	-5.0041	0	-4.9622	-4.7612	0.1267	0.0338

****Note*:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.6D: Summary of unit root test statistics for economic variables in log-difference for Finnish model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(1)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(0)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(1)	I(1)	I(0)
2.4 Final	I(0)	I(0)	I(1)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

5.1 Empirical findings of the cointegration analyses for the Finnish model

5.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In line with the former country models, in order to examine **the long-run relationship** among the variables in the Finnish model, the method of **Engle-Granger (EG)** is firstly presented and subsequently followed by **the Johansen cointegration test**.

According to **equation (5.7)**, it expresses the long-run relationship between the tourism demand (TA^{FL}) – the number of Finnish tourist arrivals to Thailand – and its economic determinants. In the model, the explanatory variables compose of the tourism price, real Finnish GDP per capita, the lagged dependent variable, and a dummy variable as follows;

$$TA^{FL} = -11.49 - \underset{(-0.32)}{0.07}Price + \underset{(2.52)}{1.82}GDP + \underset{(1.78)}{0.29}TA^{FL}(-3) + \underset{(1.57)}{0.26}TA^{FL}(-4) - 0.21DUMMY03 \quad (5.7)$$

Adjusted R-squared = 0.95

*Note: t-statistics in parentheses

However to be ascertained that **the long-run relationship** between the tourism demand and its determinants does exist, **a residual series** of **equation (5.7)** must be stationary. In tandem with the former country models, to conduct a test for stationarity of the series, likewise, the tests of unit roots, **the ADF test and the PP test**, are employed and the outcome of testing are reported in **table 5.6E**. To repeat here, the test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.6E**, the two tests apparently indicate that the null hypothesis of no cointegration is strongly rejected at all significance levels.

Table 5.6E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-4.9121	-4.8921	0	-4.8940	-4.8387

**Note*: The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Provided the outcome demonstrated in **table 5.6E**, **the long-run relationship** between the Finnish tourism demand and its economic determinants is hence authentic. Consequently, **the elasticity of demand** is the next issue to be explored. According to **the long-run equation (5.7)**, it provides the estimated long-run elasticities composing of the price elasticity and the income elasticity as reported in other models. Additionally, they all have meaningfully and correct signs corresponding to the economic theory. Each of them is to be elaborated as follows;

To begin with **the price elasticity**, it is reported **inelastic at 0.07** in absolute terms. This demonstrates that the Finnish tourism demand is price inelastic. Analytically, the tourists are somewhat insensitive to changes in the costs of living in the destination. Technically, the price elasticity of 0.07 implies that **a 1 percent increase** in the tourism price **crowds out** the number of Finnish tourist arrivals **only 0.07 percent**, or vice versa.

Then, **the income elasticity** is estimated higher than one as expected at **1.82**. This indicates that Thai tourism is luxurious for the Finnish, in line with the results in the former country models. To interpret economically, the income elasticity of **1.82** signifies that **a rise** in the Finnish real GDP per capita of **1 percent** generates the arrivals of Finnish tourists of approximately 1.82 percent provided other factors remaining the same, or vice versa.

Last but not least, According to the empirical result, the variable capturing **the habit persistence** or the so-called **word-of-mount effects** is not significant in the Finnish tourism demand relative to the other country models. However, the coefficients of 0.29 and 0.26 still indicate some degree of habit persistence of the Finnish tourists.

Finally, in order to capture the effects of **the SARs outbreaks** on the number of Finnish tourist arrivals to Thailand, the variables named **DUMMY03** is included into the model. Based upon the finding in **equation (5.7)**, it reports that the outbreaks **crowd out** the number of Finnish visitors to Thailand approximately about **0.21 percent**.

5.1.2 Empirical results of the Johansen cointegration test

In the second part, **the approach of Johansen cointegration analysis** is discussed and prior to performing such a test, it is necessary that **a lag length *(p)*** for the VAR model to be specified. According to test statistics demonstrated in **table 5.6F**, the study will rely usually on **the Akaike Information Criterion (AIC)** in choosing **optimal lags** for VAR models and it suggests four optimal lags to be included in the model.

Table 5.6F: Test statistics for the length of lags of VAR in Finnish model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	314.9321	NA	6.32e-15	-12.8305	-12.5576	-12.7274
1	597.4296	470.8292*	3.84e-19*	-22.5596	-20.3765*	-21.7346*
2	638.2233	56.0914	6.16e-19	-22.2176	-18.1244	-20.6708
3	699.0617	65.9083	5.42e-19	-22.7109	-16.7075	-20.4422
4	757.3395	46.1366	8.36e-19	-23.0975*	-15.1839	-20.1069

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 percent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

As the lag length suggested earlier, the Johansen cointegration test is conducted via the same tool, **Eviews 6 software package**. The cointegration relationships among variables are established by using two likelihood ratio tests, **the trace and maximum eigenvalue tests** and they are reported in **table 5.6G** and **table 5.6H.**

Regarding the inference, if the calculated statistics are greater than the corresponding critical values at specific significance levels, then the null hypotheses presented in the first columns of the two tables are rejected.

According to **the trace statistics test** in **table 5.6H**, it suggests that the hypothesis that there is **1 cointegrating relationship (r=1)** cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 percent significance level. Therefore, based on the λ_{trace} statistics, it is likely to suggest that there are one cointegrating relationships in the model.

Meanwhile, according to **the maximal eigenvalue test** expressed in **table 5.6I**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 45.09, greater than the critical values at the 5 percent significance level of 33.88. The λ_{max} statistics suggest that, there are one cointegrating relationship among the variables in the Finnish model.

Table 5.6G: Trace tests for cointegrating vectors for the Finnish model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	84.44	69.8189	0.0022
r $\leq$ 1	r $\leq$ 2	39.3487	47.8561	0.2466
r $\leq$ 2	r $\leq$ 3	17.3049	29.7971	0.6175

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.6H: Maximum eigenvalue tests for cointegrating vectors for the Finnish model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	45.0944	33.8769	0.0016
r $\leq$ 1	r $\leq$ 2	22.0438	27.5843	0.2181

*Mackinnon-Haug-Michelis (1999) P-values

As reported by the λ_{max} and λ_{trace} tests in **tables 5.6H** and **table 5.6I**, the variables in the Belgian demand models have one cointegrating relationship and equation **(5.8)** normalised on the dependent variable can show coefficients in a state of equilibrium or a long-run relationship among variables as follows;

$$TA^{FL} = -0.91Price + 4.97GNI + 0.66MY^{RER} + 0.93PH^{RER}$$
$$(0.92) \quad (0.16) \quad (0.30) \quad (0.58) \qquad \textbf{(5.8)}$$

*Note: standard error in parentheses

Table 5.6I: Long-run coefficients of Finnish demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.9098 (0.9202)
GDP	4.9719 (0.1628)
MY^{RER}	0.6591 (0.3040)
PH^{RER}	0.9270 (0.5759)

*Standard Error Parentheses

It is obvious that almost all variables have economically meaningful signs and statistical significance. According to equation (5.8), **the price elasticity** is found to **inelastic** which is in line with the finding of the Engle-Granger (EG) approach. Analytically, its estimated coefficient designates that **a 1 percent rise** in the tourism price would result in **a 0.91 percent** decrease in the number of Finnish tourist arrivals to Thailand, or vice versa.

With respect to **the income variable**, real GDP per capita, **the estimated income elasticity** is reported highly elastic at 4.97, as expected. This indicates that **a 1 percent increase** in the Finnish real GDP per capita results in a 4.97percent increase in the number of Finnish visitors to Thailand, or vice versa.

Regarding the cross-price elasticities, based on the estimated coefficients in equation (5.8), it reports that **tourism in the alternative destinations**, **Malaysia** and **the Philippines**, is recognised **substitute** for **tourism in Thailand**. The result shows that if the tourism price in Thailand increases by 1 percent, it will generate tourist flows to Malaysia and the Philippines about 0.66 percent and 0.93 percent, respectively.

Chart 5.4A: Recursive price elasticity for Finnish model

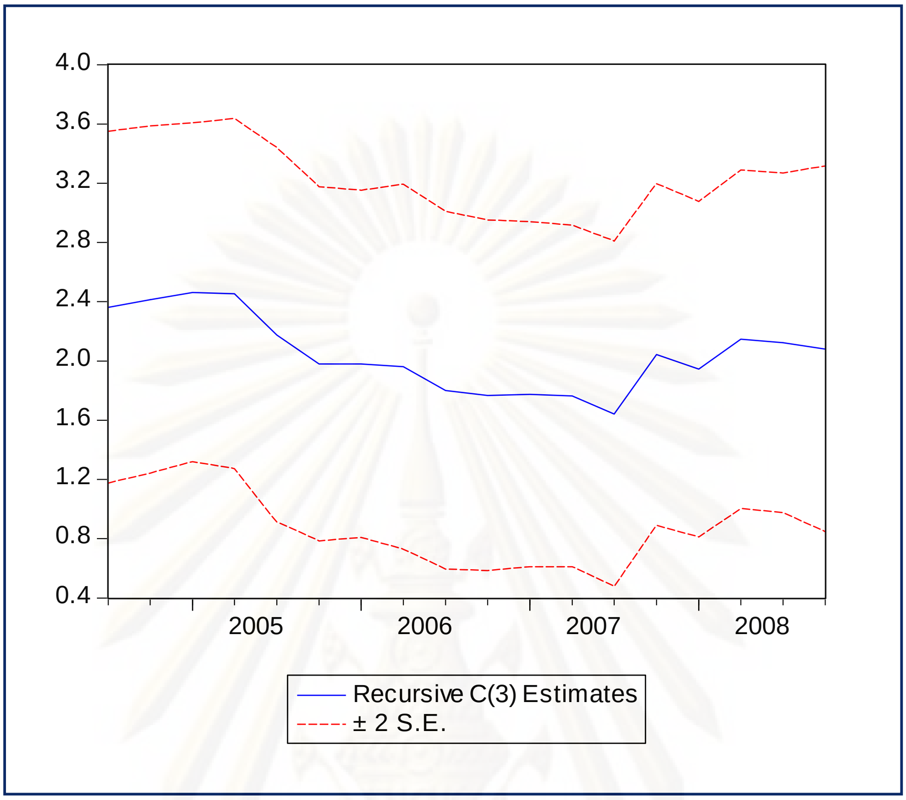


Chart 5.4B: Recursive income elasticity for Finnish model

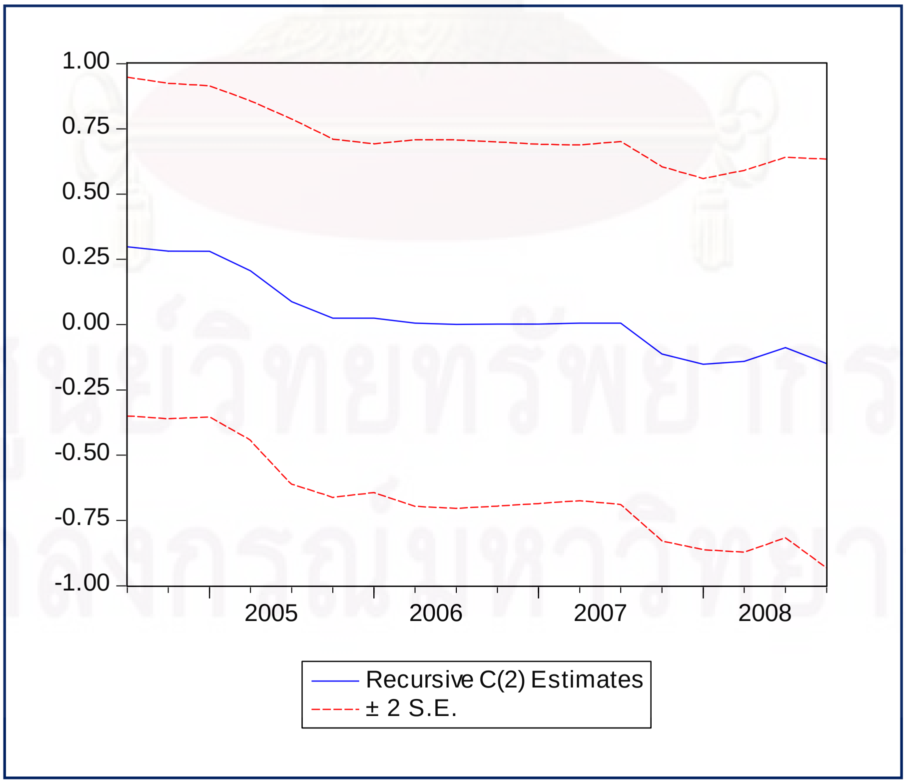
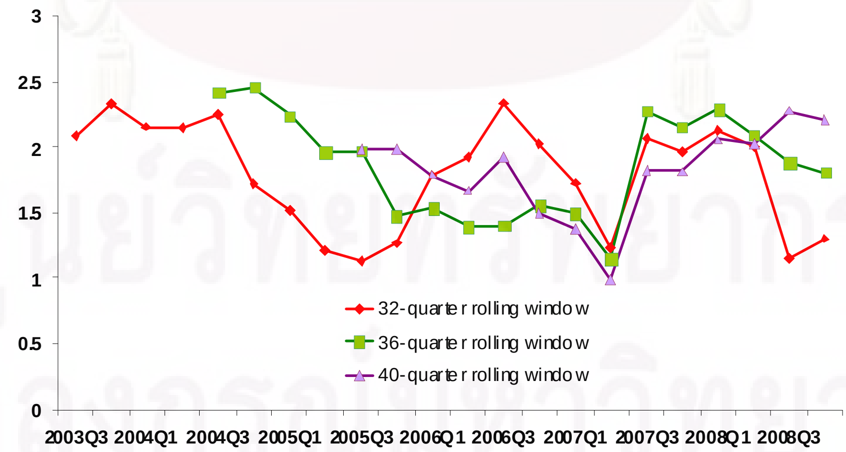


Chart 5.4C: Time-Varying Price Elasticity for Finnish Model from Estimations of Different Window Sizes

Source: Author's calculation

Chart 5.4D: Time-Varying Income Elasticity for Finnish Model from Estimations of Different Window Sizes



Source: Author's calculation

5.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for Finnish model

Following the procedures used in the former country models, to explore the evolution of the Finnish demand to Thai tourism overtime, the study employs the two approaches as outlined basic concepts and methodologies in the last chapter. The either two or one of them is utilized as tools to observe and analyse developments of trends of the inbound tourism demand elasticities.

With respect to empirical results of **the method of recursive ordinary least square (OLS)** exhibited in **chart 5.4A,** it report that, based the time-series over the period of 1996Q1-2008Q4, the price elasticity of the Finish tourism demand had fluctuated and become stable in a positive territory around 2.0-2.4. Meanwhile, the dynamics of the variable reported by the method of rolling regression are somewhat different from those reported by its counterpart. The price elasticity had displayed a downward trend over time according to the three rolling windows as demonstrated in **chart 5.4C**. Those values revealed that the price elasticity was inelastic.

Regarding the dynamics of **the income elasticity** of the Finnish model, the method of recursive OLS reveals that it had increased over time and recently showed a stable condition, moving roughly at 1.4 as demonstrated in chart 5.1B. This is line with the results reported by the approach of rolling regression based on the OLS estimation of three different window sizes. Nonetheless, the elasticity clearly expresses upward trends over the sample period compared to the method of recursive OLS and final values of the income elasticity is moving approximately at 2-2.5. These findings affirm that fact that Thai tourism is recognised luxurious. Additionally, they also help endorse the luxurious nature of tourism products suggested by the empirical findings of existing literature.

6. Empirical results of French model

As far as the French model is concerned, an issue of categorising model for unit root tests; it is in tandem with the former country models, **the dependent variable**- the quarterly number of French tourist arrivals to Thailand- is categorised into **the "intercept and trend" model**. Meanwhile, **the own price variable**, together with **the substitute price variables**, is classified into **the "intercept, no trend" model** as that fact that those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

With respect to the **unit root tests**, the procedures are followed in line with the former country models and the test statistics for all the variables in their logarithmic levels and for the two alternative models are presented in **table 5.7A** and **table5.7B**. Firstly, regarding **the ADF test**, the results clearly indicate that each of the series is nonstationary in its logarithmic level. In order to proceed to apply the cointegration tests, such nonstationarity must be abolished. To obtain stationary series, it is suggested by the economic theory to take first differences to all variables. The empirical results after taking first differences to the variables are demonstrated in **table 5.7C** and **table 5.7D.** By conducting such differences, the series obviously removes the nonstationary components in all cases and the null hypothesis of nonstationarity is apparently rejected at the 5 percent significance level suggesting that they are **integrated of order one**, or **I(1) variables**.

Whereas, in **table 5.7A** and **table 5.7B**, results of **the Phillips-Perron (PP)** unit root test are also displayed. The outcome is however not fundamentally different from those of the ADF test. Analytically, the results from the tests in the levels of the variables noticeably point to the presence of a unit root in all cases. In addition, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, suggesting that the series **are integrated of order one**, or **I(1)** and a summary is displayed in **table 5.7C** and **table 5.7D.**

Concerning the results of **the KPSS test**, they are somewhat mixed compared to the two methods. According to **table 5.7A** and **table 5.7B**, the test statistics point to nonstationarity, except the series of income variables. After taking first differences however the nonstationarity of the those variables is removed implying that they are **integrated of order one**, or **I(1).**

Notwithstanding, provided that the empirical results of the three tests, the majority report nonstationality of all variables and they are all **I(1) variables;** consequently, the cointegration analyses can be applied.

Table 5.7A: Unit root test statistics for economic variables in logarithmic levels for French model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-0.8853	-2.6607	0	-0.8049	-2.6207	-0.5770	-0.1751
Independent variables							
1. Price	-1.9136	-1.4532	0	-1.9124	-1.4428	-0.4963	-0.1767
2. Income variables							
2.1 GDP	-0.8920	-1.8676	2	-1.5024	-1.2712	-0.4850	-0.0968
2.2 HH	-1.7971	-1.3166	0	-1.8790	-1.5629	-0.5033	-0.0956
3. Substitute price variables							
3.1 MY^{RER}	-1.7451	-1.4101	0	-1.7442	-1.4243	-0.5301	-0.1756
3.2 SG^{RER}	-1.8073	-1.3985	0	-1.8064	-1.4143	-0.5251	-0.1754
3.3 PH^{RER}	-1.9021	-1.3605	0	-1.9018	-1.3448	-0.4802	-0.1806
3.4 ID^{RER}	-1.9935	-1.6526	0	-1.9908	-1.5963	-0.5006	-.01756

****Note**:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.7B: Summary of unit root test statistics for economic variables in logarithmic levels for French model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstationary	Nonstationary	Nonstationary
Independent variables			
1. Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Stationary
2.2 HH	Nonstationary	Nonstationary	Stationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.7C: Unit root test statistics for economic variables in log-difference for French model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-6.7719	-6.5770	0	-7.3221	-7.9323	0.2374	0.1149
Independent Variables							
1. Price	-5.8701	-6.0348	0	-5.8701	-6.0584	0.2338	0.0674
2. Income variables							
2.1 GDP	-2.3229	-4.3513	1	-4.2215	-4.5048	0.2091	0.1287
2.2 HH	-4.9057	-4.9610	0	-4.9117	-4.9096	1.999	0.0819
3. Substitute price variables							
3.1 MY^{RER}	-5.7707	-5.8711	0	-5.7704	-5.8902	0.1976	0.0674
3.2 SG^{RER}	-5.7147	-5.8451	0	-5.7144	-5.8546	0.2120	0.0660
3.3 PH^{RER}	-5.8493	-6.0470	0	-5.8493	-6.0636	0.2521	0.0656
3.4 ID^{RER}	-6.0026	-6.1474	0	-6.0028	-6.2471	0.2261	0.0748

****Note:*** Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.7D: Summary of unit root test statistics for economic variables in log-difference for French model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(1)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(0)
2.2 HH	I(1)	I(1)	I(0)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

6.1 Empirical findings of the cointegration analyses for the French model

6.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In tandem with the former country models, in the following section, the empirical results of the first method of the cointegration analysis, **the Engle-Granger (EG) test**, are presented.

According to **equation (5.9),** it expresses **the long-run relationship** between the tourism demand (TA^{FR}) – the number of French tourist arrivals to Thailand – and its economic determinants. In the model, the explanatory variables compose of the tourism price, real Household Consumption Expenditure per capita (HH), a lagged dependent variable, and a dummy variable as follows;

$$TA^{FR} = --1.35 - 0.34Price + 1.15HH + 0.77TA^{FR}(-4) - 0.31DUMMY03$$

(-2.20) (2.00) (8.26)

Adjusted R-squared = 0.81 **(5.9)**

*Note: t-statistics in parentheses

To be assured however that the long-run relationship between the tourism demand and its determinants really exists, a residual series of **equation (5.9)** must be stationary. To conduct a test for stationarity of the series, likewise, the tests of unit roots, **the ADF test and the PP test**, are employed and the outcome of testing are reported in **table 5.7E**. To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.7E,** the two tests apparently indicate that the null hypothesis of no cointegration is firmly rejected at all significance levels.

Table 5.7E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	**ADF test**		**Lag length of ADF**	**PP test**	
	Intercept, no trend	**Intercept and trend**		**Intercept, no trend**	**Intercept and trend**
Residual terms	-6.5562	--4.3952	0	-6.5589	-6.6073

**Note*: The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.7E**, **the long-run relationship** between the French tourism demand and its economic determinants is hence obvious. Consequently, the next issue of interest is the estimation of **the elasticity of demand**. Based upon **equation (5.9),** it shows that the estimated elasticities composing of the price elasticity, and the income elasticity and all of them have correct signs corresponding to the economic theory.

Concerning **the price elasticity**, it is reported **inelastic** at **0.34** in absolute terms and it denotes that the French tourists are somewhat insensitive to changes in the real exchange rate defined in the model. The price elasticity of 0.34 implies that **a 1 percent increase** in the price would **crowd out** the number of French visitors only **0.34 percent**, or vice versa.

Meanwhile **the income elasticity** is found to be **elastic** as expected at **1.15**. This reveals the fact that Thai tourism is luxurious for the French. In addition, the result is line with the most of the findings of most empirical literature. According to equation (5.9), the income elasticity of **1.15** signifies that **a rise** in the French real Household Consumption Expenditure per capita of **1 percent** would **increase** the arrivals of French tourists of approximately **1.15 percent**, or vice versa.

Next, the **equation (5.9)** also reveals the so-called **habit persistence** or **word-of-mount effect**s. The coefficient of **0.77 i**s high. In addition, it also shows that the variable capturing the habit persistence.

Lastly, to measure effects of **the SARs outbreaks** in 2003, the dummy variable named DUMMY03 is included into the model. According to the empirical result, the outbreaks **crowd** the number of French tourist arrivals **out** approximately **0.31 percent**.

6.1.2 Empirical results of the Johansen cointegration test

In the subsequent section, empirical results of **the Johansen cointegration analysis** are presented. Firstly, it is about a specification of **a lag length *(p)*** for the **VAR model** and according to test statistics demonstrated in table 5.7F, the study will rely on **the Akaike Information Criterion (AIC)** in choosing **optimal lags** for VAR models. It suggests four optimal lags to be included in the model.

Table 5.7F: Test statistics for the length of lags of VAR in French model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	297.9789	NA	1.28e-14	-12.12412	-11.85124	-12.02100
1	604.5457	510.9446	2.86e-19	-22.85607	-20.67300*	-22.03109*
2	651.7264	64.87343	3.51e-19	-22.78026	-18.68701	-21.23342
3	704.1694	56.81328	4.38e-19	-22.92372	-16.92029	-20.65502
4	790.2711	68.16390*	2.12e-19*	-24.46963*	-16.55601	-21.47906

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 percent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

According to the lag length suggested earlier, the Johansen cointegration test is conducted via **Eviews 6 software package**. The cointegration relationships among variables are established by using two likelihood ratio tests, **the trace and maximum eigenvalue tests** and they are reported in **table 5.3G** and **table5.3H**. The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

Table 5.7G: Trace tests for cointegrating vectors for the French model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	316.7686	95.75366	0.0000
r ≤ 1	r ≤ 2	173.7449	69.81889	0.0000
r ≤ 2	r ≤ 3	98.16054	47.85613	0.0000
r ≤ 3	r ≤ 4	47.76458	29.79707	0.0002
r ≤ 4	r ≤ 5	24.06930	15.49471	0.0020
r ≤ 5	r ≤ 6	8.849118	3.841466	0.0029

Table 5.7H: Maximum eigenvalue tests for cointegrating vectors for the British model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	143.0237	40.07757	0.0001
r ≤ 1	r ≤ 2	75.58435	33.87687	0.0000
r ≤ 2	r ≤ 3	50.39596	27.58434	0.0000
r ≤ 3	r ≤ 4	23.69528	21.13162	0.0213
r ≤ 5	r ≤ 6	15.22019	14.26460	0.0352
r ≤ 6	r ≤ 7	8.849118	3.841466	0.0029

*Mackinnon-Haug-Michelis (1999) P-values

Based upon the trace statistics test in **table 5.7G** are taken into account, it suggests that the hypothesis that there is **6 cointegrating relationships** (r=6) cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 percent significance level. Therefore, the λ_{trace} statistics is likely to suggest that there are **six cointegrating relationships** in the French model.

Secondly, according to **the maximal eigenvalue test** expressed in **table 5.3H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 143.02, greater than the critical values at the 5 percent significance level of 40.08. The λ_{max} statistics suggest that, there are **seven cointegrating relationships** among the variables in the French model.

To sum up, based on the two tests, it can conclude that there are **at least six cointegrating relationships** existing among the variables in the Belgian demand to Thai tourism.

Table 5.7I: Long-run coefficients of French demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.7578 (0.2380)
HH	7.5004 (0.3847)
MY^{RER}	-1.3785 (0.0925)
PH^{RER}	1.9418 (0.1574)
ID^{RER}	0.2142 (0.0228)

*Standard Error Parentheses

As reported by the λ_{max} and λ_{trace} tests in **table 5.7G** and **table 5.7H**, and **table 5.7I,** the variables in the French tourism demand models have at least six cointegrating relationships and **equation (5.10)** normalised on the dependent variable shows coefficients in a state of equilibrium or a long-run relationship among variables.

$$TA^{FR} = -0.76Price + 7.50HH - 1.38MY^{RER} + 1.94PH^{RER} + 0.21\ ID^{RER} \quad (5.10)$$
$$(-3.18) \quad (19.50) \quad (-14.90) \quad (12.34) \quad (9.39)$$

*Note: t-statistics in parentheses

It is apparent that almost all variables have economically meaningful signs and statistical significance. According to equation (5.10), the **price elasticity** is **inelastic** and this is in line with that value reported by the method of Engle-Granger (EG). Its estimated coefficient of 0.76 designates that a **1 per cent rise** in the tourism price in Thailand would result in **a 0.76 percent decrease** in the French tourist arrivals, vice versa.

Meanwhile, **the estimated income elasticity** is 7.50 which is considered highly elastic and it indicates that a **1 per cent** increase in France's real Household Consumption Expenditure per capita (HH) would result in **a 7.50 per cent increase** in French visitors to Thailand, or vice versa.

Regarding **the cross-price elasticity**, based on the estimated coefficients in equation (5.10), it reports that **tourism** in the alternative destination, **Malaysia,** is perceived as **complementary** to tourism in Thailand, meanwhile tourism in **Singapore,** and **the Philippines** are recognised **substitute** for tourism in Thailand.

Chart 5.5A: Recursive price elasticity for French model

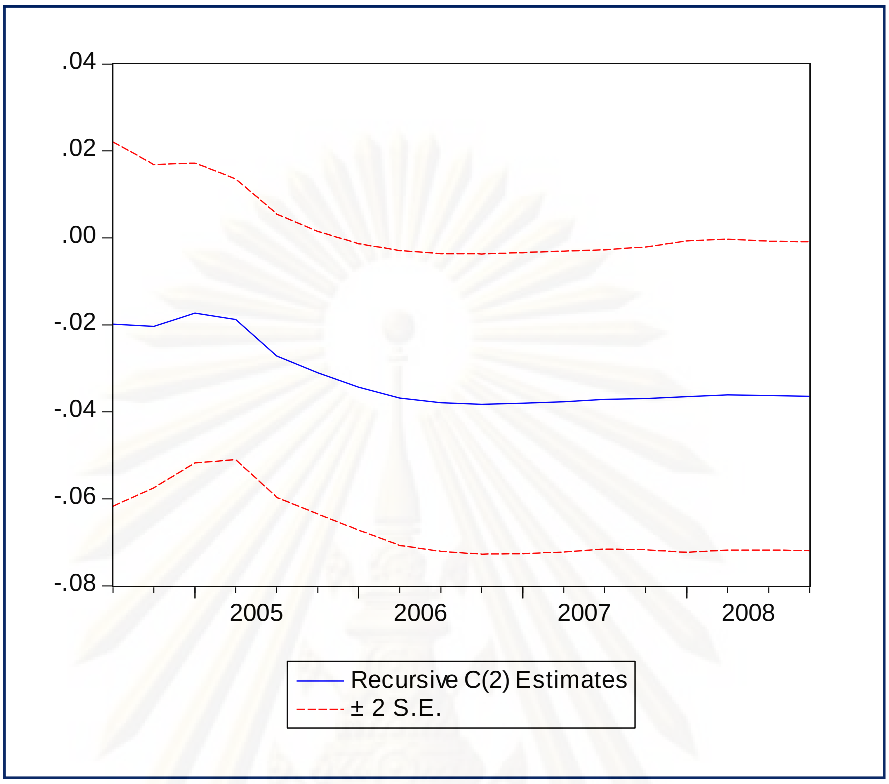


Chart 5.5B: Recursive income elasticity for French model

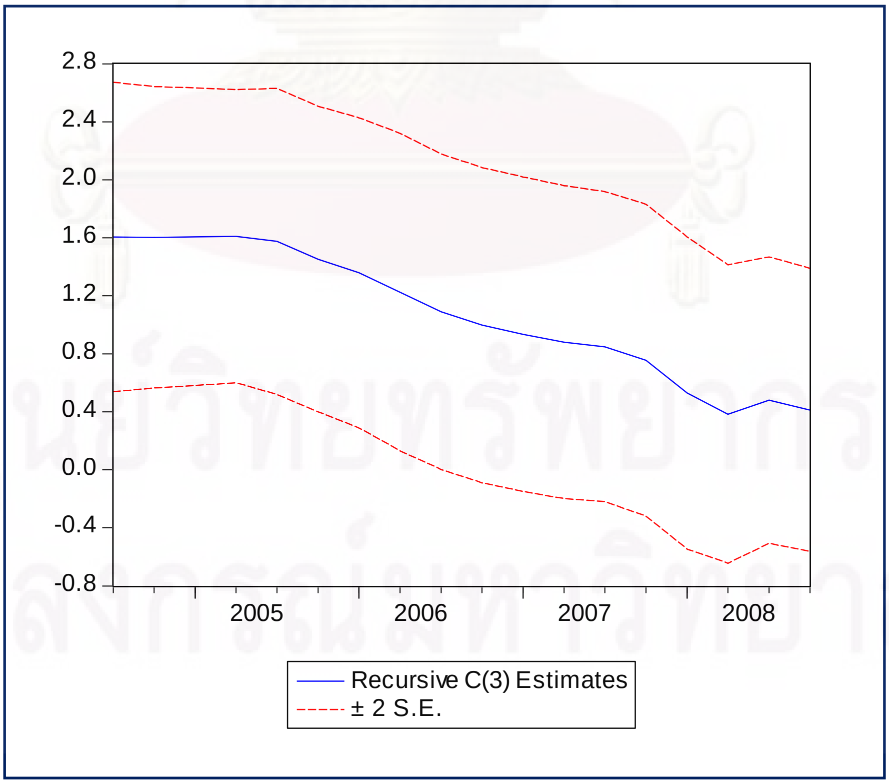
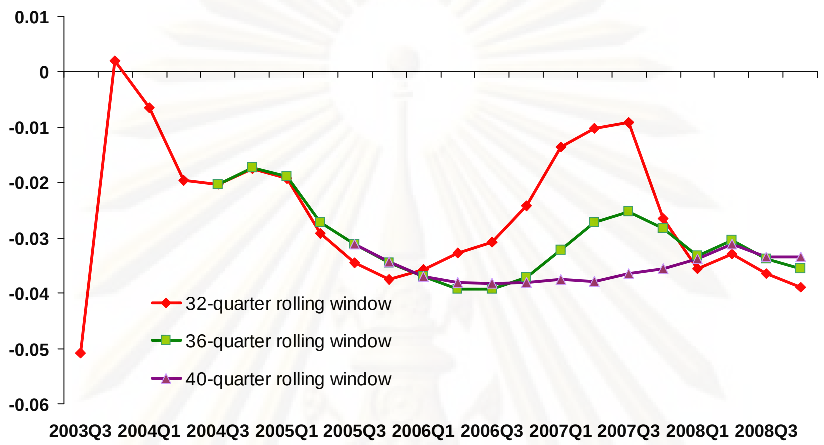
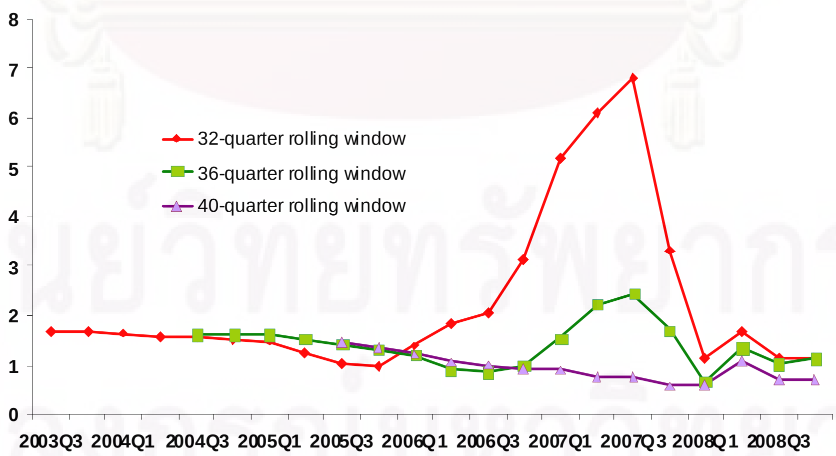


Chart 5.5C: Time-Varying Price Elasticity for French Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.5D: Time-Varying Income Elasticity for French Model from Estimations of Different Window Sizes



Source: Author's calculation

6.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for French model

In the following section, the two approaches of exploring dynamics of the elasticity of demand of the French model as outlined basic concepts and methodologies in the last chapter are to be presented.

With respect to empirical results of **the method of recursive ordinary least square (OLS)**, exhibited in **chart 5.5A**, they report that the own price elasticity of the French tourism demand had slightly declined and become stable in a negative territory approximately -0.4. In addition, over the period, the price elasticity of the French model rarely experienced dramatic shifts. Meanwhile, the dynamics of the variable reported by the method of **rolling regression** are not fundamentally and significantly different from those reported by its counterpart, but they showed that the price elasticity was more inelastic. The price elasticity had displayed a downward trend over time according to the three rolling windows as demonstrated in **chart 5.5C.** In sum, the two methods show that the price elasticity is inelastic, in other words, it is somewhat irresponsive to changes in costs of living in the tourism destination, Thailand.

Regarding **the dynamics of the income elasticity** of the model, the method of recursive OLS reveals that it had decreased over time and showed a partially stable condition, moving roughly around 0.4-0.8 as demonstrated in **chart 5.5B**. However, this is not line with the results reported by the approach of rolling regression based on the OLS estimation of three different window sizes. The elasticity clearly expresses constant trends over the sample period compared to the method of recursive OLS and final values of the income elasticity is moving approximately at 1.0-2.0. These findings affirm that fact that Thai tourism is recognised luxurious by the French.

7. Empirical results of German model

The next country model is **the German model**, an issue of categorising model for unit root tests; it is in tandem with the former country models, **the dependent variable**- the quarterly number of German tourist arrivals to Thailand- is categorised into **the "intercept and trend" model**. Meanwhile, **the own price variable**, together with **the substitute price variables**, is classified into **the "intercept, no trend" model** as that fact that those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

Regarding the results of the unit root testing, followed the same procedure specified in the former country models, the test statistics for all the variables in their logarithmic levels and for the two alternative models are presented **in table 5.8A** and **table5.8B**. The results clearly indicate that each of the series is **nonstationary** in its logarithmic level except the series of the dependent variable and all income variables. However, in order to proceed to apply the cointegration tests, such nonstationarity must be abolished. To obtain stationary series, it is suggested by the economic theory to take first differences to all variables. The empirical results after taking first differences to the variables are demonstrated in **table 5.8C** and **table 5.8D.** By conducting such differences, the series obviously removes the nonstationary components in all cases and the null hypothesis of nonstationarity is apparently rejected at the 5 percent significance level suggesting that they are **integrated of order one, I(1) variables**.

Whereas, in **table 5.8A** and **table 5.8B**, results of **the Phillips-Perron (PP)** unit root test are also displayed. The outcome is somewhat different from the respective ADF tests mentioned earlier. It is obvious that the results from the tests in the levels of the variables noticeably point to the presence of a unit root in almost all cases except the income series. In addition, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, suggesting that the series are integrated of order one, I(1) and a summary is displayed in **table 5.8C** and **table 5.8D**.

Concerning the results of **the KPSS test,** they are not different from those of the PP test. According to **table 5.8A** and **table 5.8B**, the test statistics point to nonstationarity, except the series of all income variables. After taking **first differences** however the nonstationarity of those variables is removed implying that they are **integrated of order one, I(1)**.

Notwithstanding, provided that the empirical results of the three tests, the majority report nonstationality of all variables and they are all I(1) variables; consequently, the cointegration analyses can be applied.

Table 5.8A: Unit root test statistics for economic variables in logarithmic levels for German model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-1.3356	-3.5359	0	-1.3356	-3.4586	0.8235	0.1885
Independent variables							
1Price	-1.1830	-1.7894	0	-1.2332	-1.7894	0.7971	0.1044
2. Income variables							
2.1 GDP	-1.0406	-3.8498	1	-1.3412	-3.9109	0.7941	0.0735
2.2 GNI	-0.4547	-4.7058	0	-0.7450	-4.7261	0.8744	0.1318
2.3 Gross	-1.0050	-3.6593	0	-0.7910	-3.5801	0.8476	0.1241
2.4 Final	-1.1902	-0.6731	2	-1.9867	-7.9279	0.5053	0.1857
3. Substitute price variables							
3.1 MY^{RER}	-1.0947	-1.9562	0	-1.0947	-2.1046	0.7922	0.0850
3.2 SG^{RER}	-0.8804	-1.8014	0	-0.9658	-1.9889	0.7799	0.1010
3.3 PH^{RER}	-1.0627	-1.5680	0	-1.0629	-1.7713	0.7886	0.1143
3.4 ID^{RER}	-1.8766	-1.6711	0	-1.9464	-1.6711	0.6797	0.1556

****Note:*** Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.8B: Summary of unit root test statistics for economic variables in logarithmic levels for German model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Stationary	Nonstationary	Nonstationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Stationary	Stationary	Stationary
2.2 GNI	Stationary	Stationary	Stationary
2.3 Gross	Stationary	Stationary	Stationary
2.4 Final	Stationary	Stationary	Stationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstatioinary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstatioinary	Nonstationary	Nonstatioinary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.8C: Unit root test statistics for economic variables in log-difference for German model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-8.6881	-7.0512	0	-10.1963	-10.0971	0.1190	0.0899
Independent Variables							
1. Price	-6.2674	-6.2251	0	-6.2250	-6.1769	0.0909	0.0807
2. Income variables							
2.1 GDP	-9.7947	-9.6913	0	-10.1680	-10.0651	0.0652	0.0611
2.2 GNI	-10.7236	-10.6109	0	-10.8914	-10.7844	0.1336	0.0796
2.3 Gross	-8.9422	-8.8841	0	-8.9857	-8.8841	0.0844	0.0592
2.4 Final	-7.3835	-3.8210	1	-9.7388	-36.3421	0.0876	0.0493
3. Substitute price variables							
3.1 MY^{RER}	-6.3165	-6.2574	0	-6.3057	-6.2438	0.0769	0.0755
3.2 SG^{RER}	-6.2745	-6.2035	0	-6.2745	-6.2035	0.1131	0.1129
3.3 PH^{RER}	-6.3439	-6.3023	0	-6.3450	-6.2877	0.1217	0.1095
3.4 ID^{RER}	-4.4600	-4.5370	0	-4.1304	-4.1526	0.1737	0.0383

****Note:*** Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.8D: Summary of unit test statistics for economic variables in log-difference for German model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(0)	I(1)	I(1)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(0)	I(0)	I(0)
2.2 GNI	I(0)	I(0)	I(0)
2.3 Gross	I(0)	I(0)	I(0)
2.4 Final	I(0)	I(0)	I(0)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

7.1 Empirical findings of the cointegration analyses for the German model

7.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

As explicitly declared in the first chapter that one of the objectives of this study is to examine the determinants of the European demand to Thai tourism, together with estimate the long-run tourism demand elasticities, in the following section, the empirical results of the first method of the cointegration analysis, the Engle-Granger (EG) test, are presented.

According to equation (5.11), it expresses **the long-run relationship** between the tourism demand (TA^{GR}) – the number of German tourist arrivals to Thailand – and its economic determinants. In the model, the explanatory variables compose of the tourism price, real German GDP per capita, a lagged dependent variable and dummy variables as follows;

TA^{GR} = -6.17 - 0.17Price + 1.15GDP + 0.36TA^{GR}(-4) – 0.07DUMMY03 – 0.02DUMMY05
(-2.59) (3.93) (2.94)

Adjusted R-squared = 0.79

*Note: t-statistics in parentheses **(5.11)**

To be assured however that **the long-run relationship** between the tourism demand and its determinants really exists, a residual series of equation (5.11) must be stationary. To conduct a test for stationarity of the series, likewise, the tests of unit roots, **the ADF test and the PP test**, are employed and the outcome of testing are reported in **table 5.8E**. To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.8E**, the two tests apparently indicate that the null hypothesis of no cointegration is firmly rejected at all significance levels.

Table 5.8E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	**ADF test**		**Lag length of ADF**	**PP test**	
	Intercept, no trend	**Intercept and trend**		**Intercept, no trend**	**Intercept and trend**
Residual terms	-4.5038	-4.5638	0	-4.6282	-4.6831

****Note:*** The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.8E**, the long-run relationship between the Belgian tourism demand and its economic determinants is hence attested. Consequently, the next issue of interest is the estimation of the elasticity of demand and the long-run equation (5.11) shows that the estimated elasticities composing of **the price elasticity** and **the income elasticity**. They also have correct signs corresponding to the economic theory.

Concerning **the price elasticity**, it is reported **inelastic** at **0.17** in absolute terms. This implies that the German tourists are somewhat insensitive to changes in the real exchange rate defined in the model, as a **1 percent increase** in the price would **crowd out** the number of German visitors **only 0.17 per cent**, or vice versa.

Meanwhile **the income elasticity** is reported somewhat **elastic** and higher than one at **1.15**. The result is line with the most of the findings of most empirical literature indicating that tourism is normally perceived as luxurious. According to equation (5.11), the income elasticity of 1.15 signifies that **a rise** in the German real GDP per capita of **1 percent** would **increase** the arrivals of German tourists of approximately **1.15 percent**, or vice versa.

Last but not least, the variable capturing **the habit persistence** or the so-called **word-of-mount effects** is significant in the German tourism demand as it indicates a relatively high degree of habit persistence and the according to equation (5.11) reports at 0.36.

Finally, to measure the effects of **the SARs outbreaks** in 2003 and **the Tsunami outbreak** in 2004Q4, the dummy variables DUMMY03 and DUMMY05 are included into the model. Equation (5.11) reports that the SARs outbreaks in 2003 crowd the number of tourist arrivals out approximately **0.07 percent**, meanwhile the Tsunami outbreak affects the number of visitors about **0.02 percent**.

2.1.2 Empirical results of the Johansen cointegration test

Likewise the EG method, all of the time-series data are required to be integrated of order one, I(1); consequently, the Johansen cointegration analysis can apply to those time-series data. Nevertheless, prior to performing such a test, it is necessary that **a lag length *(p)*** for the VAR model to be specified. According to test statistics demonstrated in **table 5.8F**, the study will rely on **the Akaike Information Criterion (AIC)** in choosing

optimal lags for VAR models and it suggests four optimal lags to be included in the model.

Table 5.8F: Test statistics for the length of lags of VAR in German model

Lag	LogL	LR	FPE	AIC	SC	HO
0	489.8888	NA	4.31e-18	-20.12037	-19.84748	-20.01725
1	749.4671	432.6304	6.82e-22*	-28.89446	-26.71139*	-28.06948*
2	789.0264	54.39404	1.15e-21	-28.50110	-24.40785	-26.95425
3	850.3175	66.39876*	9.92e-22	-29.01323	-23.00979	-26.74452
4	917.3389	53.05860	1.06e-21	-29.76412*	-21.85050	-26.77355

*indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5 percent level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Based on the lag length suggested earlier, the Johansen cointegration test is conducted by employing **Eviews 6 software package**. The cointegration relationships among variables are established by using two likelihood ratio tests, the trace and maximum eigenvalue tests and they are reported in **table 5.8G** and **table 5.8H**. The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables are to be rejected.

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.8G: Trace tests for cointegrating vectors for the German model

Trace statistics			Critical values	Prob*
Null	Alternative	Trace	95percent	
r = 0	r = 1	127.9137	69.8189	0.0000
r ≤ 1	r ≤ 2	81.9029	47.8561	0.0000
r ≤ 2	r ≤ 3	47.8212	29.7971	0.0002
r ≤ 3	r ≤ 4	21.6418	15.4947	0.0052
r ≤ 4	r ≤ 5	1.5576	3.8415	0.2120

Table 5.8H: Maximum eigenvalue tests for cointegrating vectors for the German model

Maximum eigenvalue statistics			0.05	
Null	Alternative	Maximum Eigenvalue	Critical values	Prob*
r = 0	r = 1	46.0108	33.8769	0.0011
r ≤ 1	r ≤ 2	34.0818	27.5843	0.0064
r ≤ 2	r ≤ 3	26.1794	21.1316	0.0089
r ≤ 3	r ≤ 4	20.0841	14.2646	0.0054
r ≤ 4	r ≤ 5	1.5576	3.8415	0.2120

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.8I: Long-run coefficients of German demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.3824 (0.1685)
GDP	1.8598 (0.3785)
MY^{RER}	-0.0606 (0.1351)
ID^{RER}	0.2505 (0.0443)

*Standard Error Parentheses

According to **the trace statistics test** demonstrated in **table 5.8G,** it suggests that the hypothesis that there is **4 cointegrating relationships** (r=4) cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5percent significance level. Therefore, the λ_{trace} statistics is likely to suggest that there are 4 cointegrating relationships in the German model.

Regarding **the maximal eigenvalue test** expressed in **table 5.8H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 46.01, greater than the critical values at the 5 percent significance level of 33.88. Based on table 5.8I, the λ_{max} statistics also suggest that there are **4 cointegrating relationships** among the variables in the model.

As reported by the λ_{max} and λ_{trace} tests in **table 5.8G** and **table 5.8H**, the variables in the German demand models have at most four cointegrating relationships and equation (5.12) normalised on the dependent variable shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

$$TA^{GR} = -0.38Price + 1.86GDP - 0.06MY^{RER} + 0.25ID^{RER}$$
$$(0.17) \quad (0.38) \quad (0.14) \quad (0.04) \qquad \mathbf{(5.12)}$$

*Note: standard error in parentheses

It is apparent that almost all variables have economically meaningful signs and statistical significance. According to equation (5.12), **the price elasticity** is inelastic and this is found to be in line with that value reported by the method of Engle-Granger (EG). Its estimated coefficient designates that **a 1 percent rise** in the tourism price in Thailand would result in a **0.38 percent decrease** in the number of German visitors, or vice versa.

Meanwhile, **the income elasticity** is reported **elastic** at **1.86**. This indicates that a **1 percent increase** in German real GDP per capita results in a **1.86 percent increase** in the number of German to tourist arrivals to Thailand.

Regarding **the cross-price elasticities**, based on the estimated coefficients in equation (5.12), it reports that tourism in the alternative destinations, Malaysia, is recognised complementary to tourism in Thailand, whereas, the German tourists perceive tourism in **Indonesia** as **substitute** for tourism in Thailand.

Chart 5.6A: Recursive price elasticity for German model

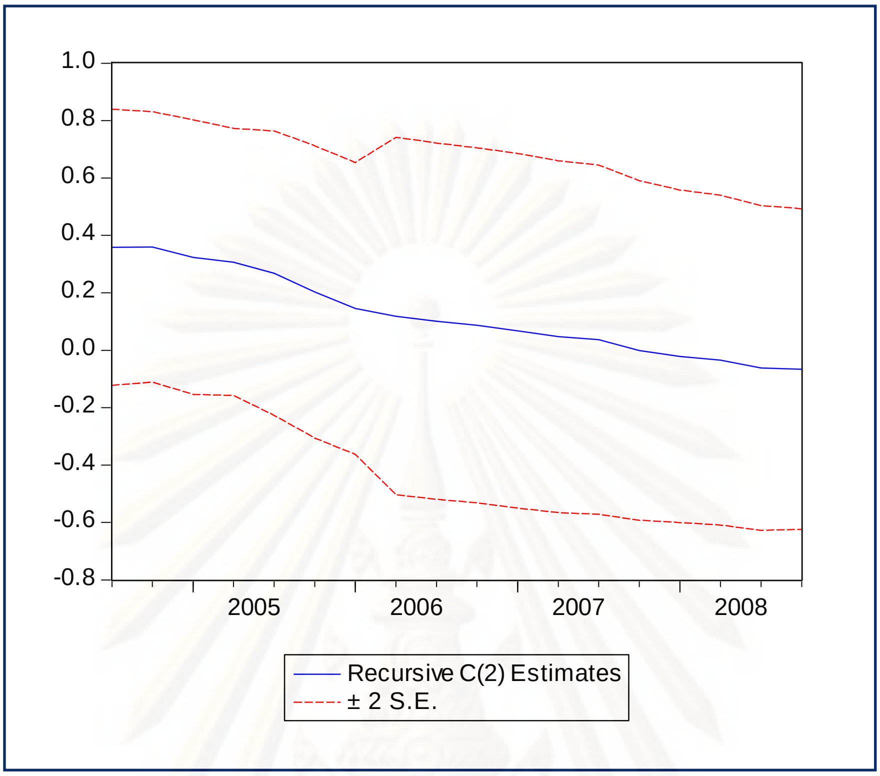


Chart 5.6B: Recursive income elasticity for German model

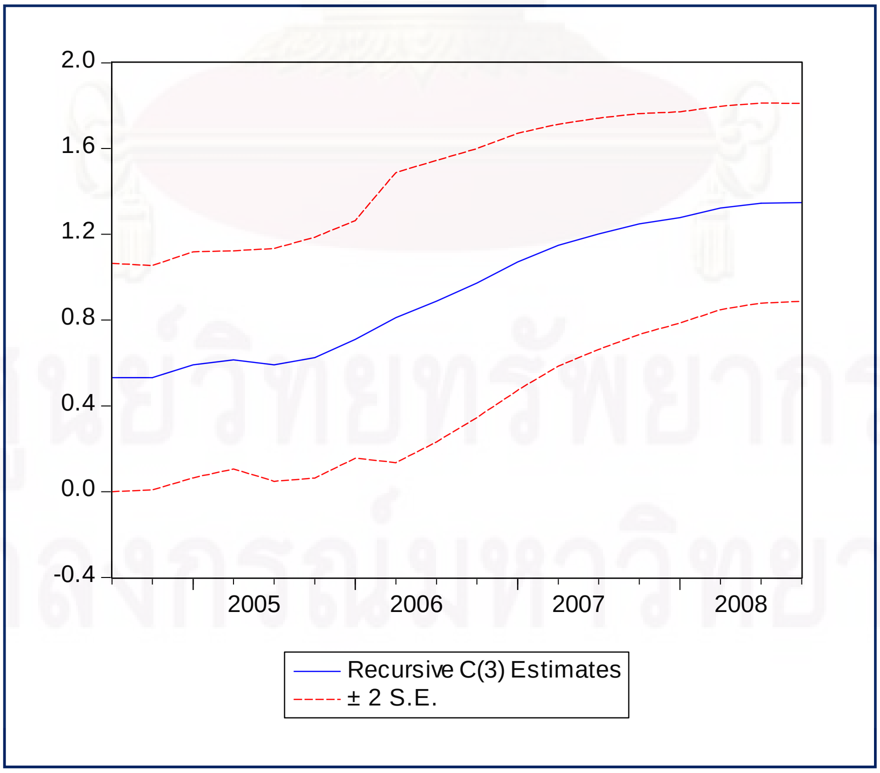
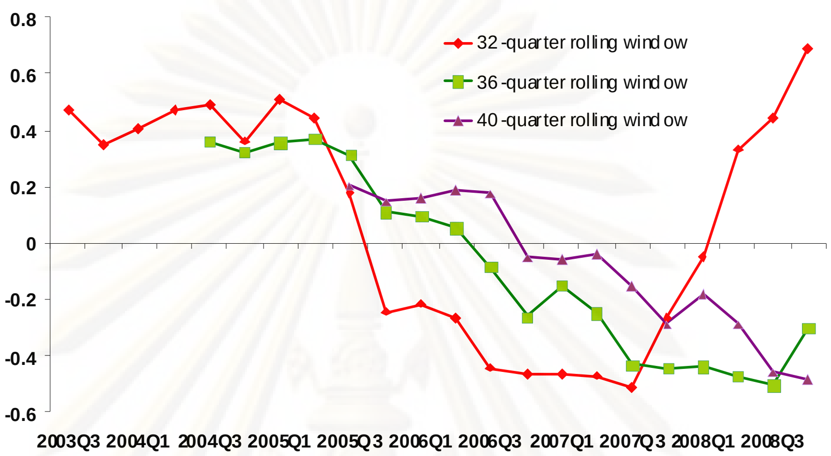
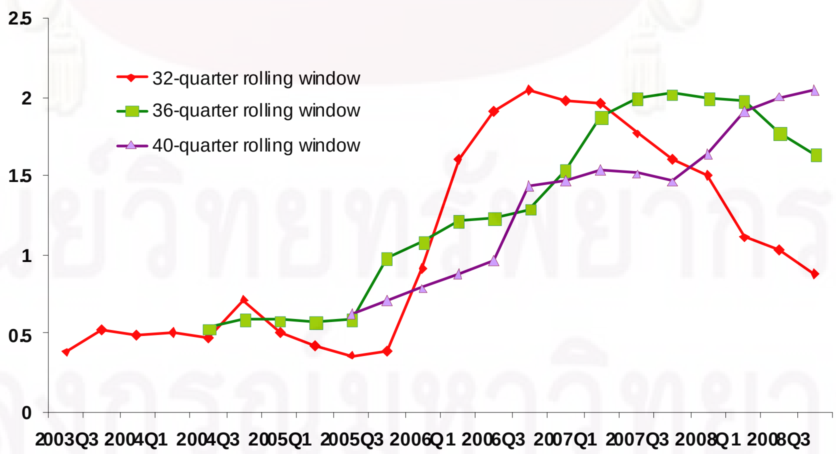


Chart 5.6C: Time-Varying Price Elasticity for German Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.6D: Time-Varying Income Elasticity for German Model from Estimations of Different Window Sizes



Source: Author's calculation

7.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for German model

In tandem with the other country model, to explore the evolution of the German demand to Thai tourism overtime, the study therefore employs the two approaches as outlined basic concepts and methodologies in the last chapter.

With respect to empirical results of **the method of recursive ordinary least square (OLS)**, exhibited in **chart 5.6A**, they report that, based the time-series over the period of 1996Q1-2008Q4, **the price elasticity of the German tourism demand** had slightly declined and become stable in a negative territory approximately -0.2-0. Meanwhile, the dynamics of the variable reported by the method of **rolling regression** are not fundamentally and significantly different from those reported by its counterpart. The price elasticity had displayed a downward trend over time according to the three rolling windows as demonstrated in **chart 5.6C**. In sum, the two methods show that the price elasticity of German demand is inelastic.

Regarding the dynamics of **the income elasticity of the German model**, the method of recursive OLS reveals that it had evolved increasingly over time and finally showed a stable condition, moving roughly at 1.2 as demonstrated in **chart 5.6B**. This is line with the results reported by the approach of rolling regression based on the OLS estimation of three different window sizes demonstrated in **chart 5.6D.** The elasticity clearly expresses upward trends over the sample period compared to the method of recursive OLS and final values of the income elasticity is moving approximately at 1-2.0. These findings mean that fact that the German income elasticity of demand is somewhat elastic.

8. Empirical results of Italian model

As far as the Italian model is concerned, an issue of categorising model for unit root tests is in tandem with the former country models, **the dependent variable**- the quarterly number of Italian tourist arrivals to Thailand- is categorised into **the "intercept and trend" model**. Meanwhile, **the own price variable**, together with **the substitute price variables**, is classified into **the "intercept, no trend" model** as that fact that those variables hardly express apparent trends similarly to the former models. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

Concerning the procedure of unit root testing, it is proceeded in line with the other country models. With respect to the outcome of **the ADF test**, the test statistics for all the variables in their logarithmic levels and for the two alternative models are presented in **table 5.9A** and **table5.9B**. The results clearly indicate that each of the series is **nonstationary** in its **logarithmic level**. In order to proceed to apply the cointegration tests, such nonstationarity must be abolished. To obtain stationary series, the economic theory suggests taking **first differences** to all variables. The empirical results after taking first differences to the variables are demonstrated in **table 5.9C** and **table 5.3D**. By conducting such differences, the series obviously removes the nonstationary components in all cases and the null hypothesis of nonstationarity is apparently rejected at the 5 percent significance level suggesting that they are **integrated of order one**, or **I(1) variables**, as expected.

Regarding the second approach of unit root testing, **the Phillips-Perron (PP)** unit root test, its results of testing are also expressed in **table 5.9A** and **table 5.9B**, results of are displayed. Empirically, the outcome is however not different from those of

the ADF tests. Obviously, the results from the tests in the levels of the variables noticeably point to the presence of a unit root in almost all of the cases. Additionally, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, suggesting that the series are **integrated of order one**, **I(1)** and a summary is displayed in **table 5.9C** and **table 5.9D**.

Concerning the results of **the KPSS test**, they are likely to report to the almost same results with the two methods. According to **table 5.9A** and **table 5.9B**, the test statistics point to nonstationarity, except the tourism price variable. Like the two methods, those variables need to be taken first differences to remove the nonstationary components and after taking differences the nonstationarity of the variables is removed implying that they are **integrated of order one**, **I(1).**

Provided that the empirical results of the three tests, the majority report nonstationality of all variables and they are all **I(1) variables**; consequently, the cointegration analyses can be applied.

Table 5.9A: Unit root test statistics for economic variable in logarithmic levels for Italian model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-2.7778	-3.7875	0	-2.7778	-3.7875	0.5127	0.1780
Independent variables							
1.Price	-1.2428	-1.8642	0	-1.2531	-1.8642	0.8232	0.1094
2. Income variables							
2.1 GDP	0.8249	-0.6789	0	-3.1824	-0.5514	0.8249	0.2430
2.2 GNI	-2.9625	1.0254	0	-2.9003	0.2885	0.8052	0.2442
2.3 Gross	-2.7781	0.0498	0	-2.8710	-0.0948	0.7831	0.2406
2.4 Final	-3.5404	0.2635	0	-3.4102	-7.5230	0.8516	0.3432
3. Substitute price variables							
3.1 MY^{RER}	-1.2519	-1.9965	0	-1.2686	-2.0919	0.8116	0.1003
3.2 SG^{RER}	-1.0952	-1.8664	0	-1.0952	-1.9585	0.8007	0.1042
3.3 PH^{RER}	-1.1704	-1.8323	0	-1.1806	-1.9114	0.8249	0.1124
3.4 ID^{RER}	-1.9189	-1.6830	0	-1.9273	-1.9422	0.7880	0.1640

****Note***: Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.9B: Summary of unit root test statistics for economic variables in logarithmic levels for Italian model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Stationary	Stationary	Nonstationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Stationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Nonstationary
2.2 GNI	Nonstationary	Nonstationary	Nonstationary
2.3 Gross	Nonstationary	Nonstationary	Nonstationary
2.4 Final	Nonstationary		Nonstationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.9C: Unit root test statistics for economic variables in log-difference for Italian model

Variables	ADF test Intercept, no trend	Intercept and trend	Lag length of ADF	PP test Intercept, no trend	Intercept and trend	KPSS test Intercept, no trend	Intercept and trend
Dependent variable							
TA	-7.2324	-7.1816	1	-15.1471	-19.8755	0.3337	0.3705
Independent Variables							
1. Price	-6.7869	-6.7377	0	-6.7809	-6.7296	0.0907	0.0734
2. Income variables							
2.1 GDP	-5.9265	-6.9092	0	-5.9185	-6.8879	0.7398	0.0778
2.2 GNI	-2.4694	-7.6628	1	-6.4558	-7.7413	0.7094	0.1019
2.3 Gross	-6.7988	-8.0809	0	-6.9006	-8.0809	0.7133	0.0806
2.4 Final	-6.2390	-21.8461	0	-6.7505	-59.1843	0.7856	0.0804
3. Substitute price variables							
3.1 MY^{RER}	-6.7931	-6.7375	0	-6.7882	-6.7038	0.0737	0.0669
3.2 SG^{RER}	-6.6831	-6.6173	0	-6.6832	-6.6174	0.0834	0.0798
3.3 PH^{RER}	-6.8408	-6.7871	0	-6.8398	-6.7818	0.0878	0.0744
3.4 ID^{RER}	-4.9793	-5.0602	0	-4.8035	-4.7772	0.1505	0.0333

****Note:*** Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.9D: Summary of unit root test statistics for economic variables in log-difference for Italian model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(0)	I(0)	I(1)
Independent variables			
1. Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(1)
2.2 GNI	I(1)	I(1)	I(1)
2.3 Gross	I(1)	I(1)	I(1)
2.4 Final	I(1)	I(1)	I(1)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

8.1 Empirical findings of the cointegration analyses for the Italian model

8.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In the following section, issues of estimating the long-run tourism demand elasticities for the Italian are to be discussed. First of all, the empirical results of the first method of the cointegration analysis, **the Engle-Granger (EG) test**, are presented.

According to **equation (5.13)**, it expresses **the long-run relationship** between **the tourism demand (TA^{IT})** – the number of Italian tourist arrivals to Thailand – and its **economic determinants**. In the model, the explanatory variables compose of the tourism price, real Italian GDP per capita, the lagged dependent variable, respectively, and a dummy variable as follows;

TA^{IT} = -5.92 -0.12Price + 1.56GDP + 0.32TA^{IT} (-4) -0.45 DUMMY03
(-0.51) (2.13) (-2.82)
Adjusted R-squared = 0.51
*Note: t-statistics in parentheses **(5.13)**

To be assured however that the **long-run relationship** between the tourism demand and its determinants really exists, a residual series of equation (5.13) must be stationary. To conduct a test for stationarity of the series, likewise, the tests of unit roots, **the ADF test and the PP test**, are utilized and the outcome of testing are reported in **table 5.9E**. To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.9E**, the two tests apparently indicate that the null hypothesis of no cointegration is firmly rejected at all significance levels.

Table 5.9E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-6.9089	-6.9803	0	-6.9088	-6.9908

**Note*: The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.9E**, **the long-run relationship** between the Italian tourism demand and its economic determinants **exists**. Consequently, the next issue of interest is the estimation of the elasticity of demand. According to **the long-run equation (5.13)**, it shows that the estimated elasticities composing of **price elasticity** and **income elasticity** and they all have correct signs corresponding to the economic theory.

Concerning **the price elasticity** in the long-run model for Italy, it is reported less than one in the absolute terms denoting that Italian tourism demand is **inelastic**. In other words, the tourists are somewhat insensitive to changes in the real exchange rate defined in the model as, for instance, **a 1 percent increase** in the price would **crowd out** the number of Italian tourist arrivals only **0.12 percent**, or vice versa.

Meanwhile **the income elasticity** is reported higher than one indicating that Thai tourism is considered **luxurious** for the Italian. The result is line with the most of the findings of most empirical literature. According to **equation (5.13)**, the income elasticity of **1.56** signifies that **a rise** in the Belgian real GDP per capita of **1 percent** would **increase** the arrivals of Belgian tourists of approximately **1.56 percent,** or vice versa**.**

Additionally, to measure the effects of **the SARs outbreaks** in 2003 , those are captured by the **DUMMY03**. It is found that the outbreaks crowd the number of tourist arrivals out approximately **0.45 percent**.

8.1.2 Empirical results of the Johansen cointegration test

Likewise the EG method, all of the time-series data are required to be **integrated of order one, I(1), the Johansen cointegration analysis** then can apply to those time-series data. Nevertheless, prior to performing such a test, it is necessary that **a lag length *(p)*** for the VAR model is specified. According to the statistics demonstrated in **table 5.9F**, the study will again rely on **the Akaike Information Criterion (AIC)** in choosing **optimal lags** for VAR models and it suggests four optimal lags to be included in the model.

Table 5.9F: Test statistics for the length of lags for VAR in Italian model

Lag	LogL	LR	FPE	AIC	SC	HO
0	244.4116	NA	1.19e-13	-9.8922	-9.61927	-9.78903
1	505.3401	434.8807*	1.78e-17*	-18.7225	-16.5394*	-17.8975*
2	547.3290	57.73482	2.72e-17	-18.4304	-14.3371	-16.8835
3	592.5861	49.02852	4.57e-17	-18.2744	-12.2710	-16.0057
4	662.6188	55.44253	4.33e-17	-19.1508*	-11.2372	-16.1602

*indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5 percent level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.9G: Trace tests for cointegrating vectors for Italian model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	40.8183	29.7971	0.0018
r ≤ 1	r ≤ 2	15.6272	15.4947	0.0478
r ≤ 2	r ≤ 3	3.4470	3.8415	0.0634

Table 5.9H: Maximum eigenvalue tests for cointegrating vectors for the Italian model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	25.1911	21.1316	0.0127
r ≤ 1	r ≤ 2	12.1802	14.2646	0.1040
r ≤ 2	r ≤ 3	3.4470	3.8415	0.0404

*Mackinnon-Haug-Michelis (1999) P-values

Based on the lag length suggested earlier and in the same process with the former country models, **the Johansen cointegration test** is conducted via **Eviews 6 software package**. The cointegration relationships among variables are explored by using two likelihood ratio tests, **the trace and maximum eigenvalue tests** and they are reported in **table 5.9G** and **table 5.9H**. The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

Regarding **the trace statistics test** demonstrated in **table 5.9G**, it suggests that the hypothesis that there is **2 cointegrating relationships (r=2)** cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 percent significance level. Therefore, the λ_{trace} statistics is likely to suggest that there are **2 cointegrating relationships** in the Italian model.

Table 5.9I: Long-run coefficients of Italian demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.0260 (0.3053)
GNI	1.8843 (0.8366)

*Standard Error Parentheses

Secondly, according to **the maximal eigenvalue test** expressed in **table 5.9H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 78.46, greater than the critical values at the 5percent significance level of 40.08. The λ_{max} statistics suggest that, there are four cointegrating relationships among the variables in the Belgian model.

To sum up, based on the two tests, it can be concluded that there are at most five cointegrating relationships existing among the variables in the Belgian demand to Thai tourism.

As reported by the λ_{max} and λ_{trace} tests in **tables 5.9G** and **table 5.9H**, the variables in the Belgian demand models have at most five cointegrating relationships. Equation (5.2) normalised on the dependent variable shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

$$TA^{IT} = -0.03Price + 1.88GNI$$
$$(-0.31) \quad (0.8366) \qquad \textbf{(5.14)}$$

*Note: standard error in parentheses

The two variables have economically meaningful signs. Regarding **the own tourism price variable**, its **price elasticity** is reported **inelastic** and this is in line with that value reported by the method of Engle-Granger (EG) earlier. Its estimated coefficient designates that **a 1 percent rise** in the tourism price in Thailand would result in only **a 0.03 percent decrease** in the number of Italian tourist arrivals, or vice versa. With respect to **the income variable**, real GNI per capita, **the estimated income elasticity** is reported elastic at 1.88 indicating that **a 1 percent increase** in the Italian real GNI per capita would bring about **a 1.88 percent increase** in the number of Italian visitors to Thailand, or vice versa.

Chart 5.7A: Recursive price elasticity for Italian model

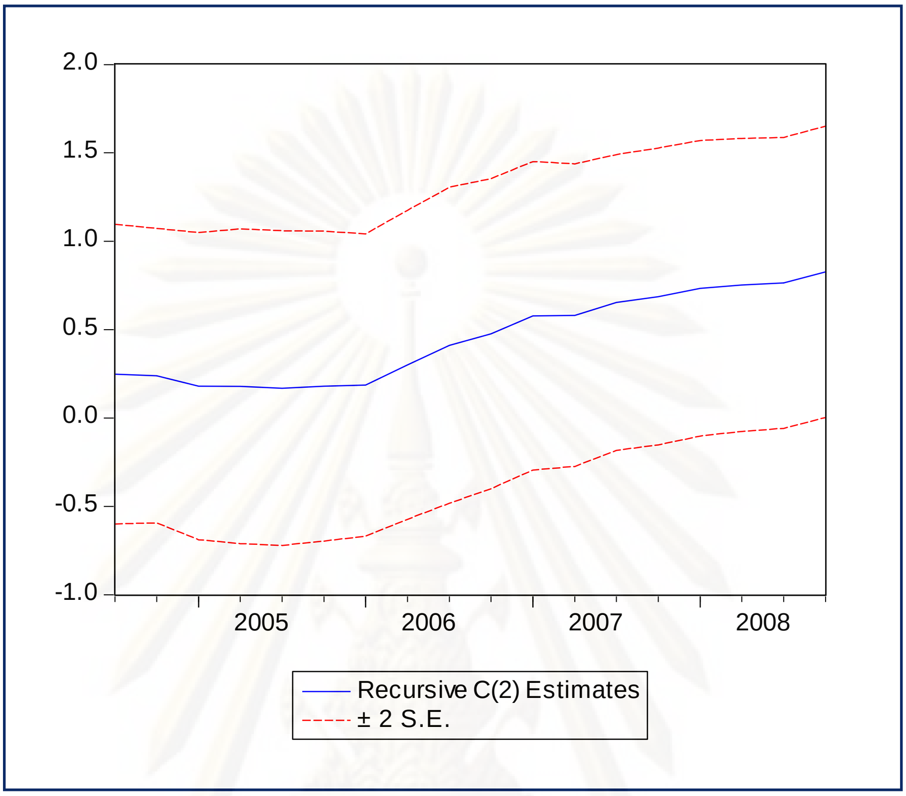


Chart 5.7B: Recursive income elasticity for Italian model

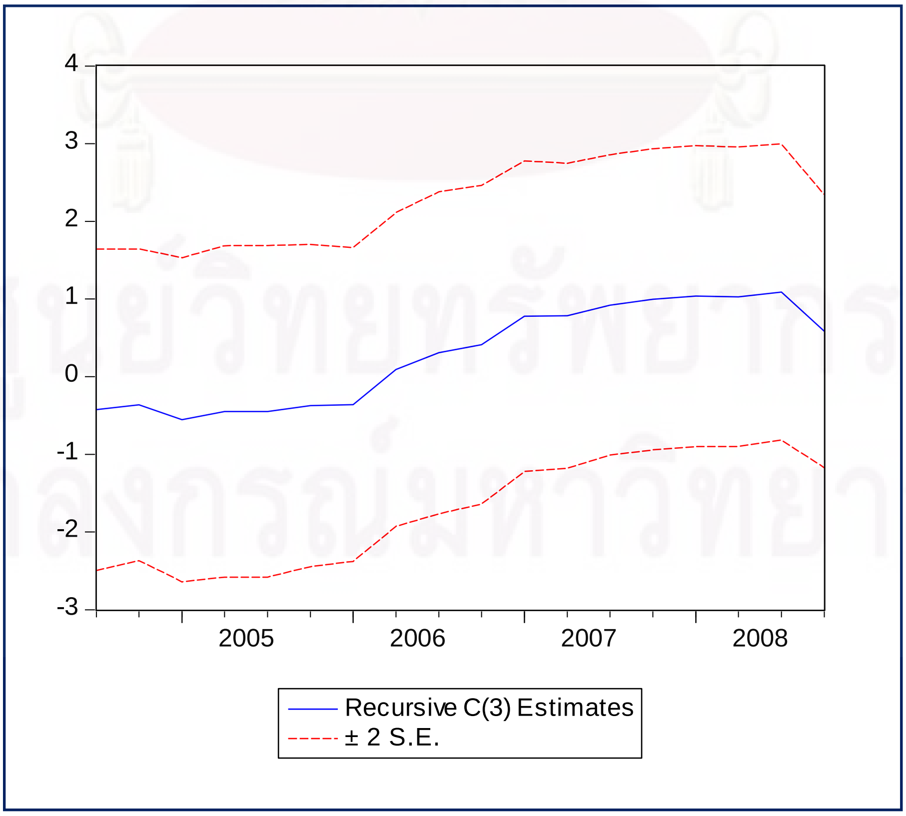
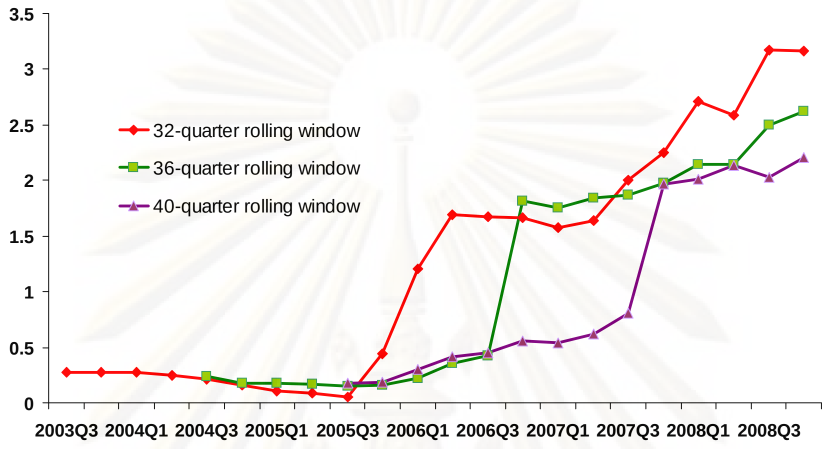
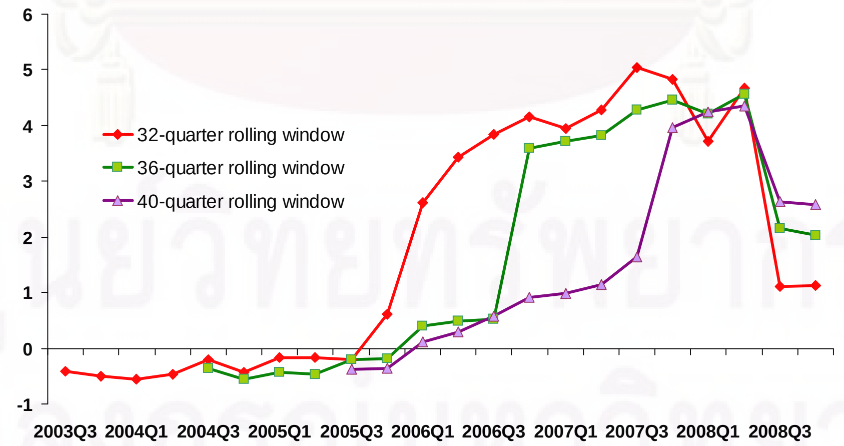


Chart 5.7C: Time-Varying Price Elasticity for Italian Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.7D: Time-Varying Income Elasticity for Italian Model from Estimations of Different Window Sizes



Source: Author's calculation

8.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for Italian model

The last two tools in exploring the evolution of the European demand to Thai tourism overtime, the study therefore employs the two approaches as outlined basic concepts and methodologies in the last chapter as described in the other country models.

With respect to empirical results of the method of recursive ordinary least square (OLS), exhibited in **chart 5.7A**, they report that, based the time-series over the period of 1996Q1-2008Q4, the own price elasticity of the European tourism demand had slightly declined and become stable in a negative territory approximately -0.2. In addition, over the period, the price elasticity of the Belgian model rarely experience dramatic shifts. Meanwhile, the dynamics of the variable reported by the method of rolling regression are not fundamentally and significantly different from those reported by its counterpart. The price elasticity had displayed a downward trend over time according to the three rolling windows as demonstrated in **chart 5.7C**. In sum, the two methods show that the price elasticity of Belgian demand is inelastic, in other words, it is somewhat irresponsive to changes in costs of living in the tourism destination, Thailand.

Regarding the dynamics of **the income elasticity of the Italian model**, the method of recursive OLS reveals that it had increased over time and then finally showed a downward trend, moving roughly below 1.0 as demonstrated in **chart 5.7B**. This demonstrated that the income elasticity is inelastic. However, this is not line with the results reported by the approach of rolling regression based on the OLS estimation of three different window sizes. The elasticity clearly expresses upward trends over the sample period compared to the method of recursive OLS and final values of the income elasticity is moving approximately at 1.0-3.0. These findings affirm that fact that Thai tourism is recognised luxurious by the Italian.

9. Empirical results for Dutch model

With respect to the Dutch model, an issue of categorising model for unit root tests; it is in tandem with the former country models, **the dependent variable**- the quarterly number of Dutch tourist arrivals to Thailand- is categorised into **the "intercept and trend" model**. Meanwhile, **the own price variable**, together with the substitute price variables, is classified into **the "intercept, no trend"** model as those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

Regarding the issue of unit root testing, it is in line with the former country models. Firstly, the outcome **the ADF test**, the test statistics for all the variables in their logarithmic levels and for the two alternative models of testing are presented in **table 5.10A** and **table5.10B**. The results clearly indicate that each of the series is **nonstationary** in its **logarithmic level**. In order to proceed to apply the cointegration tests, such nonstationarity must be abolished and technically, to obtain stationary series, taking **first differences** to all variables is necessary. The empirical results after taking first differences are demonstrated in **table 5.10C** and **table 5.10D**. By conducting such differences, the series obviously removes the nonstationary components in all cases and the null hypothesis of nonstationarity is apparently rejected at the 5 percent significance level suggesting that they are **integrated of order one**, or **I(1) variables**.

Secondly, with respect to **the Phillips-Perron (PP) test**, the outcome is however not fundamentally different from the respective ADF tests as displayed in **table 5.10A** and **table 5.10B**. Analytically, the results from the tests in the levels of the variables noticeably point to the presence of a unit root in all cases. In addition, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, suggesting that the series are also **integrated of order one, I(1)** as demonstrated in **table 5.10C** and **table 5.10D.**

Concerning the results of **the KPSS test**, they are somewhat mixed compared to the two methods. According to **table 5.10A** and **table 5.10B**, the test statistics point to nonstationarity, except the tourism price and the substitute prices. After taking differences however the nonstationarity of the two is removed implying that they are integrated of order one, I(1). Notwithstanding, provided that the empirical results of the three tests, the majority report nonstationality of all variables and they are all I(1) variables; consequently, the cointegration analyses can be applied.

Table 5.10A: Unit root test statistics for economic variables in logarithmic levels for Dutch model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-1.1301	-3.5973	0	-1.1301	-3.6102	0.9071	0.0803
Independent variables							
1Price	-1.1515	-1.6996	0	-1.9173	-1.6996	0.8125	0.1131
2. Income variables							
2.1 GDP	-0.3768	-2.0185	0	-1.7439	-0.4651	0.9063	0.1015
2.2 GNI	-1.4121	-3.1148	1	-3.2235	-1.8122	0.8965	0.0801
2.3 Gross	-1.6979	-2.9028	0	-2.9430	-1.6754	0.8880	0.0859
2.4 Final	-0.5592	-1.8204	0	-1.8589	-0.5360	0.9251	0.1441
3. Substitute price variables							
3.1 MY^{RER}	-1.0759	-1.8823	0	-1.0759	-2.0328	0.8105	0.0930
3.2 SG^{RER}	-0.8671	-1.7228	0	-0.9455	-1.9206	0.7978	0.1043
3.3 PH^{RER}	-1.0404	-1.5058	0	-1.0405	-1.7168	0.8055	0.1215
3.4 ID^{RER}	-1.8503	-1.6163	0	-1.9081	-1.6163	0.7014	0.1616

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.10B: Summary of unit root test statistics for economic variables in logarithmic levels for Dutch model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Stationary	Stationary	Stationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Stationary
2.2 GNI	Nonstationary	Nonstationary	Stationary
2.3 Gross	Nonstationary	Nonstationary	Stationary
2.4 Final	Nonstationary	Nonstationary	Stationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.10C: Unit root test statistics for economic variables in log-difference for Dutch model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA							
Independent Variables							
1. Price	-6.2309	-6.1956	0	-6.1891	-6.1451	0.0978	0.0827
2. Income variables							
2.1 GDP	-3.4367	-3.4023	1	-6.1671	-6.1091		
2.2 GNI	-8.8155	-8.8161	0	-8.9566	-8.9509		
2.3 Gross	-8.4845	-8.4892	0	-8.6127	-8.6219		
2.4 Final	-7.7972	-7.7387	0	-7.7952	-7.7367		
3. Substitute price variables							
3.1 MY^{RER}	-6.3079	-6.2558	0	-6.2965	-6.2408	0.0815	0.0774
3.2 SG^{RER}	-6.2623	-6.1954	0	-6.2623	-6.1954	0.1150	0.1149
3.3 PH^{RER}	-6.2949	-6.2593	0	-6.2961	-6.2430	0.1283	0.1116
3.4 ID^{RER}	-4.4219	-4.5031	0	-4.0858	-4.1141	0.1823	0.0381

****Note:*** Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table5.10D: Summary of unit root statistics for economic variables in log-difference for Dutch model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(0)	I(0)	I(0)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(0)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(1)	I(1)	I(0)
2.4 Final	I(1)	I(1)	I(0)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

9.1 Empirical findings of the cointegration analyses for the Dutch model

9.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

To examine the determinants of the European demand to Thai tourism, together with estimate the long-run tourism demand elasticities, in the following section, the empirical results of Engle-Granger (EG) test are presented and followed by those of the Johansen method.

According to **equation (5.15)**, it expresses **the long-run relationship** between the tourism demand (TA^{NL}) – the number of Dutch tourist arrivals to Thailand – and its economic determinants. In the model, the explanatory variables compose of the tourism price, Dutch real GDP per capita, the substitute price variables, a lagged dependent variable and a dummy variable as follows;

TA^{NL} = -14.45 - 0.30Price + 2.66GDP + 0.22MY^{RER} - 0.12ID^{RER} + 0.20TA^{NL}(-4)
(-1.55) (5.52) (1.51) (-2.74) (1.53)
- 0.08DUMMY03

*Note: t-statistics in parentheses **(5.15)**

Adjusted R-squared = 0.95

To be assured however that **the long-run relationship** between the tourism demand and its determinants really exists, **a residual series** of **equation (5.15)** must be stationary. To conduct a test for stationarity of the series, likewise, the tests of unit roots, **the ADF test and the PP test**, are employed and the outcome of testing are reported in **table 5.10E.** To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.10E**, the two tests apparently indicate that the null hypothesis of no cointegration is firmly rejected at all significance levels.

Table 5.10E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-5.9288	-5.8496	0	-5.8953	-5.8119

**Note*: The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.10E**, **the long-run relationship** between the Dutch tourism demand and its economic determinants is hence attested. Consequently, the next issue of interest is the estimation of **the elasticity of demand**. According to the long-run equation (5.15), it shows that the estimated elasticities composing of price elasticity, income elasticity, and substitute price elasticities have correct signs corresponding to the economic theory.

Concerning **the price elasticity**, it is reported inelastic at 0.30 in absolute terms. In other words, Dutch tourists are somewhat insensitive to changes in the tourism price in Thailand. The elasticity of 0.30 means that a **1 per cent increase** in the tourism price crowds out the number of Dutch tourist arrivals about **0.30 per cent**, or vice versa.

Meanwhile **the income elasticity** is reported highly **elastic** at **2.66** indicating that Thai tourism is considered luxurious for the Dutch. The result is line with the most of the findings of most empirical literature. According to **equation (5.15),** the income elasticity of **2.66** signifies that **a rise** in the Dutch real GDP per capita of **1 per cent** would **increase** the arrivals of visitors of approximately **2.66 per cent**, or vice versa.

With respect to **the cross-price elasticity**, equation (5.15) shows that **Malaysia** is considered as **substitute** tourism destinations for Thailand. In addition, according to the estimated elasticity, **a 1 per cent rise** in the Thai tourism price would generate 0.22 per cent of tourist flows to Malaysia. Meanwhile, tourism in **Indonesia** is considered **complement** to tourism in Thailand. **A 1 per cent rise** in Thai tourism price would bring about **0.12 per cent** of tourists **out-flow** from Indonesia, or vice versa.

Last but not least, it is obvious that the variable capture **the habit persistence** or the so-called **word-of-mount effects** is somewhat significant in determining Dutch tourism demand to Thailand. Lastly, the SARs outbreaks in 2003 as captured by the DUMMY03 crowd the number of tourist arrivals out approximately 0.08 per cent.

2.1.2 Empirical results of the Johansen cointegration test

In the following section, empirical results of **the Johansen cointegration test** in exploring the long-run relationship between the variables in the Dutch model are to be presented. Nevertheless, prior to performing such a test, it is necessary that a lag length *(p)* for the VAR model is specified. According to test statistics demonstrated in **table 5.10F**, the study will rely on **the Akaike Information Criterion (AIC)** in choosing

optimal lags for VAR models and it suggests four optimal lags to be included in the model.

Table 5.10F: Test statistics for the length of lags of VAR in Dutch model

Lag	LogL	LR	FPE	AIC	SC	HO
0	355.6054	NA	1.16e-15	-14.52523	-14.25234	-14.42210
1	684.7552	548.5830	1.01e-20*	-26.19813	-24.01507*	-25.37315*
2	729.8890	62.05901	1.35e-20	-26.03704	-21.94379	-24.49020
3	766.7714	39.95593	3.22e-20	-25.53214	-19.52871	-23.26344
4	851.9318	67.41862*	1.62e-20	-27.03883*	-19.12520	-24.04826

*indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5 percent level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 5.10G: Trace tests for cointegrating vectors for Dutch model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	87.2375	69.8189	0.0011
r ≤ 1	r ≤ 2	48.0459	47.8561	0.0479
r ≤ 2	r ≤ 3	26.1755	29.7971	0.1236
r ≤ 3	r ≤ 4	0.2184	3.8415	0.6403

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.10H: Maximum eigenvalue tests for cointegrating vectors for the Dutch model

Maximum eigenvalue statistics			0.05	
Null	Alternative	Maximum Eigenvalue	Critical values	Prob*
r = 0	r = 1	39.1879	33.8769	0.0106
r ≤ 1	r ≤ 2	21.8741	27.5843	0.2269
r ≤ 2	r ≤ 3	16.7132	21.1316	0.1860
r ≤ 3	r ≤ 4	9.2440	14.2646	0.6403

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.10I: Long-run coefficients of Dutch demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-1.9923 (0.4423)
GNI	4.9925 (0.3078)
MY^{RER}	2.2661 (0.4045)
ID^{RER}	0.2540 (0.0991)

*Standard Error Parentheses

According to the lag length suggested earlier, the Johansen cointegration test is conducted via Eviews 6 software package. The cointegration relationships among variables are established by using two likelihood ratio tests, **the trace and maximum eigenvalue tests** and their results are reported in **table 5.10G** and **table 5.10H**. The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

Firstly, based on the trace statistics test in **table 5.10G**, it suggests that the hypothesis that there is **2 cointegrating relationships (r=2)** cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 per cent significance level. Therefore, the λ_{trace} statistics tend to suggest that there are two cointegrating relationships in the Dutch model.

Secondly, according to **the maximal eigenvalue test** expressed in **table 5.10H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 39.19, greater than the critical values at the 5 per cent significance level of 33.88. The λ_{max} statistics suggest that, there are four cointegrating relationships among the variables in the model.

As reported by the λ_{max} and λ_{trace} tests in **table 5.10G** and **table 5.10H**, the variables in the Belgian demand models have at least one cointegrating relationships and **equation (5.16)** normalised on the dependent variable shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

$$TA^{NL} = \underset{(0.44)}{-1.99Price} + \underset{(0.31)}{4.99GNI} + \underset{(0.40)}{2.27MY^{RER}} - \underset{(0.10)}{0.25ID^{RER}} \qquad \textbf{(5.16)}$$

*Note: standard error in parentheses

With respect to the price elasticity, it is found to be elastic and it is not in line with that value reported by the method of Engle-Granger (EG). Its estimated coefficient designates that **a 1 per cent rise** in the tourism price in Thailand would result in **a 1.99 per cent decrease** in the Dutch visitors, or vice versa.

Meanwhile, **the estimated income elasticity** is **4.99** which is considered **highly elastic.** It indicates that **a 1 per cent increase** in Dutch real GDP per capita results in a **4.99 per cent increase** in Dutch tourist arrivals to Thailand, or vice versa.

Regarding **the cross-price elasticity**, based on the estimated coefficients in equation (5.16), it reports that tourism in the alternative destination, **Malaysia**, is recognised **substitute for** tourism in Thailand. Meanwhile, tourism in **Indonesia** is recognised as **complement to** tourism in Thailand. These results however are in line with those reported by the EG method.

Chart 5.8A: Recursive price elasticity for Dutch model

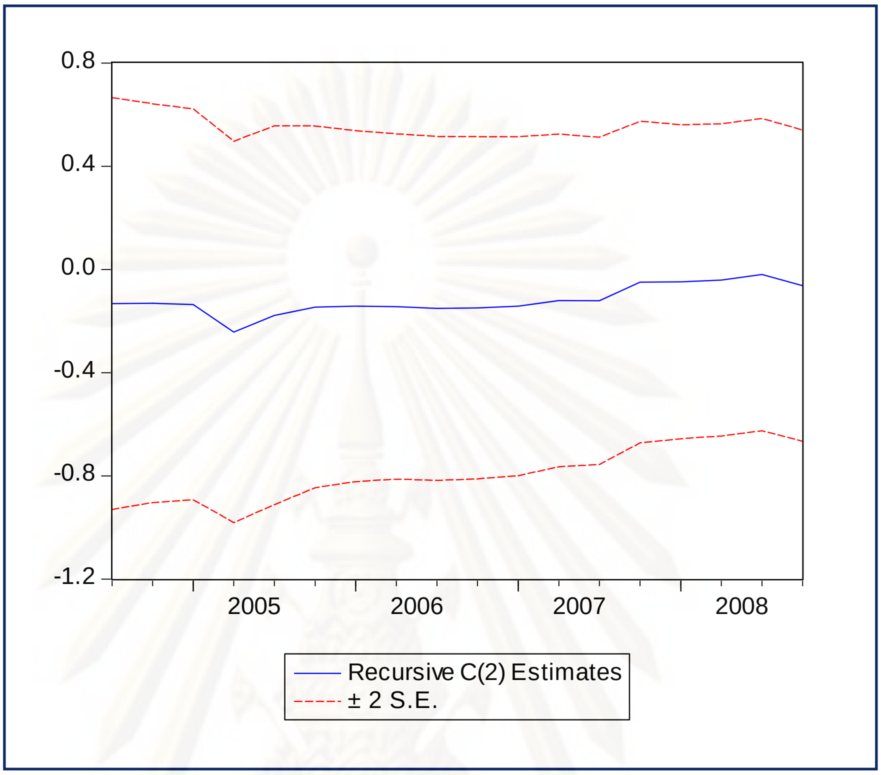


Chart 5.8B: Recursive income elasticity for Dutch model

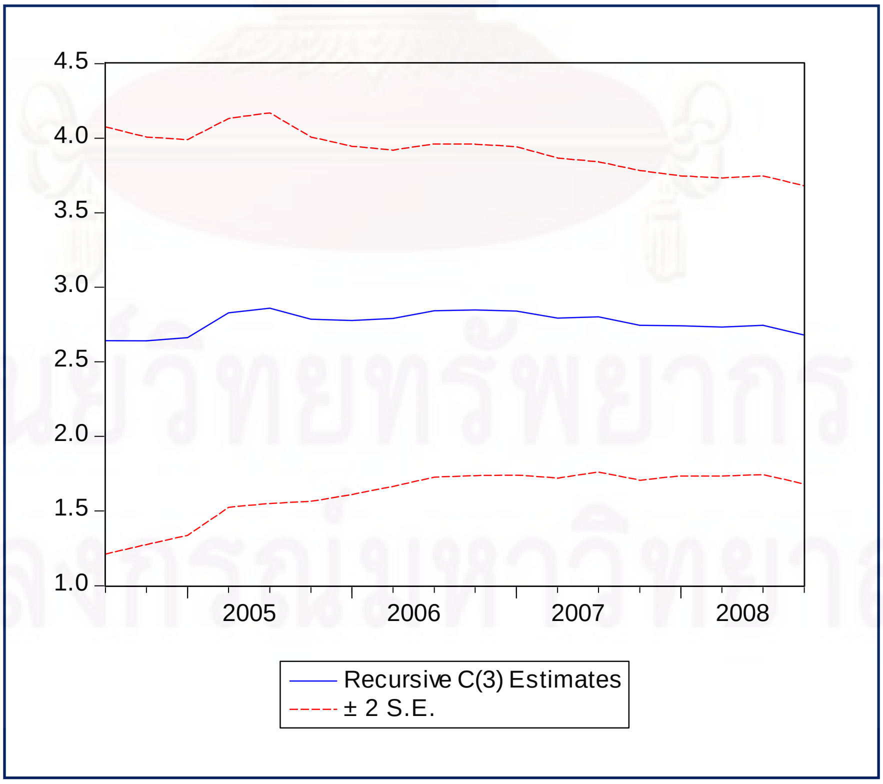
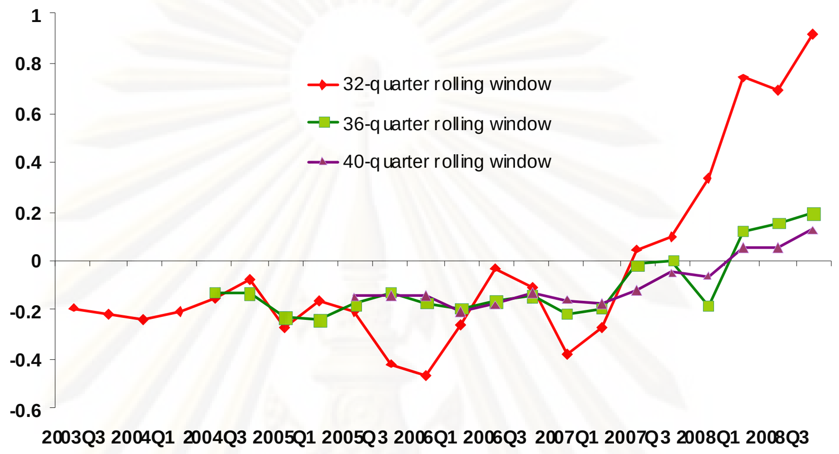
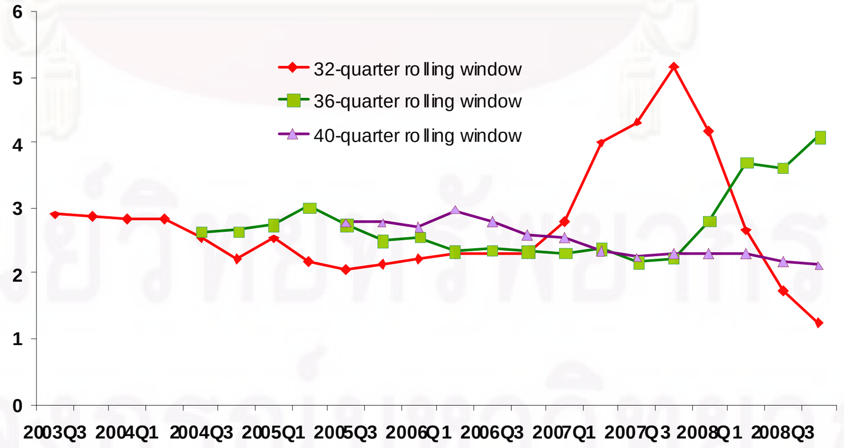


Chart 5.8C: Time-Varying Price Elasticity for the Dutch Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.8D: Time-Varying Income Elasticity for the Dutch Model from Estimations of Different Window Sizes



Source: Author's calculation

9.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for Dutch model

Following the same procedure, to explore the evolution of the Dutch demand to Thai tourism overtime, the study employs the two approaches as outlined basic concepts and methodologies in the last chapter.

With respect to empirical results of **the method of recursive ordinary least square (OLS)** exhibited in **chart 5.8A**, they report that, based the time-series over the period of 1996Q1-2008Q4, the price elasticity of the Dutch tourism demand had been inelastic and stable approximately around -0.2. Meanwhile, the dynamics of the variable reported by the method of rolling regression demonstrated in chart 5.8C is fundamentally and significantly different from those reported by its counterpart. The price elasticity had displayed an upward trend over time according to the three rolling windows as demonstrated in **chart 5.8C.** Notwithstanding, in sum, the two methods show that **the price elasticity is inelastic**.

Regarding the dynamics of **the income elasticity** of the Belgian model, the method of recursive OLS reveals that it had increased over time and recently showed a stable condition, moving roughly at 1.4 as demonstrated in **chart 5.8B.** This is line with the results reported by the approach of rolling regression based on the OLS estimation of three different window sizes. Nonetheless, the income elasticity clearly expressed a constant trend and a slight upward trends over the sample period compared to the method of recursive OLS and final values of the income elasticity are moving approximately at 1.5-4.0. These findings affirm that fact that Thai tourism is recognised luxurious. Additionally, they also help endorse the luxurious nature of tourism products suggested by the empirical findings of existing literature.

10. Empirical results for Norwegian model

As far as **the Norwegian model** is concerned, an issue of categorising model for unit root tests; it is in tandem with the former country models, **the dependent variable**- the quarterly number of Norwegian tourist arrivals to Thailand- is categorised into **the "intercept and trend" model**. Meanwhile, **the own price variable**, together with **the substitute price variables**, is classified into **the "intercept, no trend" model** as the fact that those variables hardly express apparent trends. For **the income variables,** they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

As reported in the other models, there are three results of the three conventional unit root tests and among those results, those **of the ADF test** are to be presented first and followed by the other two. With respect to a criterion in choosing optimal lag length, **the Schwarz Information Criteria (SIC)** is used to be a criterion to choose the optimal lag for the test as in the previous models. Regarding the outcome, the test statistics for all the variables in their logarithmic levels and for the two alternative models --both **"the intercept, no trend" and "the intercept and trend**"-- are presented in **table 5.11A** and **table5.11B**. The ADF test points to a conclusion that all variables are nonstationary. As usual, to abolish the nonstionarity existed in those variables; the variables are taken **first differences**. The test statistics after taking first differences to the variables are demonstrated in **table 5.11C** and **table 5.11D**. The statistics clearly denote that the nonstationarity is removed from all variables, and the null hypothesis of nonstationarity is apparently rejected at the 5% significance level suggesting that they are **integrated of order one**, or **I(1) variables**.

Next, with respect to findings of **the Phillips-Perron (PP)** unit root test, they are displayed next to those of the ADF test also in **table 5.13A** and **table 5.13B**. The outcome is not however different from those of the ADF tests. It is obvious that the results from the tests in the levels of the variables noticeably point to the presence of a unit root in all cases. In addition, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, suggesting that the series are **integrated of order one**, or **I(1) variables** and a summary of the test is displayed in **table 5.11C** and **table 5.11D**.

Concerning the results of the last conventional unit root test, **the KPSS test**, it reports mixed results – the data are found to be either nonstationary or stationary – as demonstrated in **table 5.11A** and **table 5.11B**. Nonetheless, provided that the empirical results of the three tests, the ADF test and the PP test affirm that the variables are all I(1); consequently, the cointegration analyses can be applied.

Table5.11A: Unit root statistics for economic variables in logarithmic levels for Norwegian model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-1.7280	-2.6231	0	-1.8833	-2.4850	0.8832	0.1617
Independent variables							
1Price	-2.1927	-1.9092	0	-2.0644	-1.7720	0.6542	0.1370
2. Income variables							
2.1 GDP	-1.2178	-2.9826	0	-2.0644	-1.7720	0.6542	0.1370
2.2 GNI	-1.1291	-3.7396	0	0.8240	-3.7396	0.9212	0.0557
2.3 Gross	-1.1291	-3.5514	0	-0.9332	-3.5491	0.9214	0.0570
2.4 Final per capita	-0.8322	-3.8187	4	-1.5625	-4.8379	0.9384	0.0820
3. Substitute price variables							
3.1 MY^{RER}	-1.8057	-1.8166	0	-1.8057	-2.1218	0.7017	0.0616
3.2 SG^{RER}	-1.3245	-0.9934	0	-1.4364	-1.4271	0.7786	0.1013
3.3 PH^{RER}	-1.6107	-0.8250	0	-1.6107	-1.0680	0.6325	0.1534
3.4 ID^{RER}	-2.4027	-2.0421	0	-2.5229	-2.2957	0.3872	0.1454

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.11B: Summary of unit root test statistics for economic variables in logarithmic levels for Norwegian model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Devependent variable			
TA	Nonstationary	Nonstationary	Nonstationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Stationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Stationary
2.2 GNI	Nonstationary	Nonstationary	Stationary
2.3 Gross	Nonstationary	Nonstationary	Stationary
2.4 Final per capita	Nonstationary	Nonstationary	Stationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Stationary

Table 5.11C: Unit root statistics for economic variables in log-differences for Norwegian model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-8.7998	-8.9856	0	-9.3500	-10.2102	0.2324	0.0820
Independent Variables							
1. Price	-5.0187	-5.1120	0	-4.4041	-4.6240		
2. Income variables							
2.1 GDP	-7.7130	-7.6515	0	-7.7253	-7.6579		
2.2 GNI	-8.9881	-8.8929	0	-10.1992	-10.0199		
2.3 Gross	-8.6081	-8.5197	0	-8.8948	-8.7139		
2.4 Final per capita	-4.4684	-4.3933	6	-18.7921	-21.4474		
3. Substitute price variables							
3.1 MY^{RER}	5.0492	-5.0844	0	-4.9832	-5.0105	0.1273	0.0608
3.2 SG^{RER}	-4.7601	-4.7573	0	-4.7468	-4.7427	0.1761	0.1288
3.3 PH^{RER}	-5.1218	-5.8870	1	-4.9074	-4.9708	0.2322	0.0938
3.4 ID^{RER}	-5.3342	-5.4395	0	-5.1654	-5.2896		

****Note**:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.11D: Summary of unit root test statistics for economic variables in log-difference for Norwegian model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(1)
Independent variables			
1.Price	I(1)	I(1)	I(0)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(0)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(1)	I(1)	I(0)
2.4 Final per capita	I(1)	I(1)	I(0)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(0)

10.1 Empirical findings of the cointegration analyses for the Norwegian model

10.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In tandem with the former country models, in the subsequent sections for the Norwegian model, **"the long-run relationships**" among the variables are to be explored by employing the two methods of cointegration analyses. In the first section, the empirical results of the first method, **the Engle-Granger (EG) test**, are presented.

According to **equation (5.17)**, it expresses the long-run relationship between the tourism demand (TA^{NO}) and its economic determinants. In the model, the explanatory variables compose of the tourism price, real Norwegian GDP per capita, a lagged dependent variable and the dummy variables, the equation is described as follows;

TA^{NO} = -1.54 - 0.10Price + 0.70GDP + 0.55TA^{NO} (-4) - 0.13DUMMY03

(-0.51) (2.90) (5.50)

Adjusted R-squared = 0.90 **(5.17)**

*Note: t-statistics in parentheses

Notwithstanding, in order to make sure that the long-run relationship between the tourism demand and its determinants really exists, a residual series of equation (5.17) must be tested for stationarity. To conduct the test for stationarity of the series, the ADF test and the PP test are employed and the outcome is reported in **table 5.11E.**

In line with the other models, the testing hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.11E**, the two tests apparently indicate that the null hypothesis of no cointegration is firmly rejected at all significance levels.

Table 5.11E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-4.6567	-4.5363	0	-4.6365	-4.5109

****Note*:** The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.11E**, the long-run relationship between the Norwegian tourism demand and its economic determinants exists. In line with the former other country models, the next issue of interest is the estimation of the elasticity of demand. Given the relationships in **the long-run equation (5.17)**, it shows that the estimated elasticities composing of price elasticity and income elasticity and those elasticities also have correct signs corresponding to the economic theory.

With respect to **the price elasticity**, it is reported less than one at **0.10** in the absolute terms denoting that Norwegian tourism demand is technically **price inelastic**. In other words, the Norwegian demand is somewhat insensitive to changes in the tourism price defined in the model as a **1 percent increase** in the tourism price **crowds out** the number of visitors only **0.14 percen**t, or vice versa.

Concerning **the income elasticity**, it is also reported less than one at 0.70 indicating that Thai tourism is technically considered not to sensitive to changes in income; in other words, Thai tourism is probably considered necessary for the Norwegian. According to **equation (5.17)**, the income elasticity of 0.70 signifies that a **rise** in the real GDP per capita of **1 percent** would **increase** the arrivals of tourists of approximately **0.70 percent**, or vice versa.

Third, it is obvious that the variable capture **the habit persistence** or the so-called **word-of-mount effects** is one the crucial determinants of Norwegian tourism demand as reported by the equation above. The coefficient of 0.55 indicates a very high degree of persistence implying that the Norwegian tourists keep coming back visiting Thailand.

Finally, to measure the effects of **the SARs outbreaks** in 2003, the dummy variables named DUMMY03 is included into the model. According to equation (5.17), it reports that the SARs outbreaks crowd the number of visitors out approximately **0.13 percent**.

10.1.2 Empirical results of the Johansen cointegration test

After the first long-run relationship among the variables is established by the method of EG, another tool in exploring the long-run relationships for the Norwegian model is **the Johansen Cointegration Test** and provided that all of the time-series data are **integrated of order one** or **I(1),** the test therefore can be applied to those time-series data. Likewise the previous country models, **the Akaike Information Criterion (AIC)** is used for choosing **optimal lags** for VAR models and it suggests four optimal lags to be included in the VAR model as displayed in the following table.

Table 5.11F: Test statistics for the length of lags of VAR in Norwegian model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	349.6045	NA	1.49e-15	-14.27519	-14.00230	-14.17206
1	622.3952	454.6513	1.36e-19	-23.59980	-21.41673*	-22.77482*
2	668.8494	63.87453	1.72e-19	-23.49373	-19.40047	-21.94688
3	721.4581	56.99269	2.13e-19	-23.64409	-17.64065	-21.37538
4	805.6716	66.66907*	1.12e-19*	-25.11132*	-17.19770	-22.12075

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5percent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 5.11G: Trace tests for cointegrating vectors for the Norwegian model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	206.7849	95.75366	0.0000
r ≤ 1	r ≤ 2	102.1565	69.81889	0.0000
r ≤ 2	r ≤ 3	71.00059	47.85613	0.0001
r ≤ 3	r ≤ 4	42.43099	29.79707	0.0011
r ≤ 4	r ≤ 5	21.12823	15.49471	0.0063
r ≤ 5	r ≤ 6	5.589547	3.841466	0.0181

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.11H: Maximum eigenvalue tests for cointegrating vectors for the Norwegian model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	104.6284	40.07757	0.0000

*Mackinnon-Haug-Michelis (1999) P-values

Based on the lag length suggested by the AIC earlier, the Johansen cointegration test is conducted via Eviews 6 software package. The cointegration relationships among variables are established by using two likelihood ratio tests**, the trace and maximum eigenvalue tests** and they are reported **in table 5.11G** and **table 5.11H**. In line with the former models, the inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

Table 5.11I: Long-run coefficients of Norwegian demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.9924 (0.5471)
GDP	1.7111 (0.0555)
MY^{RER}	-1.9410 (0.1746)
PH^{RER}	1.6860 (0.3218)
ID^{RER}	-0.1396 (0.0536)

*Standard Error Parentheses

Regarding **the trace statistics test** in **table 5.11G**, it suggests that the hypothesis there are **6 cointegrating relationships** (r=6) cannot be rejected since the calculated λ_{trace} are greater than the critical values at 5 percent significance levels. Therefore, based on the λ_{trace} statistics suggest that there are six cointegrating relationships in the Norwegian model.

Next, according to **the maximal eigenvalue test** expressed in **table 5.11H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 104.63, greater than the critical values at the 5 percent significance level of 40.08. However, the λ_{max} statistics suggest that there are likely to be only **1 cointegrating relationships** among the variables in the model.

To summarise, based on the two tests, it can conclude that there are at most six and at least one cointegrating relationships existing among the variables in the Norwegian model.

As reported by the λ_{max} and λ_{trace} tests in **tables 5.11G** and **table 5.11H**, the variables in the Belgian demand models have at most three cointegrating relationships. **Equation (5.18)** normalised on the dependent variable thus shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

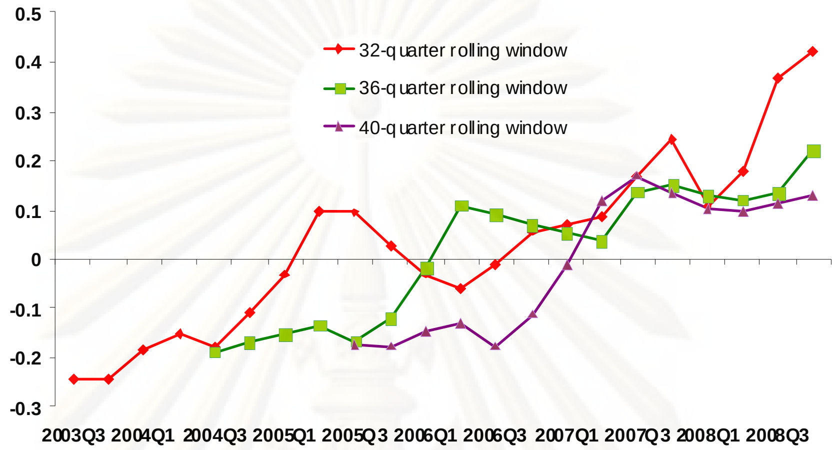
$$TA^{NO} = -\ 0.99Price + 1.71GDP - 1.94MY^{RER} + 1.69PH^{RER} - 0.14ID^{RER} \qquad \textbf{(5.18)}$$
$$(-1.81) \qquad (30.83) \qquad (-11.12) \qquad (5.24) \qquad (-2.60)$$

*Note: t-statistics in parentheses

According to **equation (5.18)**, it demonstrates that all variables have economically meaningful signs and statistical significance. With respect to **the price elasticity**, it is found to be somewhat **inelastic** which is in line with the value reported by the method of Engle-Granger (EG). The estimated coefficient designates that **a 1 percent rise** in the tourism price would lead to **a 0.99 percent decrease** in the number of tourist arrivals, or vice versa. Meanwhile, **the income elasticity** is **1.71**, which is considered **elastic.** It also indicates that **a 1 percent increase** in Norwegian real GDP per capita would result in **a 1.71 percent increase** in the number of visitors to Thailand, vice versa.

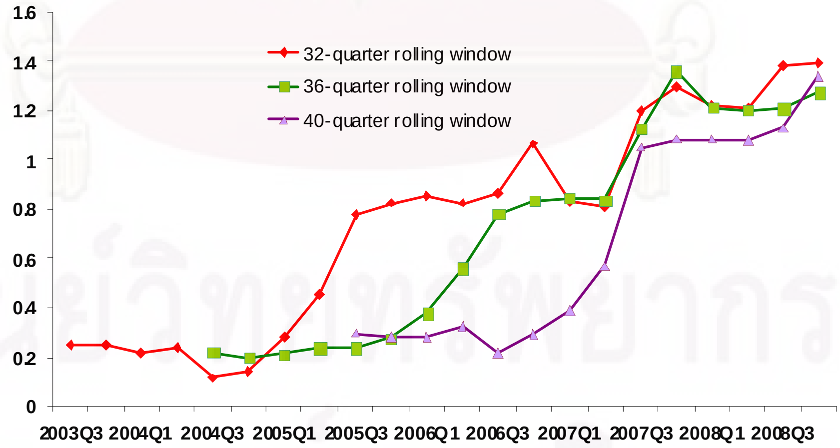
Regarding **the cross-price elasticities**, based on the estimated coefficients in equation (5.18), it reports that tourism in the alternative destinations -- **Malaysia and Indonesia**-- are recognised **complementary** to tourism in Thailand, whereas tourism in **the Philippines** is considered as **substitute** for tourism in Thailand.

Chart 5.9A: Time-Varying Price Elasticity for Norwegian Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.9B: Time-Varying Income Elasticity for Norwegian Model from Estimations of Different Window Sizes



Source: Author's calculation

10.2 The Empirical results of the Rolling Regressions for Norwegian model

To explore the evolution of the Norwegian demand to Thai tourism overtime, the following section presents empirical findings of the rolling regressions.

With respect to empirical results exhibited in **chart 5.9A**, it report that, based the time-series over the period of 1996Q1-2008Q4, **the price elasticity** of the Norwegian tourism demand had slightly increased overtime and showed a partial sign of stabiliy in a positive territory approximately in the range of 0.1-0.5. This means that the Norwegian perceive Thai tourism as “inferior goods”.

Regarding the dynamics of **the income elasticity** of this model, it revealed that it had increased over time and showed a stable condition, moving roughly around1.2-1.6 as demonstrated in **chart 5.9B**. These findings are in tandem with the other contry models and affirm that fact that Thai tourism is recognised luxurious.

11. Empirical results of Spanish model

Last but not least, the Spanish model is to be discussed, regarding the issue of categorising variables for unit root tests; it is in tandem with the former country models, **the dependent variable**- the quarterly number of Spanish tourist arrivals to Thailand- is categorised into **the "intercept and trend" model**. Meanwhile, **the tourism price variable**, together with **the substitute price variables**, is classified into t**he "intercept, no trend" model** as that fact that those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

With respect to the procedure of testing for unit roots, it is conducted as the prior country models. Based on the test statistics **in table 5.12A**, the results **of the ADF test** are presented first. The results clearly indicate that all of the series are **nonstationary** in their logarithmic levels. As suggested by the econometric procedure, in order to proceed to apply the cointegration tests, such nonstationarity must be abolished. To do so, all variables are taken first differences. The empirical results after taking first differences for the ADF test are demonstrated in **table 5.12C** and **table 5.12D**. It is obvious that nonstationary components are removed in all cases and the null hypothesis of nonstationarity is apparently rejected at the 5 percent significance level suggesting that the variables are all **integrated of order one, I(1),** as expected.

Next, concerning the second test for unit roots, **Phillips-Perron (PP) test,** the results of the test are also displayed in **table 5.12A** and **table 5.13B**. The outcome is however not fundamentally different from the respective ADF test except the series of final consumption expenditure. The results from the tests in the levels of almost all of the variables noticeably point to the presence of a unit root. In addition, based on the test statistics after the first difference is conducted, all series robustly reject the null hypothesis of the presence of a unit root, suggesting that **they are integrated of order one, I(1)** and a summary is displayed in **table 5.12C** and **table 5.12D**.

Regarding the results of **the KPSS test**, they are not fundamentally different from those of the PP test. According to **table 5.12A** and **table 5.12B**, the test statistics point to nonstationarity, except the series of final consumption expenditure. After taking differences however the nonstationarity of all series is removed implying that they are **integrated of order one, I(1)**. Notwithstanding, based on the empirical results of the three tests, it can be concluded that nonstationality exist in all variables and they all become I(1) variables after taking first difference. Consequently, the cointegration analyses can be applied.

Given all of the time-series data are nonstationary and integrated of order one, I(1), in the subsequent section, empirical results of the two methods of cointegration analyses, the Engle-Granger (EG) approach and the Johansen's method, are presented.

Table 5.12A: Unit root test statistics for economic variables in logarithmic levels for Spanish model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-1.3224	-2.5637	0	-1.3179	-2.5537	0.7488	0.1893
Independent variables							
1.Price	-1.1322	-1.9062	0	-1.1433	-1.9941	0.8199	0.1107
2. Income variables							
2.1 GDP	-1.3818	-0.5278	0	-1.3814	-0.6787	0.9383	0.1586
2.2 GNI	-1.0434	0.8206	0	-1.0549	-1.4608	0.9277	0.1649
2.3 Gross	-1.5044	0.5684	0	-1.7148	-0.3229	0.9323	0.1911
2.4 Final	-0.7375	-3.4468	0	-0.6840	-3.6503	0.9423	0.1406
3. Substitute price variables							
3.1 MY^{RER}	-1.1619	-2.0494	0	-1.1788	-2.1410	0.8090	0.1017
3.2 SG^{RER}	-1.0131	-1.9271	0	-1.0131	-2.0633	0.7969	0.1057
3.3 PH^{RER}	-1.0660	-1.8863	0	-1.0770	-1.9633	0.8211	0.1136
3.4 ID^{RER}	-1.7091	-1.6346	0	-1.7473	-1.6346	0.7871	0.1628

*_**Note**:_ Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.12B: Summary of unit root test statistics for economic variables in logarithmic levels for Spanish model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstatonary	Nonstationary	Nonstationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Nonstationary
2.2 GNI	Nonstationary	Nonstationary	Nonstationary
2.3 Gross	Nonstationary	Nonstationary	Nonstationary
2.4 Final	Nonstationary	Stationary	Stationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.12C: Unit root statistics for economic variables in log-difference for Spanish model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-4.5531	-4.6025	3	-6.5930	-6.5155	0.0654	0.0601
Independent Variables							
1. Price	-6.8007	-6.7436	0	-6.7957	-6.7363	0.0883	0.0803
2. Income variables							
2.1 GDP	-7.8341	-8.0287	0	-7.7974	-7.9604	0.2591	0.1264
2.2 GNI	-8.3698	-6.6756	0	-8.4335	-8.7972	0.2249	0.1560
2.3 Gross	-9.9086	-10.3521	0	-9.8406	-10.4555	0.3899	0.1374
2.4 Final	-10.8204	-10.7377	0	-11.1569	-10.9185	0.1066	0.0888
3. Substitute price variables							
3.1 MY^{RER}	-6.8325	-6.7702	0	-6.8289	-6.7648	0.0735	0.0697
3.2 SG^{RER}	-6.7216	-6.6522	0	-6.7216	-6.6521	0.0882	0.0877
3.3 PH^{RER}	-6.8639	-6.8025	0	-6.8629	-6.8009	0.0879	0.0824
3.4 ID^{RER}	-4.9485	-5.0126	0	-4.7593	-4.7355	0.1202	0.0344

****Note**:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.12D: Summary of unit root test statistics for economic variables in log-difference for Spanish model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(1)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(1)
2.2 GNI	I(1)	I(1)	I(1)
2.3 Gross	I(1)	I(1)	I(1)
2.4 Final	I(1)	I(0)	I(0)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

11.1 Empirical findings of the cointegration analyses for the Spanish model

11.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In the following section, the long-run relationship between the Spanish demand to Thailand tourism and its economics determinants established by the method of Engle-Granger (EG) is to be explored.

According to **equation (5.19)**, it expresses the long-run relationship between the tourism demand (TA^{ES}) – the number of Spanish tourist arrivals to Thailand – and its economic determinants. In the model, the explanatory variables compose of the tourism price, real Spanish GDP per capita, the substitute price variables of Malaysia, Singapore, the Philippines, and Indonesia respectively, and a dummy variable as follows;

$$TA^{ES} = -7.74 \underset{(-0.45)}{- 0.48Price} + \underset{(2.89)}{1.98GDP} \underset{(0.46)}{+0.35MY^{RER}} \underset{(-1.07)}{-0.87SG^{RER}} \underset{(0.62)}{+0.56PH^{RER}} \underset{(-0.07)}{- 0.50ID^{RER}}$$

$$- 0.50DUMMY03 \qquad \textbf{(5.19)}$$

Adjusted R-squared = 0.81

*Note: t-statistics in parentheses

Nevertheless, to confirm that **the long-run relationship** between the tourism demand and its determinants really **exists**, a residual series of **equation (5.19)** must be stationary. To conduct a test for stationarity of the series, likewise, the tests of unit roots, the ADF test and the PP test, are employed and the outcome of testing are reported in **table 5.12E**. To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.12E**, the two tests apparently indicate that the null hypothesis of no cointegration is firmly rejected at all significance levels.

Table 5.12E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-5.2977	-5.2525	0	-5.2442	-5.1933

****Note****:* The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.12E**, the long-run relationship between the Spainish tourism demand and its economic determinants does exist. The estimation of the elasticity of demand consequently is an issue of interest. By considering **the long-run equation (5.19)**, it shows that the estimated elasticities composing of price elasticity, income elasticity, and substitute price elasticities have correct signs corresponding to the economic theory.

Firstly, **the price elasticity** in the model, it is reported less than one at **0.48** in the absolute terms denoting that **Spanish tourism demand** is **price inelastic**. In other words, the tourists are somewhat insensitive to changes in the tourism price defined in the model. The elasticity of 0.48 implies that a **1 percent increase** in the price **crowds out** the number of Spanish visitors only **0.48 percent**, or vice versa.

Secondly, **the income elasticity** is reported higher than one at **1.98** indicating that Thai tourism is luxurious for the Spanish and this is in line with what is suggested by the empirical literature. The result is line with the most of the findings of most empirical literature. According to equation (5.19), the income elasticity of 1.98 signifies that **a rise** in the **Spanish real GDP** per capita of **1 percent** would increase the arrivals of Spanish tourists of approximately **1.98 percent**, or vice versa.

With respect to **the cross-price elasticities**, equation (5.19) shows that **Malaysia** and **the Philippines** are considered as **substitute tourism destinations** for Thailand. In addition, according to the estimated elasticities, a **1 percent rise** in the Thai tourism price would generate **0.35 percent** and **0.56 percent** of Spanish tourist flows to Malaysia and the Philippines, respectively. This is probably because Thailand and the two nations share common tourism resources, whereas tourism in **Singapore** and **Indonesia** are found to be **complement** to tourism in Thailand.

Additionally, to capture the effects of the **SARs outbreaks** in 2003, the variable DUMMY03 is added into the model. It is found that the outbreaks of the SARS in 2003 crowds out the Spanish visitors to Thailand approximately of **0.50 percent**.

11.1.2 Empirical results of the Johansen cointegration test

To be applicable for the Johansen method, all of the time-series data are required to be **integrated of order one, I(1)** and the three tests for unit roots suggest that the variables are all I(1). In order to conduct such a test, it is also necessary that an **optimal lag length** *(p)* for the VAR model is specified. According to the statistics demonstrated in **table 5.12F**, the study relies primarily on t**he Akaike Information Criterion (AIC)** in choosing optimal lags for VAR models and it suggests f**our optimal lags** to be included in the model.

Table 5.12F: Test statistics for the length of lags of VAR in Spanish model

Lag	LogL	LR	FPE	AIC	SC	HO
0	213.8808	NA	4.26e-13	-8.620033	-8.347149	-8.516910
1	532.6108	531.2166	5.72e-18	-19.85878	-17.67571*	-19.03380*
2	585.0287	72.07470*	5.65e-18*	-20.00120	-15.90795	-18.45435
3	630.0837	48.80952	9.59e-18	-19.83682	-13.83338	-17.56811
4	709.4960	62.86809	6.14e-18	-21.10400*	-13.19038	-18.11343

*indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5 percent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

According to the lag length suggested by the statistics earlier, the Johansen cointegration test is tested by Eviews 6 software package. Similar to the other country model, the cointegration relationships among variables are established by using two likelihood ratio tests, **a trace and maximum eigenvalue tests** and they are reported in **table 5.12G** and **table 5.12H**. As usual, the inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

Table 5.12G: Trace tests for cointegrating vectors for the Spanish model

Trace statistics			Critical values	Prob*
Null	Alternative	Trace	95percent	
r = 0	r = 1	61.5817	29.7971	0.0000
r ≤ 1	r ≤ 2	20.9312	15.4947	0.0069
r ≤ 2	r ≤ 3	5.4830	3.84153	0.0192

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.12H: Maximum eigenvalue tests for cointegrating vectors for the Spainish model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	40.6505	21.1316	0.0000
r ≤ 1	r ≤ 2	15.4482	14.2646	0.0324
r ≤ 2	r ≤ 3	5.4830	3.8415	0.0192

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.12I: Long-run coefficients of Spanish demand to Thai tourism

Variables	**Cointegrating Vector 1 (Normalized cointegrating coefficients)***
TA	-1.0000
Price	-0.2949 (0.2975)
GDP	3.2151 (0.3705)

*Standard Error Parentheses

It is obvious that If the trace statistics test in **table 5.12G** are taken into account, it suggests that the hypothesis that there is 3 cointegrating relationships (r=3) cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 percent significance level.

Meanwhile, according to the maximal eigenvalue test expressed in **table 5.12H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 40.65, greater than the critical values at the 5 percent significance level of 21.13. The λ_{max} statistics suggest that, there are 3 cointegrating relationships among the variables in the Spanish model.

To sum up, based on the two tests, it can conclude that there are at most three cointegrating relationships existing among the variables in the Spanish demand to Thai tourism.

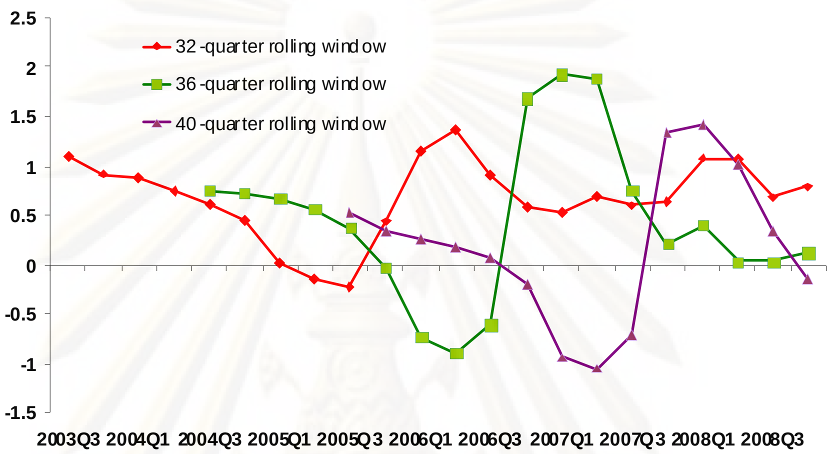
As reported by the λ_{max} and λ_{trace} tests in tables 5.3H and 5.3I, the variables in the Belgian demand models have at most five cointegrating relationships. The long-run relationship is expressed in equation (5.2) which is normalised on the dependent variable and it shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

$$TA^{ES} = - 0.29Price + 3.22GDP$$
$$(0.30) \qquad (0.37)$$

*Note: standard error in parentheses **(5.20)**

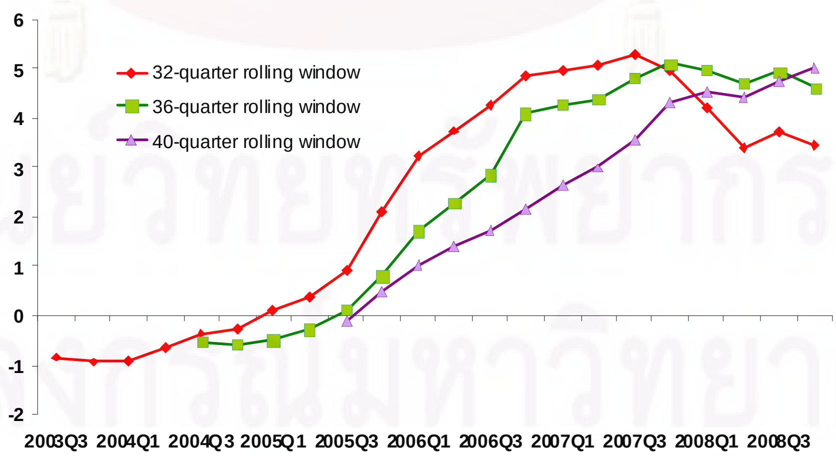
The variables have economically meaningful signs and statistical significance although not all of them. According to **equation (5.20)**, the **price elasticity** is **inelastic** and this is in line with that value reported by the method of Engle-Granger (EG). Its estimated coefficient designates that a 1 percent rise in the tourism price in Thailand would result in only a 0.29 percent decrease in the number of Spanish visitors to Thailand, or vice versa. Meanwhile, **the income elasticity** is **3.22** which is considered **highly elastic** and it also indicates that a **1 percent increase** in Spanish real GDP per capita results in a **3.22 percent increase** in the number of Spanish tourist arrivals to Thailand, vice versa.

Chart 5.10A: Time-Varying Price Elasticity for Spanish Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.10B: Time-Varying Income Elasticity for Spanish from Estimations of Different Window Sizes



Source: Author's calculation

11.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for Spanish model

Regarding the Spanish model, to explore the evolution of the elasticity of demand to Thai tourism overtime, only is the method of rolling estimation used and empirical findings are presented as follows;

With respect to empirical results exhibited in **chart 5.10A**, they pointed out that, based the time-series over the period of 1996Q1-2008Q4, the price elasticity of the Spanish tourism demand had slightly declined and become stable in a positive territory. The result is not corresponding to the economic theory and it indicates that Thai tourism is regarded as “inferior goods”.

Regarding the dynamics of **the income elasticity** of the model displayed in **chart 5.10B**, the approach of rolling regression based on the OLS estimation of three different window sizes revealed that the income elasticity is highly elastic. They were moving in the range of 3.0-5.0. These findings affirm that fact that Thai tourism is recognised luxurious by the Spanish.

12. Empirical findings of Swedish model

Regarding the Swedish, an issue of categorising model for unit root tests is in line with the former eleven country models, **the dependent variable**- the quarterly number of Swedish tourist arrivals to Thailand- is categorised into **the "intercept and trend" model**. Meanwhile, **the own price variable**, together with **the substitute price variables**, is classified into **the "intercept, no trend"** model as that fact that those variables hardly express apparent trends. With respect to **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

As reported in the other models, there are three results of the three conventional unit root tests and the results **of the ADF test** are to be presented first and followed by the other two. With respect to a criterion in choosing optimal lag length, **the Schwarz Information Criteria (SIC)** is used to be a criterion to choose **the optimal lag** for the ADF test as usual. Regarding the outcome, the test statistics for all the variables in their logarithmic levels and for the two alternative models --both "intercept, no trend" and "intercept and trend"-- are presented in **table 5.13A** and table **5.13B**. The ADF test points to a conclusion that almost all variables are nonstationary, apart from the dependent variable, the series of net national income per capita. As usual, to abolish the nonstionarity existed in the rest of the variables; the variables are taken **first differences.** The test statistics after taking first differences to the variables are demonstrated in **table 5.13C** and **table 5.13D.** The statistics clearly denote that the nonstationarity is removed from all variables, and the null hypothesis of nonstationarity is apparently rejected at the 5% significance level suggesting that they are **integrated of order one, I(1)**.

Next, with respect to findings of **the PP unit root test**, they are displayed next to those of the ADF test also in **table 5.13A** and **table 5.13B**. The outcome is however different from the respective ADF test. Analytically, the results from the tests in the levels of the variables noticeably point to the presence of a unit root in all cases. In addition, based on the test statistics after first-differencing conducted, the series robustly reject the null hypothesis of the presence of a unit root, suggesting that the series are **integrated of order one, I(1)** and a summary of the test is also displayed in **table 5.13C** and **table 5.13D**.

Concerning the results of the last conventional unit root test, the KPSS test, they point out that all variables in their logarithmic levels are already stationary as reported in **table 5.13A** and **table 5.13B**. Nonetheless, provided that the empirical results of the three tests, the ADF test and the PP test affirm **that the variables are all I(1)**; consequently, the cointegration analyses can be applied.

Table 5.13A: Unit root test statistics for economic variables in logarithmic levels for Swedish model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-0.8633	-5.6676	3	-0.9120	-2.4749	0.8663	0.1081
Independent variables							
1Price	-2.2559	-2.0011	0	-2.2532	-2.0045	0.3442	0.0889
2. Income variables							
2.1 GDP	-2.0085	-2.0054	1	-1.7629	-2.0437	0.8002	0,0529
2.2 GNI	-1.9748	-2.0416	1	-1.6265	-2.1066	0.8386	0.0515
2.3 Gross	-1.9697	-3.5562	1	-1.6911	-2.1439	0.8216	0.0525
2.4 Final	-2.1451	-1.8640	0	-2.2242	-2.2762	0.7690	0.0820
3. Substitute price variables							
3.1 MY^{RER}	-2.6775	-2.6870	1	-1.9939	-2.0326	0.3621	0.0670
3.2 SG^{RER}	-1.7993	-1.7029	1	-1.6577	-1.7209	0.4549	0.1060
3.3 PH^{RER}	-2.3036	-2.0304	1	-1.5497	-1.0700	0.4155	0.1112
3.4 ID^{RER}	-2.2057	-1.7740	0	-2.3249	-2.0476	0.3636	0.1472

****Note***: Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table5.13B: Summary of unit root test statistics for economic variables in logarithmic levels for Swedish model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Stationary	Nonstationary	Stationary
Independent variables			
1.Price	Nonstatonary	Nonstatonary	Stationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstaionary	Statioinary
2.2 GNI	Nonstaionary	Nonstationary	Stationary
2.3 Gross	Stationary	Nonstationary	Stationary
2.4 Final	Nonstatonary	Nonstationary	Stationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Stationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Stationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Stationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Stationary

Table 15.3C: Unit root test statistics for economic variables in log-difference for Belgian model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-3.3103	-3.2646	2	-8.7769	-8.6784	0.0713	0.0715
Independent Variables							
1. Price	-4.6262	-4.6578	0	-3.8537	-3.9438	0.1820	0.0989
2. Income variables							
2.1 GDP	-3.6096	-3.6628	0	-3.5812	-3.6177	0.1445	0.0799
2.2 GNI	-3.8248	-3.8770	0	-3.9394	-3.9639	0.1343	0.0811
2.3 Gross	-4.0236	-4.0789	0	-4.1572	-4.1845	0.1313	0.0778
2.4 Final	-6.0548	-6.1631	0	-6.1214	-6.2261	0.1918	0.0649
3. Substitute price variables							
3.1 MY^{RER}	-4.3178	-4.2973	0	-4.1308	-4.0158	0.1079	0.0900
3.2 SG^{RER}	-3.7989	-3.9127	0	-3.9398	-3.8733	0.1229	0.1151
3.3 PH^{RER}	-4.0887	-4.1632	0	-3.5453	-3.5101	0.1596	0.0730
3.4 ID^{RER}	-4.0857	-4.1753	0	-3.6066	-3.6305	0.2374	0.0470

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.13D: Summary of unit root test statistics for economic variables in log-differences for Swedish model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(0)	I(1)	I(0)
Independent variables			
1. Price	I(1)	I(1)	I(0)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(0)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(0)	I(1)	I(0)
2.4 Final	I(1)	I(1)	I(0)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(0)
3.2 SG^{RER}	I(1)	I(1)	I(0)
3.3 PH^{RER}	I(1)	I(1)	I(0)
3.4 ID^{RER}	I(1)	I(1)	I(0)

12.1 Empirical findings of the cointegration analyses for the Swedish model

12.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In subsequent sections for the Swedish model, the long-run relationships among the variables are to be explored by employing the two methods of cointegration analyses, similarly to the previous country models. In the first section, the empirical results of **the Engle-Granger (EG) test** are presented followed by **the Johansen Approach.**

According to **equation (5.21)**, it expresses **the long-run relationship** between **the tourism demand (TA^{SW})** – the number of Swedish tourist arrivals to Thailand – and its **economic determinants**. In the model, the explanatory variables compose of the tourism price, real Swedish GDP per capita, the lagged dependent variable, and the dummy variables, the long-run equation can be written as follows;

$$TA^{SW} = -3.76+0.31Price +1.58GDP +0.66TA^{SW}(-4)- 0.12DUMMY03$$

(1.33) (4.23) (10.80)

Adjusted R-squared = 0.91 **(5.21)**

*Note: t-statistics in parentheses

However, to make sure that the long-run relationship between the tourism demand and its determinants really exists, **a residual series of equation (5.21)** must be stationary. To conduct a test for stationarity of the series, likewise the tests of unit roots, the ADF test and the PP test are used and the outcome of testing are reported in **table 5.13E**. To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.13E**, the two tests apparently describe that the null hypothesis of no cointegration is roundly rejected at all significance levels.

Table 5.13E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-4.7551	-4.6911	3	-4.5111	-4.4700

****Note****:* The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.13E**, the long-run relationship between the Swedish tourism demand and its economic determinants is hence attested. Consequently, the next issue of interest is the estimation of **the elasticity of demand**. By looking back to the long-run **equation (5.21),** it shows that the estimated elasticities have meaningful and correct signs corresponding to the economic theory. Each of them will be detailed in the subsequent section.

Firstly, with respect to **the price elasticity**, it is reported positive at 0.31. This is somewhat not in line with what suggested by the economic theory. Theoretically, if the price elasticity of demand of a particular good is found to be positive, it is considered to be the so-called **"Giffen Good"**. In this case, the price elasticity of 0.31 implies that a **1** percent **increase** in the tourism price bring about a rise in the number of Swedish visitors of **0.31** percent, or vice versa.

Secondly, **the income elasticity** is reported more than one at **1.58** as expected. This indicates that Thai tourism is technically considered luxurious for the Swedish. According to **equation (5.21)**, the income elasticity of 1.58 signifies that **a rise** in the Swedish real GDP per capita of **1** percent would **increase** the arrivals of tourists of approximately only **1.58** per cent.

Third, it is obvious that the variable capture **habit persistence or the so-called word-of-mount effects** is one the crucial determinants of Swedish tourism demand as reported by the equation above. The coefficient of 0.66 indicates a substantially high degree of habit persistence and it implies that the Swedish tourists keep coming back visiting Thailand.

Finally, to measure the effects of the **SARs outbreaks** in 2003 and consequences of the **tsunami outbreak** in 2004Q4, dummy variables named DUMMY03 is included into the model. According to **equation (5.21)**, it reports that the SARs outbreaks crowd the number of visitors out approximately **0.12 percent**.

12.1.2 Empirical results of the Johansen cointegration test

Another tool in exploring the long-run relationships for the Swedish model is the Johansen Cointegration Test. Provided that all of the time-series data are **integrated of order one or I(1)**, the test therefore can be applied to those time-series data. Likewise the previous other country models, **the Akaike Information Criterion (AIC)** is used for choosing **optimal lags for VAR models** and it suggests four optimal lags to be included in the VAR model as displayed in the following table.

Table 5.14F: Test statistics for the length of lags of VAR in Swedish model

Lag	LogL	LR	FPE	AIC	SC	HO
0	375.1880	NA	5.13e-16	-15.34117	-15.06828	-15.23804
1	673.4296	497.0694*	1.62e-20	-25.72623	-23.54317*	-24.90125*
2	718.1541	61.49614	2.20e-20	-25.54809	-21.45483	-24.00124
3	779.3897	66.33857	1.91e-20	-26.05790	-20.05447	-23.78920
4	861.4607	64.97288	1.09e-20*	-27.43586*	-19.52224	-24.44529

*indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5percent level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Table 5.14G: Trace tests for cointegrating vectors for the Swedish model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	107.0762	69.8189	0.0000
r ≤ 1	r ≤ 2	60.4536	47.8561	0.0021

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.14H: Maximum eigenvalue tests for cointegrating vectors for the Swedish model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	46.6226	33.8769	0.0009
r ≤ 1	r ≤ 2	32.5570	27.5843	0.0105

*Mackinnon-Haug-Michelis (1999) P-values

Based on the lag length suggested by AIC earlier, the Johansen cointegration test is conducted via Eviews 6 software package. The cointegration relationships among variables are established by using two likelihood ratio tests, **a trace and maximum eigenvalue tests** and they are reported in **table 5.13G** and **table 5.13H**. The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

Table 5.14I: Long-run coefficients of Swedish demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.4910 (0.8021)
GDP	6.0722 (0.4836)
MY^{RER}	0.2240 (0.5681)
ID^{RER}	0.4190 (0.1349)

*Standard Error Parentheses

Firstly, If **the trace statistics test** in **table 5.13G** are taken into account, it suggests that the hypothesis that there is 2 cointegrating relationships (r=2) cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 percent significance level. Therefore, the λ_{trace} statistics suggest that there are **two cointegrating relationships** in this model.

Secondly, according to **the maximal eigenvalue test** expressed in **table 5.13H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} of 46.62 is greater than the critical values at the 5 percent significance level of 33.88. Hence, the λ_{max} statistics suggest that there are also **two cointegrating relationships** among the variables in the Swedish model.

To sum up, based on the two tests reported above, it can conclude that there are at most two cointegrating relationships existing among the variables in the model.

As reported by the λ_{max} and λ_{trace} tests in **table 5.13G** and **table 5.3H**, the variables in the Belgian demand models have **at most two cointegrating relationships**. **Equation (5.22)** normalised on the dependent variable shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

$$TA^{SW} = \underset{(0.80)}{-0.49}Price + \underset{(0.48)}{6.07}GDP + \underset{(0.56)}{0.22}MY^{RER} + \underset{(0.13)}{0.37}ID^{RER} \qquad \textbf{(5.22)}$$

*Note: standard error in parentheses

According to **equation (5.22)**, it demonstrates that almost all variables have economically meaningful signs and statistical significance. With respect to the **price elasticity**, it is found to be relatively inelastic which is not in line with the value reported by the method of Engle-Granger (EG). The estimated coefficient designates that a **1 percent rise** in the tourism price results in a **0.49 percent decrease** in the tourist arrivals, or vice versa. Meanwhile, the estimated **income elasticity** is 6.07, which is considered highly elastic. It indicates that **a 1 percent increase** in Swedish real GDP per capita results in **a 6.07 percent increase** in the number of visitors to Thailand, or vice versa.

Regarding **the cross-price elasticities**, based on the estimated coefficients in equation (5.22), it reports that tourism in tourism in the alternative destinations -- **Malaysia and Indonesia** -- are recognised **substitute** for tourism in Thailand.

Chart 5.11A: Recursive price elasticity for Swedish model

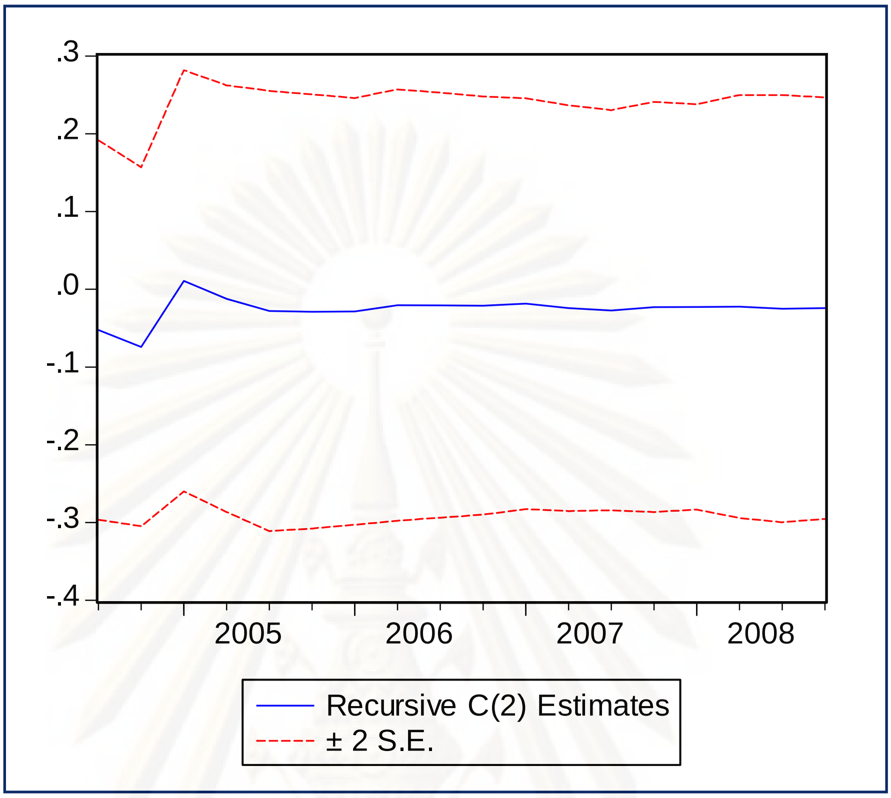
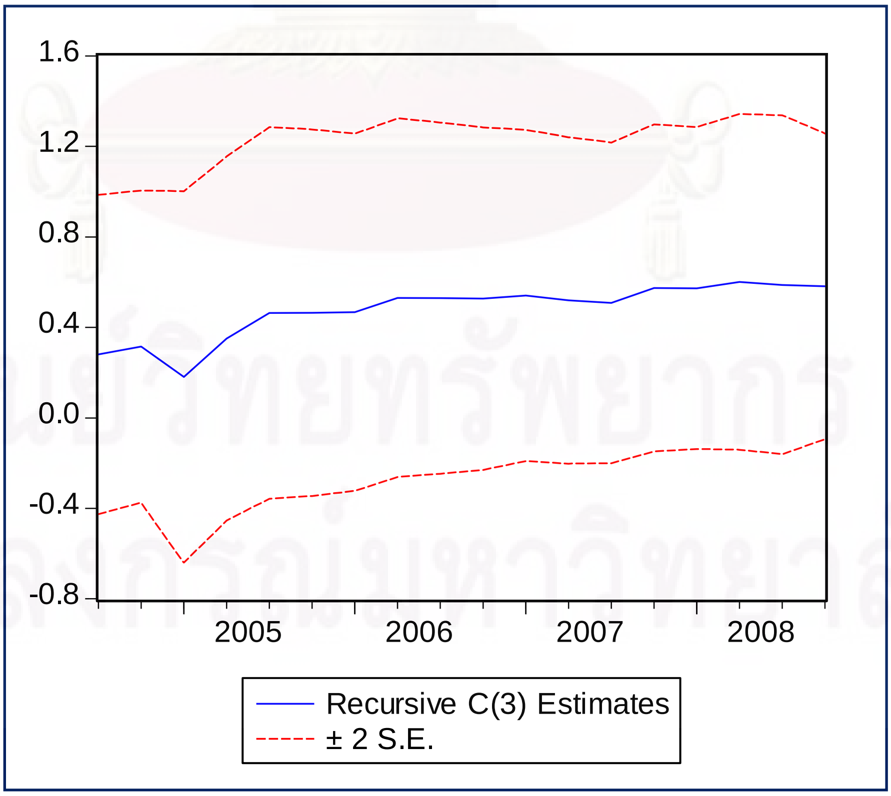
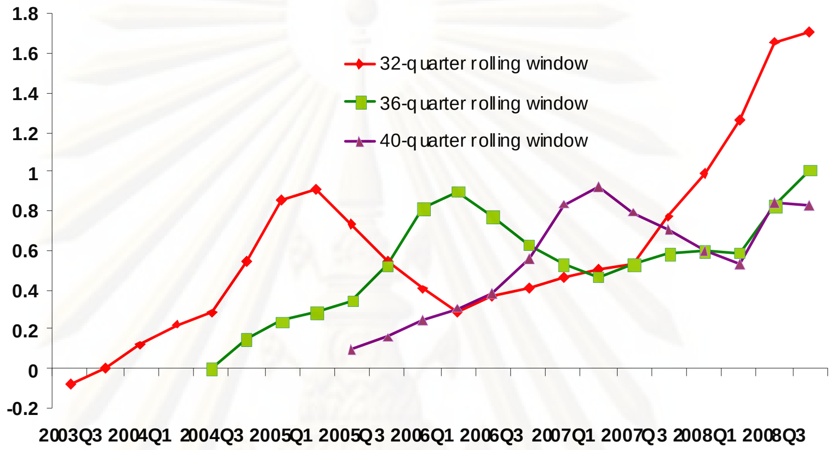


Chart 5.11B: Recursive income elasticity for Swedish model



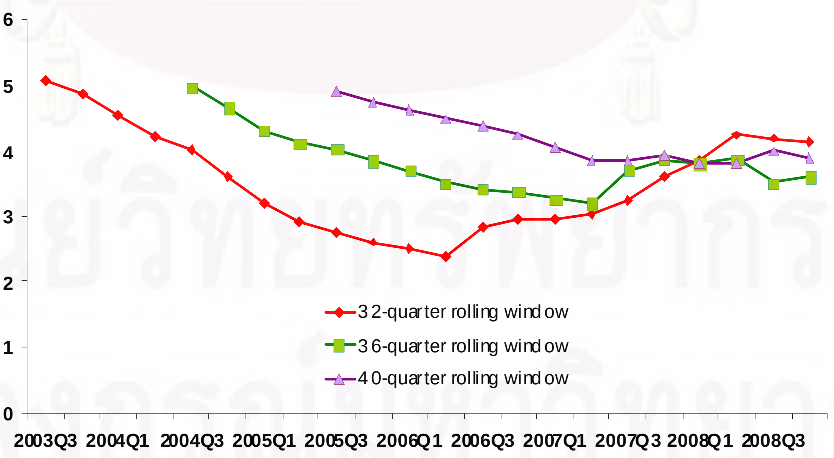
12.2

Chart 5.11C: Time-Varying Price Elasticity for Swedish Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.11C: Time-Varying Income Elasticity for Swedish Model from Estimations of Different Window Sizes



Source: Author's calculation

12.2 The Empirical results of the Recursive Ordinary Least Square (OLS) and the Rolling Regressions for Swedish model

In tandem with the previous model, to explore the dynamics of the price and income elasticities of demand in the model of Sweden, the methods of Recursive Ordinary Least Square (OLS) and the rolling regressions are used.

To begin with, the dynamics of **the price elasticity**, as demonstrated in **chart 5.11A** and **chart 5.11C**, the results of the two method is somewhat different as the result provided by the recursive OLS is constant in a negative territory near zero, meanwhile the result provided by it counterpart is rising over the sample period to a positive territory.

Then, regarding the dynamics of **the income elasticity** estimated by the two methods, the results are not fundamentally different from those of the price elasticity. The recursive OLS reports that the income elasticity almost stable over the sample period, whereas the rolling regression described the elasticity as decreasing and becoming stable at somewhat highly elastic level as displayed in **chart 5.11B** and **chart 5.11D.**

13. Empirical findings of High-Income-Country model

Following the procedure of the former models discussed earlier, **the dependent variable**- the quarterly number tourist arrivals from a group of high-income countries – **the Netherlands and Norway**— to Thailand- is categorised into **the "intercept and trend"** model as the data displays a strong trending behaviour according to a graphical examination. Meanwhile, the own price variable, together with **the substitute price variables**, is classified into the **"intercept, no trend"** model as that fact that those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

With respect to the procedure of unit root testing, it is in line with the former country models. The outcome of the tests – **the ADF test, the PP test**, and **the KPSS test** - for all the variables in their logarithmic levels, along with for the two alternative models, **"intercept, no trend" and "intercept and trend"** is demonstrated in **table 5.14A** and **table5.14B**. The results clearly indicate that all variables are nonstationary in their logarithmic levels, except the series of real GDP per capita and the dependent variable, real GNI per capita, and the real Net National Disposable Income per capita reported by the KPSS test. However, to be able to apply the **cointegration tests**, such characteristics of nonstationarity must be abolished. To achieve stationary series for the rest of the series, first differences are conducted to those variables. The results after taking first differences are demonstrated in **table 5.14C** and **table 5.14D**. By conducting such differences, the nonstationary components were entirely removed from the series under investigation and the null hypothesis of nonstationarity is apparently rejected at the 5% significance level suggesting that they are **integrated of order one**, or **I(1) variables**.

Notwithstanding, provided that the empirical results of the three tests, the majority connotes nonstationality of almost all variables and they are all I(1) variables; consequently, the cointegration analyses therefore can be applied.

Table 5.14 A: Unit root test statistics for economic variables in logarithmic levels for high-income-country model

Variables	ADF test Intercept, no trend	ADF test Intercept and trend	Lag length of ADF	PP test Intercept, no trend	PP test Intercept and trend	KPSS test Intercept, no trend	KPSS test Intercept and trend
Dependent variable							
TA	-1.4121	-2.4250	0	-1.4501	-2.4250	0.8990	0.1452
Independent variables							
1. Price	-1.2315	-1.4471	0	-1.2987	-.4471	0.7195	0.1181
2. Income variables							
2.1 GDP	-1.4157	-3.6052	0	-1.4498	-3.5335	0.9417	0.1213
2.2 GNI	-0.1198	-2.7139	0	-0.9544	-2.9294	0.9333	0.0784
2.3 Gross	-0.0368	-2.5530	0	-0.9593	-2.9687	0.9310	0.0810
2.4 Final	-0.7597	-1.1823	0	-0.5721	-2.8964	0.9434	0.1790
3. Substitute price variables							
3.1 MY^{RER}	-0.9050	-1.16811	0	-0.9791	-2.0717	0.8473	0.0933
3.2 SG^{RER}	-0.9838	-1.2737	0	-1.0729	-1.5747	0.7846	0.1164
3.3 PH^{RER}	-1.1550	-0.2734	0	-1.1847	-1.0798	0.7041	0.1413
3.4 ID^{RER}	-1.8457	-2.1466	0	-1.8677	-2.2775	0.7825	0.1357

****Note***: Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.14B:Summary of unit root test statistics for economic variables in logarithmic levels for high-income-country model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstationary	Nonstationary	Stationary
Independent variables			
1.Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Stationary	Stationary	Stationary
2.2 GNI	Nonstationary	Nonstationary	Stationary
2.3 Gross	Nonstationary	Nonstationary	Stationary
2.4 Final	Nonstationary	Nonstationary	Nonstationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.14C: Unit root test statistics for variables in log-difference for high-income-country model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-8.8815	-9.0333	0	-9.1310	-9.5091		
Independent variables							
1. Price	-5.8698	-5.8381	0	-5.7847	-5.7443	0.1187	0.0989
2. Income variables							
2.1 GDP							
2.2 GNI	-5.0510	-4.0096	3	-6.3264	-6.2410	0.0659	
2.3 Gross	-4.9770	-4.8584	3	-6.6567	-6.5120	0.0665	
2.4 Final	-7.6841	-7.6882	1	-11.5677	-11.4857	0.1084	0.0951
3. Substitute price variables							
3.1 MY^{RER}	-6.8111	-6.7510	0	-6.8507	-6.7922	0.0876	0.0836
3.2 SG^{RER}	-6.0259	-5.9891	0	-6.0268	-5.9895	0.1441	0.1304
3.3 PH^{RER}	-6.2021	-6.2167	0	-6.2047	-6.1823	0.1928	0.1415
3.4 ID^{RER}	-6.4641	-6.4818	0	-6.4602	-6.4747	0.0975	0.0350

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.14D: Unit root test statistics for economic variables in log-difference for high-income-country model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(0)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(0)	I(0)	I(0)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(1)	I(1)	I(0)
2.4 Final	I(1)	I(1)	I(1)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

12.3 Empirical findings of the cointegration analyses for the high-income-country model

13.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

To examine long-run relationships among the variables in this model, the method of **Engle-Granger (EG)** are firstly presented and **the Johansen cointegration test** is subsequently demonstrated.

According to **equation (5.23)**, it expresses **the long-run relationship** between the tourism demand (TA^{HI}) – the number of tourist arrivals to Thailand – and its economic determinants. In the model, the explanatory variables compose of the tourism price, the weighted real GDP per capita, a lagged dependent variable, and a dummy variable as follows;

(5.23)

TA^{HI} = -6.78 +0.29Price + 1.16GDP – 0.10ID^{RER} + 0.58TA^{HI} (-4) -0.12DUMMY03
(2.55) (2.87) (-2.77) (6.89)

Adjusted R-squared = 0.95
*Note: t-statistics in parentheses

A residual series of **equation (5.23)** must be tested for **stationarity** in order to affirm that the long-run relationship among the variables really exists. To conduct such a test, likewise the tests for unit roots, **the ADF test** and **the PP test** are used. The outcome of testing is reported in **table 5.14E**. Additionally, to test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

In tandem with the one-tail unit root tests, according to table 5.14E, the two tests apparently indicate that the null hypothesis of no cointegration is roundly rejected at all significance levels.

Table 5.14E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-4.7924	-4.6363	0	-4.8611	-4.7126

**Note*: The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Provided the outcome reported in **table 5.14E**, the long-run relationship between the tourism demand and its economic determinants genuinely hence exists. Next, the issue of the **estimated elasticity of demand** provided by the long-run equation (5.23) is to be elaborated.

Firstly, regarding **the price elasticity**, it is registered **positive** at 0.29. It does not corresponding to what suggests by the economic theory; however, it could be possible in the case of **"Giffen good".** Although it is not realistic, it can technically be interpreted that the price elasticity of 0.29 implies a **1 percent increase** in the Thai tourism price leads to a 0.29 percent rise in the number of visitors from the high-income countries, or vice versa.

Meanwhile **the income elasticity** is reported higher than one at **1.16** which is elastic. This number indicates that Thai tourism is considered luxurious for tourists from the high-income countries. The result is line with the most of the findings of most empirical literature. According to equation (5.23), the income elasticity of **1.16** signifies that a rise in the real GDP per capita of the high-income countries of 1 per cent would increase the arrivals of tourists of approximately **1.16 per cent**, vice versa.

Then, with respect to **the cross-price elasticities**, equation (5.23) shows that **tourism in Indonesia** is considered as **complementary** to tourism in Thailand. This means that a 1 per cent rise in the Thai tourism price would decrease 0.10 per cent of tourist flows to Indonesia, or vice versa.

Then, to capture **habit persistence** or the so-called **word-of-mount effects** in this model, the lagged dependent variable is included into the model. According to the reported results, the coefficient of 0.58 indicates a high degree of habit persistence from this group of country. Additionally, to measure the effects **the SARs outbreaks** in 2003, the DUMMY03 is included and it is reported to crowd the number of visitors out approximately 0.12 percent.

13.1.2 Empirical results of the Johansen cointegration test

The Johansen cointegration analysis is the second tool in exploring the equilibrium relationships among the variables. Nevertheless, prior to performing such a test, it is necessary that a lag length *(p)* for the VAR model is specified. The study utilises **the Akaike Information Criterion (AIC)** in choosing optimal lags for VAR models and according to the statistics demonstrated in **table 5.14F**, it suggests four **optimal lags** to be included in the model.

Table 5.14F: Test statistics for the Engle-Granger Residual-Based cointegration test

Lag	LogL	LR	FPE	AIC	SC	HQ
0	987.9403	NA	2.19e-30	-39.91593	-39.52984	-39.76945
1	1299.033	482.5113*	4.28e-34	-48.53196	-44.28502*	-46.92068*
2	1402.958	118.7707	6.10e-34	-48.69214	-40.58434	-45.61605
3	1558.895	114.5664	3.31e-34*	-50.97531*	-39.00665	-46.43442

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5 percent level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 5.14G: Trace tests for cointegrating vectors for the high-income country model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95 percent**	
r = 0	r = 1	59.4414	47.8561	0.0028
r ≤ 1	r ≤ 2	35.1766	29.7971	0.0109
r ≤ 2	r ≤ 3	15.9258	15.4947	0.0430
r ≤ 3	r ≤ 4	4.6864	3.8415	0.0304

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.14H: Maximum eigenvalue tests for cointegrating vectors for high-income country model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	24.2649	27.5843	0.1258
r ≤ 1	r ≤ 2	19.2508	21.1316	0.0898
r ≤ 2	r ≤ 3	11.2394	14.2646	0.1426
r ≤ 3	r ≤ 4	4.6864	3.8415	0.0304

*Mackinnon-Haug-Michelis (1999) P-values

Based on the lag length suggested earlier, Eviews 6 software package is employed to conduct the Johansen cointegration test. The cointegration relationships among variables consequently are established by using two likelihood ratio tests, **the trace and maximum eigenvalue tests** and they are reported in **table 5.14G** and **table 5.14H.** The inference is still that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

First, according to **the trace statistics test** in table 5.14G, they suggest that the hypothesis that there are 3 cointegrating relationships (r=3) cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 percent significance level. Therefore, the λ_{trace} statistics suggest that there are likely to be three cointegrating relationships in the model.

Then, according to **the maximal eigenvalue test** expressed in **table 5.14H**, it is obviously that the hypothesis of having a cointegration relationship can be rejected since the calculated λ_{max} is 24.26, less than the critical values at the 5 percent significance level of 27.58. Thus, λ_{max} statistics likely to suggest that there is no cointegrating relationship among the variables in the high-income-country model.

In summary, as suggested by the two tests, it can conclude that there are three cointegrating relationships existing among the variables in this model.

Table 5.14I: Long-run coefficients of a group of high-income countries demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	0.8240 (0.2447)
GDP	2.6636 (0.5676)
ID^{RER}	-0.3713 (0.3372)

*Standard Error Parentheses

Based on the report s of the λ_{max} and λ_{trace} tests in **table 5.14G** and **table 5.14H**, the variables in the high-income country model have maximum three cointegrating relationships and equation (5.24) normalised on the dependent variable hence shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

$$TA^{HI} = 0.82Price + 2.66GDP - 0.37ID^{RER} \qquad \textbf{(5.24)}$$
$$(0.82) \qquad (0.57) \qquad (0.33)$$

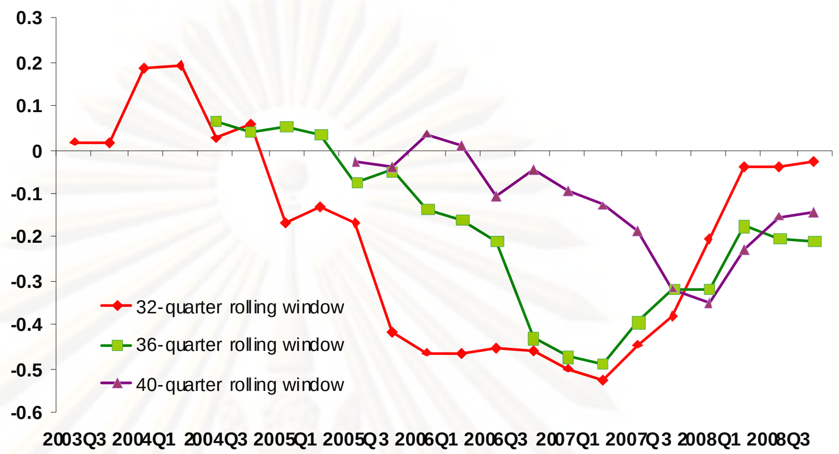
*Note: standard error in parentheses

As reported in the long-run equation above, almost all variables have economically meaningful signs and statistical significance. As far as **the price elasticity** is concerned, it is registered **positive** at 0.82, consistent with the finding of the EG approach. The estimated coefficient implies that **a 1 per cent rise** in the tourism price in Thailand results in **a 0.82 per cent increase** in the number of tourist arrivals Thailand, or vice versa.

Regarding **the income elasticity**, it is found to be elastic at **2.66**. The estimated income elasticity of b 2.66 means that **a 1 per cent increase** in the real GDP per capita results in **a 2.12 per cent increase** in the number of visitors from high-income countries to Thailand, or vice versa.

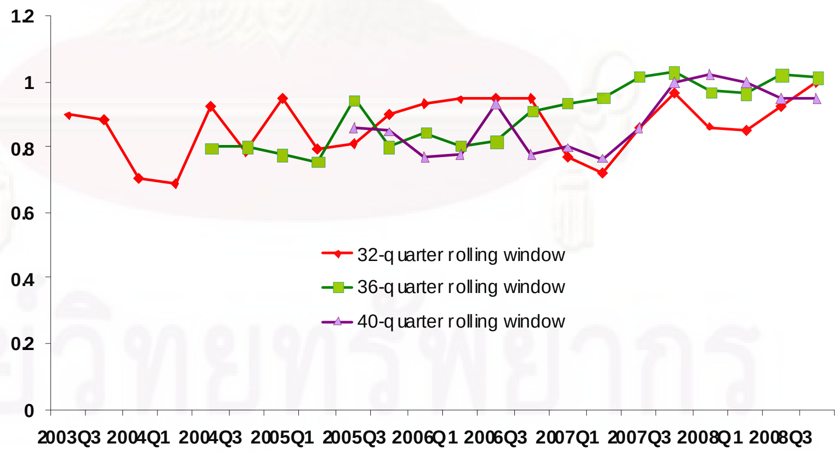
Regarding **the cross-price elasticity**, based on the estimated coefficients in equation (5.24), it reports that tourism in the alternative destinations, Indonesia, is recognised complementary to tourism in Thailand. The cross-price elasticity implies that a **1 per cent increase** in tourism in Thailand would also generate a tourist out-flow of Indonesia of **0.37 per cent**, or vice versa.

Chart 5.12A: Time-Varying Price Elasticity for High-Income Country Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.12B: Time-Varying Income Elasticity for High-Income Country Model from Estimations of Different Window Sizes



Source: Author's calculation

13.2 The Empirical results of the Rolling Regressions for high-income-country model

As discussed in the former country models, in order to explore the evolution of the group of high-income countries' demand to Thai tourism overtime, the methods of rolling regression is used.

To begin with, **the dynamics of the price elasticity**, as displayed in chart 5.12A, firstly, the price elasticity estimated from different window sizes of the rolling regressions, they tend to fluctuate over the sample period of 1996Q1 in a negative territory; however, the final values showed signs of stabilisation moving around -0.3-0. Overall, the graphical illustration shows that **the price elasticity** is still **inelastic.**

Secondly, with respect to **the dynamics of the income elasticity,** the three different window sizes report that the elasticity overtime seems to be stabilized around 0.8-1 and it is unlikely to experience any shift. According to the results, it affirms that Thai tourism is recognised necessity for the high-income countries as reported in the findings of the EG approach.

14. Empirical results of Middle-High-Income countries

In tandem with the former models discussed earlier, the dependent variable- the quarterly number of tourist arrivals of the group of middle-high-income countries – **Belgium, Britain, Denmark, Finland, Germany, Sweden** -- to Thailand- falls into **the "intercept and trend" model** as the series displays a strong trending behaviour according to a graphical examination. Meanwhile, **the own price variable**, together with **the substitute price variables**, is classified into **the "intercept, no trend" model** as that fact that those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

Regarding the findings of the unit root tests, the results of the tests, **the ADF test, the PP test, and the KPSS test,** for all the variables in their logarithmic levels, along with for the two alternative models, "intercept, no trend" and "intercept and trend" are reported in **table 5.15A** and **table5.15B**. The results clearly indicate that all variables are nonstationary in their logarithmic levels, except **the KPSS test** reports mixed results of both nonstationary and stationary. However, in order to be able to apply the cointegration tests, such characteristics of nonstationarity must be disappeared. To acquire stationary series for those series, the first difference is applied. The results after taking first differences to the variables are demonstrated in **table 5.15C** and **table 5.15D**. By conducting such differences, the nonstationary components were entirely removed from the series under investigation and the null hypothesis of nonstationarity is apparently rejected at the 5 per cent significance level suggesting that they are **integrated of order one**, **I(1).**

Table 5.15A: Unit root test statistics for economic variables in logarithmic levels for middle-high-income country model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-0.9380	-2.6314	0	-0.8844	-2.6314	0.9248	0.0867
Independent variables							
1. Price	-1.4325	-1.0778	0	-1.4325	-1.2802	0.6854	0.1281
2. Income variables							
2.1 GDP	-1.3498	-1.1866	0	-1.2989	-1.6892	0.9336	0.0977
2.2 GNI	-0.4725	-2.6637	0	-0.4594	-2.9290	0.9544	0.1019
2.3 Gross	-0.7229	-1.2507	0	-0.7235	-2.5972	0.9456	0.0825
2.4 Final	-2.8804	-1.2507	1	-2.4680	-0.9849	0.9104	0.2174
3. Substitute price variables							
3.1 MY^{RER}	-2.6978	-2.3915	0	-2.0189	-2.4424	0.6741	0.6881
3.2 SG^{RER}	-1.4756	-0.2539	0	-1.4767	-0.7553	0.8308	0.1314
3.3 PH^{RER}	-1.3679	-1.0286	0	-1.3569	-1.0099	0.7399	0.1447
3.4 ID^{RER}	-2.2827	-2.0250	0	-2.3306	-2.2975	0.6514	0.1404

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.15B: Summary of unit root test statistics for economic variables in logarithmic levels for middle-high-income country model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstationary	Nonstationary	Sationary
Independent variables			
1. Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Stationary
2.2 GNI	Nonstationary	Nonstationary	Stationary
2.3 Gross	Nonstationary	Nonstationary	Stationary
2.4 Final	Nonstationary	Nonstationary	Nonstationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.3C: Unit root test statistics for economic variables in log-difference for middle-income-country model

Variables	ADF test		Lag length of ADF	PP test		KPSS test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-7.0082	-6.9773	0	-7.2773	-7.2765		
Independent variables							
1. Price	-5.6555	-5.7059	0	-5.6409	-5.6567	0.2007	0.0942
2. Income variables							
2.1 GDP	-6.0035	-6.1055	0	-6.1037	-6.1405		
2.2 GNI	-8.4902	-8.4709	0	-8.4159	-8.4013		
2.3 Gross	-7.3740	-7.3241	0	-7.3762	-7.3248		
2.4 Final	-9.0985	-10.1607	0	-9.0204	-9.8952	0.5053	0.0500
3. Substitute price variables							
3.1 MY^{RER}	-8.1191	-8.1122	0	-8.1472	-8.1439	0.1010	0.0564
3.2 SG^{RER}	-5.0650	-5.2729	0	-5.0313	-5.2839	0.2477	0.1186
3.3 PH^{RER}	-6.5541	-6.5797	0	-6.5314	-6.5845	0.2182	0.1070
3.4 ID^{RER}	-5.7433	-5.8398	0	-5.7170	-5.7464	0.1584	0.0367

****Note****:* Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.15D: Summary of unit root test statistics for economic variables in log-difference for middle-high-income-country model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(0)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(0)
2.2 GNI	I(1)	I(1)	I(0)
2.3 Gross	I(1)	I(1)	I(0)
2.4 Final	I(1)	I(1)	I(1)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

14.1 Empirical findings of the cointegration analyses for the middle-high-income country model

14.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In line with the former models, in order to examine long-run relationships among the variables in the model, empirical results of the Engle-Granger (EG) test is firstly presented and followed by the Johansen cointegration test.

According to **equation (5.25)**, it expresses the long-run relationship between the tourism demand (TA^{MH}) – the number of tourist arrivals to Thailand – and its economic determinants. In the model, the explanatory variables compose of the tourism price, real GDP per capita, a lagged dependent variable and a dummy variable. The estimated long-run equation is displayed as follows;

$$TA^{MH} = -1.08 - 0.13Price + 0.54GDP + 0.77TA^{MH}(-4) - 0.19DUMMY03 \qquad (5.25)$$
$$(-1.21) \qquad (2.034) \qquad (7.88)$$

Adjusted R-squared = 0.94

*Note: t-statistics in parentheses

Notwithstanding, to be assured however that the long-run relationship between the tourism demand and its determinants really exists, **a residual series** of **equation (5.25)** must be stationary. To conduct a test for stationarity, likewise the tests of unit roots, **the ADF test and the PP test**, are utilized and the outcome of testing are reported in **table 5.15E**. To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.15E**, the two tests indicate that the null hypothesis of no cointegration is strongly rejected at all significance levels.

Table 5.15E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-4.0404	-4.0065	0	-4.0791	-4.0505

****Note:*** The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Given the outcome reported in **table 5.15E**, the long-run relationship between the tourism demand and its economic determinants is hence attested. The estimated elasticity of demand is the next issue of interest. According to **the long-run equation (5.25)**, it shows that the estimated elasticities all have correct signs corresponding to the economic theory.

With respect to **the price elasticity**, it is reported inelastic at 0.13 in absolute terms and it denotes that the tourism demand of this group of country is less responsive to changes in tourism prices in Thailand. In other words, the visitors are somewhat insensitive to changes in the real exchange rate defined in the model due to the fact that a **1 per cent increase** in the price would **crowd out** the number of tourist arrivals only 0**.13 per cent**, or vice versa.

Meanwhile **the income elasticity** is also found to be **inelastic** at **0.54**, which means that Thai tourism is considered necessary for the group of middle-high income countries. The result is not somewhat line with the most of the findings of most empirical literature. According to equation (5.25), the income elasticity of 0.54 implies that **a rise** in the real GDP per capita of the group of **1 per cent** would **increase** the arrivals of visitors of approximately **0.54 percent**, or vice versa.

Then, to capture **habit persistence** or the so-called **word-of-mount effects** in this model, the lagged dependent variable is included into the model. According to the reported results, the coefficient of 0.77 indicates a high degree of habit persistence from this group of country. Additionally, to measure the effects the SARs outbreaks in 2003, the DUMMY03 is included and it is reported to crowd the number of visitors out approximately 0.19 percent.

14.1.2 Empirical results of the Johansen cointegration test

Another tool in exploring the long-run relationships for this model is **the Johansen cointegration test**. Similar to the EG method, all of the time-series data are required to be **integrated of order one, I(1)**, the test therefore can be applied to those time-series data. Likewise, the other models, **the Akaike Information Criterion (AIC)** is used for choosing **optimal lags** for VAR models and it suggests four optimal lags to be included in the VAR model as displayed in the following table.

Based upon the lag length suggested by the AIC, the Johansen cointegration test is conducted via **Eviews 6 software package** and the cointegration relationships among variables are established by using two likelihood ratio tests, **the trace and maximum eigenvalue tests** as used in the other models. The relevant findings are reported in **table 5.15G** and **table 5.15H**.

Table 5.15F: Test statistics for the length of lags of VAR in middle-high-income country model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1109.685	NA	1.52e-32	-44.88510	-44.49902	-44.73862
1	1454.070	534.1486	7.65e-37	-54.86001	-50.61307*	-53.24873
2	1545.701	104.7203	1.80e-36	-54.51839	-46.41059	-51.44230
3	1749.572	149.7828*	1.38e-37*	-58.75802*	-46.78937	-54.21713*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5 percent level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 5.15G: Trace tests for cointegrating vectors for the middle-high income country model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	45.3361	29.7971	0.0004
r ≤ 1	r ≤ 2	16.4766	15.4947	0.0355
r ≤ 2	r ≤ 3	5.8433	3.8415	0.0156

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.15H: Maximum eigenvalue tests for cointegrating vectors for the middle-high-income country model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	28.8596	21.1316	0.0034
r ≤ 1	r ≤ 2	10.6333	14.2646	0.1736
r ≤ 2	r ≤ 3	5.8433	3.8415	0.0156

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.15I: Long-run coefficients of a group of middle-high-income country demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-0.4191 (0.1919)
GDP	1.9084 (0.1734)

*Standard Error Parentheses

The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

Based on the trace statistics test in **table 5.15G**, it suggests that the hypothesis that there is **3 cointegrating relationships** (r=3) cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 percent significance level. Therefore, there are likely to be three cointegrating relationships in the model suggested by the λ_{trace} statistics.

Second, according to the maximal eigenvalue test expressed in **table 5.15H,** it is clearly that the hypothesis of no cointegration relationship (r=0) is rejected since the calculated λ_{max} is 28.86, greater than the critical values at the 5 percent significance level of 21.13 The λ_{max} statistics suggest that there are three cointegrating relationships among the variables in the model.

To sum up, based on the two tests, it can conclude that there are three cointegrating relationships existing among the variables in the group of middle-high-income countries' demand to Thai tourism.

As reported by the λ_{max} and λ_{trace} tests in **table 5.15G** and **table 5.15H**, the variables in the models have three cointegrating relationships and **equation (5.26)** normalised on the dependent variable shows coefficients in a state of equilibrium or a long-run relationship among variables as follows;

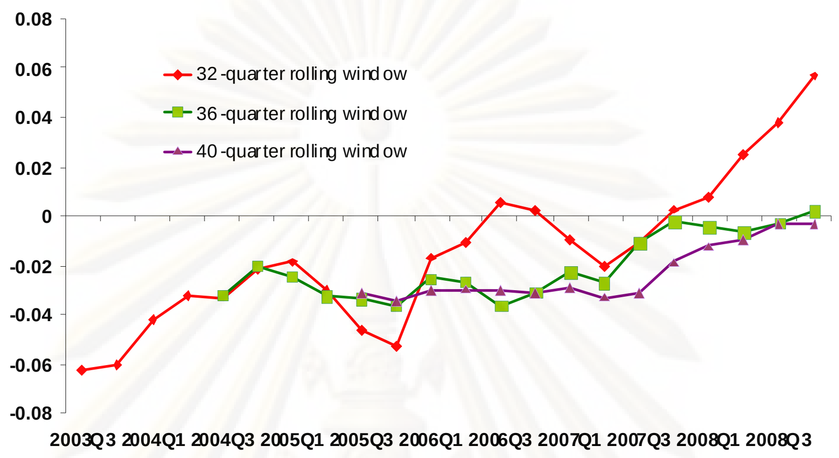
$$TA^{MH} = -\underset{(0.19)}{0.42}Price + \underset{(0.17)}{1.91}GDP \qquad \textbf{(5.26)}$$

*Note: t-statistics in parentheses

Based upon **equation (5.26),** the variables have economically meaningful signs and statistical significance. Regarding the price elasticity is found to be elastic at 0.42 in absolute terms and this is clearly in line with that reported by the method of Engle-Granger (EG) earlier. Its estimated coefficient designates that a 1 per cent rise in the Thai tourism price results in a 0.42 per cent decrease in the group's visitors, or vice versa.

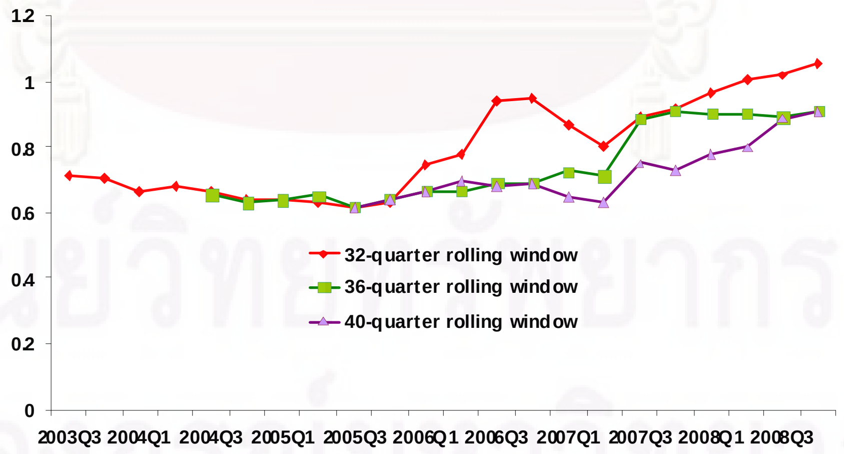
Meanwhile, **the estimated income elasticity** is recorded at **1.91** which is considered elastic and it also indicates that a **1 per cent increase in** the real GDP per capita would result in **a 1.91 per cent increase** also in terms of the number of the tourist arrivals to Thailand. Vice versa.

Chart 5.13A: Time-Varying Price Elasticity for Middle-High-Income Country Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.13B: Time-Varying Income Elasticity for Middle-High-Income Country Model from Estimations of Different Window Sizes



Source: Author's calculation

14.2 The Empirical results of the rolling regressions for the group of middle-high-income country model

To explore the evolution of the group of middle-high-income countries' demand to Thai tourism overtime, this model is to follow the former group of country models, only will the methods of rolling regression be used.

As displayed in **chart 5.13A,** firstly, the three price elasticities estimated from different window sizes, they tend to decline over the period of 1996Q1-2008Q4 and become stable in a negative territory approximately at -0.06. In addition, over the period, they rarely experience dramatic shifts. Overall, the findings show that the price elasticity is inelastic, in other words, the visitors in this group of countries are somewhat irresponsive to changes in costs of living in the tourism destination, Thailand.

Regarding **the dynamics of the income elasticity**, the approach of rolling regression based on the OLS estimation of three different window sizes reports that the elasticity at first is seem to be stabilized around 2 and it is later likely to experience a shift; however, it returns to stabilized around 2 again. According to the results, it affirms that Thai tourism is recognised luxurious. Additionally, they also help endorse the luxurious nature of tourism products suggested by the empirical findings of existing literature.

15. Empirical results for middle-income countries

Similar to all of the former models discussed earlier, **the dependent variable**-the quarterly number tourist arrivals from a group of middle-income countries – **Belgium, France, Italy, and Spain—** to Thailand- is categorised into **the "intercept and trend" model** as the data displays a strong trending behaviour according to a graphical examination. Meanwhile, **the own price variable**, together with **the substitute price variables,** is classified into **the "intercept, no trend" model** as that fact that those variables hardly express apparent trends. For **the income variables**, they all demonstrate trending patterns over the sample period; they therefore fall into the same category as the dependent variable.

Concerning results of the unit root test, **table 5.16A** and **table5.16B** display the test statistics of **the ADF test**, **the Phillips-Perron (PP) test**, and **the KPSS test** for all the variables in their logarithmic levels, along with for the two alternative models, **"intercept, no trend" and "intercept and trend".** The results clearly indicate that all variables are nonstationary in their logarithmic levels. In order to be able to apply the cointegration analyses to the data, such characteristics of nonstationarity must be disappeared. To obtain stationary series, first differences are conducted to those variables. The results after taking first differences are demonstrated in **table 5.16C** and **table 5.16D.** By conducting such differences, the nonstationary components were entirely removed from the series under investigation and the null hypothesis of nonstationarity is apparently rejected at the 5% significance level suggesting that they are **integrated of order one**, **I(1) variables**.

Table 5.16 A: Unit root test statistics for economic variables in logarithmic levels for middle-income country model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	–1.3894	-2.9907	0	-1.1353	-2.9907	0.7290	0.1774
Independent variables							
1. Price	-1.0631	-1.6818	0	-1.0631	-1.8256	0.8177	0.1134
2. Income variables							
2.1 GDP	-2.3106	0.5122	0	-2.9134	0.0056	0.7167	0.2220
3. Substitute price variables							
3.1 MY^{RER}	-1.0385	1.8131	0	-1.0497	-1.9146	0.7844	0.1016
3.2 SG^{RER}	-1.0137	-1.7134	0	-1.0137	-1.8659	0.8194	0.1107
3.3 PH^{RER}	-1.0363	-1.6993	0	-1.0467	-1.7772	0.8037	0.1138
3.4 ID^{RER}	-1.0784	-1.7611	0	-1.0929	-1.8522	0.8373	0.1217

****Note***: Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.16 B: Summary of unit root test statistical for economic variable in logarithmic levels for middle-income model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	Nonstationary	Nonstationary	Nonstationary
Independent variables			
1. Price	Nonstationary	Nonstationary	Nonstationary
2. Income variables			
2.1 GDP	Nonstationary	Nonstationary	Nonstationary
3. Substitute price variables			
3.1 MY^{RER}	Nonstationary	Nonstationary	Nonstationary
3.2 SG^{RER}	Nonstationary	Nonstationary	Nonstationary
3.3 PH^{RER}	Nonstationary	Nonstationary	Nonstationary
3.4 ID^{RER}	Nonstationary	Nonstationary	Nonstationary

Table 5.16C: Unit Root test statistics for economic variables in log-difference for middle-income country model

Variables	ADF test		Lag	PP test		KPSS test	
	Intercept, no trend	Intercept and trend	length of ADF	Intercept, no trend	Intercept and trend	Intercept, no trend	Intercept and trend
Dependent variable							
TA	-6.8273	-6.8190	1	-8.7984	-9.1837	0.1605	0.0875
Independent variables							
1. Price	-6.6648	-6.6062	0	-6.6648	-6.6061	0.1033	0.0935
2. Income variables							
2.1 GDP	0.0929	-5.3414	2	-4.1563	-5.6610	0.6683	0.0814
3. Substitute price variables							
3.1 MY^{RER}	-6.8836	-6.8135	0	-6.8836	-.8135	0.0933	0.0921
3.2 SG^{RER}	-6.5903	-6.5276	0	-6.5903	-6.5276	0.1033	0.0974
3.3 PH^{RER}	-6.8605	-6.7920	0	-6.8605	-6.7920	0.1039	0.0979
3.4 ID^{RER}	-6.7380	-6.6923	0	-6.7310	-6.6834	0.0948	0.0860

****Note***: Critical values for ADF and PP tests for a 5percent significance level and a sample of size n =50 is -2.93 for intercept, no trend and -3.50 for intercept and trend. Meanwhile, upper tail critical values for the KPSS test statistic asymptotic distribution under the null hypothesis of level stationary for a 5percent significance level is 0.463 and under the null hypothesis of trend stationary for a 5percent significance level is 0.146. These critical values are taken from Stewart, Kenneth G. Introduction to Applied Econometrics. Duxbury Applied Series. Belmont CA: Thomson Brooks Cole, 2005. p.762.

Table 5.16D: Summary of unit root test statistics for economic variables in log-difference for middle-income country model

Variables\Test Statistics	ADF Test	PP Test	KPSS Test
Dependent variable			
TA	I(1)	I(1)	I(1)
Independent variables			
1.Price	I(1)	I(1)	I(1)
2. Income variables			
2.1 GDP	I(1)	I(1)	I(1)
3. Substitute price variables			
3.1 MY^{RER}	I(1)	I(1)	I(1)
3.2 SG^{RER}	I(1)	I(1)	I(1)
3.3 PH^{RER}	I(1)	I(1)	I(1)
3.4 ID^{RER}	I(1)	I(1)	I(1)

15.1.1 Empirical findings of the cointegration analyses for the middle-income model

15.1.1 Empirical findings of the Engle-Granger (EG) cointegration test

In the following section, the long-run relationship among the variables is to be explored. The first method is the Engle-Granger (EG) cointegration test and the second approach of Johansen cointegration test is to be discussed subsequently.

The EG method is to establish the **long-run relationship** between the tourism demand (TA^{MI}) of the group of middle-income countries – the total number of tourist arrivals from those countries to Thailand – and its economic determinants. In the model, the explanatory variables compose of the tourism price, real weighted GDP per capita, a lagged dependent variable, and a dummy variable as displayed in **equation (5.27)** as follows;

$$TA^{MI} = -0.99 - 0.34Price + 1.46GDP + 0.67TA^{MI}(-4) - 0.35DUMMY03 \quad \textbf{(5.27)}$$
$$\qquad (-2.23) \qquad (2.71) \qquad (7.07)$$

Adjusted R-squared = 0.78
*Note: t-statistics in parentheses

Theoretically, to assure however that the long-run relationship between the tourism demand and its determinants really exists, a residual series of the long run of **equation (5.27)** must be stationary. To conduct a test for stationarity of the series, likewise, the tests of unit roots, **the ADF test** and **the PP test**, are employed and the result of testing are reported in **table 5.16E**. To test a hypothesis of cointegration, the null and alternative hypotheses in the test are;

H_0: the series are not cointegrated (residuals are nonstationary)

H_1: the series are cointegrated (residuals are stationary)

Similar to the one-tail unit root tests, according to **table 5.16E**, the two tests apparently indicate that the null hypothesis of no cointegration is firmly rejected at all significance levels.

Table 5.16E: Test statistics for the Engle-Granger Residual-Based cointegration test

Variables	ADF test		Lag length of ADF	PP test	
	Intercept, no trend	Intercept and trend		Intercept, no trend	Intercept and trend
Residual terms	-6.4979	-6.5605	0	-6.4914	-6.5606

**Note*: The critical values for the cointegration test are -3.96, -3.37, and -3.07 at the significance level of 1percent, 5percent, and 10percent, respectively. These critical values are taken from Hill, R.Carter, Griffiths William E., and Lim, Guay C. Principles of Econometrics. Third edition. Massachusetts. John Wiley & Son, Inc. 2008.

Provided the outcome reported in **table 5.16E**, the long-run relationship between the group of middle-income countries' tourism demand and its economic determinants is hence attested. Consequently, the issue of the elasticity of demand is explored. Based upon the long-run equation (5.27), it demonstrates that the all estimated elasticities have meaningful and correct signs corresponding to the economic theory. The following section will elaborate the findings relating to those elasticities.

To begin with, **the price elasticity**, it is reported inelastic at 0.34 in absolute terms. This implies that toruists from Belgium, France, Italy, and Sapain, on average, are less responsive to changes in toursm price in Thailad. In addition, the elasticity of **0.34** means that a **1 per cent increase** in the tourism price results in a **0.34 per cent fall** in the number of visitors, or vice versa.

Then **the income elasticity** is recorded positive at **1.46**, which is considered elastic and it indicates that, theoretically, tourism in Thailand is **luxurious**. Additionally, the finding is in line with the existing findings of most literature affirming that tourism is income elastic. According to equation (5.27), the income elasticity of **1.46** signifies that **a 1 per cent rise** in the real GDP per capita of brings out the arrivals of tourists approximately **1.46 per cent**, or vice versa.

Last but not least, it is fairly obvious that the variable capturing **habit persistence** or the so-called **word-of-mount effects** is one the crucial determinants of Danish tourism demand. The coefficient of 0.67 indicates a high degree of persistence and it reflects that most tourists keep coming back to visit Thailand.

Finally, to measure the effects of **the SARs outbreaks** in 2003, a dummy variable named DUMMY03 is included into the model. According to equation (5.27), **the outbreaks crowd** the number of visitors **out** approximately **0.35 per cent.**

2.1.2 Empirical results of the Johansen cointegration test

Another tool in exploring the long-run relationships among the variables is **the Johansen Cointegration Test**. In tandem with the EG method, all of the time-series data are required to be integrated of order one, I(1), the test therefore can be applied to those time-series data. Likewise, the former models, **the Akaike Information Criterion (AIC)** is used for choosing **optimal lags** for VAR models and it suggests four **optimal lags** to be included in the VAR model as displayed in the following table.

Table 5.16F: Test statistics for the length of lags of VAR in middle-income country model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	452.8192	NA	2.95e-17	-18.19670	-17.92644	-18.09416
1	699.4283	412.6929	9.46e-21	-26.26238	-24.10030*	-25.44209*
2	760.7390	85.08423	6.46e-21	-26.76486	-22.71096	-25.22681
3	822.3941	67.94637*	5.42e-21*	-27.28139*	-21.33567	-25.02559

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5 percent level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 5.16G: Trace tests for cointegrating vectors for the middle-income model

Trace statistics			Critical values	Prob*
Null	**Alternative**	**Trace**	**95percent**	
r = 0	r = 1	38.1741	29.7971	0.0043
r ≤ 1	r ≤ 2	17.3961	15.4947	0.0256
r ≤ 2	r ≤ 3	6.5467	3.8415	0.0105

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.16H: Maximum eigenvalue tests for cointegrating vectors for the middle-income model

Maximum eigenvalue statistics			0.05	
Null	**Alternative**	**Maximum Eigenvalue**	**Critical values**	**Prob***
r = 0	r = 1	20.7779	21.1216	0.0560
r ≤ 1	r ≤ 2	10.8493	14.2646	0.1619
r ≤ 2	r ≤ 3	6.5467	3.8415	0.0105

*Mackinnon-Haug-Michelis (1999) P-values

Table 5.16I: Long-run coefficients of a group of middle-income countries demand to Thai tourism

Variables	Cointegrating Vector 1 (Normalized cointegrating coefficients)*
TA	-1.0000
Price	-1.1530 (0.3792)
GDP	1.7894 (1.0804)

*Standard Error Parentheses

Based upon **the lag length** suggested by **the AIC** earlier, Eviews 6 software package is used to conduct **the Johansen cointegration test**. The cointegration relationships among variables are established by using two likelihood ratio tests as usual**, the trace and maximum eigenvalue tests** and they are reported in **table 5.16G** and **table 5.16H**. The inference is that if the calculated statistics are greater than the corresponding critical values at specific significance levels, the null hypotheses presented in the first columns of the two tables should be rejected.

First, according to **the trace statistics test** in **table 5.16G**, it suggests there is 3 **cointegrating relationships (r=3)** and the hypothesis cannot be rejected since the calculated λ_{trace} is greater than the critical values at 5 per cent significance level. Therefore, there are likely to be three cointegrating relationships in this model as suggested by the λ_{trace} statistics

Second, based on **the maximal eigenvalue test** expressed in **table 5.16H**, it is clearly that the hypothesis of no cointegration relationship (r=0) is not rejected since the calculated λ_{max} is 20.78, less than the critical values at the 5 percent significance level of 21.12. The λ_{max} statistics is likely to suggest that there is no cointegrating relationship among the variables in the model.

To summarise, according to reports of the two tests, it can conclude that there are three cointegrating relationships existing among the variables in the model of the group of middle-income countries.

Given the reported statistics by the λ_{max} and λ_{trace} tests in **table 5.16G** and **table 5.16H**, the variables in the model have three cointegrating relationships and equation (5.28) normalised on the dependent variable shows coefficients in a state of equilibrium or a long-run relationship among variables expressed as follows;

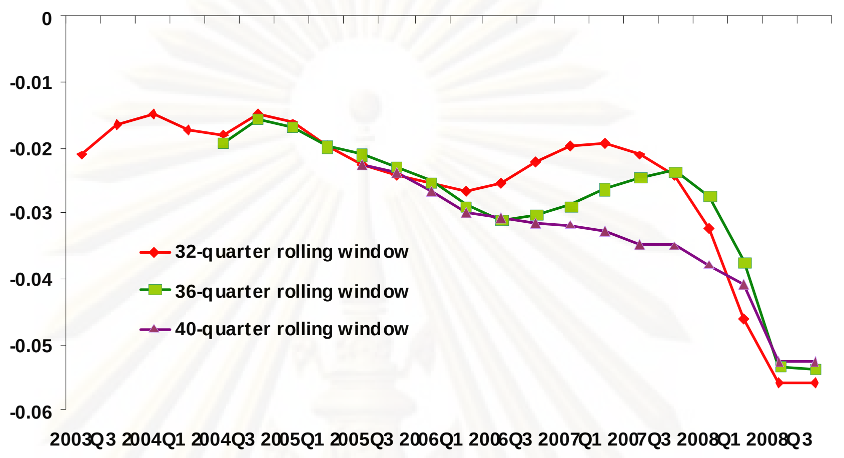
$$TA^{MI} = -1.15Price + 1.79GDP \qquad (5.28)$$
$$\quad (0.38) \qquad (1.08)$$

*Note: standard error in parentheses

According to the long-run equation (5.28), it is obvious that all variables have economically meaningful signs and statistical significant. To consider the estimated elasticities, **the price elasticity** is found to be elastic which contrasts to the inelastic value reported by the method of Engle-Granger (EG). The estimated price elasticity of -**1.15** in absolute terms designates that a **1 per cent rise** in the tourism price would result in **a 1.15 per cent decrease** in the number of visitors, or vice versa.

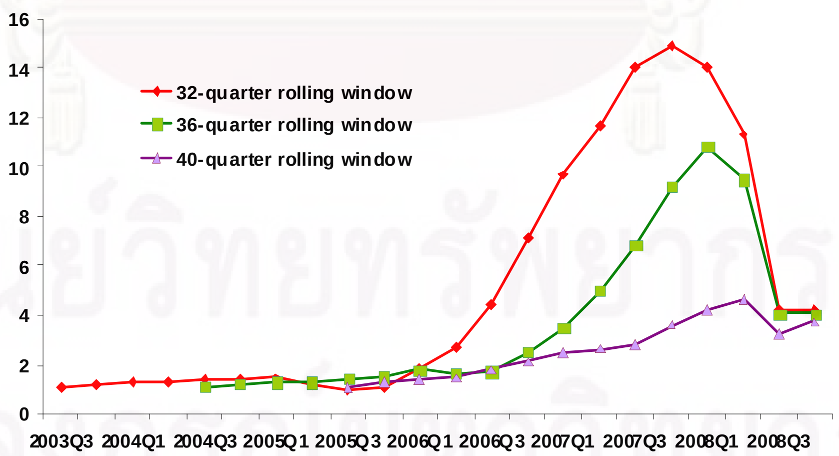
Meanwhile, **the estimated income elasticity** is 1.79 which is considered elastic and the result is in tandem that of the EG approach. It coefficient indicates that a **1 per cent increase** in real GDP per capita of these countries results in a 1**.79 per cent increase** in the number of tourist arrivals to Thailand, or vice versa.

Chart 5.14A: Time-Varying Price Elasticity for Middle-Income Country Model from Estimations of Different Window Sizes



Source: Author's calculation

Chart 5.14B: Time-Varying Income Elasticity for Middle-Income Country Model from Estimations of Different Window Sizes



Source: Author's calculation

The Empirical results of the Rolling Regressions for the group of middle-income country model

Following the two the groups of country models, only will the methods of rolling regression be used to explore the evolution of the group of middle-income countries' demand to Thai tourism overtime.

As displayed in **chart 5.14A**, firstly, the price elasticity estimated from different window sizes, they tend to increase over the period of 1996Q1-2008Q4 and become stable in almost positive territory approximately at 0 - 0.06. In addition, over the period, they rarely experience noticeable dramatic shifts. Overall, the findings show that the price elasticity is still inelastic and tends to be positive, going forward.

Regarding the dynamics of the income elasticity, the approach of rolling regression based on the OLS estimation of three different window sizes reports that they seem to be stabilized over around 0.6-0.8 and they are later likely to slowly increase towards one. This supports the findings of the EG method of inelastic income elasticity.

16. Concluding Remarks

Based upon the findings reported in earlier section, there are several issues to consider; firstly, the price elasticities both estimated by the Engle-Granger (EG) method and the Johansen approach are not remarkably different, both of them reported that price elasticity of demand is inelastic in the case of a cross-country comparison. The EG method reported that the price elasticity in all country models are price inelastic, meanwhile, the price elasticities of demand in the Danish and the Dutch models estimated by the Johansen approach were reported elastic.

Secondly, in the case of income group, the EG test and the Johansen approach pointed out that the price elasticity of demand of the high-income countries are positive. This indicates that Thai tourism for tourists from the high-income zone is a "Giffen good", i.e. the number of tourist arrivals is positively related to tourism price. Regarding the middle-high-income group, the price elasticity was found to be inelastic by the two estimation methods. For the last income group – the middle-income countries, the EG method reported that the price elasticity was inelastic, but the Johansen approach reported the figure was slightly elastic.

Thirdly, with respect to the income elasticity of demand in terms of a cross-country comparison, as expected, the two approaches reported that the figure is elastic. Nonetheless, a case of the Norwegian model, the elasticity was reported to be inelastic by the EG method. Whereas, in terms of the income groups, almost all of income groups were found to have elastic income elasticity, except in a case of middle-high-income countries estimated by the EG approach, the elasticity was inelastic. Based on the general findings, it can be concluded that the income elasticity is elastic both in terms of the cross-country comparison and the income-group comparison.

Lastly, concerning the cross-price elasticity of demand, the empirical results painted mixed conclusions, i.e. each competitive destination – Malaysia, Singapore, the Philippines, and Indonesia- can be either substitute or complement. The two estimation methods however pointed out to the same conclusion for each competitive destination.

CHAPTER VI

CONCLUSIONS AND POLICY IMPLICATIONS

As mentioned in the first chapter that the objectives of this study are (I) to examine economic determinants of European demand to Thai tourism, together with explore the long run or equilibrium relationships between the tourism demand and those determinants (II) to estimate values of the long-run elasticity of European demand to Thai tourism, and (III) to explore the dynamics of the elasticity of European demand to Thai tourism over the period of 1996Q-2008Q4, this chapter will present conclusions based on empirical findings in chapter v and also suggest some policy implications.

However, prior to discussing those issues, the methodology used in the study will be recapped. Firstly, in choosing explanatory variables for the models, the correlation coefficients between those candidate explanatory variables and the dependent variable are calculated. These coefficients provide information regarding explanatory power of the variables. Next, to comply with the objectives of the study, the so-called cointegration analyses composing of the Engle-Granger (EG) Method and the Johansen Cointegration Test are used to explore the long run relationships among the variables. In additional to the two approaches - the Recursive Ordinary Least Square (OLS) and the rolling regression- are employed in order to investigate the evolution or the dynamics of the demand elasticity over time.

Regarding the organisation of this chapter, general observations and findings of the price elasticity are to be discussed in the first section. Then, those of the income elasticity will be illustrated in the second section. Meanwhile, policy implications are about to be presented in the end of each section.

However, according to the first research question established in chapter I, the chapter found that, both in the case of the country models and the income-group models, the income variable most represented the real GDP per capita, and the lagged dependent variable are the most essential determinants of the European demand to Thai tourism. Meanwhile, the tourism price and the substitute price variables are not statistically significant in almost all models. The findings and policy implications are to be elaborated in the following section.

6.1 Findings of the price elasticity and policy implications

With respect to the price elasticity of the European tourism demand to Thai tourism, the study employs two methods of cointegration analysis to quantify the so-called long run elasticity – the Engle-Granger Approach, and the Johansen Approach. Empirical results of the two approaches are demonstrated in **table 6.1** and **table 6.2**, respectively**.** It is apparently seen that the almost all of the price elasticity of European countries' tourism demand are inelastic. However, in the cases of the Swedish and the high-income-country, the EG method reports positive price elasticity which is not corresponding to what suggested by the economic theory. This is theoretically possible in the case of **"Giffen goods**" implying that quantity demanded is positively correlated to price. Practically, in those cases, there is insufficient theoretical justification to affirm there is such a case concerning tourism products. Meanwhile, the Johansen approach also points to the same conclusion that most of the price elasticity of demand is price inelastic. But in the cases of Denmark, the Netherlands and the middle-income-country model, the price elasticity is reported to be elastic. In addition, in the case of the high-income-country, the elasticity is found to be positive.

What policy implications can be drawn from the inelastic price elasticity? Theoretically, if the price elasticity of demand is inelastic, it implies that quantity demanded is less responsive to changes in price of a good. According to this, firms or entrepreneurs can increase their products' prices to maximise profits without losses because only a small proportion of customers decreases. Meanwhile, to lower prices in order to attract a large number of customers are not a good strategy due to the fact that only does a small quantity demanded increase.

Concerning policy implications, as mentioned in the first chapter that almost all tourism strategies or tourism campaigns in Europe launched by the Tourism Authority of Thailand (TAT) or even domestic tourism businesses, based upon the findings of the price elasticity, they suggest that deployment of those strategies and campaigns is ineffective. One of the main and crucial explanations for this is that European tourists generally perceive Thailand and its neighbouring countries as already cheap destinations for their long-haul tourism. To attract a larger number of European tourists to Thailand, it is better to employ other marketing strategies rather than a low-tourism-price policy, for example, according to the findings reported in chapter II, they reported that the good environment of tourism destination is the key factor influencing the choices of destination and the major motivations for European tourists are rest/recreation and sun/beach. The policymakers can promote Thailand as a tourism destination fulfilling and meeting their motivations.

Based on the findings in the last chapter, they suggest that the habit persistence and the so-called word-of-mouth effects are one of the most essential determinants of the tourism demand aside from income levels of the European tourism-generating countries. These facts provide some implications to policymakers that maintaining tourism images as attractive tourist destination is more significant. In other words, the supply side does really matter. This also includes all social and economic dimensions from infrastructure to safety in everyday life.

In addition, the three main objectives of the European holidaymakers are following (I) rest or recreation, (II) sun and beach and (III) visiting friends and relatives as discussed in chapter II. Thailand has already a wide-range of tourism resources meeting European tourists' demand. The most important issue for policymakers is how to make Thailand become the so-called "a must- visit country" for European tourists in order to sustain the number of visitors and also raise the figures of tourism receipts for the country in long run.

Table6.1: Estimated elasticities of Thai tourism demand by Engle-Granger Cointegration Test						
Variables	**Price elasticities**	**Income elasticities**	**Cross-Price elasticities**			
			Malaysia	**Singapore**	**Philippines**	**Indonesia**
Belgium	-0.16	2.04	-0.11		0.45	-0.10
Britain	-0.13	1.61	0.02	-0.12		
Denmark	-0.01	1.06	-0.31		0.15	
Finland	-0.07	1.82				
France	-0.34	1.15				
Germany	-0.17	1.15				
Italy	-0.12	1.56				
Netherlands	-0.30	2.66	0.22			-0.12
Norway	-0.10	0.70				
Spain	-0.48	1.98	0.35	-0.87	0.56	-0.50
Sweden	0.31	1.58				
High-income countries	0.29	1.16				
Middle-high-income countries	-0.13	0.54				
Middle-middle countries	-0.34	1.46				

Table 6.2: Estimated elasticities of Thai tourism demand by Johansen Cointegration Test						
Variables	**Price elasticities**	**Income elasticities**	**Cross-Price elasticities**			
			Malaysia	**Singapore**	**Philippines**	**Indonesia**
Belgium	-0.78	3.57	-1.20		-0.60	-0.22
Britain	-0.90	2.32	0.52		-0.52	-0.02
Denmark	-1.30	3.68	-0.69		1.34	0.21
Finland	-0.91	4.97	-0.66		0.93	
France	-0.76	7.50	-1.38		1.94	0.21
Germany	-0.38	1.86	-0.06			0.25
Italy	-0.03	1.88				
Netherlands	-1.99	4.99	2.27			-0.25
Norway	-0.99	1.71	-1.94		1.69	-0.14
Spain	-0.48	1.98	0.35	-0.87	0.56	-0.50
Sweden	-0.49	6.07	0.22			0.37
High-income countries	0.82	2.66				-0.37
Middle-high income countries	-0.42	1.91				
Middle-middle countries	-1.15	1.79				

Table 6.3: Overview of the World Economic Outlook Projections

(Percent change unless otherwise noted)

	Year over Year						Q4 Over Q4		
			Projections		Difference form 2009 WEO projections		Estimates	Projections	
	2008	**2009**	**2010**	**2011**	**2010**	**2011**	**2009**	**2010**	**2011**
World output[1/]	-3.0	-0.8	-3.9	4.3	0.8	0.1	1.3	3.9	4.3
Advanced economies	0.5	-3.2	2.1	2.4	0.8	-0.1	-0.7	2.1	2.5
United States	0.4	-2.5	2.7	2.4	1.2	-0.4	-0.3	2.6	2.4
Euro area	**0.6**	**-3.9**	**1.0**	**1.6**	0.7	0.3	**-1.8**	**1.1**	**1.8**
Germany	**1.2**	**-4.8**	**1.5**	**1.9**	1.2	0.4	**-1.9**	**1.0**	**2.5**
France	**0.3**	**-2.3**	**1.4**	**1.7**	0.5	-0.1	**-0.5**	**1.6**	**1.6**
Italy	**-1.0**	**-4.8**	**1.0**	**1.3**	0.8	0.6	**-2.4**	**1.3**	**1.1**
Spain	**0.9**	**-3.6**	**-0.6**	**0.9**	0.1	0.0	**-3.1**	**0.1**	**1.2**
Japan	-1.2	-5.3	1.7	2.2	0.0	-0.2	-1.8	1.8	2.5
United Kingdom	0.5	-4.8	1.3	2.7	0.4	0.2	-2.8	1.9	3.1
European Union	**1.0**	**-4.0**	**1.0**	**1.9**	0.5	0.1	**-1.9**	**1.3**	**2.2**
World growth based on market exchange rates	1.8	-2.1	3.0	3.4	0.7	0.0	…	…	…

Note: Real effective exchange rate are assumed to remain constant at the levels prevailing during July 30-August 27, 2009. Country weights used to construct aggregate growth rates for groups of countries were revised. When economies are not listed alphabetically, they are ordered on the basis of economic size.

[1/] The quarterly estimates and projections account for 90 percent of the world purchasing power-parity weights.

Source: IMF's World Economic Outlook Update, January 2010

Table 6.4: Advanced Economies: Real GDP, Consumer Prices, and Unemployment

(Annual percent change and percent of labour force)

	Real GDP				Consumer Prices				Unemployment			
	2007	2008	2009	2010	2007	2008	2009	2010	2007	2008	2009	2010
Advanced economies	2.7	0.6	-3.4	1.3	2.2	3.4	0.1	1.1	5.4	5.8	8.2	9.3
United States	2.1	0.4	-2.7	1.5	2.9	3.8	-0.4	1.7	4.6	5.8	9.3	10.1
Euro area[1/]	**2.7**	**0.7**	**-4.2**	**0.3**	*2.1*	*3.3*	*0.3*	*0.8*	***7.5***	***7.6***	***9.9***	***11.7***
Germany	**2.5**	**1.2**	**-5.3**	**0.3**	*2.3*	*2.8*	*0.1*	*0.2*	***8.4***	***7.4***	***8.0***	***10.7***
France	**2.3**	**0.3**	**-2.4**	**0.9**	*1.6*	*3.2*	*0.3*	*1.1*	***8.3***	***7.9***	***9.5***	***10.3***
Italy	**1.6**	**-1.0**	**-5.1**	**0.2**	*2.0*	*3.5*	*0.7*	*0.9*	***6.1***	***6.8***	***9.1***	***10.5***
Spain	**3.6**	**0.9**	**-3.8**	**-0.7**	*2.8*	*4.1*	*-0.3*	*0.9*	***8.3***	***11.3***	***18.2***	***20.2***
Netherlands	**3.6**	**2.0**	**-4.2**	**0.7**	*1.6*	*2.2*	*0.9*	*1.0*	***3.2***	***2.8***	***3.8***	***6.6***
Belgium	**2.6**	**1.0**	**-3.2**	**0.0**	*1.8*	*4.5*	*0.2*	*1.0*	***7.5***	***7.0***	***8.7***	***9.9***
Finland	**4.2**	**1.0**	**-6.4**	**0.9**	*1.6*	*3.9*	*1.0*	*1.1*	***6.8***	***6.4***	***8.7***	***9.8***
United Kingdom	**2.6**	**0.7**	**-4.4**	**0.9**	*2.3*	*3.6*	*1.9*	*1.5*	***5.4***	***5.5***	***7.6***	***9.3***
Sweden	**2.6**	**-0.2**	**-4.8**	**1.2**	*1.7*	*3.3*	*2.2*	*2.4*	***6.1***	***6.2***	***8.5***	***8.2***
Norway	**3.1**	**2.1**	**-1.9**	**1.3**	*0.7*	*3.8*	*2.3*	*1.8*	***2.5***	***2.6***	***3.3***	***3.8***
Denmark	**1.6**	**-1.2**	**-2.4**	**0.9**	*1.7*	*3.4*	*1.7*	*2.0*	***2.7***	***1.7***	***3.5***	***4.2***

[1/] Based on Eurostat's harmonized index of consumer prices

Note: When economies are not listed alphabetically, they are ordered on the basis of economic size.

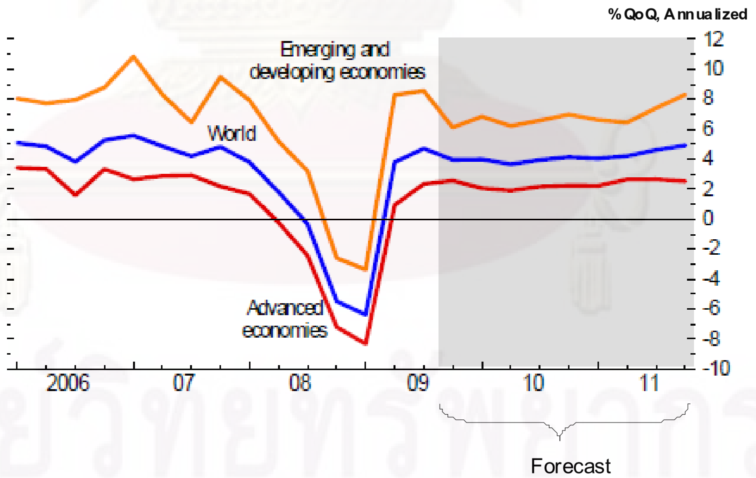
Source: IMF's World Economic Outlook, October 2009

6.2 Findings of the income elasticity and policy implications

Findings of the income elasticity are presented in line with the price elasticity in the earlier section. The long-run income elasticity of the European countries' tourism demand is estimated by the two methods -the Engle-Granger (EG) approach and the Johansen approach. A summary of the income elasticity estimated by the two methods is presented in **table 6.1** and **table 6.2**, respectively.

The EG method points out that almost all country models have an elastic income elasticity, aside from Norway and the middle-high-income countries having the elasticity of 0.70 and 0.54, respectively. However, regarding the empirical results of the Johansen test, they indicate that the income elasticity is elastic for all country models. Although the results of the two approaches is slightly different, it should be concluded that the income elasticity of tourism demand is elastic according to the economic theory and the empirical evidence discussed in chapter III.

Chart 6.1 Global GDP Growth



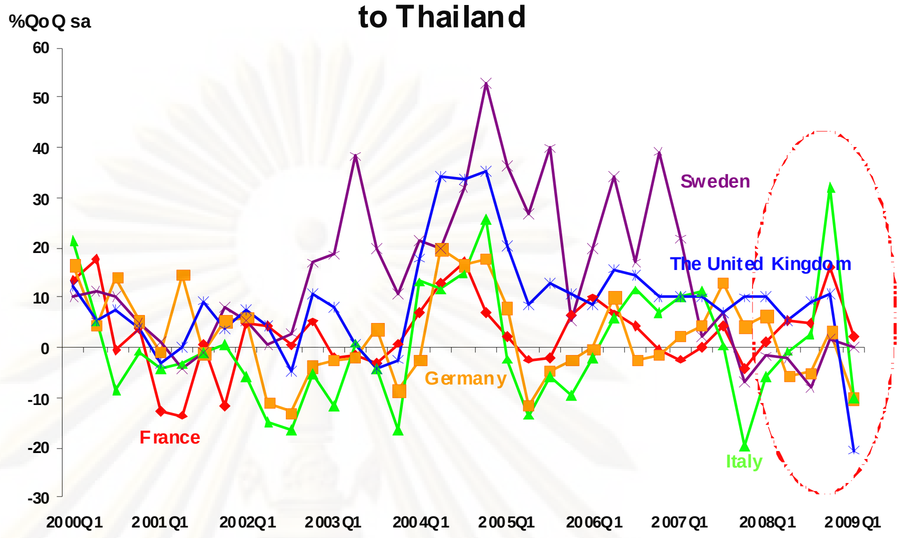
Source: IMF's World Economic Outlook Update, January 2010

Regarding policy implications based on the findings of the income elasticity, it can be seen that European tourists are somewhat sensitive to changes in current income levels. This means that economic conditions affecting income crucially contribute to the process of making decisions concerning to tourism. According **table 6.3** and **table 6.4**, the European economy was forecasted to experience a negative growth in the year 2009; it can therefore be anticipated that this factor partially contributes to a decrease in the number of European tourist arrivals to Thailand and also tourism receipts. Meanwhile, in 2010, the European output and real GDP growth rates were forecasted to expand in slow paces. Given other things remaining equal, these will further contribute to a decline in the number of European visitors to Thailand.

If the economies based on real GDP growth of major tourism-generating countries- the United Kingdom, France, Germany, Sweden, and Italy- are taken to account, the German economy was severely affected the most in 2009 by the global economic crisis followed by Italy, Sweden, the UK, and France. Based on these figures, it can be expected that the number of tourist arrivals from these countries would decline and **chart 6.2** clearly paints the situation. Concerning the magnitude of declining for each country, it totally depends on the income elasticity.

Going forward, according to **chart 6.1**, the forecasted GDP growth rate for advanced economies is around 2-3 per cent in 2010 and 2011. This is expected to affect the purchasing power of the European consumers/tourists and since the Thai tourism products are considered luxurious, they will be severely declined according to the estimated income elasticity, provided that other things remaining equal.

Chart 6.2 Growth in the number of European tourist arrivals to Thailand



Source: Office of Tourism Development and Author's calculation

Although shocks to the tourism sector such as economic crisis are considered inevitable and unpredictable, those shocks can be manageable in order to minimise losses. For example, policymakers can anticipate and project losses incurred the Thai tourism sector owing to the current economic crisis provided magnitudes of income elasticity.

Regarding the cross-price elasticity, both the EG method and the Johansen test report mixed empirical results depending on each tourism destination. However, the tourism prices competitive destinations composing of Malaysia, Singapore, the Philippines, and Indonesia, are not significant in terms of influencing European tourists' decision-making process. In addition, the cross-price elasticity estimated by the two methods tends to point out that these competitive destinations are complementary to Thailand in the perception of European tourists.

6.3 Findings of the dynamics the elasticity of demand and policy implications

As specified in the last research question in Chapter I that do the estimated elasticities of European tourism demand – the price and income elasticities – vary over the sample period of 1996Q1-2008Q4, based on the findings reported in chapter V, answers to the research question tend to be yes, both kinds of elasticity had evolved overtime. To answer this research question, a couple of economic analysis tools – the rolling regression analysis and the Recursive OLS- were employed.

Regarding findings of the dynamics of the price elasticity estimated by both the rolling regression and the Recursive OLS, they were reported to decrease approaching zero overtime reflecting that the elasticity is inelastic, either classified according a cross-country comparison or an income-group comparison. This provides policy implication for both the policymakers and the private sector as follows;

(I) For the policymakers, launching tourism campaigns promoting Thailand as a cheap tourism destination are no longer to be successful in increasing both in terms of the number of tourist arrivals and tourism receipts since the price elasticity of the tourism demand is inelastic, i.e. decreasing domestic tourism prices leading to a small increment in the number of tourist arrivals.

(II) On the private tourism stakeholders, the inelastic price elasticity of demand means that they can increase prices to some certain degrees in order to maximise profits with losing many tourists.

With respect to findings of the dynamics of the income elasticity estimated by either the rolling regression or the Recursive OLS, they pointed out that the income elasticity overtime is elastic, in line with the results reported by the EG and Johansen methods, and this is true for both in the case of country models and income-group models. For policy implications based on the findings, it can be concluded that it is risky to count on the income factor alone since the factor itself exposes to both home-country and external shocks. In addition, the policymakers have no capability to influence the income levels of tourism-generating countries, or in other words, the income variables are exogenous. The best policy however should be implemented is to promote good travel environment for tourists as the factor was reported to be the number one attraction affecting choosing tourism destinations. This also supports the functioning of the word-of-mount effect as it is one of the most determinants of European tourism demand to Thai tourism.

6.4 Others policy implications

Based on the facts presented in chapter II regarding sources of tourism information for European tourists, the three main sources are (I) recommendations of friends and colleges (II) the internet and (III) personal experience. According to these facts, they suggest following policy implications;

(I) The so-called word-mouth effects, recommendations from friends and colleges, and habit persistence play a crucial role for European tourists' decision-making process. It is therefore important for Thai policymakers to maintain good images for Thailand as a must-visit destination.

(II) Since European holidaymakers rely heavily on the internet in searching for tourism information, it is essential both for policymakers and private stakeholders to provide sufficient, reliable, and updated tourism information. Additionally, the policymakers should support the private sector in accessing the internet in promoting, providing, and marketing tourism information for tourists.

With respect to the organisation of holiday-trips of European holidaymakers, based on the findings in chapter II, they prefer to organise trips individually relying on tourism information from the internet. This method of organisation for holiday-trips is becoming popular. Meanwhile, a traditional approach of booking and organising holiday-trips via travel agencies is deteriorating. This fact suggests that for Thai travel agencies, they need to adopt themselves to changing methods of organising trips. Instead of providing tourism in traditional methods such as establishing offices and/or travel agencies aboard, they should consider provide reliable online services for tourists. This approach not only helps avoid experiencing barriers in Europe in terms of both laws and languages, but also it reduces operating and transaction costs for tourism business firms and travel agencies.

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BIOGRAPHY

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