An Econometric Analysis of International Tourism Demand in Hong Kong - A Cointegration and Error Correction Approach

By

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Thesis Summary

The purpose of this study is to develop econometric models to better understand the economic factors affecting inbound tourist flows from each of six origin countries that contribute to Hong Kong's international tourism demand. To this end, we test alternative cointegration and error correction approaches to examine the economic determinants of tourist flows to Hong Kong, and to produce accurate econometric forecasts of inbound tourism demand.

Our empirical findings show that permanent income is the most significant determinant of tourism demand in all models. The variables of own price, weighted substitute prices, trade volume, the share price index (as an indicator of changes in wealth in origin countries), and a dummy variable representing the Beijing incident (1989) are also found to be important determinants for some origin countries. The average long-run income and own price elasticity was measured at 2.66 and – 1.02, respectively.

It was hypothesised that permanent income is a better explanatory variable of long-haul tourism demand than current income. A novel approach (grid search process) has been used to empirically derive the weights to be attached to the lagged income variable for estimating permanent income. The results indicate that permanent income, estimated with empirically determined relatively small weighting factors, was capable of producing better results than the current income variable in explaining long-haul tourism demand.This finding suggests that the use of current income in previous empirical tourism demand studies may have produced inaccurate results. The share price index, as a measure of wealth, was also found to be significant in two models. Studies of tourism demand rarely include wealth as an explanatory variable. The results in this study indicate that wealth should be included as a possible determinant in forecasting long-haul tourism demand. However, finding a satisfactory proxy for wealth common to different countries is problematic.

This study indicates that the ECM (Error Correction Models) based on the Engle-Granger (1987) approach produce more accurate forecasts than ECM based on Pesaran and Shin (1998) and Johansen (1988,1991,1995) approaches for all of the long-haul markets and Japan. Overall, ECM produce better forecasts than the OLS, ARIMA and NAÏVE models, indicating the superiority of the application of a cointegration approach for tourism demand forecasting.

The results show that permanent income is the most important explanatory variable for tourism demand from all countries but there are substantial variations between countries with the long-run elasticity ranging between 1.1 for the U.S. and 5.3 for U.K. Price is the next most important variable with the long-run elasticities ranging between –0.8 for Japan and –1.3 for Germany and short-run elasticities ranging between –0.4 for Germany and –0.7 for Taiwan. The fastest growing market is Mainland China. The findings have implications for policies and strategies on investment, marketing promotion and pricing.

International Tourism/ Tourism Demand/ Tourism Forecasting/ Cointegration/ Hong Kong

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Abbreviation

ADF	Augmented Dickey-Fuller
AEG	Augmented Engle-Granger
AIC	Akaike's Information Criterion
AIDS	Almost Ideal Demand System
AR (1)	Autoregressive Model (First Order)
ARDL	Autoregressive Distributed Lagged Modelling
ARIMA	Autoregressive Integrated Moving Average
ARMA (p,q)	Autoregressive- Moving Average
ASEAN	Association of Southeast Asian Nations
BSM	Basic Structural Model
CIDW	Cointegration Durbin- Watson
CPI	Consumer Price Index
CUSUM	Cumulative Sum of Tests of Structural Stability
CUSUMSQ	Cumulative Sum of Square Tests of Structural Stability
DF	Dickey- Fuller
DW	Durbin-Watson
EAP	East Asia and Pacific Region
ECM	Error Correction Model
ECMs	Error Correction Models
FIML	Full Information Maximum Likelihood
HEGY	Hylleberg, Engle, Granger and Yoo unit root test
HKSAR	Hong Kong Special Administrative Region
HKTA	Hong Kong Tourist Association
HKTB	Hong Kong Tourism Board
LCH	Life Cycle Hypothesis
LES	Linear Expenditure Model
LM	Lagrangian Multiplier Test
MAE	Mean Absolute Error Criterion
OLS	Ordinary Least Square
OPEC	Organization of Petroleum Exporting Countries
PATA	Pacific Asia Travel Association
PIH	Permanent Income Hypothesis

PRC	People's Republic of China
RESET	Ramsey RESET test
RMSE	Root Mean Square Error Criterion
RSS	Residual Sum of Squares
SAR	Special Administrative Region
SBC	Schwarz Bayesian Criterion
SER	Standard Error Estimates
SMA	Seasonal Moving Average
STSM	Structural Time Series Model
SUR	Seeming Unrelated Regression
VAR	Vector Autoregressive Model
UECM	Unrestricted Error Correction Model
WTO	World Tourism Organization

Chapter 1: Background, Objectives and Organisation of Thesis

1.1 Background

Tourism carries not only socio-psychological and political significance for Hong Kong but also provides it with considerable economic benefits. According to the World Tourism Organisation (WTO), tourism is the world's largest and fastest growing industry within the global economy (Lundberg et al., 1995). In 1998, the tourist industry ranked first among various groups of worldwide exports, above petroleum, automobiles and chemical goods. By definition, the study of tourism is the sum of the phenomena and relationships arising from the interaction of tourists, business suppliers, host governments and host communities in the process of attracting and hosting these tourists and other visitors (Goeldner et al. 2000).

Due to the complexity and diversity of the tourism industry, its study must utilise knowledge of various disciplines to expand and enhance the understanding of the phenomena. A considerable number of disciplines were and are still engaged in tourism analysis, the principal ones being anthropology, ecology, economics, geography, politics, social psychology and sociology. Among various disciplines that contribute to the study of tourism, economics covers rational behaviour and market exchange of human activities (Hirshelifer, 1988). Economists who study tourism are concerned with investigating the effects of the supply and demand of tourism, the balance of payments and foreign exchanges of tourism, the employment created by tourism, and the expenditure multiplier of tourism over the past few decades.

Hong Kong is one of the most tourism-oriented economies in the world (Kwong, 1997). Since 1960, Hong Kong has been classified as a 'tourist country' in East Asia and the Pacific (EAP) region by the WTO. In 2000, more than 13 million people, the equivalent of twice the population of Hong Kong, visited the Special Administration Region of Hong Kong (HKSAR), placing demands on its tourist services, and spending almost US$7.9 billion (around 5% of GDP). On 2nd November 1999, the Chief Executive of Hong Kong announced that an agreement had been reached to build a Disney theme park and resort at Penoy's Bay, Hong Kong, indicating a new era of international tourism in the HKSAR.

One of the management problems that is impeding the growth of Hong Kong's tourism industry, and thus hindering its contribution to the economy, is the inadequate understanding of the determinants of international tourist flows into Hong Kong, and the absence of a robust model for forecasting tourism demand. It is possible that this has led to poor forecasting and inefficient resource planning in tourist-related industries over the past few decades.

Two major reasons that accurate estimates of determinants of tourism demand are necessary, according to Quayson and Var (1982), are: (1) the public and private tourism sectors require meaningful estimates of tourism demand in order to ensure the efficient allocation of scarce resources, and (2) the estimates of demand elasticity to provide worthwhile information for economic decision making. In addition, Song and Wong (2003) indicated that a good understanding of what determines the demand for Hong Kong tourism can help policy makers formulate strategies to increase the competitiveness of the Hong Kong tourism industry. In the context of tourism demand forecasting, Archer (1994) notes that managers must generate forecasts to undertake strategic planning. He also stresses that the quality of management's decisions for resource allocation also depends on the accuracy of the forecast. Moreover, Witt and Witt (1995) indicated that accuracy is particularly important when forecasting tourism demand on account of the perishable nature of the product. Given the perishability of the tourism product, it is important to generate more reliable estimates of demand elasticity and to make more accurate future demand forecasts to enable tourist-related industries to better produce their short and long-term development plans.

1.2 Objectives of Study

Researchers and practitioners in the field of tourism demand estimation and forecasting suggested that a combination of descriptive and quantitative approaches might be more appropriate for modelling and forecasting tourism demand. However, very few quantitative studies have investigated the underlying factors that contribute to the international tourism demand in Hong Kong. The purpose of this study is to re-examine the economic determinants of international tourist flows into Hong Kong and to build a robust econometric forecasting model for the demand for tourism, based on the alternative cointegration and error correction approaches. Charemza and Deadman (1992) note that cointegration analysis in time series econometrics was introduced in the late-1980s, and has been regarded by many researchers as the most important recent advances in econometric methodology. Cointegration analysis, its relationship to ECMs and its use in conjunction with Hendry-type testing down procedures are thought to be the more advanced econometric techniques within the context of tourism demand analysis by many practitioners.

The objectives of this study are as follows:

1. To develop econometric models to measure inbound tourist flows from each of six main origin countries that contribute to tourism demand in Hong Kong, to re-examine the economic determinants of inbound tourist flows to Hong Kong in a combination of descriptive and quantitative approach, and to produce an accurate econometric forecast of the inbound tourism demand. For tourism demand modellers and forecasters, correctly identifying the determinants

of tourism demand and appropriately specifying the tourism demand models are crucial for the generation of accurate forecasts of future tourism demand.

2. To evaluate the overall statistical significance of a new economic variable and new estimation procedures of income and price variables in tourism demand models. The new economic variable is the share price variable and the new estimation procedure for the income variable is the grid search process of the permanent income variable. Those variables are used to test the effect of permanent income and asset wealth within the framework of permanent income-life cycle hypothesis in the tourism demand model. The new estimation procedure for the substitute price variable is the rival search process of the weighted substitute price variable. This procedure aims to identify the nature of competition among the selected alternative destinations based on statistical evidence in order to re-examine the role of substitute price in the tourism demand model. The new variable and the above new estimation procedures are designed to investigate whether or not incorporating the new variable of the share price and the new estimation procedures of permanent income and weighted substitute price variable could improve the reliability of parameter estimates and the overall significance of economic determinants in tourism demand models.

3. To compare the empirical results of the estimated tourism demand models for each of six origin countries, based not only on the Engle-Granger (1987) residual-based approach, the Johansen (1988, 1991, 1995) and Johansen and Jusselius (1990 and 1992) maximum likelihood approach of cointegration analysis, both of which commonly appear in literature, but also the Pesaran and Shin (1998) autoregressive distributed lagged modelling approach. The latter is particularly worthwhile to this study because the results of the ADF unit root test (discussed in Chapter 6) demonstrate that there exists difficulty in identifying the same order of integration for all of the underlying variables in tourism demand models of the United States, Japan and China.

4. To conduct an evaluation of the forecasting performance of five selected alternative econometric models. These econometric models are developed on the basis of the Engle-Granger (1987), Johansen (1988, 1991, 1995) Case 2 {(refer to the VAR models with restricted intercepts and no trends, Ch.7, Pesaran and Pesaran (1997))}, Johansen (1988, 1991, 1995) Case 3 {(refer to the VAR models with unrestricted intercepts and no trends, Ch. 7, Pesaran and Pesaran (1997))} and Pesaran and Shin (1998) approaches, as well as a traditional static OLS approach. The preferred econometric models, selected based on minimal forecasting errors, are further compared with the ARIMA and the benchmark NAÏVE models to

investigate whether the econometric models could generate more accurate forecasts than time-series models and benchmark NAÏVE models.

5. To apply the preferred econometric models in order to produce an econometric forecast for the tourism demand from each country of origin over the period from 2000 to 2004 under alternative scenario assumptions. Since the forecasting errors of the explanatory variables increase with respect to the length of the forecasting horizon, we have set a five-year period as the maximum time possible to forecast tourism demand.

6. To assess the economic implications for the tourist-related industry with respect to both descriptive analysis of tourism demand and the quantitative findings of demand elasticity for the selected economic determinants. These elasticity estimates are used to assess the effect of a variety of business strategies and public policy options, including pricing strategies of hotels and airlines, with respect to each of the origin countries. A combination of descriptive and quantitative analysis of tourism demand can substantiate our understandings of inbound tourist behaviour and the nature of the international tourism demand in Hong Kong.

7. To contribute to the empirical literature on tourism demand estimation and forecasting and to provide relevant information for both tourist-related industry and the government bodies of Hong Kong. The contribution of this research is threefold. First, it is the first study to provide comprehensive evidence to the empirical literature on tourism demand estimation and forecasting in supporting the superiority of the permanent income-life cycle approach as an alternative to the popular current income approach, when modelling income and wealth effect in tourism demand equation. Second, it provides evidence to support the application of ECMs based on alternative cointegration approaches to estimate the parameters of the economic determinants of tourism demand and to produce accurate tourism demand forecasts. Third, the qualitative and quantitative findings of international tourism demand in this research provide a source of relevant information for the tourist-related industry and government bodies to assess the effects of a variety of business and public policy options, and assists in allocating tourism resources.

1.3 Organisation of Thesis

This thesis contains ten chapters.

Chapter 1 introduces the thesis.

Chapter 2 analyses the trend of tourism demand Worldwide, and regionally in East Asia and the Pacific. This chapter also focuses on the importance of Hong Kong's tourism trade within a regional and international context.

Chapter 3 presents a descriptive analysis of tourism demand in Hong Kong over the period from 1959 to 2001. This analysis examines the growth trends of tourism demand in Hong Kong, the analysis of economic determinants on tourism demand, the contribution of tourism to the Hong Kong economy, and the characteristics of inbound international tourist flows to the Hong Kong. In particular, we attempt to identify the dummy variables for any special events, political disturbances and policy changes over the past four decades that have impacts on tourist arrivals.

Chapter 4 reviews a selection of tourism demand studies from across the world. We focus on the review of studies that examine inbound tourism demand using applications that are among the most advanced econometric techniques and, in particular, on using cointegration and error correction approaches. We also include a critical appraisal of previous studies to indicate any existing gaps of knowledge in the quantitative modelling of tourism demand. As the focus of the relevant tourism demand studies is varied, the review of studies on the evaluation of relative forecasting performance of tourism demand models will be presented independently in Chapter 9. Finally, in Appendix A, we present a summary of review of selected tourism demand studies prior to 1990.

Chapter 5 discusses the research methods and procedures used in developing econometric models to study international tourism demand in Hong Kong. In this chapter, we thoroughly explore the merits of introducing the new economic variable of the share price, applying new estimation procedures of the permanent income variable (grid search process) within the context of the theory of Permanent income-Life Cycle Hypothesis and the weighted substitute price variable (rival search process) in the development of our tourism demand models. As well, we evaluate the conceptual superiority of applying the Pesaran and Shin (1998) approach as an alternative to popular cointegration approaches. Finally, we outline both the procedures for evaluating the relative forecasting performance of the seven selected forecasting models and scenario forecasting of tourism demand for the period from 2000 to 2004.

The purpose of both Chapters 6 and 7 is to present and analyse the empirical results of tourism demand models based on the alternative cointegration and error correction approaches for each of six major countries of origin. In Chapter 6, we present and analyse the empirical results of the tourism demand models, based on the Engle-Granger (1987) and Johansen (1998, 1991, 1995) Case 3 models. As the procedures involved in cointegration analysis are different among the various approaches, we present the results of the Pesaran and Shin (1998) approach separately in Chapter 7. The summaries of empirical results of diagnostic tests for the choice of the functional form, the diagnostic statistics for the preferred ECM and the empirical results of Dickey-Fuller (1981) time trend test for unit root are presented in Appendices C, D, and F respectively.

Chapter 8 summarises and compares the results of the estimated demand elasticity of selected economic determinants, based on the models derived from the Engle-Granger (1987), Johansen (1988,1991,1995), Cases 2 and 3, and Pesaran and Shin (1998) procedures. In this chapter, we assess the economic and policy implications with regard to tourist-related industries, from the estimated income, own price, substitute price, share price and trade volume elasticity measures.

Chapter 9 evaluates the forecasting accuracy of econometric models based on the three alternative cointegration approaches and OLS approach, in the context of the international tourism demand in Hong Kong. In addition, the forecasting accuracy of the five econometric models is evaluated using the ARIMA and NAÏVE models as benchmark for comparison purposes. We first evaluate separately the rankings of the seven forecasting models and five econometric models over five different time horizons. Once ranked, we select the preferred econometric models on the basis of those estimation procedures with the smallest forecasting errors for each of the six countries of origin to produce ex-ante tourism demand forecasts. Finally, using the assumptions of most-likely scenario and other alternative scenarios for each of the six origin countries over the period from 2000 to 2004, we present the results of the scenario forecast of tourism demand.

Chapter 10 is the summary of the research findings of the study, and includes the discussion of results and conclusions of our research objectives, policy implications, recommendations, and the concluding remarks. In this chapter, we also discuss the limitations of this research and identify some possible areas for future research.

Chapter 2 Growth of World and East Asia and Pacific Tourism Demand and Hong Kong International Tourism

2.1 Introduction

The purpose of this chapter is to analyse the development and growth pattern of worldwide and East Asia and the Pacific (EAP) regional tourism demand for the period of 1950-2000. In particular, we aim to investigate any disturbances that cause Worldwide and EAP regional tourism demand to fluctuate over the past five decades. In addition, in this chapter, we will examine the position of Hong Kong international tourism played in the context of Worldwide and EAP regional tourism and investigate the changing role of Hong Kong's international tourism with respect to the structural change of Hong Kong's economy.

The chapter is organised as follows. In the second section we define the terms of international tourism and explain the definitions of terms used in this research. In the third and fourth sections, we analyse the trends of worldwide and EAP regional tourism demand between the period 1950-2000 and present the EAP regional tourism analysis, respectively. In the fifth section, we analyse the leading position of Hong Kong's tourism in the context of Worldwide and regional tourism and in the sixth section, we investigated the changing role of Hong Kong tourism with respect to the structural change of Hong Kong's economy since the mid-1980s. Finally, in the chapter summary, we highlight our key observations.

2.2 Definition of International Tourism, Terms in the study and Sources of Data

According to the definition of the World Tourism Organisation (WTO), the term 'tourism' is used to describe the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes. International tourism constitutes the temporary short-term movement of people to a country other than the one in which they normally live and work.

A visitor is any person who travels to a place outside his or her usual environment for a period not exceeding twelve months, and whose main purpose of their visit is anything other than the exercise of an activity that is remunerative. This covers two classes of visitors: 'tourists' and 'excursionists'.

Tourists can be further categorised as 'international tourists' and 'domestic tourists'. 'International tourists' are temporary visitors who stay for at least 24 hours in the country (not their own) visited. The purpose of an international tourist's visit can be classified under one of the following: (1) for reasons of business or family, a visiting mission or a meeting, (2) for reasons of leisure (recreation, holiday, health, study or religious purposes). Some countries include an upper limit to a visitor's length of stay, for example three months. This is normally the length time stated on a tourist visa or other permit granted to a visitor. A 'domestic tourist', as defined by the World Tourism Organisation (WTO) is "any resident of the country", national or not, who travels from his/her place of residence to another place within the same country, who stays for at least one night for activities other than those that are remunerative. Finally, 'excursionists' are temporary visitors who stay for less than 24 hours in the country they are visiting.

According to the definition of the Hong Kong Tourist Association (HKTA), both tourists and excursionists are classified as 'civilian visitors'. In this research, the term 'tourist' will be used in the place of 'civilian visitor', and will include both tourists and excursionists. The term 'traveller' will be used to denote a wider group, including tourists, service visitors, transit passengers and aircrew members.

The term tourist can be further categorised into three groups: outbound tourists (local residents), inbound tourists (international visitors) and domestic tourists (local residents). In this study, we will focus on the behaviour of inbound tourists. As such, in this research, the term 'tourist' refers to inbound international tourists, and the term 'tourism demand' refers to the flow of international tourists to Hong Kong.

The term 'destination' connotes a country, region or city to which visitors travel as their main objective. In this research, the country, region or city in which a visitor ordinarily lives is referred to as the 'source market', the 'generating' country, 'origin country', or the 'tourist origin country'.

The definition of the term 'tourist industry' in Hong Kong is problematic, because most 'tourist enterprises', such as restaurants and entertainment venues, are also available to local residents, which means that both local residents and tourists alike purchase goods and services from these businesses.

In general, one can distinguish for study three kinds of demand for international tourism. In the transportation field, 'international travel' is defined as the demand for transportation between countries. In the tourist industry, 'international travel' refers to the goods and services acquired at the point of destination. Alternatively, 'international travel' often refers to "the visitor arrivals at the frontier of the destination".

The definition of tourism demand currently lacks uniformity. It requires clarity first by categorising the various studies of international tourism. For Hong Kong, international tourism can be further separated into two specific categories: a 'long-haul market' category, which refers to tourists arriving from Australia, New Zealand, the United States, Canada, Europe, Africa and the Middle East; and a 'short-haul market', which refers to tourists arriving from the People's Republic of China, Taiwan, Japan and South-east Asia. In this study, we have selected the United States, the United Kingdom and Germany as our major long-haul markets, and China, Taiwan and Japan as our major short-haul markets. These markets accounted for more than 72% of the total visitor arrivals in Hong Kong over the period of study.

The definition of East Asia and the Pacific region is classified by the WTO as China, Hong Kong, China, Japan, Korea, D.P. Rep, Republic of Korea, Macao, Mongolia, Taiwan, Brunei, Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, Vietnam, American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, N. Mariana Islands, New Caledonia, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga, and Vanuatu.

Quemarez (1989) indicated that it is possible to classify all studies on international tourism demand by studying the patterns of people arriving at a destination in three ways: 'transport', 'visitor arrivals' and 'trade and payments'. 'Transport' studies examine the choice a traveller makes for his/her mode of transport. 'Visitor arrivals' studies determine the aggregate inflow or outflow of tourists and/or the distribution of visitor arrivals at a destination from across their countries of origin. 'Trade and payments' studies focus on the aggregate expenditure by visitors on tourism or travel services, and the distribution of the aggregate expenditure according to their countries of origin. As the availability and reliability of tourist expenditure data have been problematic, this research follows the 'visitor arrivals' approach. 'Tourism demand' in this study examines the aggregate inflows of tourists (visitor arrivals) from across the tourist-origin countries only.

Similar to studies of merchandise trade, tourist activity is expressed in terms of volume and value. 'Tourist volume' refers to the number of tourists entering (or leaving) a given destination (or origin) country. The 'inbound tourist' (tourist arrivals) and 'outbound tourist' (tourist departures) terms are used to describe the international movement of people.

Any country's expenditure on tourism (tourist value) can be expressed as the product of (1) the number of tourist arrivals, (2) the average length of stay, and (3) the average expenditure per diem. Tourist expenditure data always exclude payments made for transportation.

Technically, we can record the measurement of tourist flows or tourist expenditures in various ways. Inbound tourist flows are generally recorded using data collected from frontier counts, sample surveys or registration at accommodation establishments. The Hong Kong Tourism Board (HKTB) and the former Hong Kong Tourist Association (HKTA) collect data on tourist arrivals using frontier counts, and on tourist expenditures using sample surveys. An inherent problem with frontier and single-day re-entry counts is that, in some cases, a substantial transit traffic and element may be included in the count, which distorts the statistics. For example, a visitor from China who visits Macao and returns to Hong Kong the same day will be counted as an arrival twice. Problems also arise when accommodation establishment records are used to count tourist arrivals, as this method excludes excursionists, tourists staying with friends or relatives, and those who choose to stay in other forms of unregistered accommodation. Therefore, despite the stated limitations, HKTB has chosen to use the method of frontier counting of visitor arrivals in Hong Kong to report visitor arrivals.

The main sources of data relating to international tourism are the World Tourism Organisation (WTO), which regularly produces several publications containing tourism-related statistics, and the Pacific Asia Travel Association (PATA), which publishes statistical report for tourism annually. The PATA is concerned with tourism in PATA member countries, whereas the WTO is concerned with world tourism. The information on Hong Kong is available from the following organisations: Hong Kong Tourism Board, the former Hong Kong Tourism Association, and the statistics department of the Hong Kong Government. In particular, the statistical review of tourism (Hong Kong) provides the most comprehensive collection of official government tourism statistics available.

2.3 Trend of Worldwide, East Asia and the Pacific Tourism Demand

2.3.1 Trend of Worldwide Tourism Demand (1950-2000)

Tourism is a major industry throughout the world. In 1998, the tourist industry ranked first among various groups of export earnings, above food, petroleum, automobiles and chemicals. As shown in Table 2.1 and Figure 2.1, tourism receipts accounted for 7.9% of the total worldwide export of services and goods in 1998.

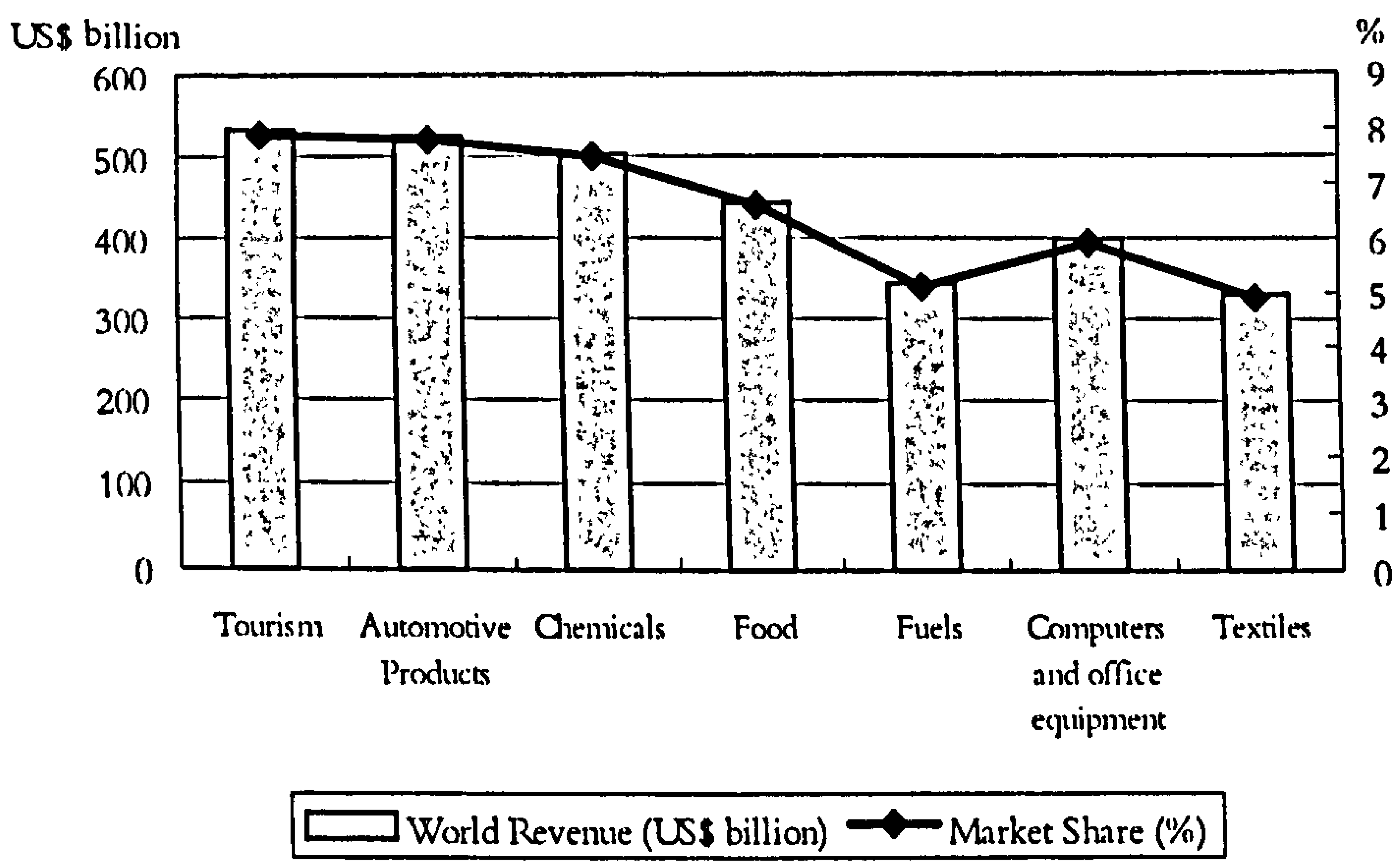
In spite of adverse economic and political occurrences, the growing demand for tourism seems to continue. However, several events have had a negative effect on the industry over the last three decades. These include a global economic recession in the early 1970s that was caused by the first oil crisis, a second oil crisis that followed in the early 1980s, the Gulf War crisis, which took place in the early 1990s, and the Asian financial crisis, which occurred in the late 1990s. Regardless of their nature, these events appear to have only created short-term negative effects on the industry.

Table 2.1 **Worldwide Export Earnings, Generated by Merchandise, Services and Tourism, 1998**

	World Revenue (US$ billions) 1998	Market Share of export earnings(%) 1998
1. Tourism	533	7.9
2. Automotive Products	525	7.8
3. Chemicals	503	7.5
4. Food	443	6.6
5. Fuels	344	5.1
6. Computers and office equipment	399	5.9
7. Textiles	331	4.9

Source: WTO, World Trade Organisation, International Monetary Fund Madrid, Spain, 1999.

Figure 2.1 Worldwide Export Earnings, Generated by Merchandise, Services and Tourism, 1998



As shown in Table 2.2 and Figure 2.2, International tourism grew steadily over the past decade, excluding the period of the Gulf War in 1991, when growth was only 1.25%, and the period of the Asian financial crisis in 1998, when growth was only 2.20%. Table 2.2 shows that in 1998 the total number of tourist arrivals worldwide was 627 million, which was an increase of 2.2% over the previous year. This was the lowest growth since the Gulf War crisis, and was caused, in part, by Asia's economic downturn during the course of the Asian financial crisis.

Visitor arrivals, measured in terms of tourist trips throughout the world, increased from 457 million people to 699 million people over the period from 1990 to 2000. This translates into an annual increase of 4.34% over the course of the decade. Turning to a year-to-year assessment, the industry experienced a slump in the early 1990s, at the time of the Gulf War crisis, but recovered strongly in 1992, and grew steadily at a slower rate over the next five-year period from 1993 to 1997. The economic downturn in Asia caused another slowdown in 1997, but the industry recovered significantly by 2000.

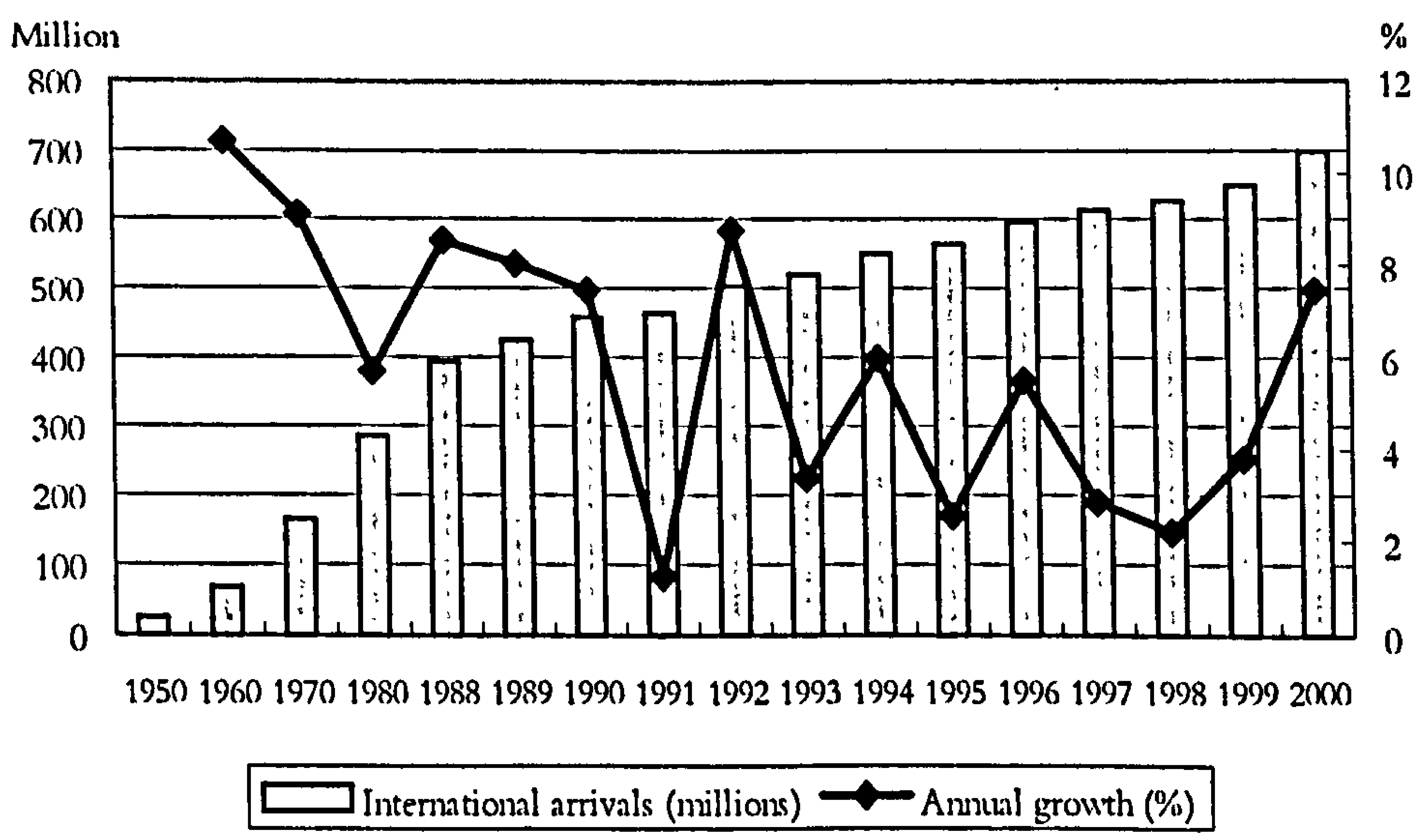
Table 2.2 Worldwide Visitor Arrivals and Annual Rate of Growth (1950-2000)

Year	International Arrivals (millions)	Annual Growth (%)
1950	25	-
1960	69	10.7* (1950-1960)
1970	165	9.1*(1960-1970)
1980	286	5.7*(1970-1980)
1988	394	8.54
1989	425	8.03
1990	457	7.44
1991	463	1.25
1992	503	8.75
1993	520	3.37
1994	551	5.98
1995	565	2.55
1996	596	5.49
1997	613	2.85
1998	627	2.20
1999	650	3.80
2000	699	7.45

Source: Tourism Market Trends, EAP region, 1988-1997, 2000. WTO. Madrid, Spain, 1998, 2001.

Note: 1. * indicates average annual growth rate over 60s, 70s and 80s.

Figure 2.2 Worldwide Visitor Arrivals and Annual Rate of Growth (1950-2000)



Overall international tourism receipts totalled US$476 billion in 2000. Table 2.3 and Figure 2.3 show that from 1990 to 2000, worldwide visitor spending increased sharply from US$269 billion to US$476 billion. This translates into a 5.88% annual growth rate, which is 1.5% higher than the 4.34% annual growth rate of arrivals over the same period. This is certainly due to the increase in visitor spending per capita during this period of time. Table 2.3 and Figure 2.3 show that in 1998, the total international tourism receipts were US$ 443 billion, a decrease of 1.1% over the previous year. The slowdown was mainly caused by the Asian financial crisis.

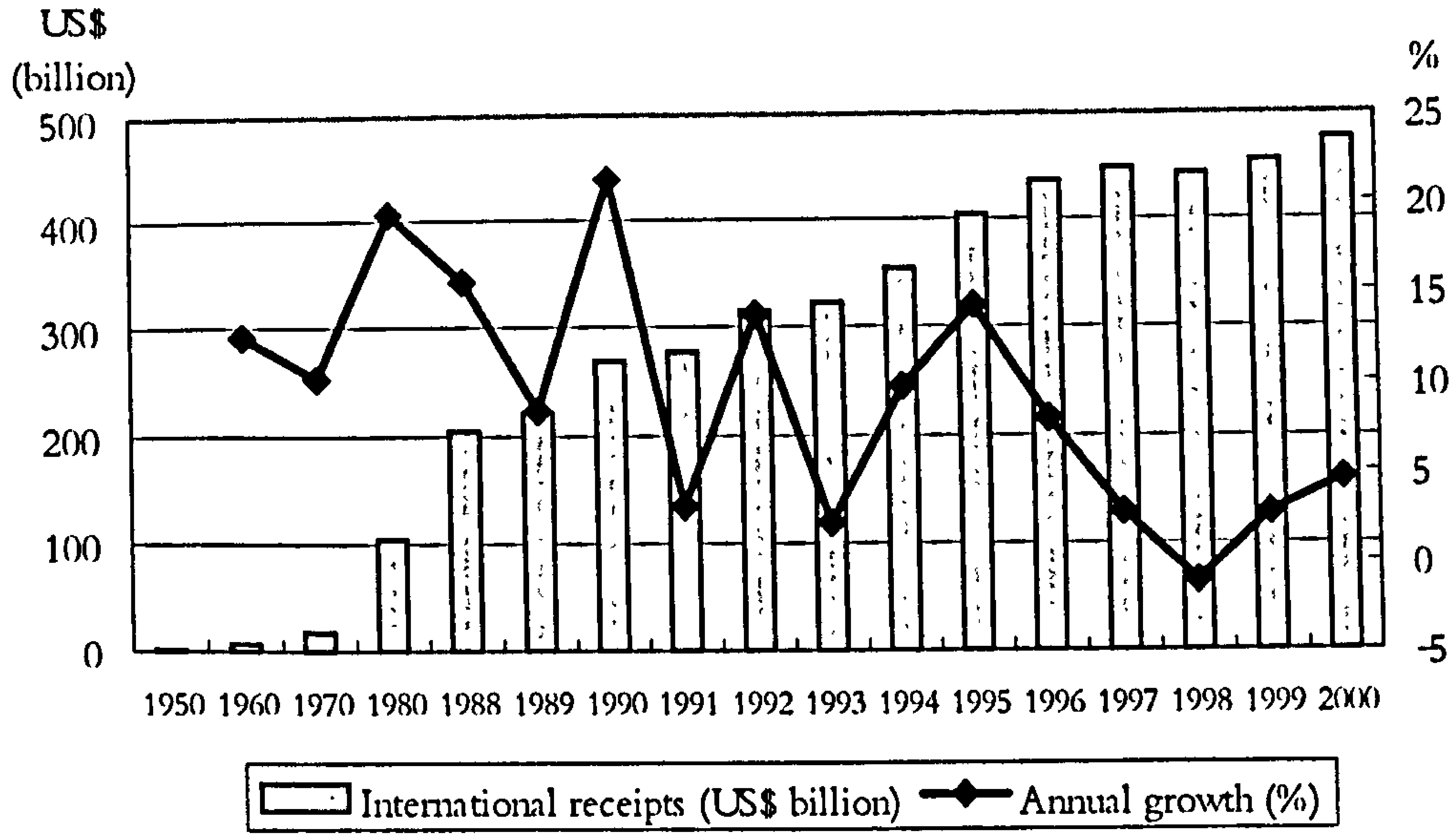
Table 2.3 Worldwide Tourism Receipts and Annual Rate of Growth (1950-2000)

Year	International Receipts (US$ billions)	Annual Growth (%)
1950	2.1	-
1960	6.8	*12.46 (1950-1960)
1970	17.9	*10.16 (1960-1970)
1980	105	*19.35 (1970-1980)
1988	205	15.52
1989	222	8.39
1990	269	21.33
1991	277	3.09
1992	315	13.68
1993	322	2.17
1994	354	9.69
1995	404	14.17
1996	436	7.96
1997	448	2.74
1998	443	-1.1
1999	455	2.71
2000	476	4.61

Source: Tourism Market Trends, EAP Region, 1988-1997 and 2000. WTO, Madrid, Spain, 1998 and 2001.

Notes * indicates the average annual growth rate over the 60s, 70s and 80s.

Figure 2.3 Worldwide Tourism Receipts and Annual Rate of Growth (1950-2000)



2.3.2 Spatial Distribution of Worldwide Tourism Demand

Although international visitor arrivals and receipts experienced a trend of long-term increase, not all regions benefited equally from the development of global tourism. Since 1988, as shown in Table 2.4, the East Asia and the Pacific (EAP) region registered the strongest arrival growth rate in arrivals at 7.49% from 1988 to 2000. This was 53% faster than the world average of 4.90%.

Among other developing areas, the Middle East and Africa were also fast-growing regions, with 7.47% and 6.83% growth rates, respectively. Europe and America, however, showed subdued performance, primarily as a reflection of the sluggish economies of some of the major tourist origin countries, including Japan and Germany.

Table 2.4 Inbound Tourism Demand – Regional Performance (1988, 1993, 2000)

Destination*	Visitor Arrivals (millions)			Annual Growth Rate over Indicated Period (%)		
	1988	1993	2000	1988-1993	1993-2000	1988-2000
Europe	239.9	311.7	463.3	5.37	5.82	5.64
Americas	83.1	103.7	129.0	4.53	3.18	3.73
East Asia and Pacific region	47.0	71.1	111.9	8.63	6.69	7.49
Africa	12.5	18.6	27.6	8.27	5.09	6.83
Middle East	8.3	11.3	20.6	6.37	8.95	7.47
South Asia	2.9	3.5	6.4	3.83	9.00	6.82
World	393.7	519.9	698.8	5.72	4.31	4.90

Source: World Tourism Statistics, Various Issues, (WTO). Madrid, Spain, 2001.

Note: * indicates WTO Regional Classification.

The regional distribution of the share in world tourism receipts and arrivals shown in Table 2.5 indicates that the EAP region has expanded its share of global tourism receipts significantly, from 6.1% to 17.4% over the period between 1970 and 2000. This was mainly at the expense of European tourism, which registered a drop from 62% of the world's receipts in 1970 to 48.7% in 2000. In terms of visitor arrivals, the EAP region absorbed 16.1% of the total worldwide visitor arrivals in 2000, an increase of more than five times its mere 3.0% worldwide share in 1970.

Table 2.5 Regional Market Shares of Worldwide Visitor Arrivals and Tourism Receipts (1970, 2000)

Destination	Share of World Receipts (%)		Share of World Arrivals (%)	
	1970	2000	1970	2000
Europe	62.0	48.7	70.5	57.7
Americas	26.8	28.7	23.0	18.5
EAP region	6.1	17.4	3.0	16.1
Others	5.1	5.2	3.5	7.7

Source: World Tourism Statistics, WTO. Madrid, Spain, 2001.

2.3.3 Trend of Tourism Demand in East Asia and the Pacific Region

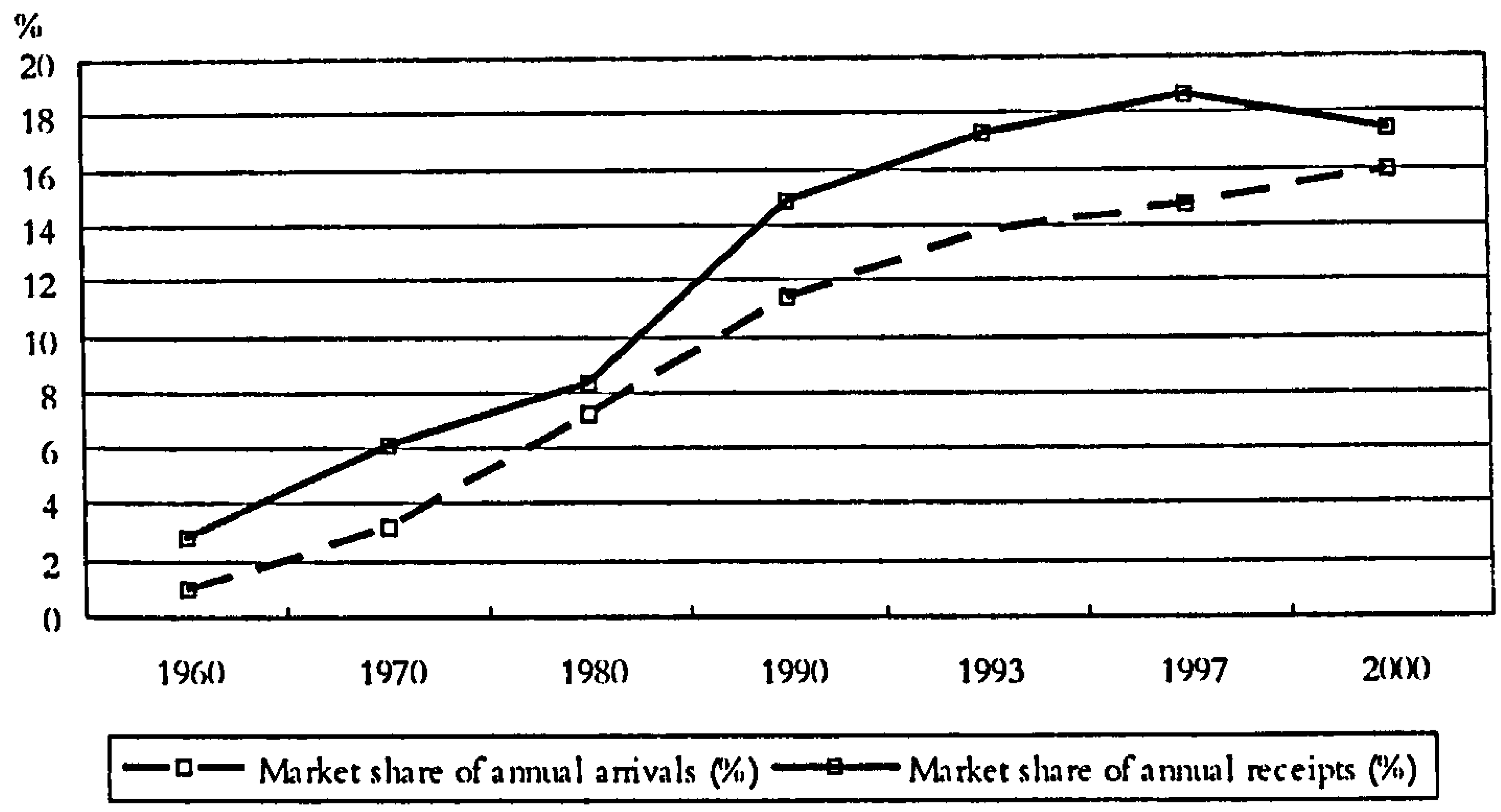
According to the data compiled from the WTO and shown in Table 2.6 and Figure 2.4, the EAP region has achieved an impressive growth rate in its market share of world international arrivals and receipts since 1960.

Table 2.6 East Asia and the Pacific Region's Market Shares of Worldwide Visitor Arrivals and Tourism Receipts (1960, 1970, 1980, 1990, 1993, 1997 and 2000)

Year	Market Share of Worldwide Annual Arrivals (%)	Market Share of Worldwide Annual Receipts (%)
1960	1.0	2.8
1970	3.0	6.1
1980	7.3	8.4
1990	11.4	14.8
1993	13.8	17.3
1997	14.7	18.6
2000	16.1	17.4

Source: Tourism Market Trends, EAP region, 1988-1997 and 2000, WTO. Madrid, Spain, 1998, 2001.

Figure 2.4 East Asia and Pacific Region's Market Shares of Worldwide Visitor Arrivals and Tourism Receipts (1960, 1970, 1980, 1990, 1993, 1997 and 2000)



In terms of arrivals, the region's share tripled between the period from 1960 to 1970, and quadrupled over the period from 1970 to 1990. Even during the Gulf War years, from 1990 to 1993, the EAP region continued to gain market share in terms of both arrivals and receipts, to show a 2.4% increase in its share of worldwide arrivals, and a 2.5% increase in its share of worldwide tourism receipts. In the course of the Asian financial crisis between 1997 and 2000, the EAP region continued to gain the market share of annual arrivals, at a 1.4% increase in its share of worldwide tourism demand. Conversely, it lost in terms of the market share of annual receipts, at a 1.2% drop in the share of worldwide tourism receipts.

Moreover, as shown in Tables 2.4 and 2.7, the EAP region grew faster than the worldwide average in terms of tourism arrivals and receipts by a wide margin of 2.6% and 1.4%, respectively, over the period from 1988 to 2000. Thus, the world's fastest growing tourism region, according to the analysis, continues to be the EAP region.

Table 2.7 Recent Trends of Visitor Arrivals and Tourism Receipts in East Asia and Pacific Region (1988-2000)

		Change	Average Annual Growth Rate		
Arrivals		1988-2000 (millions)	1988-2000 (%)	1988-1992 (%)	1993-1997 (%)
	EAP Region	+64.6	7.5	8.1	6.1
	World	+304.8	4.9	6.3	4.2
Receipts		1988-2000 (US$ billions)	1988-2000 (%)	1988-1992 (%)	1993-1997 (%)
	EAP Region	+52.0	8.7	11.6	12.2
	World	+271.0	7.3	11.4	8.6

Source: World Tourism Statistics, Various Issues.

A key feature of the growth of tourism in the EAP region, within the context of its rising proportion of global international visitor arrivals, was that it was mainly at the expense of shares lost by the European and North American markets over the past few decades. This is especially true since 1980.

However, it is noteworthy to mention that the high rate of inbound growth to the region has run parallel to the area's overall pattern of trade and economic growth. International tourism in the EAP region has increasingly been driven by intra-regional travel, that is, the people of a specific region travelling within that same region. In 1999, the intra-regional tourist arrivals accounted for 77%, as shown in Table 2.13, of total travellers. The higher rate of travel within the region is led by visitors who originate in China and Japan, rather than by inter-regional travellers from Europe and North America.

According to Table 2.8 and Figure 2.5, out of the 698.8 million international visitor arrivals worldwide in 2000, nearly 16%, or 111.6 million arrivals, occurred within the EAP region. The region also received US$82.5 billion or 17.3% of world tourism receipts during that year. However, several events have had a negative effect on the tourism demand in the region over the last decade. In terms of growth rate of tourism receipts, this represents an increase of about 300% from 1970 to 2000. Due to the Asian financial crisis, the trend of visitor arrivals and spending experienced a deceleration of growth in the 1990s, compared to the rapid growth from 1960 to 1990.

Since the 1960s, the EAP region has developed into an established destination for outbound tourists from Western Europe, North America and Japan, all of which are major industrialised countries. Compared to other tourist destinations in the world, the EAP region has broad diversity, a strategic location, and numerous scenic attractions. According to international tourism statistics, some regional cities or countries such as Hong Kong are considered among the most appealing in the world on the basis of their world share of visitor arrivals and tourism receipts.

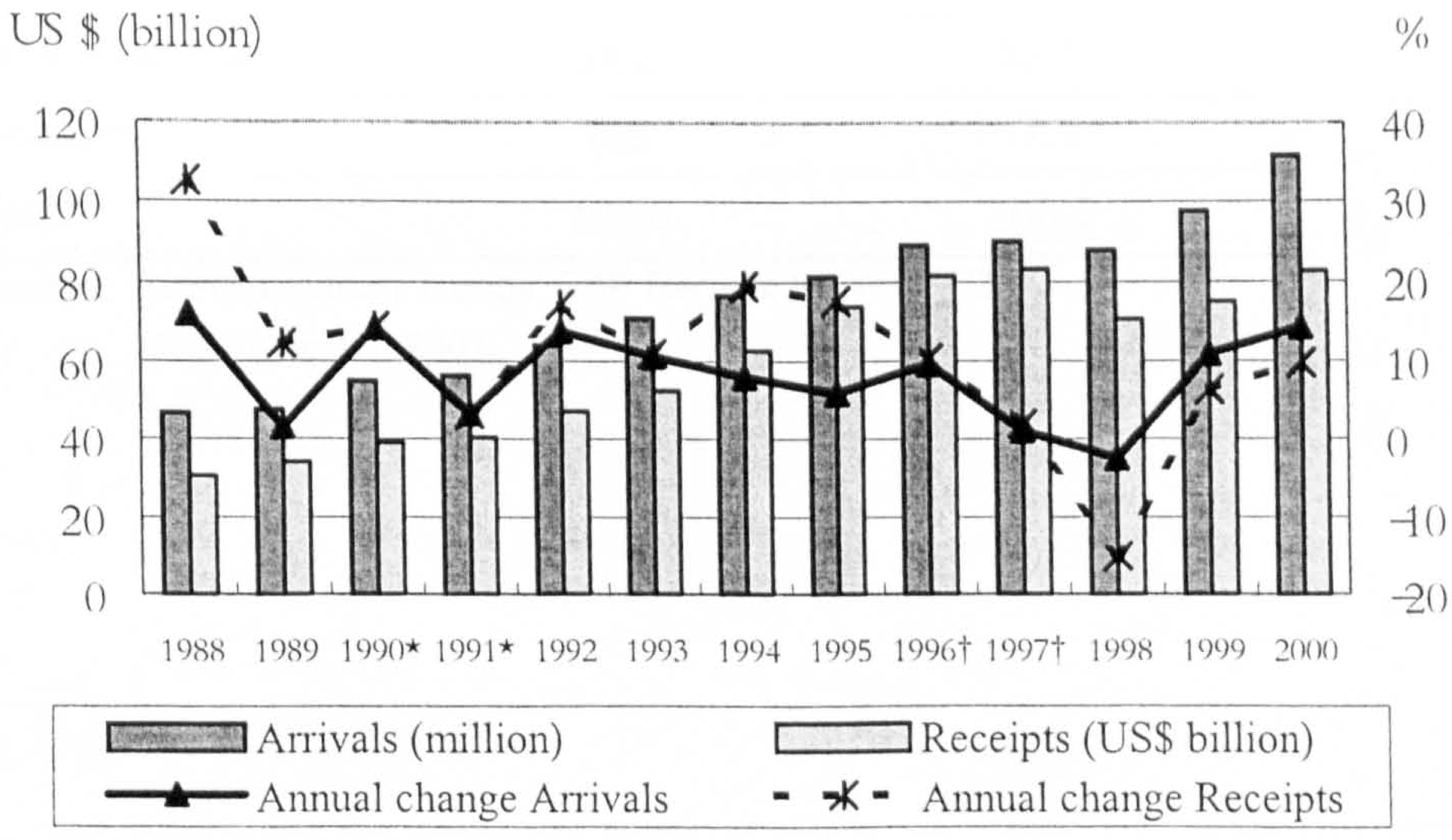
Table 2.8 International Visitor Arrivals and Receipts in East Asia and the Pacific Region (1988-2000)

	Arrivals (millions)	Annual Change (%)	Receipts (US$ billions)	Annual Change (%)
1988	47.0	16.11	30.5	32.56
1989*	47.8	1.59	34.2	12.28
1990	55.0	14.30	39.2	14.37
1991**	56.4	3.37	40.4	3.22
1992	64.2	13.83	47.4	17.19
1993	71.1	10.66	52.6	10.96
1994	76.8	8.01	62.8	19.50
1995	81.4	5.95	73.9	17.63
1996	89.2	9.62	81.6	10.43
1997***	90.2	1.14	83.2	2.01
1998***	88.0	-2.44	70.7	-15.0
1999	97.6	10.9	75.2	6.36
2000	111.6	14.34	82.5	9.70

Notes:1.* period of June fourth incident in 1989
2. ** period of Persian Gulf War in 1991
3. ***period of Asia Financial Crisis in 1997-1998

Source: Tourism Market Trends, EAP region, 1988-1997 and 2000, WTO. Madrid, Spain, 1998 and 2000.

Figure 2.5 International Visitor Arrivals and Receipts in East Asia and Pacific Region (1988-2000)



The fact that the EAP region delivered a remarkable performance in the past few decades can be explained by the following factors:

1. Strong economic growth in major tourist-origin countries, which facilitated intra-regional travel, thus enhancing the short-haul market.

2. Gradual relaxation of travel restrictions in some of the most populated Asian countries, in Japan in the early 1970s, Taiwan and South Korea in the mid-1980s, and finally China in the early 1990s, which enhanced the intra-regional tourist flow.
3. A politically stable environment in the EAP region.
4. Extensive tourism promotion activities embarked upon by various tourist associations within the region.
5. More frequent, short-duration trips taken by visitors.

Although the region as a whole encountered strong growth over the past few decades, the distribution of visitor arrivals and tourism receipts within the EAP region remains uneven. In Section 2.3.4, we will analyse the distribution of visitor arrivals and receipts, specifically focusing on Northeast Asia.

2.3.4 Spatial Distribution of Tourism Demand in East Asia and the Pacific Region

As indicated by Table 2.9, Northeast Asian region (classified by the WTO as China, Hong Kong Special Administrative Region (HKSAR), Japan, North Korea, South Korea, Macao, Mongolia and Taiwan) account for 57.2% of visitor arrivals and 49.8% of tourism receipts in the EAP region.

Table 2.9 Sub-regional Breakdown of Visitor Arrivals and Tourism Receipts in East Asia and Pacific Region (2000)

	Visitor Arrivals (%)	Tourism Receipts (%)
Northeast Asia	57.2	49.8
Southeast Asia	34.2	33.1
Oceania	8.6	17.1
Total	100.0	100.0

Source: Tourism Market Trends, EAP Region, 2000, WTO. Madrid, Spain, 2001.

Table 2.10 Market Share of Visitor Arrivals and Tourism Receipts – Leading Individual Destinations in East Asia and Pacific Region (2000)

	Visitor Arrivals (%)	Tourism Receipts (%)
China	27.9	19.7
Hong Kong	11.7	9.6
Thailand	8.5	8.6
Singapore	5.9	7.8
Malaysia	9.1	5.5
Australia	4.4	10.2
Indonesia	4.5	7.0
Korea	4.8	8.0
Japan	4.3	4.1
Taiwan	2.6	4.5
Macao	6.0	3.7

Source: Tourism Market Trends, EAP Region, 2000, WTO. Madrid, Spain, 2001.

In terms of market share of individual destination countries, Table 2.10 shows that China and Hong Kong, both located at the heart of Northeast Asia, are the most popular destinations in the region, accounting for 27.9% and 11.7% of the region's market share of visitor arrivals in 2000, respectively. In addition, the top four destinations in the region (China, Hong Kong, Thailand and Malaysia) – account for a total of 57.2% of the total market share.

For tourism receipts, China obtained the largest market share in the region at 19.7%, while Hong Kong received 9.6%. Thailand and Singapore are also popular destinations in the EAP region in terms of tourism receipts. Australia ranked sixth in terms of visitor arrivals, but is the region's second largest foreign exchange earner of tourism receipts. The top four destinations in term of tourism receipts (China, Australia, Hong Kong and Thailand) account for the total of 48.1% of total market share in the region.

2.3.5 Trend of Tourism Demand in North-East Asia Region

In 2000, the number of visitor arrivals in the sub-region of Northeast Asia totalled 64.0 million people, an increase of 36.3 million people over 1988's arrivals, as shown in Table 2.11 and Figure 2.6. This translates into a 7.23% annual growth rate over the period from 1988 to 2000.

Table 2.11 Visitor Arrivals and Tourism Receipts – Northeast Asia Region (1988-2000)

	Arrivals (millions)	Change (%)	Receipts (US$ billions)	Change (%)
1988	27.7	16.48	15.8	33.76
1989	25.6	-7.80*	17.2	8.42
1990	28.0	9.46	17.6	2.62
1991	31.2	11.38**	18.6	5.47
1992	36.6	17.60	21.7	16.97
1993	40.7	11.03	24.8	14.39
1994	42.4	4.22	28.8	15.82
1995	44.1	4.03	33.6	16.74
1996	49.4	12.09	37.4	11.41
1997	49.8	0.75***	38.0	1.49
1998	50.7	1.81***	36.7	-3.40
1999	55.2	8.88	37.6	2.45
2000	64.0	15.9	41.1	9.31

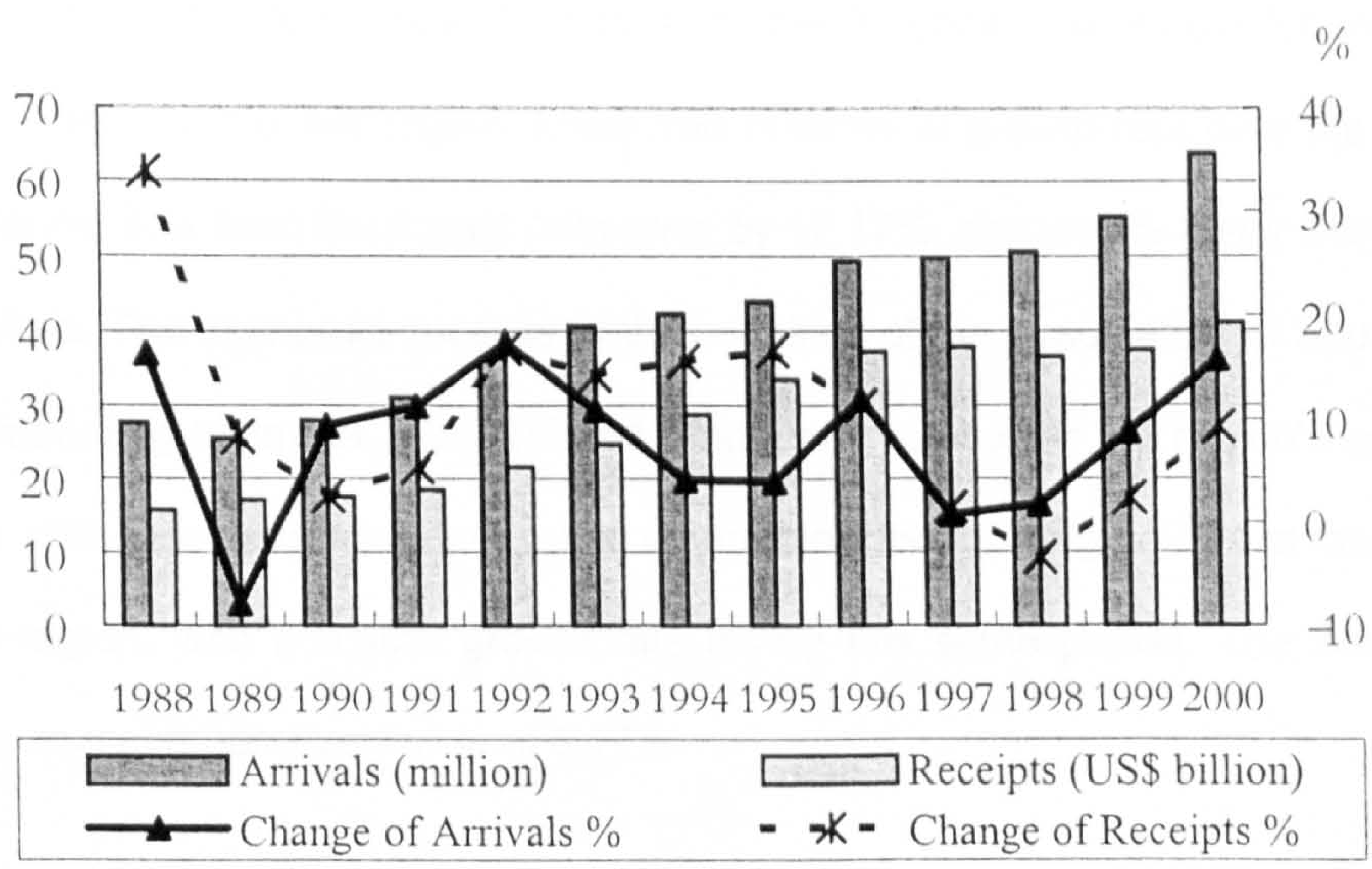
Source: Tourism Market Trends, EAP region, 2000, WTO. Madrid, Spain, 2001.

Notes 1. * indicates period of 4th June incident in 1989.

2. ** indicates period of Gulf-War crisis in 1991.

3. *** indicates period of Asia financial crisis in 1997-1998.

Figure 2.6 Visitor Arrivals and Tourism Receipts – Northeast Asia Region (1988-2000)



The sharp decline of the Northeast Asia's visitor arrival rate in 1989 could be a consequence of the 4th June incident (student demonstration in Beijing) in China. However, tourism in the sub-region recovered extremely quickly in 1990, and the growth rate of arrivals continued to accelerate in the first half of the 1990s.

Aside from the drop in arrivals in 1989, the worst year on record in Northeast Asia in the second half of the last decade was 1997. An increase of only 0.75% in total visitor arrivals, or 49.8 million visitors, was registered during that year. Overall, tourism receipts in the region decreased by 3.40% to US$36.7 billion in 1998, which makes it the worst year of the past decade. Visitor arrivals recovered again quite quickly in 1999, and both visitor arrivals and tourism receipts were fully recovered by 2000, accounting for 64.0 million and US$41.1 billion, respectively. In terms of tourism demand, the downturn experienced in the region in 1997 could be mainly attributed to the decline of intra-regional tourism, as a result of the Asian Financial Crisis.

In the context of the developing countries that mainly make up the EAP region, the demand for international tourism was generally thought to have originated within the industrialised markets of West Europe, North America and Japan. However, starting in the 1980s, the bulk of the tourist flows into the Northeast Asia sub-region was generated by the movement of people between the countries of that same region. This included intra-regional travellers from among the area's newly industrialised countries, comprising Hong Kong, China, Japan, South Korea, Macao, Taiwan and Malaysia, which created a tourist flow inside the EAP region.

As shown in Table 2.12, Intra-Northeast Asia visitor arrivals increased to almost 33 million in 1997, which accounted for almost 69% of the total arrivals in that sub-region, a subset of the EAP region. European tourists accounted for over 4 million arrivals, or 8.95% of total arrivals in the Northeast Asia sub-region, and ranked second on the list, followed by Southeast Asians, with over 3.9 million visitor arrivals, or 8.11% of total arrivals. Tourists from the Americas accounted for over 3.5 million visitor arrivals, or 7.34%, to the sub-region. Measured in terms of growth rate over the period from 1988 to 1997, the tourist flow from Southeast Asia grew by 12.17%, almost 4% faster than the flow from within Northeast Asia. The economic success of the countries of the Association of Southeast Asian Nations (ASEAN), including Malaysia, Thailand and Singapore, supported the region's growth to achieve this impressive rate. European travellers made up another fast-growing source of long-haul visitor arrivals to the sub-region, with a 9.36% growth rate during this same period. The Americas' visitor arrival growth rate was comparatively slow at 5.17%.

Table 2.12 Trends of International Tourism Demand in Northeast Asia, by Region (1988 and 1997)

Region	Visitor arrivals in Northeast Asia (000s)		Average Annual Growth Rate (%)	Market Share (%)	
Intra-regional	**1989**	**1997**	**1989-1997**	**1989**	**1997**
EAP region (total)	19,293	37,972	8.83	69.61	78.30
Northeast Asia	17,173	33,200	8.59	61.96	68.46
Southeast Asia	1,569	3,931	12.17	5.66	8.11
Australia	482	746	5.60	1.74	1.54
Other Oceania	9	17	8.00	0.03	0.03
Other East Asia/Pacific	60	79	3.56	0.22	0.16
Europe	2,121	4,340	9.36	7.65	8.95
The Americas	2,378	3,557	5.17	8.58	7.34
South Asia	279	430	5.56	1.01	0.89
Africa	86	140	6.35	0.31	0.29
Middle East	34	59	7.06	0.12	0.12
Others	3,525	1,996	-6.86	12.72	4.12
Total	27,714	48,494	7.24	100	100

Source: Tourism Market Trends, East Asia and the Pacific, 1989-1997, WTO. Madrid, Spain, 1998.
Note Arrivals from East Asia Pacific region consist of arrivals from Northeast Asia and Southeast Asia.

2.4 Regional Tourism Analysis – Increasing Role of Intra-Regional Tourism Demand

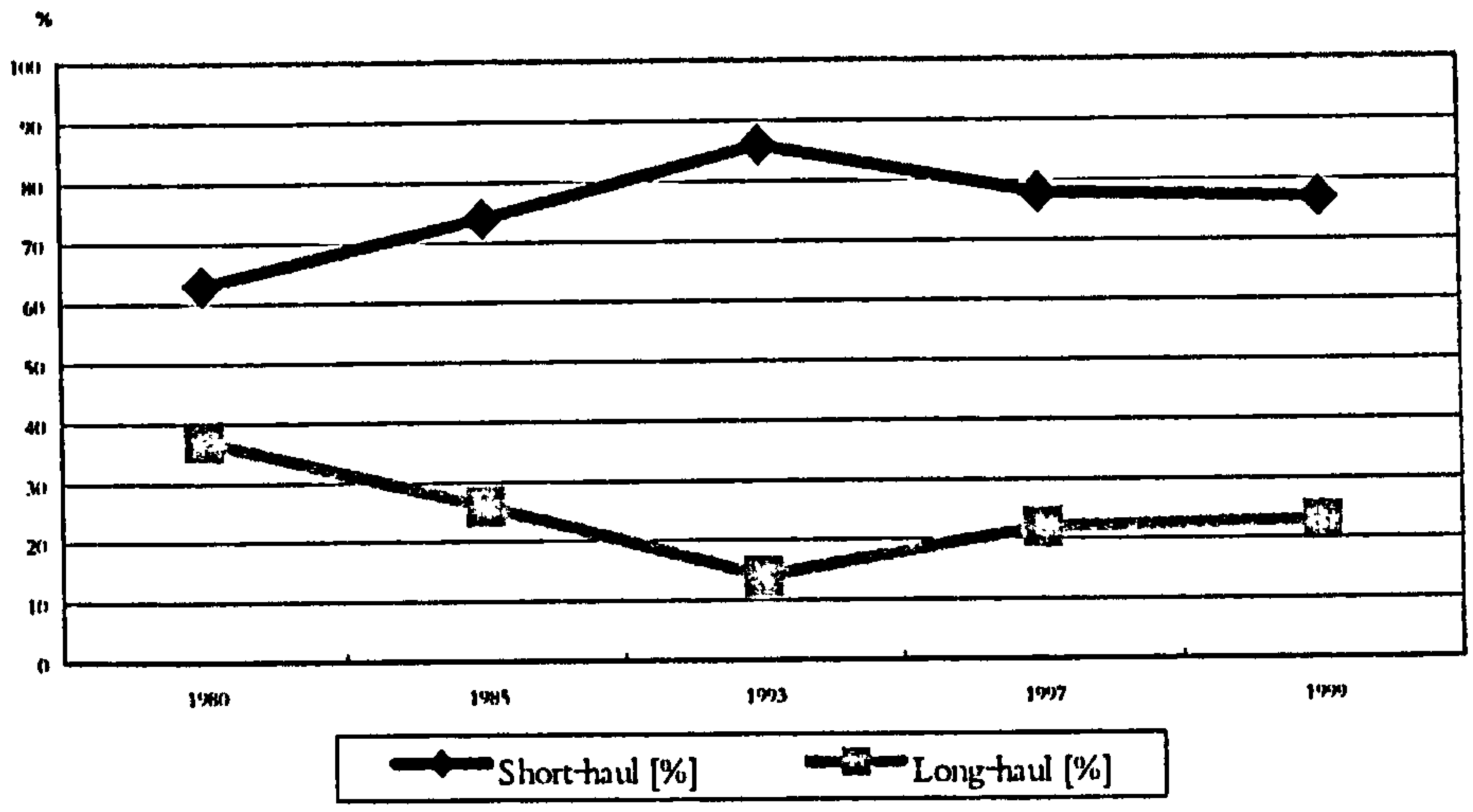
In general, there are three major types of tourist flows in the EAP region. The largest is intra-regional travel. According to the definition of the WTO, intra-regional tourism is also known as short-haul travel.

Table 2.13 Market Share of Intra-Regional Tourism in East Asia and Pacific Region (1980, 1985, 1993, 1997 and 1999)

	Short-haul (%)	Long-haul (%)
1980	63	37
1985	74	26
1993	86	14
1997	78	22
1999	77	23

Source: Tourism Market Trends, EAP region, 1980-1993, 1988-1997 and 2000, WTO, Madrid, Spain, 1994, 1998 and 2001.

Figure 2.7 Market Share of Intra-regional Tourism in East Asia and Pacific Region (1980, 1985, 1993, 1997, and 1999)



In the long run, as shown in Table 2.13 and Figure 2.7, the intra-regional demand of the EAP region has been on the increase. In 1999, the intra-regional tourist flow within the region accounted for 77% of the region's total international visitor arrivals, a decrease of 9% in market share compared to 86% of the visitor arrivals in 1993 but, in 1980, an increase of 14% in market share compared to 63% of visitor arrivals. Similar to the EAP region, as of the 1980s, intra-regional tourism flows have been the driving force of tourism growth in many different regions in the world.

Table 2.14 Intra-Regional Tourist Destinations by Region (1988 and 1994)

	Tourist Arrival Destinations, 1994 (1988) (%)					
Origin	**Africa**	**The Americas**	**Europe**	**EAP Region**	**Middle East**	**South Asia**
Africa	45.1 (33.0)	0.2 (0.3)	1.2 (2.4)	0.5 (0.6)	8.5 (23.6)	2.3 (2.4)
The Americas	3.2 (3.8)	74.9 (80.7)	6.3 (7.8)	7.3 (13.1)	4.6 (4.5)	9.5 (9.2)
Europe	34.7 (48.5)	14.3 (12.9)	77.4 (86.2)	12.3 (16.0)	23.5 (27.6)	45.3 (38.4)
EAP Region	1.7 (1.6)	7.0 (5.6)	2.9 (2.6)	76.2 (66.7)	7.8 (8.9)	13.2 (11.7)
Middle Asia	3.8 (12)	0.2 (0.2)	0.6 (0.7)	0.4 (0.8)	35.8 (33.4)	5.0 (5.9)
South Asia	0.3 (0.3)	0.2 (0.3)	0.1 (0.3)	1.5 (2.9)	4.5 (2.1)	24.4 (32.4)

Source: World Tourism Statistics, WTO.

Notes: Figures in parentheses indicate 1988 data.

As shown in Table 2.14, in 1994 the EAP region attracted the second-highest percentage of intra-regional tourists at 76.2%, second only to Europe at 77.4%, and followed by the Americas at 74.9%. South Asia and the Middle East attracted the least number of intra-regional tourists, reflecting the overall subdued economic activity in these areas. However, in 1988 the EAP region attracted the percentage of intra-regional tourists at 66.7%.

In the context of the EAP region's tourism, the strong performance and growth of its intra-regional tourism in comparison with that of other regions can be attributed to mainly two factors. The first is the dynamic economic growth experienced in the EAP region since the end of the Second World War. For example, Japan's economic 'miracle' of the 1970s, and the following success of the Asian Tigers' economies in the 1980s, appeared to be the key factors in the growth of intra-regional traffic and inter-regional tourism demand in the region. The second factor in the growth of intra-regional tourism is the economic opening of China, which occurred in the late 1980s.

Table 2.15 Tourism Growth Trends in East Asia and Pacific Region by Major Region (1985-1997)

	Average Annual Growth Rate (%)	Visitor Arrivals by Region		Change in Arrivals (%)
Origin	**1985-1997**	**1996**	**1997**	**1996-1997**
Intra-regional (total short-haul arrivals)	10.3	69,171,000	67,650,000	-2.2
Europe	11.2	9,880,000	10,389,000	5.2
The Americas	4.9	6,033,000	6,226,000	3.2
South Asia	4.1	1,262,000	1,304,000	3.3
Africa	13.0	410,000	449,000	9.5
Middle East	1.9	282,000	287,000	1.8
Inter-regional (total long-haul arrivals)	7.7	17,867,000	18,655,000	4.4

Source: Annual Statistics Report, 1998, Pacific Asia Travel Association.

2.4.1 Major Source Markets in East Asia and Pacific Region

As demonstrated in Table 2.15, in 1997, European (mainly West European) countries topped the list of long-haul markets arriving in the EAP region, at approximately 10.4 million arrivals. The second largest long-haul market flow came from the Americas that same year, at a sum total of 6.2 million arrivals. The remaining tourists mainly originated in South Asia and, to a much lesser extent, in Africa and the Middle East.

As mentioned, Europe constituted a major tourist-generating market for the EAP region. The number of inbound European tourists increased slightly over a 10-year period, as indicated by the 11.2% (Shown in Table 2.15) average annual growth rate in visitor arrivals from that area during the period between 1985 and 1997.

As seen in Table 2.16, Europe's market share of total visitor arrivals in the EAP region made it the largest long-haul market from 1985 to 1999, accounting for 54.1% of all long-haul travel to the area. In 1999 alone, 11.3% of all of the EAP region arrivals came from Europe, registering a 0.8% increase in total share of visitor arrivals from Europe to the region. From 1985 to 1999, Europe marked a 13.9% increase in the market share of total long-haul arrivals in the EAP region.

The outstanding performance of European tourists over those from the Americas was the result of favourable economic conditions in the continent during the period of 1985-1999. The appreciation of various European currencies against the US Dollar also afforded the Europeans greater purchasing power, as most Asian currencies are linked to or move in line with the US Dollar. This combination - the strong European economy and the high purchasing power - both contributed significantly to the tremendous growth of the European market in the region.

Table 2.16 Market Share of Total Arrivals in East Asia and Pacific Region (1985 and 1999)

	1985 (%)	1999 (%)
Short-haul Arrivals	73.9	77.0
Long-haul Arrivals	26.1	23.0
Europe	10.5 (40.20)	11.3 (54.1)
The Americas	11.7 (44.80)	7.3(34.93)
South Asia	2.7 (10.34)	1.5 (7.17)
Africa	0.4 (1.53)	0.5 (2.39)
Middle East	0.8 (3.06)	0.3 (1.44)

Source: Annual Statistics Report, 1985, 1999, Pacific Asia Travel Association.

Notes: Market share of total long-haul arrivals in parentheses

2.4.2 Most Popular Tourist Destinations in East Asia and the Pacific Region

Although the EAP region as a whole experienced a tremendous growth over the years, the distribution of visitor arrivals across countries within the region was uneven. The top ten destinations in the EAP region, as shown in Table 2.17A, demonstrate that the distribution of visitor arrivals among the countries of the region is concentrated among several of the more popular destinations. The top ten destinations list reveals that, combined, the top four tourist destinations in the region (China, Hong Kong, Thailand and Malaysia) received more than 57.2% of all visitors to the region in 2000. In addition, as shown in Table 2.17B, Hong Kong, Singapore and Thailand are considered as the most favourite destinations of the Intra-regional tourists in the EAP region, with the exception of South Korea.

Table 2.17A International Visitor Arrivals for Top Ten Destinations in East Asia and Pacific Region (1990 and 2000)

Destination	Rank 1990	Rank 2000	Arrivals 2000 (millions)	Market Share in EAP Region (%)	Change in Arrivals 1999-2000 (%)
China	1	1	31.2	27.9	15.5
Hong Kong	3	2	13.1	11.7	15.3
Thailand	4	4	9.5	8.5	9.9
Malaysia	2	3	10.2	9.1	28.9
Singapore	5	6	6.5	5.8	5.0
Indonesia	10	8	5.1	4.6	7.1
Macao	8	5	6.7	6.0	32.3
Australia	9	9	4.9	4.4	10.9
Japan	6	10	4.8	4.3	7.2
South Korea	7	7	5.3	4.7	4.8

Source: Compiled from Tourist Market Trends, EAP Region, 1988-1997, 2000 WTO.

Table 2.17B: Intra-regional Destination Preferences – Top Three Destinations in East Asia and the Pacific Region of Tourists from East Asia and the Pacific Region, Selected Countries of Origin (1995)

Country of Origin	Primary Destination	Secondary Destination	Tertiary Destination
China	Hong Kong	Macao	Thailand
Japan	Korea	Hong Kong	Singapore
Taiwan	Hong Kong	Japan	Singapore
South Korea	Japan	China	Hong Kong
Indonesia	Singapore	Malaysia	Hong Kong
Thailand	Malaysia	Hong Kong	Singapore
Philippines	Hong Kong	China	South Korea
Singapore	Indonesia	Thailand	Malaysia

Source: Annual Statistical Report, 1995, Pacific Asia Travel Association. (1995)

As indicated in Table 2.18, the top ten tourist-attracting countries in the EAP region indicated that China heads the list as the number one single destination for tourist receipts to the EAP region, with 16.2 US$ billion. In a broader sense, China was ranked as the fifth most popular tourist destination worldwide, in terms of numbers of arrivals, as shown in Table 2.19, after France, Spain, the United States, and Italy.

It is important to emphasise that the data for China, as used in this study, were published by the WTO, and are an estimate for reference only. As yet, China itself does not collect and compile official data on visitor arrivals. Excluding China, Hong Kong can be considered the first-choice tourist destination within the region, and is ranked 16th most popular in the world. Hong Kong had over 11.4 million visitor arrivals in 1999.

Table 2.18 International Tourism Receipts – Top Ten Destinations in East Asia and the Pacific Region

Destination	Rank 2000	Tourism Receipts (US$ billions)	Change in Receipts 1999-2000 (%)
China	1	16.2	15.1
Australia	2	8.4	5.3
Hong Kong	3	7.9	9.1
Thailand	4	7.1	6.3
Singapore	5	6.4	6.6
Indonesia	6	5.7	22.1
South Korea	7	6.6	-2.8
Japan	8	3.4	9.4
Malaysia	9	4.6	28.9
Taiwan	10	3.3	4.1

Source: World Tourism Statistics, Various Issues, WTO.

According to Tables 2.17A and 2.19, in 1999, two of the region's top four tourist destinations, China and Hong Kong, as measured in terms of visitor arrivals, also ranked among the top tourism receipts earners. Malaysia is excluded from this list, possibly because of the presence of the significant number of single-day return tourists who arrive in that country from Singapore. Such visitors generally maintain very low daily expenditures. As shown in Table 2.18, in 2000, China replaced Hong Kong at the head of the list of the top earners in the region, with total tourism receipts totalling US$16.2 billion, almost triple its 1993 level. Hong Kong, on the other hand, has temporarily but significantly suffered from the regional slowdown. This has created a sharp decline in Hong Kong's 2000 tourism receipts to US$7.9 billion, a 13.7% drop in tourist expenditures from 1996.

In terms of international tourism receipts, two of the most popular destinations in the EAP region rank among the top sixteen destinations in the world. This indicates that the EAP region has become one of the major players in the worldwide tourist market. And over the long run, despite its temporary setback, Hong Kong (currently ranked number two in the region in visitor arrivals and number three in tourism receipts) remains one of the leading tourist destinations in the region.

Table 2.19 World's Top 16 Tourism Destinations – Visitor Arrivals and Tourism Receipts (1999)

Rank	International visitor arrivals (million)		Rank	International tourism receipts ($US billion)	
1	France	73.0	1	United States	74.4
2	Spain	51.8	2	Spain	30
3	United States	48.5	3	France	27.9
4	Italy	36.1	4	Italy	26.7
5	China*/**	27.0	5	United Kingdom	19.9
6	United Kingdom	25.7	6	Germany	19.0
7	Canada	19.6	7	China	12.4
8	Mexico	19.0	8	Austria	12.1
9	Russia	18.5	9	Canada	9.3
10	Poland	18.0	10	Greece	9.2
11	Austria	17.5	11	Russia	9.0
12	Germany	17.1	12	Australia*	9.0
13	Czech Rep	16.0	13	Switzerland	8.8
14	Hungary	12.9	14	Mexico	8.7
15	Greece	12.0	15	Hong Kong	8.0
16	Hong Kong*	11.4	16	Mexico	7.5

Notes: 1. * denotes countries within EAP region

2. ** denotes China visitor arrivals, including day-trip travellers to Hong Kong

Source: World Tourism Statistics, WTO.

2.4.3 Top Spenders in East Asia and Pacific Region

The outstanding performance of the EAP region tourist market over the past two decades is a direct result of Japan's astonishing post-war economic performance. The country has grown into one of the world's economic superpowers. Japan's success has subsequently led to the expansion of the economies termed the 'Asian Tigers', including South Korea, Singapore, Hong Kong and Taiwan. This, in turn, has generated demand for outbound travel. In 1997, China overtook Taiwan as the second biggest spender on travel aboard in 1997, and has begun to show her long-term potential in the region.

Table 2.20 Top Five Spenders on Intra-regional Travel – East Asia and Pacific Region (1992 and 1997)

Destination	Rank		Tourist Spending ($US millions)		Market Share (%)		Changes in Spending (%)
	1992	1997	1992	1997	1992	1997	1992-1997
Japan	1	1	26.800	33,041	53	43.5	23
China	10	2	N.A.	10,116	7.5	13.4	N.A
Taiwan	2	3	7,100	6,500	14.0	8.6	-8.5
Korea	5	4	3,100	6,262	4.6	8.3	202
Australia	3	5	4,000	6,129	7.9	8.1	53

Source: Tourism Market Trends, EAP Region, 1989-1998, WTO. Madrid, Spain, 1999.

Table 2.20 compares the data for five countries between 1992 and 1997 from which tourists originate within the EAP region to highlight the countries with the highest intra-regional expenditures. Japan continued to be the highest spender during this period, contributing 43.5% of the total tourist receipts of the region, or nearly US$300 per capita. In 1997, the total expenditures of tourists from Japan rose to around US$33 billion, up from US$26.8 billion in 1992. This number translates into an increase of 23% during the 1992 to 1997 period.

With the nearly double-digit economic growth experienced in China over the period from 1992 to 1997, the Chinese have become the second-highest spenders in terms of travel within the region, at nearly US$10 billion in tourist receipts during 1997 alone. This amount is approximately one-third of Japan's spending, and the equivalent of 13.4% of market share.

Taiwan and Korea ranked third and fourth for intra-regional tourist expenditures in the same year. Both show similar expenditure amounts of around US$6 billion. Taiwan was the only market that registered a negative figure among the top five outbound markets, at US$6.5 billion in 1997, 8.5% less than the US$7.1 billion spent in 1992. Australia ranked fifth, spending US$6.1 billion in 1997.

2.5 Leading Position of Hong Kong International Tourism

As shown earlier in Tables 2.6 and 2.8, in 2000, the WTO estimated that the EAP region accounted for a 16.1% share of the world's total tourism arrivals. In 2000, the EAP region received a total of US$82.5 billion, or 17.4% of the world's total tourism receipts. In 1985, about 3.6 million visitors out of the 304 million visitors worldwide (1.12% of total worldwide tourist arrivals) selected Hong Kong as their destination, as shown in Table 2.21. In 1991, this figure almost doubled at 6 million arrivals out of the 463 million tourist arrivals worldwide (1.29 % of total worldwide tourist arrivals) and, by 2000, increased to over 13 million arrivals, an equivalent of 1.86% of worldwide tourist arrivals.

These numbers translate into an annual growth rate of visitor arrivals to Hong Kong of 10.6% from 1980 to 2000. This number, when compared with the world's overall growth rate of 4.4% over the same period, shows the Hong Kong as the world's fastest growing tourist area.

Table 2.21 Total Visitor Arrivals, Growth and Market Share – Top Ten Tourist Destinations in East Asia and Pacific Region (1980, 1985, 1991, 1994 and 2000)

Country	Total Visitor Arrivals in EAP Region by Country					Average Annual Growth Rate (%)			Market Share of Visitor Arrivals in EAP Region by Country (%)	
	1980	1985	1991 (millions)	1994 (millions)	2000 (millions)	91-00	80-91	80-00	1994	2000
China	3,500,000	7,133,000	12.3	21.1	31.2	10.9	12	11.6	27.4	27.9
Hong Kong	2,301,473	3,656,817	6.8	9.3	13.1	7.8	10.5	10.6	12.2	11.7
Thailand	1,847,000	2,438,000	5.1	6.2	9.5	7.2	9.6	8.5	8.0	8.5
Malaysia	2,105,000	2,933,000	5.8	7.8	10.2	6.5	9.7	8.2	9.4	9.1
Singapore	2,562,000	2,738,000	4.9	6.3	6.5	3.3	6.1	4.8	8.2	5.8
Indonesia	527,000	749,000	2.6	4.0	5.1	7.8	15.5	12.0	5.2	4.6
Macao	-	1,715,000	3.0	4.5	6.7	9.3	-	-	5.8	6.0
Japan	844,000	2,102,000	2.1	1.9	4.8	9.6	8.7	9.1	2.5	4.3
South Korea	976,000	1,426,000	3.2	3.6	5.3	5.8	11.4	8.8	4.7	4.7
Taiwan	1,393,000	1,452,000	1.9	2.1	2.6	3.6	2.6	3.2	2.8	2.3

Source: Compiled from
1. Tourism Market Trends, EAP Region, 1982-1993
2. Tourism Market Trends, EAP Region, 1988-1997
3. Tourism Market Trends, EAP Region, 2000

Travel, both intra-regionally and inter-regionally, is on the increase. Strong economic growth in many Asian countries originally contributed to the improvement of the standard of living and an increase in leisure time, which, in turn, provided more opportunities for the Asian middle class to explore neighbouring countries. The data in Table 2.21 prove Hong Kong's dominance within the region's top ten most popular destination countries in terms of visitor arrivals from 1980 to 2000, and in terms of the growth rate of visitor arrivals from 1980 to 1990 and from 1991 to 2000.

Around 13 million visitors arrived in Hong Kong in 2000, some 30% ahead of the territory's closest regional rival, Thailand, with a total of 9.5 million visitor arrivals. Results were varied among other competitors in the region. Singapore's tourism industry fell to the number four spot in 2000, with 6.5 million arrivals. Japan, on the other hand, increased its share from 2.5% in 1994 to 4.3% in 2000.

With the completion of Britain's handover of Hong Kong to China in June of 1997, the new Hong Kong Special Administrative Region (HKSAR) became a city within China and the Mainland's door to the world. At this point, China is poised to become a member of the World Trade Organisation, and the resulting economic integration of China into the global economy will likely attract business travellers from around the world to Hong Kong. In 2000, the HKSAR had the second largest visitor arrival share within the EAP region, accounting for almost 11.7% of all visitor arrivals to the region.

While Hong Kong continues to dominate the overall Asian tourism market as the most popular destination in the EAP region, regional rivals such as Thailand and Singapore are building their tourism industries rapidly, and will soon challenge this position. Competition will most likely continue to intensify as long as the Hong Kong currency continues to be linked with the US Dollar in the course of the Asian Financial Crisis.

Other countries within the region have progressively regained their competitiveness, in part through the significant devaluation of their currencies against the US Dollar and European currencies. Over the course of the Asian economic crisis, Hong Kong's competitors, including the Philippines, Thailand, South Korea, Malaysia and Indonesia, have devalued their currencies by more than half against the US Dollar. Singapore's dollar has fared only slightly better. Conversely, Hong Kong has maintained the value of its currency, which is pegged to the US Dollar, throughout the Asian financial crisis. As a result, goods and services have remained more expensive in Hong Kong than in other parts of the region. The currency devaluation of some countries' currencies does create an extraordinary factor in the competition for visitor arrivals by making destinations with better exchange rates more attractive than they might be otherwise, to intra- and inter-regional tourists alike.

2.6 Changing Role of Hong Kong International Tourism

Hong Kong's tourism industry has long made a significant contribution to the economy and had played a significant role in the development of regional tourism.

Table 2.22 Trend of Tourism Receipts – Top Eight Countries in East Asia and Pacific Region (1990, 1994-1996 and 2000)

Country/ Region	Tourism Receipts in EAP Region by Country (US$ billion)					Market Share of Tourist Receipts in EAP Region by Country (%)	
	1990	1994	1995	1996	2000	1996	2000
China	2.2	7.3	8.7	10.2	16.2	12.5	19.6
Hong Kong	5	8.2	9.6	10.8	7.9	13.3	9.6
Thailand	4.3	5.8	7.7	8.7	7.1	10.6	8.6
Singapore	4.7	7.5	8.4	8	6.4	9.6	7.8
South Korea	3.6	3.8	5.6	5.4	6.6	6.7	8
Japan	3.6	3.5	3.2	4.1	3.4	5	4.2
Indonesia	2.2	4.8	6.3	6.3	5.7	7.7	6.9
Taiwan	1.7	3.2	3.3	3.6	3.3	4.5	4
Total receipts to EAP region	34.2	62.8	73.9	81.6	82.5	100%	100%

Source: Annual Statistical Report, 1994, Pacific Asia Travel Association and Tourism Market Trends, 2000, World Tourism Organisation.

As demonstrated in Table 2.22, the level of spending in Hong Kong by international visitors is among the highest in the EAP region. In 2000, for example, total receipts from tourism accounted for 7.9 US$ billion, 4.6% of Hong Kong's Gross Domestic Product (GDP), and roughly 31% of Hong Kong's domestic exports.

Hong Kong's tourist industry is, in fact, its largest sector within the category of the export of services, ahead of shipping, insurance, finance and trade-related services, by a wide margin. A country's exports are generated in a number of ways, specifically the export of goods, the re-export of goods and services, and the export of services. As a small and open economy, Hong Kong is critically dependent on the export of its goods and services.

There are many ways in which services can be rendered to foreigner-tourism-related activities, ahead of other trade-related services. Today, this accounts for the lion's share of the export of Hong Kong services. This means that Hong Kong's tourism industry is now its largest foreign-exchange earner, ahead of even the textile and garment industry. In the mid-1980's, the structural change of the Hong Kong economy had led to the changing role of international tourism in Hong Kong.

In the years between 1960 and the mid-1980s, the manufacturing sector, which exported most of its output to markets overseas, was the backbone of the Hong Kong economy. From the 1980s to the 1990s, Hong Kong's major economic activities have undergone a drastic change, reflecting the ever-changing role of Hong Kong economy within the process of the 'intra-regional reallocation of exporting resources'. This is especially true since China opened its economic doors in the mid-1980s. From the mid-1980s and until the late 1990s, since the People's Republic of China (PRC) opened its economy to worldwide investors, on the basis of the 'restructuring' of the Chinese economy, the contribution of Hong Kong's manufacturing sector to its economy has declined.

Table 2.23 illustrates the number of people engaged in Hong Kong's major economic sectors since 1980. At that time, the manufacturing sector accounted for 907,463 jobs, or 46.8% of Hong Kong's total labour force. In 2000, the manufacturing sector only employed 333,700 workers, or 10.4% of the total labour force. As Hong Kong continues to evolve towards a service-oriented economy, the manufacturing sector has declined in terms of employment. It accounts for around 6% of Hong Kong's 2000 GNP, a significant drop from one third of Hong Kong's total GNP in the early 1980s.

The 'restructuring' of the Chinese economy was a major factor in the declining importance of Hong Kong's manufacturing sector. China's economy was transformed from a closed-plan economy to a part-market-driven economy that allowed foreign direct investment to build factories and businesses in China. Compared with the cost of labour and rent in Hong Kong or even Taiwan, those in China were extremely low when the Mainland first opened up economically. Hourly wages in China were initially below US$.10 per hour, for example. Since that time, many manufacturing facilities have relocated from Hong Kong to China in order to strengthen the external competitiveness of the business in the world market. This change implies that while in absolute terms Hong Kong domestic exports may decline (as indicated by the decline of employment in manufacturing), re-exports from China will continue to generate more job opportunities in Hong Kong's service sector to take up the slack caused by the manufacturing sector.

Table 2.23 Workforce of Hong Kong's Major Economic Sectors (1980,1990, 1996 and 2000)

Economic Sector	1980		1990		1996		2000	
	Workforce	Share (%)	Workforce	Share (%)	Workforce	Share (%)	Workforce	Share (%)
Manufacturing	907,463	46.8	751,000	28.43	495,600	16.6	333,700	10.4
Wholesale, retail and import/export trade, restaurants and hotels.	455,100	23.47	703,200	26.62	912,700	30.5	981,100	30.6
Financing, insurance, real estate and business services	131,600	6.78	208,600	7.9	363,400	12.13	478,100	14.91
Transport, storage and communication	77,272	3.99	268,400	10.16	341,400	11.4	353,400	9.8
Others	367,565	18.96	710,800	26.90	882,900	29.47	1,061,000	33.08
Total	1,939,000	100	2,642,000	100	2,996,000	100	3,207,300	100

Source: Hong Kong Monthly Digest of Statistics and Hong Kong Annual Digest of Statistics, Various Issues, 1980-2000, (Census and Statistics, Hong Kong Government).

The Composite Employment Estimates listed in Table 2.23 show that the numbers of people employed in the wholesale, retail and service sector surged from 455,100 in 1980 to 981,100 in 2000. Over the same period, the number of people employed in finance, insurance, real estate and business services increased from 131,600 to 478,100. Conversely, the number of people employed in manufacturing declined sharply from 907,463 to 333,700. These changes further confirm that Hong Kong has moved from a relatively low-end, value-added manufacturing-based economy to a high-end, value-added service economy. This trend has also helped Southern China move from an agricultural-based economy to a higher, relatively speaking, value-added manufacturing-based economy. Both economies ultimately benefit from this process, defined by economists as the intra-regional reallocation of exporting resources in terms of goods and services.

Thus, Hong Kong manufacturer sources materials, provide market information, arrange finance, and co-ordinate between buyers from overseas and producers in Hong Kong offices, but leave their manufacturing base operations to the low-cost economy of China. This process continues even once the services sector reaches and passes the 90% contribution mark to Hong Kong's GDP. The services sector involves finance, insurance, real estate and business services, wholesale and retail services, exhibition business, and the growing tourism and hotel services.

Additionally, the demand for tourism relies increasingly on business visitors, and thus runs parallel to the changing role of Hong Kong's economy in the context of the reallocation of exporting resources, in terms of goods and services in China and in other economies in the region. Since Hong Kong is positioning itself as a regional service-centre, the development of competitive business-related tourism appears to be a critical issue in the next era of economic development. In the future, business-related tourist services could also be considered an integral part of Hong Kong's economy, comprising a wide spectrum of the service sector, including retail, hotel and restaurant, transportation and telecommunication services.

In 2000, more than 13 million people, the equivalent of almost twice the population of Hong Kong, visited the SAR, placing demands on its tourist services and spending almost US$7.9 billion during their stay. Of the 13 million visitors, 30% were business travellers, who place their demands mainly on the SAR's business-related tourist service sector. More recently, business tourism has taken a dominant position within the economy to become an integral sector that supports Hong Kong's regional role as a business hub.

In the context of pleasure travellers, Hong Kong is among the most popular travel destinations in the world, a fact that reflects the high quality and wide variety of attractions and facilities available to visitors.

In terms of tourism, Hong Kong's identity alone has special meaning. Many countries have a number of gateway cities: New York and Los Angeles in the United States, Tokyo in Japan, and London in the United Kingdom, to name a few. These gateway cities are channels that connect different parts of their respective countries to the outside world. Hong Kong now performs this function for the Chinese Mainland.

Hong Kong also serves as a tourist 'gateway' city set for rapid growth, when China's population of 1.3 billion people, 200 times that of Hong Kong and 20 times that of the United Kingdom, are taken into consideration. Until 2000, only 3.77 million Chinese visitors travelled to Hong Kong from the Mainland, a mere 0.3% of China's massive population. In the year of 2000, the flow of tourists out of China continues to be restrained by institutional measures that will likely be lifted gradually over time. Once this happens, the volume of tourists arriving in Hong Kong from China, and passing through Hong Kong on their way to destinations elsewhere in the world, is expected to create record-breaking increases in visitor arrivals.

There are indications that suggest that Hong Kong is following in the footsteps of world-class cities such as London, New York and Tokyo, eventually serving as a business hub to the EAP region. This theory is based on a belief that nearly 90% of the working population in 2000 worked in the service industry. Today, Hong Kong is well positioned to function as the region's business hub. It has a well-established international banking sector, communities of lawyers, accountants, business consultants and agents, the world's largest container port, a global aviation hub, and a professional group of people who have the expertise required to do business with China. This infrastructure enables a steady flow of visitor arrivals and, in particular, a large volume of business travellers. It also suggests that Hong Kong's tourist sector will play a unique role in the next era of economic development within China and the EAP region as a whole.

The trends of tourism demand in Hong Kong, as defined above, suggest that some of the SAR's tourism will shift from a high number of pleasure tourists to a mixture that includes more business-related tourists. Hong Kong should therefore continue to develop itself as an attraction to a balanced portfolio of business and vacation travellers over the next decade, to reflect not only Hong Kong's position as a paradise for pleasure tourists, but as a regional business hub as well. It is also important to note that China and Taiwan accounted for almost 50% of the SAR's total arrivals in 2000, a fact that highlights the unique role Hong Kong plays in serving greater China as a whole.

2.7 Chapter Summary

This chapter began with an analysis of the trends of worldwide and East Asia and Pacific tourism demand for the period 1950-2000. In particular, we studied special events that caused fluctuations of tourism demand in the world and the EAP region over the past five decades. In addition, we analysed the growing importance of the EAP region and, in particular Hong Kong, in the context of international tourism. Our analysis indicated that international tourism grew steadily over the past few decades. Global visitor arrivals grew at an average of 6.9%, increased from 25 millions to 699 millions between 1950 and 2000, while visitor receipts grew at an average growth rate of 11.5% per annum, an increase from US$2.1 billion to US$476 billion over the same period.

In the face of rising global travel and tourism, the EAP region achieved an impressive growth rate in its market share of world international arrivals and receipts since 1960. In terms of the market share of arrivals, the region's share tripled from 1.0% in 1960 to 3.0% in 1970, and more than quadrupled over the period from 1970 to 2000. This indicates the growing importance of international tourism to the EAP region.

Despite challenges to Hong Kong's dominance as a tourist destination of choice for travellers from Singapore and Thailand, the analysis of this chapter indicated Hong Kong has maintained its regional tourism market dominance over the past few decades. In terms of visitor arrivals, Hong Kong is the most popular destination (excluding Mainland China) in the region, accounting for 11.7% of regional market share in 2000. In the context of tourism receipts, Hong Kong obtained the second largest market share (excluding Mainland China) in the region, in the same year, at 9.6%.

Excluding Mainland China, Hong Kong could be considered the top tourist destination within the region, and was ranked at 15th most popular in the world in terms of international visitor arrivals, and 16th in terms of international receipts. This confirms that Hong Kong has a leading position in worldwide and regional tourism over the past five decades.

Since the 1950s, Hong Kong's tourism industry has made a significant contribution to the economy. However, our analysis of the structural change of Hong Kong's economy in the mid-1980s indicated that the role of tourism has changed. With regard to this changing role, we conclude that Hong Kong should continue to develop its tourism to better attract a balanced portfolio of business and pleasure travellers to reflect not only Hong Kong's position as a paradise for pleasure tourists but as a regional business hub as well.

In the next chapter, we will review the overall growth trends of the Hong Kong tourist market over the period from 1959 to 2001. We will examine the tourism demand trends of the major tourist origin countries selected for our study, and the overall contribution of international tourism to the Hong Kong economy. As well, in the next chapter, we will examine the effect of economic determinants on tourism demand based on a descriptive approach, the composition and characteristics of inbound tourists and the seasonality of Hong Kong's international tourism industry. We will also examine political incidents and special events that have affected tourist arrivals in Hong Kong.

Chapter 3: Descriptive Analysis of International Tourism Demand in Hong Kong

3.1 Introduction

The purpose of this chapter is to analyse the development and growth pattern of international tourism demand in Hong Kong for the period 1959 to 2001. In particular, we examine the economic determinants of tourism demand and review the political incidents, social policies and special events that occurred in Hong Kong and in the tourist origin countries for the same period, to examine how tourism demand was affected by these events. In addition, we present a survey of the characteristics of tourist arrivals in Hong Kong, with a focus on the countries of origin in relation to arrivals.

Sections 3.2 to 3.6 analyse the trend of international tourism demand in Hong Kong for the period between 1959 and 2001. In particular, we aim to investigate any disturbances that cause tourism demand to fluctuate over the past four decades in Hong Kong. Section 3.7 analyses the long-term potential of the most important China market. Section 3.8 examines the prospect of Hong Kong's Disneyland Theme Park project. In Section 3.9, we survey the major characteristics of Hong Kong's visitors and, finally, in Section 3.10, we summarise the major findings of the chapter. The evolution of the absolute tourist arrivals and annual growth rate of tourist arrivals for each of six major tourist origin countries and the aggregate tourist arrivals for Hong Kong are provided from, Fig G.1 to Fig G.7 in appendix G, which plot these variables over time.

3.2 Tourism Demand in 1960s

The development of tourism in Hong Kong can be divided roughly into four stages. In the first stage, which occurred in the late 1950s and early 1960s, Hong Kong was not yet a world-renown tourist resort. Visitor arrivals in 1958 (the first year the Hong Kong Tourist Association (HKTA) started to officially collect such data) totalled around 100,000 people. Those tourists spent US$67 million in tourism receipts at current prices (in 1958, US$1=HK$5.714), as shown in Table 3.1. Most came from North America and the United Kingdom, and some came from Japan.

In 1957, the colonial government of Hong Kong realised the significance of tourism to the economy and decided to promote the industry by establishing the HKTA, the first official tourist body operating in Hong Kong. This body is a government-aided organisation that represents all sectors of Hong Kong's tourist industry. Unlike tourist organisations in many less-developed countries, the HKTA does not have the power to regulate tourist enterprises and has no imperative tourism development plan. This is consistent with Hong Kong's adopted economic philosophy, a policy of positive non-interventionism.

In 1961, the number of foreign visitor arrivals in Hong Kong increased to 163,661 people. They spent US$ 79.5 million in tourism receipts at current prices (in 1961, US$1=HK$5.714). From the late 1950s to the 1960s, as shown in Table 3.2, visitor arrivals grew rapidly at an average annual growth rate of 20%. In 1969, the total number of international visitor arrivals in Hong Kong reached 765,213, garnering approximately US $223.4 million in tourist receipts at current prices (in 1969, US$1=HK$6.6061). These numbers translate into an annual growth rate of 12% from 1958 to 1969.

Table 3.1 Tourism in Selected Countries/Regions – East Asia and Pacific Region (1958 and 1979)

	Visitor Arrivals			Tourist Expenditures (US$ millions)		
	1958	1979	Growth (times)	1958	1979	Growth (times)
Hong Kong	103,000	2,213,000	21.5	67	1,194	17.6
Singapore	75,000	2,247,000	30.0	7.5-10	515	51.5-68.7
Malaysia	10,000-16,000	740,000	46.3-74	1-1.5	50	33.3-50
Thailand	50,000-60,000	1,591,000	26.5-31.8	7.5-9	219	24.3-29.2
Tahiti	1,100	101,000	91.8	1.1	65	59.1
New Zealand	30,000	414,000	13.8	10.9	162	14.9
Australia	61,300	790,000	12.9	23-25	525	21-22.8
Philippines	30,000	967,000	32.2	10	355	35.5
Taiwan	25,700	1,340,000	52.1	1	919	919
Japan	96,700	1,113,000	11.5	61-67	550	8.2-9.0
South Korea	6,660	1,126,000	169.1	1.0-1.5	326	217.3-326.0

Source: Annual Statistics Report, Various Issues, HKTA, and Annual Report, PATA.

3.3 Tourism Demand in 1970s

The second stage of Hong Kong's development as a tourist destination took place during the early 1970s, when the growth rate of visitor arrivals exhibited a slowdown. The face of the tourists was also changing: In 1971, Japan overtook the United States as Hong Kong's foremost tourist-generating country, with 237,950 Japanese tourists alone arriving in Hong Kong. Comparatively, the number of American tourists arriving totalled slightly less, at 217,695 people.

As shown in Table 3.2, in 1972, overall visitor arrivals in Hong Kong was 1,082,253, the first time visitor arrivals exceeded one million. Throughout the 1970s, the tourism industry experienced a trend of steady growth, albeit at a slower rate. The average annual compound growth rate declined to 10% during this decade, a slowdown of about half of the momentum of the 1960s' boom.

Although visitor arrivals continued to be stable throughout the 1970s, some fluctuations occurred, particularly prior to 1975. During this time, the tourist industry had its first negative growth in 1971, as a result of the Vietnam War. More significantly, the travel industry encountered a two-year, non-growth period in terms of actual visitor arrivals in 1974 and 1975, primarily due to a global economic recession that was caused by the first oil crisis.

The first oil crisis in 1973 was a key factor in the downturn in the history of Hong Kong's organised tourist industry. The crisis was brought about by the Organisation of Petroleum Exporting Countries (OPEC), which formed a cartel to control the supply of oil. This subsequently resulted in the tripling of oil prices, and brought to a major global economic recession. At that time, oil was the main source of fuel for industry in Hong Kong and throughout the world, hence provided a significant disruption in tourism development in Hong Kong.

Apart from economic factors, politics also played a significant role in the industry's first-ever downturn in 1971. The Vietnam War, which broke out in the late 1960s, together with the Cultural Revolution in China, contributed to the decrease in visitor arrivals in Hong Kong. China's Cultural Revolution, in particular, caused social unrest within Hong Kong, producing a large influx of refugees. At that time, left-wing worker strikes were a common phenomenon in Hong Kong. In particular, one strike, which lasted from 1967 to 1971, was the largest of its kind during that period. These political events had a direct negative impact on Hong Kong's tourism industry.

Another event that caused Hong Kong's visitor arrivals to fluctuate was the 1970 World Exposition in Tokyo, Japan. Expo-70 brought many long-haul visitors east, and created an opportunity for them to visit not only Japan, but also Hong Kong, before or after attending the fair. The year after Expo-70 closed, visitor arrivals to Hong Kong dropped by 2.2%, while tourism receipts dropped by 1.6%. The event, arguably, had as much of an impact on the former territory in its year, as did the Vietnam War and the Cultural Revolution in China.

The lack of large business events or exhibition fairs organised in Hong Kong during the early 1970s played a significant role in the sluggish rate of visitor arrivals. In 1974, for example, only 15 large business events were held in Hong Kong and, as a result, business travellers accounted for only 10% of all visitor arrivals during that year. This figure was much lower than the 30% average achieved in the 1990s. This figure indicates that Hong Kong had depended too heavily on pleasure tourists arriving from various industrialised countries. Thus, the combination of the impact of Tokyo Expo-70, the Vietnam War, and China's cultural revolution led Hong Kong tourism to experience its first-ever negative growth in visitor arrivals and tourism receipts. Even the 1.6% drop in tourist expenditures in 1971 can be directly attributed to factors of global political instability and economic recession.

Hong Kong's tourist industry recovered from the downturn very quickly form the effect of first oil crisis in 1976, as indicated by an increase of over 20% in visitor arrivals and 45% in tourism receipts that year. Moreover, the total number of visitor arrivals grew from one million in 1972 to an excess of two million in 1978, a time span of only six years. During this period, overall tourism receipts reached approximately US$ 965.5 million at current 1978 prices (in 1978, US$1=HK$4.81). At the same time, tourists from Japan topped the list for the highest visitor arrivals in Hong Kong - they accounted for nearly a quarter of all visitor arrivals in the then-territory. Visitors from North America, Southeast Asia, Europe and Australia were next highest in terms of arrivals.

As shown in Table 3.1 and Figure 3.1A, Hong Kong was the most popular tourist destination within East Asia and the Pacific region compared to tourism receipts of other Asian destinations in 1958 and 1979. In 1979 alone, Hong Kong registered 2.2 million visitor arrivals and 1194 US$ million tourism receipts.

Although Hong Kong is smaller than Japan, an economic super-power in terms of GNP, in 1979, the then-British colony entertained more international visitors and received more tourism revenue than did the archipelago. In fact, Hong Kong accumulated approximately US$1194 million from tourism receipts (in 1979, US$1=HK$4.96), more than double that of Japan's US$550 million in receipts.

Moreover, in 1979, Hong Kong's tourism receipts accounted for approximately 6.78% of its GDP and 10.6% of its merchandise exports. These statistics have kept Hong Kong on the World Tourist Organisation's 'tourist country list' since 1960. To qualify as a 'tourist country', the country's tourism receipts must account for more than 5% of the country's GNP and more than 10% of its merchandise exports. As shown in Table 3.2, during the period of the 1960s and 1970s, Hong Kong's tourism revenues have done just that, indicating that the former territory has long been classified as a 'tourist country' in the EAP region.

Table 3.2 Economic Significance of Tourism in Hong Kong (1961-1980)

	Tourist Expenditures	Tourist Expenditures Relative to World Tourism Receipts	Tourist Expenditures Relative to GDP	Tourist Expenditures Relative to Domestic Exports	Visitor Arrivals
	[US $millions (%)]	(%)	(%)	(%)	[Numbers (%)]
1961	79.5 (14.8)	1.08	7.50	15.45	163,661 (34.9)
1962	91.2 (14.8)	1.17	7.57	15.71	253,016 (54.6)
1963	105.7 (15.9)	1.27	7.56	15.77	315,665 (24.8)
1964	122.9 (16.3)	1.07	7.89	15.86	398,534 (26.3)
1965	127.1(3.4)	1.15	6.90	14.44	446,743 (12.1)
1966	133.4(5.0)	0.97	7.33	12.25	505,733 (13.2)
1967	129.8 (-2.7)	1.01	6.34	11.75	527,733 (4.3)
1968	165.2(27.2)	1.02	7.49	11.88	618,410 (17.3)
1969	223.4 (35.2)	1.44	8.57	12.87	765,213 (23.7)
1970	300.3 (34.4)	1.68	9.75	14.74	927,256 (21.2)
1971	295.6(-1.6)	1.38	7.87	12.00	907,295 (-2.2)
1972	372.7(26.1)	1.52	8.72	13.81	1,082,253 (19.3)
1973	433.3 (16.3)	1.57	7.19	11.31	1,291,950 (19.4)
1974	484.2 (11.75)	1.42	6.77	10.47	1,295,462 (0.2)
1975	510.9 (5.5)	1.32	6.91	11.26	1,300,836 (0.4)
1976	740.5(45.0)	1.69	7.33	10.61	1,559,977 (20.0)
1977	831.2 (12.3)	1.50	6.64	10.40	1,755,669 (12.5)
1978	965.5 (16.2)	1.48	6.71	11.41	2,054,739 (17.0)
1979	1194.4 (23.7)	1.59	6.78	10.60	2,213,209 (7.7)
1980	1179 (-1.3)	1.40	5.71	8.89	2,301,473 (4.0)

Source: HKTA, Annual Report, various issues, 1961-1980.
Estimate of Gross Domestic Product, Hong Kong Government, various issues, 1961-1980.
Hong Kong Monthly Digest of Statistics, various issues, 1961-1980, (Census and Statistics, Hong Kong).
Hong Kong External Trade Statistics, various issues, 1961-1980, (Census and Statistics, Hong Kong)

Note: Parentheses values indicate change by percentage over previous year

Figure 3.1A Economic Significance of Tourism in Hong Kong – Tourist Expenditure (1961-1980)

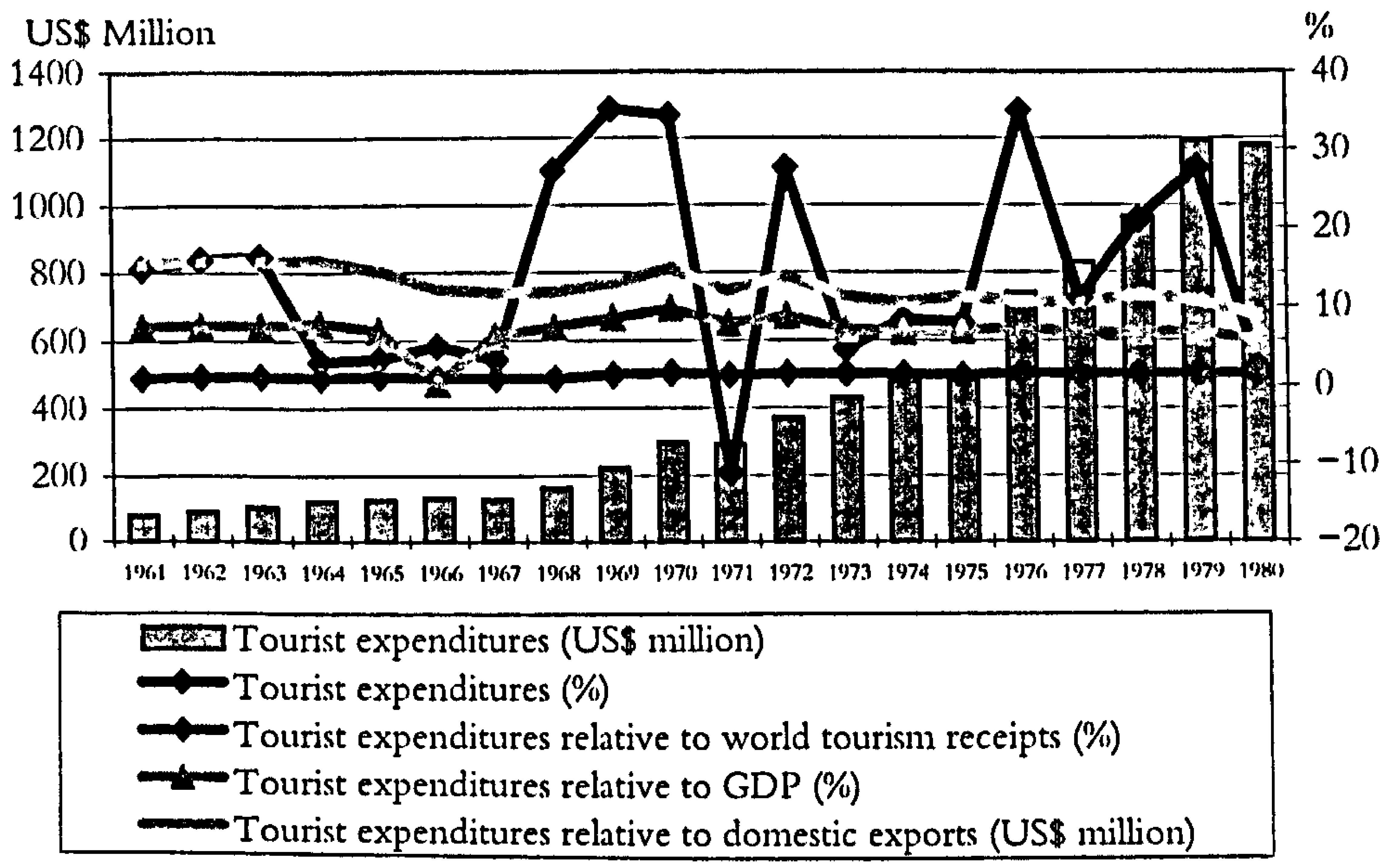
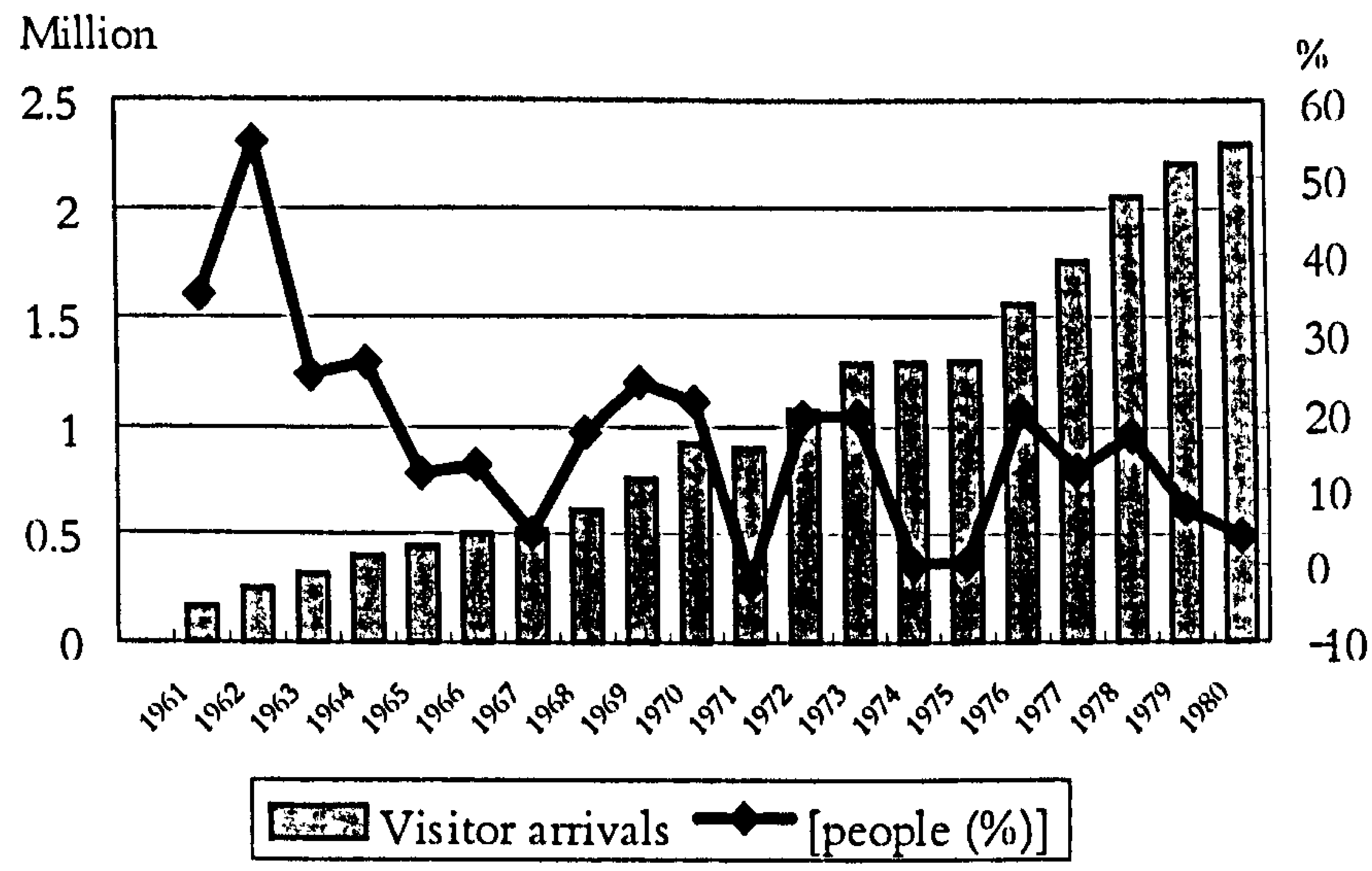


Figure 3.1B Economic Significance of Tourism in Hong Kong – Visitor Arrivals (1961-1980)



Source: HKTA, Annual report, various issues, 1961-1980.
Estimate of Gross Domestic Product, Hong Kong Government, various Issues, 1961-1980.
Hong Kong Monthly Digest of Statistics, various issues, 1961-1980 (Census and Statistics, Hong Kong).
Hong Kong External Trade Statistics, various issues, 1961-1980 (Census and Statistics, Hong Kong).

3.4 Tourism Demand in 1980s

Although the second oil crisis occurred in the early 1980s, international demand for tourism sustained the trend of growth throughout Hong Kong's third stage of development in the 1980s. In 1985, as indicated in Table 3.3 and Figure 3.2, 3,656,817 international visitors arrived in Hong Kong. This marked a 58.8% increase over arrivals in 1980, and translated into an annual average growth of 10.2% over the five-year period. The demand for tourism grew even more rapidly in the late 1980s. By 1989, 5,984,501 international visitors arrived in Hong Kong, a 63.65% increase from 1985 to 1989, or a 13.2% annual increase over the second half of that decade. Moreover, in 1989, Hong Kong tourism receipts accounted for 6.58% of GDP and 15.5% of domestic exports, which indicates the level of significance of Hong Kong international tourism to the Hong Kong economy.

The annual growth rate during the ten-year period in the 1980s was approximately 11%, slightly higher than the 9.5% growth rate experienced in the 1970s, but much slower than the phenomenal growth rate of 18.9% in the 1960s. However, during the 1980s, Hong Kong's tourism underwent a major structural change from an inter-regional tourism destination, with most visitors originating from industrialised countries, to that of intra-regional tourism, with tourists coming primarily from the Northeast Asian countries/ regions of Taiwan, China and Japan.

In the early 1980s, similar to the late 1970s, the major source markets for Hong Kong tourism remained with Japan, the United States, United Kingdom, Germany and Southeast Asia.

Table 3.3 Economic Significance of Tourism in Hong Kong (1981-1989)

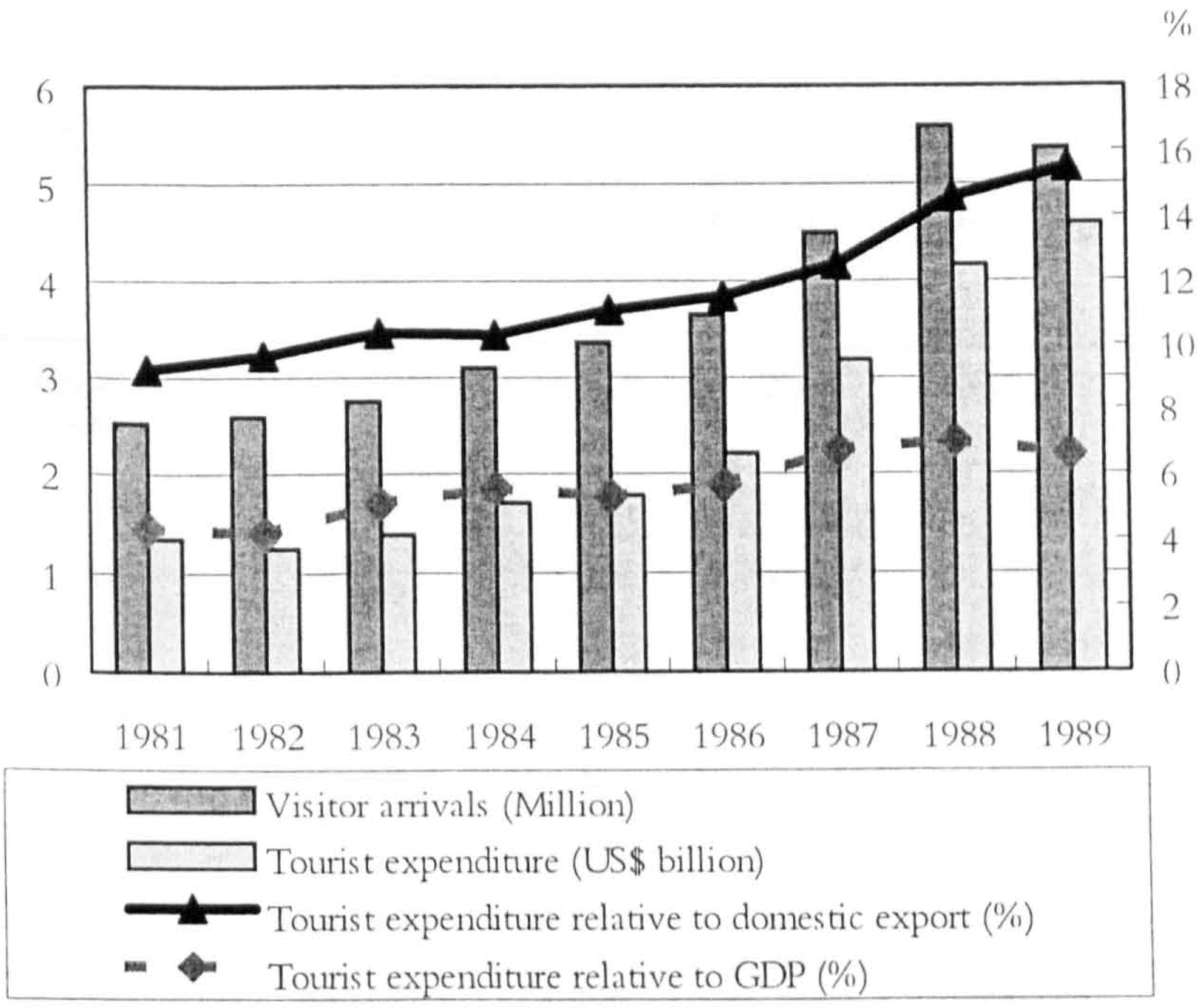
	Visitor Arrivals (in million)	Tourist Expenditures (US$ Billions)	Tourist Expenditures Relative to Domestic Exports (%)	Tourist Expenditures Relative to GDP (%)
1981	2.535203 (10.2)	1.343(11.4)	9.24	4.34
1982	2.592012 (2.2)	1.251(-7%)	9.68	4.18
1983	2.753549 (6.2)	1.383 (10.6)	10.39	5.10
1984	3.303719 (20)	1.711 (23.7)	10.33	5.55
1985	3.656817(10.7)	1.788 (4.5)	11.10	5.31
1986	4.052641(10.8)	2.21 (23.6)	11.53	5.65
1987	4.917044(21.3)	3.184 (44.1)	12.52	6.73
1988	6.167221(25.4)	4.166 (30.8)	14.60	7.00
1989	5.984501(-3.0)	4.595 (10.3)	15.50	6.58

Source: Visitor Arrival Statistics, Various Issues, HKTA, Estimate of Gross Domestic Product and Hong Kong Monthly Digest of Statistics, Various Issues.

Note Visitor arrivals complied from statistics of incoming visitors to Hong Kong by Nationality. Parentheses values indicate change by percentage over previous year.

As shown in Table 3.4, these markets combined account for over 75% of the visitors to Hong Kong. Relative to the population of Hong Kong, the inflow of 3 million pleasure and business tourists during the mid-1980s indicated a potential new type of tourism and Hong Kong became a business hub for the region. In this regard, Hong Kong's openness was far ahead of that of other Asian countries. In 1985, only Singapore, with a population of 3 million people and 3 million tourists, boasted the same level of openness to an influx of business travellers.

Figure 3.2 Economic Significance of Tourism in Hong Kong (1981-89)



Source: Visitor Arrival Statistics, Various Issues, (HKTA), Estimate of Gross Domestic Product, Various Issues, (Hong Kong Government) and Hong Kong Monthly Digest of Statistics, Various Issues (Census and Statistics, Hong Kong).

In the late 1980s, Japan emerged as one of the super economic powers of the world. The country's nominal per-capita GDP, once ranked as number one within the industrialised world, derived an extremely high level of purchasing power for its people. The positive asset wealth effect caused by its overheated property and stock markets in the late 1980s, together with the appreciation of the Yen against the US dollar, fuelled the Japanese population's desire for outbound travel. These economic fundamentals continued to strengthen Japan's claim as the largest source market for inbound tourists to Hong Kong throughout the 1980s. During this time, visitor arrivals from Japan increased sharply from 465,987 in 1980 to 1,317,575 in 1990, representing a 20% market share of the total visitor arrivals in Hong Kong, or an annual growth rate of 11%. This growth rate developed faster than that of visitor arrivals from other industrialised countries.

Japan's economic success benefited not only itself, but also gave strength to other Southeast Asian economies, mainly as a result of the massive flow of foreign direct investments during the process of the regional reallocation of exporting resources. As a result of this spreading of wealth, in the early- to mid-1980s, ASEAN economies such as Malaysia, Indonesia, Thailand and Singapore became future sources of tourist arrivals in Hong Kong within Asia.

Table 3.4 Breakdown and Growth Rate of Inbound Visitor Arrivals – Hong Kong (1980, 1985 and 1990)

		1980 Arrivals	1985 Arrivals	Growth Rate 1980-1985 (%)	Arrivals 1990	Growth Rate 1985-1990 (%)	Growth Rate 1980-1990 (%)
Short-haul	Southeast Asia	516,227	669,822	29.8	848,077	26.6	64.3
	Japan	465,987	626,066	34.6	1,317,575	109.5	282.0
	Taiwan	119,635	168,056	42.8	1,328,157	661.3	1087.0
	China	-	308,978	Nil	754,376	144.2	244
Long-haul	U.S.A.	349,686	623,850	83.4	578,215	-4.0	76.5
	U.K.*	121,054	187,906	55.2	279,333	48.6	230.8
	Canada	56,352	113,545	101.5	166,695	46.81	295.81
	Germany	65,046	83,620	28.7	122,026	48.8	91.6
	India	38,467	72,689	89	76,463	8.0	204.4
Total		2,301,473	3,656,817		6,580,850		

Source: Visitor Arrival Statistics – HKTA
* Visitor arrivals from U.K compiled from statistics of incoming visitors to Hong Kong by country of residence.

According to statistics compiled by the HKTA, overall visitor arrivals in Hong Kong from Southeast Asia increase from 516,227 in 1980 to 848,077 in 1990. This represented 12.9% of the total visitor arrivals in Hong Kong in 1990 and translated into an annual growth rate of 5.1% over that of the 1980s.

In the 1980s, one of the major developments in global trends of the tourist industry was that the EAP region captured a large portion of global international visitor arrivals at the expense of tourist regions in Europe and North America. Likewise, the change in source markets for tourists to Hong Kong followed the worldwide trend by drawing more tourists from the EAP region, in particular from Taiwan and China, rather than from Europe and North America. As shown in Table 3.4, the number of Mainland China arrivals increased sharply from 308,978 to 754,376 over the period 1985-1990. The rapid increase was possibly due to the introduction of travel packages to Hong Kong in China in the period of 1987.

As shown in Table 3.4, the number of Taiwanese arrivals in Hong Kong increased sharply from 119,635 in 1980 to 1,328,157 in 1990, a more-than-tenfold increase over the course of the decade. These numbers translated to an annual compound-growth rate of 27%, or more than double the growth rate of 11% for arrivals from Japan, and more than five times the growth rate of 5.1% for Southeast Asian tourists over the same period. In terms of market share, visitor arrivals from Taiwan surged from 5.20% in 1980 to 20.18% in 1990.

Several factors caused this increase in arrivals from Taiwan. First, in July 1987, the Taiwanese government abolished the country's ban on direct travel to Hong Kong. At the same time, Taiwanese travellers were allowed for the first time to bring up to US$5,000 out of Taiwan, which further enhanced their purchasing power. Subsequently, in November 1987, Taiwanese visitors were also allowed to travel to the People's Republic of China via a third country.

Measures were also taken by China to facilitate the entry of Taiwanese people to the Mainland. These liberalisation efforts not only contributed to the longer-term improvement of the purchasing power of Taiwanese outbound tourists, they were also key elements for explaining a short-term, fourfold increase in visitor arrivals from Taiwan during the three-year period from 1987 to 1990.

An additional explanation for the sharp increase of arrivals from Taiwan is given on the basis of the success of the Taiwanese economy, which led to a surge of consumption expenditure. The export boom, caused by a drastic worldwide increase in demand for electronic and computer products, created a rise in per capita income in Taiwan and, as in the case of Japan, a positive asset wealth effect was generated from the country's overheated property and stock market. All contributed to a sharp increase in Taiwanese outbound tourists in the mid- to late 1980s.

3.4.1 Growth of Business Travellers in Hong Kong in the Late 1980s

The opening of the People's Republic of China in terms of economic reform and the relaxing of restraints on outbound travel were decisive factors that allowed for a massive outflow of tourists and business travellers to Hong Kong from the mainland, starting from the mid-1980s. In addition, these economic reforms encouraged some Taiwanese and Japanese enterprises to follow Hong Kong's example of creating export competitiveness by relocating their production facilities to China. These intra-regional reallocations of exporting resources, which are often aided by Hong Kong 'middlemen', have changed the shape of Southern China's agricultural-based economy to that of a manufacturing-based economy and, as from the mid-1980s, helped Hong Kong consolidate its position as the business hub of the region. As the process of the intra-regional reallocation of exporting resources continued to spread to other high-cost economies, more and more businessmen stayed in Hong Kong as a rest stop before or after the business trips to China. As a result, by the late 1980s, business visitors constituted more than 30% of total visitor arrivals in Hong Kong. This has formed a well-balanced portfolio for the SAR's tourism industry, in comparison with the comparatively low proportion of business tourists (around 10%) in the 1970s.

Two factors stand out as having driven the change in the balance between business and pleasure tourists. First, during the early stages of China's economic opening, the PRC's transportation network was extremely poor, whereas that of Hong Kong was already excellent. In addition, Hong Kong had developed world-class hotels, reliable telecommunication services, and a well-facilitated airport that aided business travel to China. It is obvious that Hong Kong's hotel and tourism sector was integral to garnering its leading position as a regional business hub and a gateway city to China for international business travellers. In the late 1980s, Hong Kong's position as a business hub was further strengthened when the colonial government exercised much effort towards improving Hong Kong's overall competitiveness. Their efforts included deregulating Hong Kong's telecommunication services, modernising its financial environment, and bringing the then-colony's infrastructure up to international standards.

The 4th June incident, which occurred suddenly and without warning in Beijing, was without question the only event that explains the second downturn of the tourism industry in Hong Kong. The downturn also happened quickly and over a very short period of time, directly following that event. The Beijing incident was a threat to vacation and business travellers, who became more and more concerned with their safety while they travelled to Hong Kong or through it to China. As a result, the arrivals from the United States, Japan and Europe dropped by at least 10%, a significant change over the previous year. In terms of numbers, overall visitor arrivals in Hong Kong declined from 6,167,221 in 1988 to 5,984,501 in 1989, as shown in Table 3.3 and Figure 3.2.

3.5 Tourism Demand in 1990s

3.5.1 Recovery of Tourism Demand in Early 1990s

By 1991, the tourism industry was recovering well from the Beijing incident. As a result, tourist arrivals grew at a rapid rate between 1991 and 1996. Tourists from China and Taiwan constituted a major factor in the recovery. In addition, two Asian markets, Japan and Southeast Asia, also grew more significantly, because the Beijing incident did not create barriers for the ongoing process of the regional reallocation of exporting resources. In 1991, as shown in Table 3.6, the Japanese, Taiwanese, Mainland Chinese and South-East Asian countries accounted for over 65% of the market share of visitors arrivals in Hong Kong. This figure provides concrete evidence that the reallocation of tourism demand from the inter-regional market to the intra-regional market was quite remarkable in the late 1980s. As shown in Table 3.5, Hong Kong tourism receipts accounted for an average of 6.18% of its GDP and 21.54% of its domestic exports over the period 1990 to1994.

One noteworthy point must be mentioned. The absolute number of inter-regional tourists who arrived in Hong Kong during the 1980s was also on the rise, particularly those arriving from Western European countries. In terms of market share, however, the European portion was declining in comparison to visitor arrivals from Asia. Taking into consideration the fact that a declining market share may not necessarily imply a decline in the absolute number of visitor arrivals, it is important to note that this decline was measured in terms of the rapid growth of intra-regional visitor arrivals in Hong Kong. Table 3.6 shows that such high arrivals over the past decade are due to a concentration of intra-regional business tourists. Hence, a small share of inter-regional travel may still, in fact, have a higher absolute number of actual arrivals.

Table 3.5 Economic Significance of Tourism in Hong Kong (1990-2000)

	Visitor Arrivals (millions)	Tourist Expenditures (US$ billions)	Tourist Expenditures Relative to Domestic Exports (%)	Tourist Expenditures Relative to GDP[1] (%)
1990	6.58 (9.9)	4.87 (6.0)	16.3	6.32
1991	6.8 (3.3)	5.08 (4.3)	16.6	5.73
1992	8.01 (17.8)	6.20 (22)	19.9	5.99
1993	8.94 (11.6)	7.70 (24.2)	26.1	6.49
1994	9.33 (4.4)	8.24 (7.0)	28.8	6.34
1995	10.2 (9.3)	9.60 (16.5)	32.3	6.94
1996	12.9 (26.5)	11.99 (24.9)	44.5	7.92
1997	11.2 (-13.2)	9.98 (-16.8)	34.0	5.25
1998	10.2 (-8.9)	7.50 (-24.8)	28.2	4.19
1999	11.3 (7.8)	7.21 (-3.9)	29.2	4.38
2000	13.1 (15.9)	7.89 (9.4)	31.0	4.58

Source: Annual Report, Various Issues, (HKTA), Estimate of Gross Domestic Product, 1999, (Hong Kong Government) and Hong Kong Monthly Digest of Statistics, Various Issues, (Census and Statistics, Hong Kong).

Note 1. According to the estimate of Fletcher (1994), the tourism income multiplier for Hong Kong economy is 1.02. It indicates that the ratio of tourism expenditures relative to GDP is approximately equal to the ration of contribution of tourism to the Hong Kong economy.

2. Parentheses values indicate change by percentage over previous year

Table 3.6 Breakdown of Inbound Visitor Arrivals – Hong Kong (1991-1997)

	1991	1992	1993	1994	1995	1996	1997
Short haul							
Southeast Asia	1,004,316	1,226,235	1,228,048	1,186,519	1,247,112	1,427,879	1,325,173
Japan	1,247,024	1,311,884	1,269,205	1,429,848	1,671,319	2,015,121	1,305,485
Taiwan	1,284,786	1,625,231	1,762,410	1,650,081	1,776,244	1,820,335	1,883,514
China	763,332	1,024,361	1,569,799	1,734,435	1,977,223	2,237,452	2,212,977
Long haul							
U.S.A.	586,634	660,126	717,891	751,130	740,372	794,018	762,782
U.K.*	275,626	314,231	339,162	379,577	360,545	397,153	340,263
Canada	161,784	180,231	189,432	185,290	174,656	165,887	178,046
Germany	140,422	174,950	222,951	239,197	252,253	284,940	229,949
India	76,463	80,022	78,911	80,099	86,151	105,838	89,320
Total	6,795,413	8,010,524	8,937,500	9,331,156	10,199,994	12,973,764	11,273,377

Source: Annual Report, Various Issues, HKTA, Statistical Review of Tourism, Various Issues, 1991-1997, HKTA, and Visitor Arrival Statistics, Various Issues, HKTA.

Notes. 1. Visitor arrivals from U.K compiled from the statistics of incoming visitors to Hong Kong by country of residence

2. Visitor arrivals from all origin countries (except U.K.) compiled from statistics of incoming visitors to Hong Kong by nationality.

3.5.2 Regional Comparisons of Hong Kong International Tourism in Early 1990s.

To compare the overall position of Hong Kong's tourism industry with that of other tourist destinations in the region, we must now study the trends of international visitor spending in the EAP region, rather than the data of visitor arrivals of the early 1990s. Statistics compiled by the World Tourism Organisation (WTO) and the Pacific Asia Travel Association (PATA) showed that Hong Kong derived the largest amount of money generated by international visitor spending in the EAP region from 1990 to 1993.

Table 3.7 shows tourism receipts of the major markets in the EAP region from 1990 to 1993. Visitor spending in Hong Kong rose sharply during the three-year period from US$5.0 billion to US$7.7 billion, or a 14.5% annual increase. This rate is 4% more than its visitor arrival growth rate during the same time. This implies a rise in overall per capita visitor spending, reflecting the trend that Hong Kong has shown its regional competitiveness in the international tourism market.

Table 3.7 **International Visitor Spending – Major East Asia and the Pacific Region Tourism Destinations (1990-1993)**

	1990 (US$ billions)	1991 (US$ billions)	1992 (US$ billions)	1993 (US$ billions)	Annual Growth 1990-1993 (%)
China	2.2	2.8	3.9	4.7	28.3
Hong Kong	5.0(1)	5.1(1)	6.2(1)	7.7(1)	14.5
Indonesia	2.1	2.5	3.3	4.0	23.7
Japan	3,6	3.4	3.6	3.5	-0.5
South Korea	3.6	3.4	3.2	3.5	-0.5
Malaysia	1.7	1.5	1.8	1.9	4.0
Philippines	1.3	1.3	1.7	2.1	17.5
Singapore	4.6 (2)	4.6 (2)	5.3 (2)	5.8 (2)	8.0
Thailand	4.3 (3)	3.9 (3)	4.8 (3)	5.0 (3)	5.0
Australia	4.1	4.5	4.4	4.7	4.4
New Zealand	1.0	1.0	1.0	1.2	4.5

Source: Annual Statistical Report, Various Issues, (PATA).

Note: Figures in parentheses indicate rankings of international receipts.

China, Indonesia and the Philippines also emerged as fast growing tourist destinations within the region, indicated by double-digit growth in their tourism receipts. However, in the same period, Australia, Malaysia, New Zealand, Singapore and Thailand registered only a modest increase in tourism receipts, represented by single digit growth of visitor spending. Japan and Korea had even less success: both registered negative growth in tourism receipts during this time. This poor performance is mainly attributed to the real appreciation of the Japanese yen and the Korean won. In summary, following Hong Kong, Indonesia, China and the Philippines were the best performers in the region in terms of tourism receipts and spending growth rates.

Measured in terms of aggregate tourism receipts during 1993, Hong Kong continued to retain its competitiveness as the most popular destination in the region. It is remarkable that despite being only a city, Hong Kong has amassed more money from visitor spending than vast countries such as Japan, Australia, Thailand and Singapore.

3.5.3 Tourism Demand in Mid-1990s

As indicated in Table 3.6, China replaced Taiwan as the largest tourist-generating market for Hong Kong for the first time in 1994. At that time, Japan ranked third and Southeast Asia ranked fourth. These four largest source markets, which are located within the EAP region, illustrate further the dominance of intra-regional travel to Hong Kong. In 1994, tourists from those four countries combined had 67% of all tourists arriving in Hong Kong. While the number of tourist arrivals in Hong Kong from Asia had increased, there was a slight drop in visitors from Taiwan. This was caused by a temporary ban placed on group travel from Taiwan to China in mid-1994, as a result of the Thousand Island Lake Incident (thirty Taiwan tourists were murdered in Thousand Lake) in China. This incident occurred in 1994, when more than twenty Taiwanese visitors were murdered at Thousand Island Lake in China. However, nobody was caught and punished for the crime. Despite this, Taiwan continued to contribute to Hong Kong's tourism industry, as indicated by the increased spending by visitors from US$1,012 per capita in 1993 to US$1072 in 1994.

In the context of long-haul markets, Western Europe registered the strongest growth in terms of visitor arrivals in Hong Kong. The number of Western European tourists arrivals in the then-colony increased sharply from 773,726 in 1993 to 923,567 in 1994. This was an increase of nearly 50% since 1990. Major European markets that continued to send tourists to Hong Kong were the United Kingdom with 379,577 visitors and Germany with 239,197 visitors in 1994, as shown in Table 3.6. The surge in European arrivals in the early 1990s could have been caused by relatively strong European currencies against the US dollar.

In the mid-1990s, Hong Kong continued to achieve a rapid growth in tourism demand, with the rate accelerating through 1995 until it peaked at nearly 13 million visitor arrivals in 1996, a year prior to the handover of the then-territory's sovereignty. Between 1994 and 1995, Hong Kong continued to attract increasing tourist demand from Asia visitors hailing from the EAP region, but at the same time, there was a drop in the number of visitors from the United States and the United Kingdom. This decline could be attributed to fragile economic conditions in the English-speaking economies during the mid-1990s. The decline in the disposable per-capita income of westerners kept many long-haul travellers from going to Hong Kong. Visitor arrivals from the United States dropped from 751,130 in 1994 to 740,372 in 1995. A similar decline in visitor arrivals occurred within the United Kingdom, from 379,577 in 1994 to 360,545 in 1995.

As a result of the relaxation of visa requirements for Chinese tourists in 1993, China overtook Taiwan to become the largest source market of tourists to Hong Kong since 1994. In 1995, 1,977,273 visitors arrived in Hong Kong from China, as shown in Table 3.6. This was a three-fold increase over a five-year period starting in 1990. Measured in terms of market share, China supplied 20% of Hong Kong's total visitor arrivals in 1995. In 1996, there were about 2,237,452 visitor arrivals in Hong Kong from China, doubling those of 1992.

Since 1994, macroeconomic stabilisation measures in China have helped cool down the country's overheated economy, and subsequently anchored for it a soft landing. These measures further increased the arrivals and expenditures of business and leisure travellers from China in Hong Kong. In 1996, arrivals from the Mainland slowed, but continued to register a modest increase of 3%, or 2.3 million visitor arrivals.

Slower than expected increases in arrivals from China prior to 1997 suggested a shortfall in business travellers or official visitors coming to Hong Kong, as a result of restraints put on all official travel prior to the territory's handover. In contrast, in 1996, the proportion of pleasure tourists continued to increase: the number rose from 55% to 58% of the total visitors to Hong Kong that year. In 1996, visitors from the Mainland contributed US$2.0 billion in total tourism receipts. The per capita spending by Mainland Chinese visitors in Hong Kong increased from US$546 a year in 1994 to US$849 a year in 1996. This was thought to be a sign of increasing affluence of the Mainland Chinese. In 1996, the per capita spending of tourists from China was set at only 15% below that of tourists from Japan. This was a welcome trend, as China's pleasure tourists are thought to be the highest potential source market for the long-term development of Hong Kong's tourism industry.

In contrast to the sharp growth of tourists arriving in Hong Kong from China, the tourist flow from Japan was sluggish from 1992 to 1994. This trend reflected an overall decrease in outbound tourists from Japan, worldwide. Later, the archipelago continued to contribute an increasing number of visitors to Hong Kong, from 1,429,848 visitors in 1994 to 1,671,313 in 1995, as shown in Table 3.6. At this time, the Japanese market began to recover from a series of natural disasters. A policy of easy-to-obtain credit was put into place, and the Japanese yen remained strong enough to stimulate purchasing power. The desire of the Japanese to travel overseas was also boosted by the strong short-term appreciation of the Japanese yen against the US dollar, which reached a historical high of US$1 to JPY80 in late 1995. This appreciation may have been caused by Japan's huge trade surplus with the United States. Hence, an obvious increase in the numbers of visitors to Hong Kong from Japan was registered.

Arrivals in Hong Kong from the United States' market remained sluggish during this period, while the United Kingdom registered a 10% increase in arrivals in the then-territory, from 360,545 people in 1995 to 397,153 people in 1996.

3.5.4 Hong Kong Handover, 1997

Apart from economic fundamentals, the outstanding growth of tourist arrivals in 1996 was also affected by the impending handover of Hong Kong from Britain to China. During this period, many Japanese were motivated to travel to Hong Kong prior to the handover date on 1st July 1997. In many cases, travel was prompted by the mere misconception that the ease of travelling to Hong Kong would change after 1997. As a result, in 1996, the Japanese regained their position as Hong Kong's top tourist spenders, with more than 2 million visitors spending a total of US$2.37 billion, an increase of 31.1% from 1995. Per capita spending, however, decreased by 6.9% to HK$7,764 per tourist. The overall decrease in per capita spending appeared to be a reflection of Japan's subdued domestic economy, as well as the changing characteristics of the tourists themselves: in 1996, there was an increasing dominance of young Japanese female travellers recorded in the tourist portfolio. Such tourists possessed less disposable income and stayed for a reduced length of time.

The 1997 handover event was the major factor to contribute to the increased numbers of arrivals and expenditures from all regions, including South and Southeast Asia, the United States, Australia and Western Europe. Their reasons for arriving in the months leading up to the handover could be attributed to different psychological causes. It is more than likely that tourists originating in Europe, the United Kingdom and China, in particular, wanted to see the then British crown colony for historical reasons. Conversely, travellers from regions like Northeast Asia came to Hong Kong as a result of special promotional campaigns in their areas that encouraged them to visit.

3.6 Downturn of Tourism Demand in late 1990s

In the wake of the devaluation of the currencies of major rival countries to Hong Kong's tourism within the region, Hong Kong tourism suffered a serious downturn over the period from 1997 to 1999. This massive devaluation of other Asian currencies happened as a direct result of the Asian financial crisis that took place in the middle of 1997.

3.6.1 Background of Asian Financial Crisis

Prior to the Asian financial crisis, the government of Thailand maintained a pegged exchange rate against the US dollar. In addition, during the period between the mid-1980s and 1995, Thailand experienced strong economic growth. In the mid-1990s, however, the Thai economy began to slow down, and its balance of payment deficit widened. After a series of speculative attacks against the Thai Baht in the middle of 1997, the Thai government abandoned the pegged exchange rate system, which caused the value of the Baht to immediately collapse. This effect quickly spread to other currencies within the Asian Pacific region. The spillover was, in part, the result of an attempt by other nations in the region to maintain their competitiveness against the Baht, and in part caused by speculators, who realised that other economies within the region – (Indonesia and Korea, in particular) had similar problems to those of Thailand. These problems involved weak financial markets and heavily indebted corporate sectors. As currencies came under pressure from international speculators, those countries that had borrowed heavily in terms of foreign currencies began to realise their foreign debt service cost rise. With such large foreign debts, they sought to find ways of reducing payments on their external liabilities. These actions, however, put further pressure on their currencies, which intensified the speculative wave and plunged the region's economies into still deeper financial chaos.

3.6.2 Impact of Asian Financial Crisis on Tourism Demand

Due to the Asian financial crisis, most Asian countries underwent a process of depreciation of their currencies to restore international price competitiveness. The regional competitiveness of Hong Kong's tourist services was eroded as a direct result of its option to maintain a linked exchange rate with the US dollar (U.S$1 to HK$7.8).

In the course of the Asian financial crisis, as shown in Table 3.8, the number of visitors in 1997 declined to 11,273,377, a decrease of 13.11% from 1996. This was because tourists chose to travel to substitute destinations in the region, where the prices of tourism products had declined relatively to those of Hong Kong. Although most Asian countries were in the process of recovering, the number of visitor arrivals in Hong Kong continued to decline. In 1998, the total number of visitors to the SAR was 10,159,646, 9.88% less than in 1997 and 21.69% less than in 1996.

3.6.3 Changing Trend of Tourist Flows from Japan and China in Late 1990s

Over the period between 1996 and 1998, there was a significant change to the distribution of visitor arrivals in Hong Kong. While tourist arrivals from Taiwan and China were not affected by the Asian financial crisis, visitors from Japan were on the decline. This change was rapid and remarkable during the post-1997 period, and could be attributable to the massive depreciation of various regional currencies of Hong Kong's major tourism rivals. In 1996, of the total 12,973,764 visitors to Hong Kong, 2,015,121 came from Japan. After 1996, however, visitors from Japan dropped dramatically to 938,196 in 1998. The number of Japanese visitors dropped over that short time from 2,025,121 in 1996 to 938,196 in 1998, a disappointing decline of 53.5%, as shown in Table 3.8.

There were speculative explanations for such a drastic fall in tourist arrivals from Japan. First, the Japanese were extremely concerned about the burst of their asset bubble. In addition, an increase in sales tax in April 1997 put the Japanese economy into a deep recession. At the same time, the yen continued to depreciate, and major domestic businesses were running into difficulties, year after year. Also, the Asian financial crisis in the summer of 1997 resulted in financial difficulties in Japan's banks and securities firms. These factors seriously affected both pleasure and business travellers from Japan.

Conversely, the number of arrivals from China was not affected by the Asian financial crisis. In 1996, the number of visitors arriving from Japan was 2,015,121, 274,968 less than those coming from China. In 1998, however, 2,602,410 visitors came from China, 1,664,214 more than those arriving from Japan. This incredible increase can be attributable mainly to the continuing policy of opening up China's borders, and the relaxing of the Mainland's emigration policy. As China continued to open up, foreign investment and trade with foreign traders were strongly encouraged, resulting in an expansion of the Chinese economy. As a result, meetings, conferences and exhibitions were held in the HKSAR, which led to the increase of the business visitors. In 1998, business visitors accounted for 21% of the total number of visitors arriving from China. This increase indicated a long-term potential for the Chinese market.

Table 3.8 Breakdown and Growth Rate of Visitor Arrivals in Hong Kong – Major Origin Countries (1996-1998)

Country	1996	1997	1998	Change (1996-1998) (%)
China	2,237,452	2,212,977	2,602,410	16.3%
Taiwan	1,820,335	1,883,514	1,794,771	-1.40%
Japan	2,015,121	1,305,485	938,196	-53.44%
U.K.	397,153	340,263	325,738	-18.00%
U.S.A	794,018	762,782	749,945	-5.55%
Germany	284,940	229,949	173,232	-39.20%
South East Asia	1,823,450	1,626,917	1,274,348	-30.11%
Total	12,973,764	11,273,377	10,159,646	-21.70%

Sources Statistical Review of Tourism, Various Issues, HKTA.

As shown in Table 3.8, the second largest source of tourists in 1998 was Taiwan. Approximately 1,794,771 visitors arrived from that country, which was about 17.5% of Hong Kong's total visitors. The other major source markets were Japan, the United States, the United Kingdom and Germany.

3.6.4 Recovery from Asian Financial Crisis

Although the Hong Kong tourist industry was one of the hardest-hit sectors of its economy in the course of the Asian financial crisis, Hong Kong's tourism recovered quickly. The total visitor arrivals in 1999 were 11,328,272, up about 11.15% over those of 1998. Table 3.9 shows the trend of visitor arrivals over the period from 1999 to 2001.

Table 3.9 Breakdown and Growth Rate of Visitor Arrivals – Major Origin Countries (1999-2001)

Origin Country	1999	2000	2001	Change (1999-2001) (%)	Average growth (1999-2001) (%)
China	3,080,649	3,766,356	4,425,108	+43.64%	+19.88%
Taiwan	1,979,411	2,356,528	2,409,637	+19.05%	+10.65%
Japan	1,012,323	1,354,801	1,425,892	+12.38%	+19.54%
U.S.A.	780,021	937,552	905,063	+9.71%	+8.37%
U. K.	333,973	367,938	360,581	+7.97%	+4.08%
Germany	197,213	197,213	177,370	-10.06%	-5.00%
Total	11,328,272	13,059,477	13,725,332	+21.16%	+10.18%

Sources A Statistical Review of Tourism, Various Issues, HKTB.

Visitor arrivals in Hong Kong continued to increase over the period from 1999 to 2001. According to the statistics provided in Table 3.9, the total number of visitor arrivals in the SAR in 2001 was 13,725,332, 21.16% over 1999. This increase was mainly related to Hong Kong tourism's improved price competitiveness through a process of domestic price adjustments, with the price of group tours, flights, hotels and shopping dropping in the aftermath of the Asian financial crisis.

As mentioned, tourists originating in China were not affected by the financial crisis, but continued to increase dramatically during the 1999 to 2001 period. Visitor arrivals from the mainland amounted to nearly 4.5 million in 2001, an increase of 43.6% over those of 1999. Additionally, China was the only country unscathed by the Asian economic crisis, with its economic growth maintaining at around 8.5% per annum over the past few years.

Regardless of this increase, we cannot deny that the "Basic Law" (The Law of Hong Kong) had remarkable effect on the increase of visitors from China. Some Chinese from the Mainland misunderstood Article 24 of the Basic Law, which they believed would allow them to remain in Hong Kong if their families were permanent residents. Many thought that travelling as tourists to Hong Kong might help them to be prepared for a future in Hong Kong.

Visitor arrivals from Taiwan, Hong Kong's second largest source market, recovered strongly over the 1999 to 2001 period. In 2001,Taiwanese visitors accounted for about 17.64% of the total number of visitor arrivals in Hong Kong.

Although the tourist arrivals from the Japanese market experienced a serious decline between 1996 and 1998, the trend of the visitor arrivals from Japan recovered slightly during the 1999 to 2001 period. About 1,425,892 Japanese visitors arrived in Hong Kong in 2001, about 10% of total visitor arrivals, which made it the SAR's third largest source market.

Visitors from the United States dropped by 3.5%, from 937,552 arrivals in 2000 to 905,063 in 2001, as a direct result of the terrorist attacks that occurred on 11th September in New York (shown in Table 3.10.). This serious drop in numbers, which occurred in the last quarter of 2001, put American tourists at about 6.6% of the total visitor arrivals in Hong Kong in 2001, which left it as the SAR's fourth largest source market.

3.6.5 Impact of Terrorist Attacks in New York on Tourism Demand

Visitor arrivals from the United States were on the increase during the period from 1998 to 2000. The number of inbound tourist flows from the United States suddenly reversed from this trend as a direct result of the terrorist attacks on 11th September in New York and Washington, D.C. In examining the quarterly data of visitor arrivals in 2001, as shown in Table 3.10, the number of tourists from the United States decreased from 348,754 in the fourth quarter of 2000 (October to December) to 286,946 in the fourth quarter of 2001, a decrease of 17.73%. This indicated that the "9/11 incident" had a serious impact on tourist flows from the United States.

Likewise, visitor arrivals from the other major long-haul markets, the United Kingdom, Germany and Japan, also registered a decrease of 7.5%, 15% and 20%, respectively, in the fourth quarter of 2001, in comparison to the fourth quarter of 2000.

Tourist arrivals from the major short-haul markets, China, and Taiwan, were not seriously affected by this incident. In particular, tourists from China in the fourth quarter of 2001 registered an increase of 29% over the fourth quarter of 2000 to fourth quarter, 2001. This increase of China tourist flows is a strong indication that China has long-term potential as Hong Kong's largest source market for tourists at the turn of the century.

Table 3.10 Breakdown of Visitor Arrivals in Hong Kong for Major Origin Countries, (1999, 2000, 2001, and Fourth Quarters of 2000 and 2001).

Year	Month	U.S.A.	U.K.	Germany	China	Taiwan	Japan
2000		937,552	367,938	197,213	3,766,356	2,356,528	1,354,801
2001		905,063	360,561	177,370	4,425,108	2,409,637	1,425,892
2000	9	85,719	28,465	16,143	310,496	195,151	130,692
	10	124,196	38,816	23,998	315,346	216,834	112,169
	11	119,098	39,203	21,456	303,615	188,061	126,647
	12	105,460	31,107	13,063	353,846	204,436	126,928
2001	9	71,747	27,213	14,255	346,204	177,978	116,839
	10	94,265	35,944	20,150	395,444	197,319	84,127
	11	97,661	35,244	17,487	403,808	184,676	95,492
	12	95,020	29,770	11,927	456,108	199,121	112,645

Sources Statistical Review of Tourism, Various Issues, HKTB.

3.7 Outlook of Tourism Demand – Long Term Potential of China Market

The future performance of the China market can be considered a most critical success factor for Hong Kong's tourism over the next few decades. In this section, we attempt to analyse the economic benefits provided by the China market.

With the Chinese mainland on one side, and Southeast Asia on the other, Hong Kong is situated at the centre of the Asia-Pacific region, and can act as a hub for international communications between the two regions. Specifically, Hong Kong is the main gateway to Mainland China. As China has opened its doors to the rest of the world, an increasing number of international tourists travel there for pleasure and business. In addition, China's doors have opened outward, which has allowed the increasingly affluent Chinese citizens to visit the rest of the world. This has caused Hong Kong to have increasing tourism receipts from Chinese tourists over the 1998 - 2001 period, as shown in Table 3.11.

The optimistic outlook for China as a source market for tourists is also related to the increasing dominance of business tourists from the mainland. Over the past decade, Chinese business investment was a major source of direct foreign investment in Hong Kong's economy. According to statistics, in 1999 approximately 3,000 mainland enterprises were registered in Hong Kong, a gross asset value that approached US$300 billion. With China's recent accession to the World Trade Organisation, the Chinese economy is expected to open even further, which would cause the Mainland and her trading partners to send more and more business tourists to Hong Kong in the coming years. As well, Hong Kong's Disneyland Theme Park project is predicted to attract more pleasure tourists from the mainland over the next decades.

As shown in Table 3.12, the average spending by Chinese tourists is currently close to the highest of all source markets, when compared with other major tourist's origin countries. Statistics indicate that China has been Hong Kong's largest market in terms of total tourist arrivals and receipts since 1997. Recently, the WTO has forecast that by the year 2020, 100 million Chinese would travel overseas per annum. This would cause China to become the world's fourth largest source of outbound tourists, behind Germany, Japan and the United States. Taking Hong Kong's proximity to China into account, its tourism industry could benefit greatly from China's upgraded status.

Table 3.11 Breakdown of Tourism Receipts from Visitors – Total Spending (US$ Millions)

	1997	1998	1999	2000	2001
China	2,056	1,879	1,796	2,345	2,948
Taiwan	1,741	1,432	1,448	1,467	1,372
Japan	1,401	777	861	840	707
U.S.A.	779	646	590	624	628
U.K.	305	242	192	203	212
Germany	237	128	109	95	89
Total	9979	7496	7210	7886	8241

Sources Statistical Review of Tourism, Various Issues, HKTB.

Table 3.12 Breakdown of Tourism Receipts from Visitors – Per Capita Spending (US$)

	China	Taiwan	Japan	U.S.A.	U.K.	Germany	Average
1998	704	759	706	780	684	681	711
1999	560	702	734	687	575	575	613
2000	619	614	607	646	552	490	582
2001	663	567	529	670	585	515	581

Sources Statistical Review of Tourism, Various Issues, HKTB.

Table 3.13 Breakdown of Tourism Receipts from Visitors – Per Diem (US$)

	China	Taiwan	Japan	U.S.A.	U.K.	Germany	Average
1988	181	284	247	238	166	186	210
1999	144	269	265	217	133	154	182
2000	186	265	251	198	139	144	194
2001	192	245	228	206	129	145	189

Sources Statistical Review of Tourism, Various Issues, HKTB.

3.8 Outlook of Tourism Demand – Disney Theme Park Project

Famous cities like London and Paris have long histories of cultural development, which provide pleasure tourists with a wide variety of interesting attractions (e.g. palaces and museums) for sightseeing purposes. These attractions make those cities inherently attractive to visitors. Hong Kong currently has less to offer in this regard. The scarcity of attractions, aside from eating establishments and shopping facilities, has caused concern among many within the tourist industry. To address this shortcoming, the launch of a new Disneyland Theme Park is considered by some to be a prospective tourism project that will contribute to the future success of Hong Kong's tourism industry.

In early 1999, Shanghai and Hong Kong had both signed agreements of intent with Disney to develop theme parks. Ultimately, the Walt Disney Company and the Hong Kong government reached a final agreement that a new Disney Theme Park will be built in HK.

3.8.1 Background of Walt Disney Theme Park Project

The Walt Disney Company, an American enterprise and the proud parent of Donald Duck and Mickey Mouse, is the world's leading operator of theme parks. In 1955, the Walt Disney Company opened its first theme park in California. Since then, three additional Disneyland theme parks have been opened in Florida, Paris and Tokyo. In 1983, the Company extended its business beyond the borders of the United States by building the first overseas Disneyland in Japan, also Asia's first Disney theme park. Upon the success of Tokyo Disneyland, another Disneyland was developed in Paris, a first for Europe. Hong Kong Disneyland will be the fifth to open in the world, with completion date set for 2006.

In the course of the Asia financial crisis, the Hong Kong economy suffered from a significant economic downturn. To boost the domestic economy, the SAR seriously needed a large amount of foreign direct investment. The Walt Disney Company, realising Hong Kong's weakness, demanded what could be considered harsh terms to secure a better deal for itself. The company asked the Hong Kong government for the following terms:

1. that Hong Kong government provides 170 hectares of land free of charge for building the park
2. that the Hong Kong government be responsible to reclaim and fill the required land.
3. that Hong Kong government be responsible for providing the required transportation systems to and from the park, and the sewage disposal system for the park.

4. that the Hong Kong government takes responsibility for providing a beautiful, scenic location and good air quality.
5. that the Walt Disney Company will receive 70% of the entry fee income and 30% of the revenues from the sales of theme-related souvenirs.
6. that the Hong Kong government be responsible for the management of the park.
7. that the Walt Disney Company holds 50% stocks of the park.

3.8.2 Economic Benefits of Disney Theme Park

Hong Kong has to bear a significant cost to launch the new Disneyland theme park, but such an endeavour has equally as great potential value in both the short- and long-term. First, the Theme Park is expected to stimulate inbound tourist flows to Hong Kong. An increase of inbound tourist flows could create increased opportunities for employment, contribute more output to the national income, and generate more in foreign exchange revenues. In particular, the new theme park could potentially attract more tourists to Hong Kong from China, a country having more than 13 billion people. And, as mentioned already, although tourism demand in Hong Kong was low during the course of the Asia financial crisis, visitor arrivals from China have continued to increase. According to visitor arrivals statistics, tourists arriving from China have increased from 2.23 million in 1996 to 4.4 million in 2001. This latter figure is four times larger than that of visitors arriving from the United States. As Chinese tourists often experience difficulties in obtaining visas for those countries that currently have Disney Theme Parks, their chances of visiting such a theme park are currently low. A Disneyland theme park in Hong Kong is thus a good potential travelling incentive for tourists from the mainland.

In addition to tourists from China, the Hong Kong Disney Theme Park has the potential to attract a large number of tourists from Taiwan and other parts of Southeast Asia because of its proximate location. Such tourists can arrive at Hong Kong's Disneyland from their home countries within three hours.

Hong Kong could also promote its Disneyland to tourists from India. Approximately 3.5 million middle-class Indian citizens travel the world yearly, and the number of visitor arrivals in Hong Kong from India has been rising in recent years. In 2001, 161,752 Indian tourists arrived in Hong Kong, an increase of 23.1% over the previous year, and an increase of 52.47% over the 1996 to 2001 period. Although tourists from India are not currently a focus for the Hong Kong tourist industry, the country is a potential market for the future, as the purchasing power of Indian tourists has been on an increasing trend. And, as currently no

Disneyland exists in the South Asia region, a Disney theme park in Hong Kong is a potential attraction.

Russia is another new market for Hong Kong. Normally, about 800,000 Russian tourists travel the world yearly, but only a few thousand select Hong Kong as a destination. With new attractions such as a Disney theme park in place, it is likely that more and more Russian tourists will choose to travel to Hong Kong.

Many investors in Hong Kong's tourist industry believed that this theme park is an excellent opportunity for the SAR because Disney has the potential to attract many mainland tourists, who choose Hong Kong as their vacation destination. To the Hong Kong economy, the Disneyland project is seen as an effective and efficient way to improve the overall competitiveness of the Hong Kong tourism, and as a remedy for the ruin that the Asian financial crisis left in Hong Kong over the period from 1998 to 2001.

3.9 Survey of Visitor Characteristics in Hong Kong

3.9.1 Lengths of Stay

In the early 1990s, visitors came to Hong Kong for short visits only. Table 3.14 shows the average length of time spent by tourists in various destinations across the EAP region. According to these figures, the average length of stay in Hong Kong in 1997 was 3.6 days and, in 1998, 3.4 days. Visitor stays in Hong Kong are among the shortest time spans in the region, in comparison with other competing destinations.

As shown in Table 3.14, in 1997 and 1998, tourists to Singapore and Hong Kong stayed for an average time spans of less than 5 days. Overall, the duration of visits to all destinations across the region appear to be on the decrease, as most travellers are intra-regional, and on short-break tours and/or from countries of origin such as Taiwan, South Korea and Japan, where the length of paid holidays is quite short.

Table 3.15 shows the average time span of visitors staying in Hong Kong during the 1990s by country of origin. In the early to mid-1990s (1992-1996), those who, on average, remained in Hong Kong the longest were from China, followed by those from Australia and New Zealand and Western Europe. In 1995, for example, visitors from China spent an average of 5.9 days in the then-colony. A majority of tourists from China have relatives in Hong Kong, and large numbers were on organised tours with itineraries that lasted from one to one-and-a-half weeks. Since 1995, however, visitors from China have stayed in Hong Kong for fewer and fewer days. In 2000, Chinese from the mainland remained in Hong Kong for an average of only 2.7 days, a 2-day drop from time spent in 1995. On the whole, however, tourists from Taiwan and Japan stay in Hong Kong for the shortest period of time – less than 3 days, on an average taken from the decade of the 1990s.

Table 3.14 Average Length of Stay in East Asia and Pacific Region, by Origin Country/Region (1997, 1998) (days)

	1997	1998
Australia	24.0	24.0
Philippines	9.1	9.5
Taiwan	7.4	7.7
Thailand	8.3	8.4
South Korea	5.5	4.9
Malaysia	5.3	5.5
Hong Kong	3.6	3.4
Singapore	3.3	3.4

Sample survey method: Hong Kong, Indonesia, Philippines and South Korea.
Arrival/departure method: Malaysia, Singapore, Taiwan, and Thailand
Source: Extracted from PATA, 1998.

Table 3.15 Average Length of Stay of Inbound Visitors in Hong Kong, by Origin Country/ Region (1992-2000) (days)

	1992	1993	1994	1995	1996	1997	1998	1999	2000
Southeast Asia	3.69	3.68	3.63	3.4	3.35	3.3	3.3	3	2.7
Taiwan	2.66	2.72	2.84	2.92	2.67	2.5	2.6	2.4	2.3
Japan and Korea	2.91	2.9	2.95	2.98	2.89	2.8	2.8	2.6	2.3
U.S.A. and Canada	3.6	3.8	3.52	3.45	3.68	3.7	3.8	3.2	3.2
Western Europe	4.02	3.95	3.74	3.82	4.13	4	3.8	3.5	3.4
Australia and New Zealand	4.85	4.52	4.37	3.98	3.97	3.5	3.2	4.2	3.8
China	-	5.71	6.1	5.9	5.5	5	3.9	3	2.7
Others	-	3.9	3.9	3.9	3.7	3.4	3.6	3.6	3.5

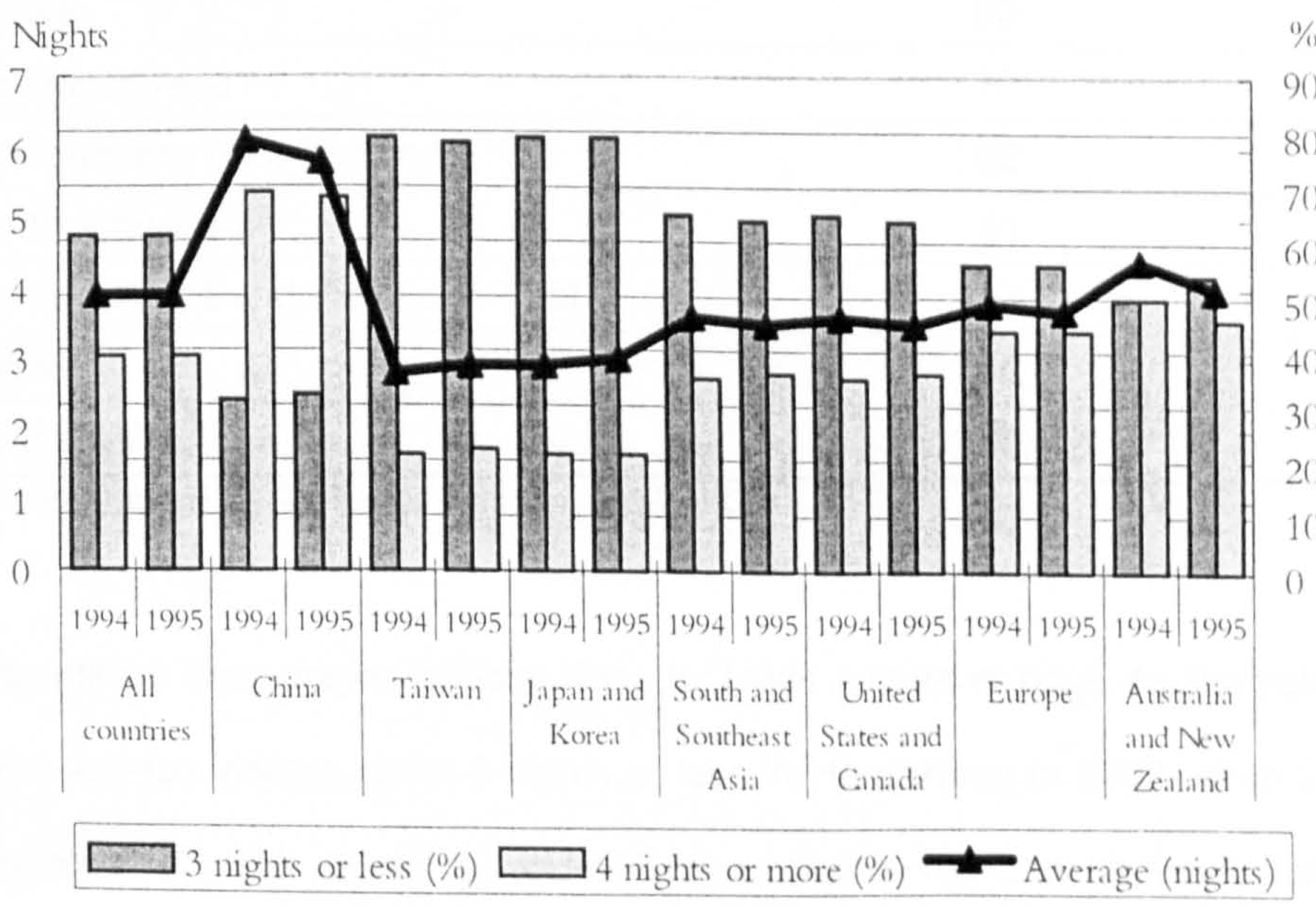
Source: Statistical Review of Tourism, Various Issues, 1990-2001, HKTB.

Table 3.16 Breakdown of Length of Stay by Origin Country or Region (1994-1995)

		3 nights or less (%)	4 nights or more (%)	Average (nights) Length of stay
All countries	1994	61	39	3.9
	1995	61	39	3.9
Growth		0	0	0
China	1994	31	69	6.1
	1995	32	68	5.8
Taiwan	1994	78	22	2.8
	1995	79	21	2.7
Japan and Korea	1994	78	22	2.9
	1995	79	21	2.8
South and Southeast Asia	1994	65	35	3.6
	1995	64	36	3.5
United States and Canada	1994	65	35	3.6
	1995	64	36	3.5
Europe	1994	56	44	3.8
	1995	56	44	3.7
Australia and New Zealand	1994	50	50	4.4
	1995	54	46	4

Source: Visitor Profile Report, HKTA.

Figure 3.3 Breakdown of Length of Stay by Origin Country or Region (1994-1995)



Source: Visitor Profile Report, HKTA.

The statistics from the breakdown of the length of tourist stays, as shown in Table 3.16 and Figure 3.3, indicate that in 1994 about 78% of Japanese and Korean and Taiwanese visitors spent less than 3 days in Hong Kong. On average, Japanese and Korean visitors spent 2.9 days in the then-territory, while Taiwanese visitors, on average, spent even less time at 2.8 days. As well, the time-length trend of Taiwanese and Japanese visitors has deteriorated in the past few years. In 1995, Japanese and Korean visitors and Taiwanese stayed fewer days in Hong Kong than in previous years, an average of 2.8 days and 2.7 days, respectively. The declining length of stay of Taiwanese tourists may be explained by the fact that many visit Hong Kong repeatedly.

3.9.2 Repeat Visitors and Length of Stay

As shown in Table 3.17, for all markets combined, 60% of 1999 arrivals were repeat visitors. The major sources of such tourists were the short-haul markets of Asia, with Taiwan supplying the highest proportion, 80% of total arrivals. The next highest source market for repeat visitors was the region of Southeast Asia, at 70%. Tourists from North American and European markets showed relatively low repeat-visitor rates of 51% and 47% of all arrivals from these regions, respectively.

Table 3.17 Percentage of Repeat Visitors from Major Source Markets, by Origin Country/ Region (1999)

Market	1999 (%)
Japan and South Korea	50
Taiwan	80
Southeast Asia	70
Australia and New Zealand	62
North America	51
Europe, Africa and the Middle East	47
China	49
All markets	60

Source: Statistical Review of Tourism, 2000, HKTA.

Since 1995, visitors have stayed in Hong Kong for fewer and fewer days. As illustrated in Table 3.18, 76% of the total overseas visitors spent 3 nights or less in Hong Kong in 2000, while 24% spent 4 nights or more, compared with 61% (3 nights) and 39% (4 nights) in 1994, as shown in Table 3.16. In 2000, the average length of visitor stays declined to 3.0 nights, down from 3.9 nights in 1994, as shown in Table

3.18. Chinese visitors have continued to sustain the higher lengths of visits, with 31% staying for 4 nights or more. In contrast, Japanese and Taiwanese visitors tended to stay for the shortest periods of time. In 2000, Japanese and Korean visitors spent an average of 2.4 nights in Hong Kong, down from 2.9 nights in 1994. Taiwanese visitors spent an average of 2.3 nights, down from 2.8 nights in 1994.

Compared with the short-haul markets, visitors arriving from long-haul markets have continued to stay for longer periods of time, with North Americans staying for an average of 3.4 nights, and African and Europeans an average of 3.8 nights. Although a number of reasons may exist to explain the diminishing duration of visits in Hong Kong, it is generally believed that a scarcity of new attractions, an increase in the presence of short-haul visitors and repeated visitors, strong competition from other Asian destinations, and the relative decrease in travel costs are the key reasons for this trend.

Table 3.18 Length of Stay by Major Source Markets by Origin Country or Region, (1998, and 2000).

		3 nights or less (%)	4 nights or more (%)	Average (nights) Length of stay
All countries	1998	65	35	3.6
	2000	76	24	3
Growth (%)		16.9	-31.4	-16.7
China	1998	61	39	3.9
	2000	69	31	2.7
Taiwan	1998	85	15	2.7
	2000	88	12	2.3
Japan and Korea	1998	85	15	2.9
	2000	89	11	2.4
South and Southeast Asia	1998	68	32	3.5
	2000	74	26	3.1
United States and Canada	1998	67	33	3.4
	2000	70	30	3.4
Africa and Europe	1998	61	39	3.8
	2000	65	35	3.8
Australia and New Zealand	1998	67	33	3.2
	2000	63	37	3.5

Source: Visitor profile report, 1997-1998, 2001, HKTA.

3.9.3 Purposes of Visit

Since Hong Kong is not regarded as an international resort destination, visitors generally do not travel to Hong Kong for pleasure alone. Many come for business, while others come to visit friends and relatives. Still others stop in Hong Kong on their way to other countries. Regardless, vacation still appears to be the main purpose of visitors to Hong Kong from both short-haul and long-haul markets.

As shown in Table 3.19, in 2000, 55% of visitor arrivals from all countries combined came to Hong Kong for pleasure. In 2000, 68% of Japanese and Korean visitors came to Hong Kong for pleasure, whereas only 45% of the arrivals from America came for this reason.

Table 3.19 Purpose of Visit by Major Source Markets by Origin Country and Region (1999-2000) (%)

		Vacation	Visiting friends and relatives	Business	En-route	Others
All countries	1998	49	9	32	8	1
	2000	55	8	30	6	1
China	1998	53	14	20	12	1
	2000	61	10	20	8	1
Taiwan	1998	43	9	41	5	2
	2000	52	5	36	4	1
Japan and Korea	1998	63	5	31	1	1
	2000	68	3	26	2	1
South and Southeast Asia	1998	46	9	40	4	2
	2000	51	9	36	4	1
The United States and Canada	1998	45	6	35	11	2
	2000	45	6	40	8	1
Africa and Europe	1998	45	8	40	7	1
	2000	48	7	39	7	1
Australia and New Zealand	1998	35	10	29	23	2
	2000	48	9	32	10	1

Source: Visitor Profile Report, 1999-2001, HKTA.

On the whole, however, as of 2000, the proportion of pleasure tourists began to increase at a significant rate. In part, this reflects the increase of intra-regional travel by Asians as a result of the recovery from the Asian financial crisis. For all countries combined, 55% of the visitors came to Hong Kong for pleasure in 2000, a 13% increase compared to figures taken from the same period in 1998, where more than 49% of visitors arriving in Hong Kong were travelling for pleasure.

Unlike the increase of pleasure visitors, however, the arrival rate of business travellers remains quite stable. Of all visitors arriving in Hong Kong in 2000, 30% came for business. During the course of the Asian financial crisis, the proportion of business travellers arriving in Hong Kong rose to 32% in 1998, which was an increase of 22% over 1997. This change demonstrates that business continued to account for a significant proportion of visitor arrivals, even at a time when there was a severe drop in pleasure tourists.

North Americans accounted for the highest percentage of business travellers arriving in Hong Kong, 40% in 2000. At the same time, more than 36% of Taiwanese visitors arrived specifically for business purposes. The figures indicate that people of North American, Taiwan, Europe and Africa continue to consider Hong Kong as a regional business hub and a gateway to China. In 2000, more than one-third of all visitors from these markets came mainly for business purposes. From China, approximately one-fifth of the tourists arriving in Hong Kong came for business purposes, which translates into almost 800,000 visitor arrivals. This indicated that China supplied the largest absolute numbers of business tourists. The surge in absolute numbers is, to a high degree, a reflection of the increasing dominance of triangular trade within the greater China region of the mainland, Taiwan and Hong Kong. As well, the increasing quantity of business travellers from the United States reflects a rise in the presence of American business people who have direct international investments in China, indicating that Hong Kong plays a unique role as middleman for trade between China and the United States.

In 2000, 6% of all inbound visitors considered Hong Kong as a stopover point for onward travel. The most significant markets in this regard were tourists who arrived from Australia, New Zealand, the United States, Canada and Mainland China. In 2000, 10% of visitors from Australia and New Zealand and 8% of visitors from the United States and China stayed in Hong Kong briefly, before going to other countries or returning to their countries of origin. Australians and New Zealanders often think of Hong Kong as a stopover point, because there are few non-stop flights that originate in these countries and go to Europe and North America. Mainland Chinese travellers also view Hong Kong as a stopover point on their way to North America and Europe, because few direct flights exist between China and the United States or Europe.

Of special interest is the quantity of Taiwanese visitors who, en-route to China, visit Hong Kong. This is because direct flights between Taiwan and China might be inaugurated in the near future. Surprisingly, only 4% of Taiwanese travellers were categorised as such in 2000. Most of these visitors are believed to have been travelling through Hong Kong to or from China. The 4% rate indicates that the impact on Hong Kong tourism of direct air links between China and Taiwan will be minor.

3.9.4 Visitor Spending Patterns in Hong Kong

Visitor spending in Hong Kong dropped to third out of all of the countries in the EAP region in 1999, as a result of the Asian financial crisis. As shown in Table 3.20, Hong Kong received US$7210 million from visitors that year, with an average per capita spending of US$636. China ranked first in the region, receiving a total of US$14098 million, while Australia, Korea and Thailand ranked second, fourth and fifth, respectively. Visitor spending plays an important role in driving the economic growth of an area, so it might be interesting to explore in greater depth the question of where tourists choose to spend their money. An investigation of the breakdown of visitor spending is, in fact, essential to identify Hong Kong's underlying strengths as an international tourism centre. That visitor spending has dropped significantly since 1996 is also important, and can be attributed, in part, to the impact of the Asian financial crisis and the post-1997 syndrome.

Table 3.20 Top 10 Tourism Earners – East Asia and Pacific Region (1999)

Rank	Destination	1999 Revenues (US$ millions)	Revenues per tourist (US$)
1	China	14098	521
2	Australia	8017	1797
3	Hong Kong	7210	636
4	Korea	6802	1459
5	Thailand	6695	774
6	Singapore	5974	955
7	Indonesia	4710	1002
8	Taiwan	3571	1481
9	Japan	3428	773
10	Malaysia	2822	355

Source: Compiled from Tourism Market Trends, EAP region, 2000, WTO.

Table 3.21 and Figure 3.4 shows the total visitor spending in Hong Kong by major source markets from 1987 to 2000, while Table 3.22 shows the breakdown of visitor spending pattern from 1991 to 2000. As indicated in Table 3.21, the major source markets of Hong Kong tourism receipts in 2000 are China, Taiwan, Japan and Southeast Asia. Despite this, North America and Western Europe supplied more than

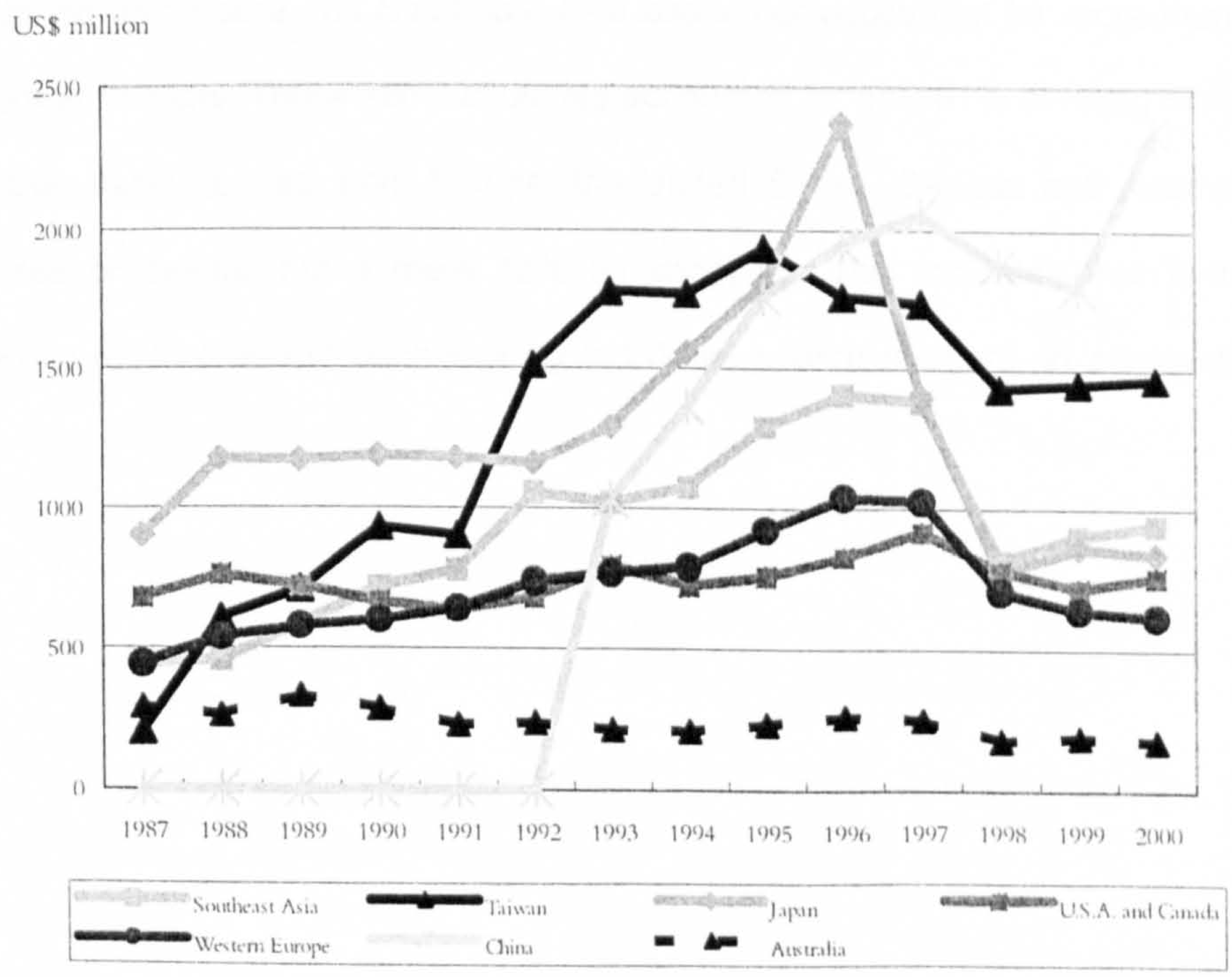
15% of the year's total visitor spending in Hong Kong.

Table 3.21 Receipts from Visitors by Country/Region (1987-2000) (US$ millions)

	Southeast Asia	Taiwan	Japan	U.S.A. and Canada	Western Europe	China	Australia
1987	444.1	203.1	900.5	680.8	443.1	-	289.9
1988	457.1	610.9	1172.9	761.0	539.4	-	260.3
1989	586.9	712.6	1168.3	722.1	579.8	-	333.5
1990	718.5	931.2	1182.9	666.3	602.1	-	286.0
1991	778.9	901.7	1177.4	639.0	643.3	-	229.7
1992	1053.8	1514.1	1158.2	682.1	740.1	-	236.5
1993	1020.4	1783.2	1291.5	792.2	766.9	1026.1	213.6
1994	1072.9	1774.2	1559.6	724.4	790.8	1362.8	207.9
1995	1292.6	1938.5	1808.9	756.4	923.1	1762.8	232.4
1996	1408.3	1762.7	2371.9	826.9	1038.5	1949.9	261.7
1997	1384.1	1741.2	1401.5	916.0	1025.6	2055.6	250.1
1998	815	1432.1	771.2	777.6	705.1	1879.4	176.9
1999	903.9	1447.9	861.0	716.0	641.1	1796.4	188.6
2000	943.1	1465.5	839.5	758.3	617.9	2344.6	176.1

Source: Tourism Receipts, Various Issues, HKTA.

Figure 3.4 Receipts from Visitors by Country/Region (1987-2000) (US$ millions)



Source: Tourism Receipts, Various Issues, HKTA.

To better understand the spending behaviour of tourists in Hong Kong, we must take a closer look at the visitor expenditure breakdown. As shown in Table 3.22, 90% of all spending by visitors during the 1990s was on shopping, hotels, and meals outside hotels. More specifically, as shown in Table 3.23A, most Asian visitors spent around 50% of their money on shopping in 2000. Mainland Chinese visitors spent more than 65% but, conversely, only 30% of European, Australian and New Zealand tourist expenditures were on this activity.

The second largest expenditure for tourists in Hong Kong was on hotels, which accounted for around 15% (China) to 28% (Southeast Asia) of a short-haul tourist's total budget. Tourists from long-haul markets, on the other hand, spent the largest proportion of their money, 37% to 44%, on accommodation, compared to their 29% to 34% spent on shopping.

The proportion of money spent by long-haul tourists on hotel and meals outside hotels is higher than that of short-haul visitors, whose cash was concentrated mostly towards shopping. Hence, the statistics support the fact that the spending of long-haul and short-haul visitors appears to be markedly different. Each spends money on different activities and shops for different items. The figures in Table 3.23B of expenditure breakdowns across countries by item, for example, show that in 2000, tourists from China, Taiwan, Japan and Korea and Southeast Asia altogether accounted for more than 86% of Hong Kong's total shopping receipts. Those same countries accounted for only 61% of Hong Kong's total hotel receipts. On the other hand, tourists from Europe, the United States, Canada and Australia spent 38% of total expenditures on hotels, but a mere 13% on shopping. This indicates that further research must be completed to explore tourist behaviour by individual source markets, in conjunction with overall visitor demand.

Table 3.22 Tourism Receipts Breakdown – Visitor Spending Patterns for All Origin Countries Combined (1991-2000) (%)

	Shopping	Hotels	Meals Outside Hotels	Entertainment	Tours	Others
1991	52.4	27.8	10.7	2	2.4	4.7
1992	53.1	27.7	10.9	1.6	2.2	4.5
1993	50.8	27.4	12.7	2	2.7	4.4
1994	51.9	28.2	12.1	1.6	2.9	3.3
1995	50.8	29.4	11.2	2.1	2.9	3.4
1996	49.5	30.9	11.1	1.6	3.3	3.5
1997	49.2	30.4	11.9	1.5	2.9	4.1
1998	49	28	12.7	1.9	3.4	5.1
1999	50.7	24.8	14.2	1.8	3	5.5
2000	50.2	25.9	14.3	1.9	2.2	5.6

Source: Visitor Profile Report, Various Issues, HKTA and HKTB.

Table 3.23A Spending Breakdown of Tourist Receipts Across Items by Major Origin Country/ Region (2000) (%)

	Shopping	Hotels	Meals Outside Hotels	Tours and Entertainment	Others
Japan and Korea	47.1	26.2	14.3	7.2	5.1
Taiwan	56.6	20.2	13.4	3.7	3.6
Southeast and South Asia	46.8	27.6	15.2	3.6	6.8
Australia and New Zealand	28.1	44.0	16.9	3.3	7.7
The Americas	34.2	37.4	17.5	2.6	8.4
Europe, Africa and the Middle-east	29.0	41.8	18.0	3.7	7.5
China	65.1	15.6	11.9	3.7	3.6
All countries	50.2	25.9	14.3	4.1	5.6

Source: Visitor Profile Report, 2001, HKTB.

Table 3.23B Spending Breakdown Across Source Markets by Item (2000) (%)

	Shopping	Hotel	Meals Outside Hotels	Tours and Entertainment	Others
Japan and Korea	12.7	13.6	13.5	30.9	17.5
Taiwan	22.0	15.2	18.4	19.3	20.6
Southeast Asia	11.7	13.4	13.5	12.1	14.6
Australia and New Zealand	1.6	4.7	3.3	2.4	3.6
The Americas	6.1	19.3	13.0	8.8	12.4
Europe	5.4	15.1	11.9	9.3	12.0
China	40.5	18.7	26.2	30.9	19.2
Total	100%	100%	100%	100%	100%

Source: Visitor Profile Report, 2000, HKTA.

Table 3.24 shows the visitor expenditure breakdown across Asian destinations. As indicated in Table 3.24, amongst the major destinations in the region, including Indonesia, Malaysia and the Philippines, hotel, food and beverage expenses generally constitute 50% of the total tourist receipts of a visitor, excluding airfare. Both Hong Kong and Singapore have positioned themselves as shopping paradises and, as a result, expenditures on shopping within these two countries exceed 50% of the tourists' total expenditures. As a result, shopping appears to be the most important sector of tourism to each destination, whereas accommodation and other items are of less importance, relatively speaking.

Table 3.24 Visitor Expenditure Breakdown – Destinations in East Asia and Pacific Region, per capita (1995)

	Total Tourist Expenditures per Capita (US$)	Hotels (%)	Food and Beverages (%)	Shopping (%)	Sightseeing and Local Transportation (%)	Entertainment (%)	Other Expenses (%)
Hong Kong	960	29.4	11.5	50.8	2.9	2.1	3.4
Singapore	1,420	21.1	10.7	55.6	6.6	1.1	4.9
Indonesia	1,270	30.6	18.7	24.4	15.7	5.2	5.4
Thailand	1,190	21.2	14.5	37.6	12.6	9.3	4.8
Malaysia	570	32.0	18.0	21.0	12.0	6.0	11.0
Philippines	1,360	30.4	17.2	17.1	4.9	21.7	8.7

Source: Annual Statistical Report, 1997, PATA.

3.9.5 Seasonal Variations on Visitor Arrivals in Hong Kong

Visitor arrivals in Hong Kong fluctuate widely in accordance with the months and the dates of major holidays in its biggest source markets. Table 3.25A shows the average month-to-month fluctuations in visitor arrivals from 1980 to 1990, and from 1991 to 2000. We have divided these two decades into sub-periods to allow for an investigation of the changes in visitor arrivals as a result of the different seasons.

As shown in Table 3.25A, January and February were the least popular months for tourists visiting Hong Kong throughout the 1980s. This was particularly true at the time of the Chinese New Year, when many of Hong Kong's shops and restaurants are traditionally closed. The period between June and September was also, on average, a less popular period for visitor arrivals in the 1980s, at 2.5% below average. This can mainly be attributed to Hong Kong's hot and humid weather, and the typhoon season that occurs at this time of the year.

In contrast, October was Hong Kong's peak tourist month during the 1980s and 1990s, with 19% higher-than-average visitor arrivals recorded in the 1980s, and 10% higher in the 1990s. This increase can be attributed mainly to the pleasant weather that is common to the region during this month: warm, sunny and significantly drier than Hong Kong's humid and hot summer months.

The period from March to May is generally the second most popular season for visitors in Hong Kong. In the 1980s, 6% higher-than-average arrivals were recorded. Weather is again a major factor, because Hong Kong is relatively cool and dry between March and May. This period is also popular for conventions and exhibitions, a factor that contributes to the numbers of business visitors who arrive in Hong Kong.

Table 3.25A displays the average visitor arrivals in Hong Kong by month during the periods of 1980 to 1990 and 1991 to 2000, to allow a comparison with the seasonal nature of the international tourists coming to Hong Kong. The data indicate that, from 1980 to 1990, the ratio of visitor arrivals was at its lowest during the month of February when arrivals were 20% below average, and at its highest in October when visitor arrivals were 19% above average. During the 1990s, however, seasons appeared to affect tourists' decisions to travel to Hong Kong less. From 1991 to 2000, the range narrowed to 16% below average arrivals in February, and only 12% above average in December. In addition, the coefficient of variation of average visitor arrivals in Hong Kong by month dropped from 10.24% (1980-1990) to 7.72% (1991-2000), indicating the lower seasonal fluctuations in the 90's.

It appears that the lower seasonal fluctuations in the 1990's can be attributed to the Hong Kong policy that aims to develop potential new tourist markets and products. It has also been suggested that price discriminating measures during off-peak seasons, as originally introduced by the hotel sector to attract more tourists, became increasingly popular in the 1990s, as indicated in Table 3.25A Table 3.25B and Figure 3.5. This may have caused the decrease in fluctuations in Hong Kong's international arrivals market share.

The HKTB itself has worked towards promoting Hong Kong's attractions overseas. Its efforts to develop Hong Kong further as an international travel destination using a variety of campaigns may well be another contributing factor in the reduction of the impact that seasonal factors have on international visitor arrivals.

Table 3.25A Average Visitor Arrivals in Hong Kong by Month (1980-1990, 1991-2000)

	1980-1990 (Arrivals)	Above/Below Average (%)	1991-2000 (Arrivals)	Above/Below Average (%)
January	279,200	-14	789,578	-8
February	262,052	-20	719,742	-16
March	334,843	+3	849,669	+0
April	354,184	+9	884,075	+4
May	348,456	+7	838,678	-2
June	309,937	-5	801,774	-6
July	309,328	-5	865,970	+2
August	329,237	+1	889,378	+4
September	321,817	-1	816,874	-4
October	386,818	+19	936,652	+10
November	343,745	+5	884,101	+4
December	330,477	+1	959,845	+12
Monthly Average	325,841		853,028	

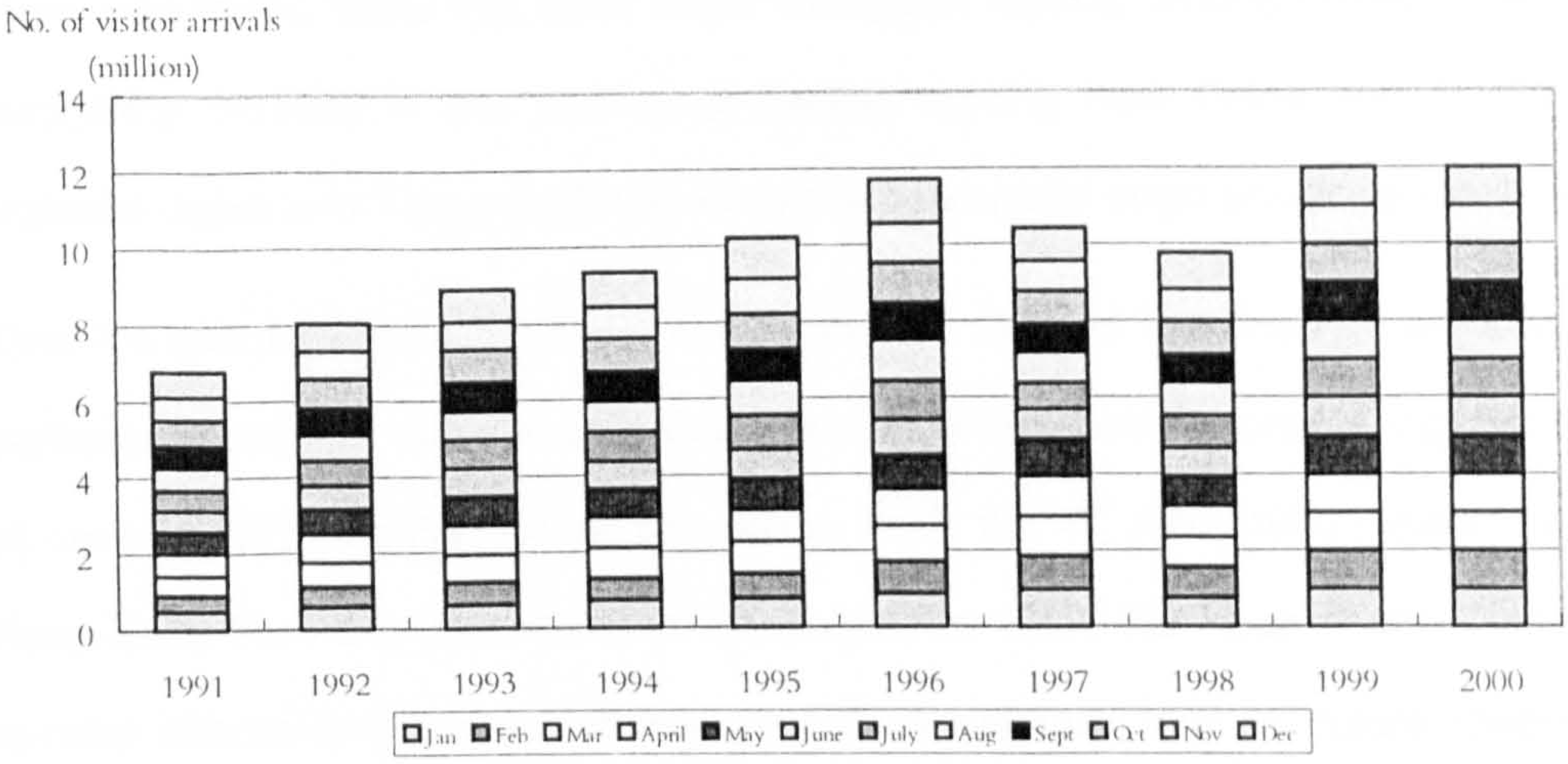
Source: Annual Report, Various Issues, 1980-2000, HKTA.

Table 3.25B: Visitor Arrivals in Hong Kong by Month (1991-2000)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Jan	497036	582712	608422	721187	750118	981590	1093506	791726	879036	990448
Feb	412629	532436	607807	587467	669292	933532	982445	710389	831989	929435
Mar	516229	630460	739156	806550	844509	1049784	1138066	811998	913709	1046623
April	593102	709343	777497	803921	834675	1037409	1139215	852943	948994	1143652
May	569389	652517	758905	744147	800794	997105	1063393	826026	905335	1069168
June	555317	630584	740437	733387	792665	1025267	861520	804646	866297	1007626
July	553854	653819	747477	763719	871125	1119709	709357	884441	966034	1095293
Aug	576151	667945	787239	801609	911094	1199747	868812	915807	1003602	1161777
Sept	579892	700625	742323	768137	819867	1045896	776479	781653	877979	1075893
Oct	674587	775857	855143	887779	935865	1184549	901664	899566	1057102	1194407
Nov	616769	716169	761265	812913	916468	1125876	844128	885378	1043529	1118517
Dec	659458	758057	811829	900340	1053532	1273300	894792	995073	1034666	1226398
Total	6795413	8010524	8937500	9331156	10199994	12973764	11273377	10159646	11328272	13059477

Source: Hong Kong Monthly Digest of Statistics, Various issues, 1991-2000, Hong Kong Census and Statistics Department, Hong Kong.

Figure 3.5 Visitor Arrivals in Hong Kong by Month



Source: Hong Kong Monthly Digest of Statistics, Various Issues, 1991-2000, Hong Kong Census and Statistics Department, Hong Kong.

3.10 Chapter Summary

In this chapter, we analysed the development and the growth patterns of Hong Kong tourism demand over the past four decades. Moreover, we have examined the economic determinants of tourism demand, and presented a survey of the characteristics of tourists from the major tourist origin countries over the same period. Our analysis indicated an increasing growth trend of international tourism demand in Hong Kong over the 1958 to 2000 period. During this time, Hong Kong visitor arrivals grew at an annual average of 12.5% from 0.103 million (1958) to 13.1 million (2000), and visitor receipts increased from US$0.067 billion in 1958 to US$7.9 billion in 2000, which is an average growth rate of 12% per annum.

Over the past four decades, Hong Kong achieved a remarkable growth rate in tourism demand. In terms of tourist expenditures relative to GDP, Hong Kong tourism receipts accounted for approximately an average of 9.75% GDP and 14.74% of domestic exports in the 1970s. These statistics put Hong Kong on the World's Tourist Organisation's list of tourist countries. During the 1980s, the change in source markets for tourists arriving in Hong Kong followed a worldwide trend that saw visitors drawn from more short-haul markets. In 1985, short-haul markets accounted for an approximately 50% combined share of visitors to Hong Kong. In terms of tourist expenditures relative to GDP, Hong Kong tourism receipts increased to 6.77% of GDP in 1989 from 5.71% of GDP in 1980. In the 1990s, the share of short-haul markets increased from 50% to 75%. Hong Kong tourism expenditures stood at around 5% of GDP over the period 1995- 1999, which confirmed that the tourist-related industry made an important contribution to the overall economy of Hong Kong.

More importantly, there has been major change in ranking among markets over time, which showed a staggering increase in the number of tourists arriving from China and Taiwan. Mainland China has replaced Japan and Taiwan as Hong Kong's largest tourist origin country since 1994.

Over the past four decades, Hong Kong's tourism demand has been on an upward trend, but has been seriously affected by some events and economic crises, both regional and global. These included the first oil crisis in 1973 and the second oil crisis in 1980; the 4th, June, 1989 incident in China; the handover of Hong Kong from British to Chinese sovereignty in 1997; the Asian financial crisis that same year; and terrorist attacks in the United States on 11th, September 2001. In future chapters, we will employ the results of our descriptive analysis of tourism demand for a selection of economic determinants of tourism demand and dummy variables in our econometric models of tourism demand to examine the effects of these events on tourist arrivals in Hong Kong.

In terms of tourism by purpose in 2000, pleasure arrivals accounted for 55% of the total arrivals to the SAR, followed by business tourism at 30%, visiting friends and relatives at 8%, and en-route stopover visits at 6%. This reflects the increasing role of business travel with respect to the economic development of Hong Kong's in the 1980s and 1990s.

Our analysis of the seasonal patterns of tourist arrivals indicated that March and October were Hong Kong's peak months, based on the average arrivals per month. In contrast, January and February were the least popular months for tourists.

We indicated, in this chapter, that Hong Kong's tourism market grew rapidly over the past four decades. In particular, the growth rate of tourist arrivals in Hong Kong was higher than the growth rate of global tourist arrivals on the basis of our descriptive analysis of tourism demand. Researchers are always suggesting that a combination of descriptive and quantitative approach might be more acceptable for tourism demand modelling and forecasting. However, very few econometric studies have investigated the underlying factors that contribute to the phenomenal growth of international tourism demand in Hong Kong.

In the next chapter, we will review the relevant empirical literature of the tourism demand estimation, using alternative modelling approaches and a wide variety of data.

Chapter 4 Review of Empirical Literature of Tourism Demand Estimation

4.1 Introduction

One objective of this study is to develop an econometric model of tourism demand based on alternative cointegration and error correction approaches. Thus, there is a strong need for an investigation of past relevant literature before further examination is carried out. Broadly speaking, previous empirical tourism demand estimation literature can be classified into two major categories: studies based on the classical single equation approach, and studies based on a system of equations approaches.

The single equation econometric models of tourism demand can be further divided into the following major categories: (1) those that concentrate on the study of economic determinants of tourism demand, and (2) those that focus on forecasting tourism demand. The purpose of this chapter is to review past studies of econometric models of tourism demand based on single-equation approach with a specific focus on the study of the economic determinants of tourism demand. As previously indicated, one objective of this study is to produce more accurate forecasts for tourism demand. As this research focus is different from the former categories of tourism demand studies, the review of the studies that concentrate on the evaluation of forecasting tourism demand performance will be presented independently in Chapter 9.

This chapter is arranged as follows. First, we review the major single-equation econometric model of tourism demand. The tourism demand models using time-series data are presented in Section 4.2. In Section 4.3 we review tourism demand studies with models using cross-sectional and pooled cross-sectional-time series data. In Section 4.4, we review those tourism demand studies estimated with alternative cointegration approaches. We do this separately because the factors involved in cointegration analysis are different from other approaches.

In Sections 4.5 and 4.6, we review the Hong Kong tourism demand studies, and critically appraise the previous empirical literature of tourism demand, respectively.

In the last section, we summarise the major findings of this chapter.

Finally, in Appendix A, we present a review of selected tourism studies written before 1990.

4.2 Review of Econometric Models of Tourism Demand (Single Equation) – Evidence based on Time Series Model (1990s)

The studies of Gonzalez and Moral (1995); Lee, Var and Blaine (1996) and Pyo, Uysal and Warner (1996) investigated the relationship between economic determinants and tourism demand over the 1990s, based on alternative econometric approaches.

Gonzalez and Moral (1995) employed the structural time-series model (STSM) to model and forecast inbound tourism demand in Spain. The STSM can be used to examine the effect of explanatory variables with the application of a time series element of stochastic trends and seasonal components that are assumed to capture the effects of all the non-observable variables.

These estimated structural time-series models were applied to forecast the trend of aggregate tourist expenditures and arrivals. Independent variables were selected on the basis of a survey of the past econometric models of tourism demand. Monthly data were used to attempt to discover more closely the variation and patterns of tourist expenditures and arrivals. The researchers chose January 1979 to December 1991 for their estimation, and January 1992 to December 1992 for examining and evaluating the ex-post forecasting performance.

Unlike other tourism demand studies based on econometric approaches, the Gonzalez and Moral (1995) study focused not only on the investigation of the effect of economic determinants, but also on the time-series element designed to capture the effect of unobservable variables. The income variables in the study were represented by the weighted index of the industrial production index in the tourist origin countries. Gonzalez and Moral (1995) included seasonal adjustments in both equations. In addition, they used the weighted index of the price of tourism in Spain, defined as relative prices adjusted by the nominal exchange rate in a group of origin countries, as the own price variable. The set of origin countries, as selected by the researchers, included Germany, France, Holland, Portugal, the United Kingdom, Sweden and the United States. These markets accounted for 72% of total visitor arrivals in Spain.

In the Gonzalez and Moral (1995) study, a variable, the substitute price, was included to investigate the 'third country' competitive effect in both models. The weighted substitute price index was constructed using the weighted tourism price index in Spain relative to prices in a predetermined set of major competitive markets, adjusted by the nominal exchange rate. The tourist destinations of Egypt, France, Greece, Italy, Morocco, Portugal, Tunisia and Turkey were selected to represent Spain's competitive destinations, on the basis of a subjective judgement in the context of international tourism in Spain. We should make two additional remarks on the construction methodology of the weighted substitute price index. First, the researchers employed a moving-weighted system to reflect any possible change in the relative importance of each origin country or competitive destination over the estimation period. Second, Gonzalez and Moral (1995) calculated the construction of the own- and substitute-price indices of the set of origin countries and the set of competitive destinations using the method of geometric averaging rather than arithmetic averaging. Finally, they included a dummy variable in the tourist-arrival equation to take into consideration the effect of the Easter holidays on the Spanish inbound tourist arrivals.

Surprisingly, the empirical results of Gonzalez and Moral (1995) indicated that the income variable, represented by the index of industrial production, was statistically insignificant in both equations. This could be partly explained by the problem of specification bias, as the industrial production index replaced disposable income as a proxy for the income variable in both equations.

However, the results from the structural time-series model used in the Gonzalez and Moral (1995) approach indicate that the own price and substitute price variables were both significant in determining tourist expenditures and arrivals. In the tourist expenditures equation (without income index), the elasticity of the own price index was found to be -0.61, and the elasticity of weighted substitute price index was +0.65. In addition, the results of the estimated structural time series model suggested that different dynamic effects of the own and substitute price index exist, so the combination of own price and substitute price as one single price variable did not reflect the aggregate price effect accurately. This evidence suggested that the own price and the substitute price variable should be included separately in the tourism demand model.

Finally, Gonzalez and Moral (1995) assessed the ex-post forecasting performance of the STSM by comparing the data using the ARIMA, the transfer function model, and the ECM. Overall, the forecasting results were found to be quite similar for the STSM, ARIMA and the transfer function forecasting models but the ECM was the poorest forecasting model. Although the ARIMA model is much simpler than the others, it performs exceptionally well in forecasting tourism demand. The authors made a recommendation that if the objective of the study focussed on forecasting tourism demand in Spain, the ARIMA model would have been the best candidate.

Lee, Var and Blaine (1996) used the classical multivariable regression model to investigate the effect of the economic determinants on inbound tourist expenditures in Korea, using annual data taken from the period of 1970 to 1989, in both linear and log-linear form. They used the following eight major origin countries to make their investigation: Japan, the United States, Taiwan, Hong Kong, the United Kingdom, the former West Germany, the Philippines and Canada.

The price-type variables were also included in the Lee et al. (1996) study. Lee et al. (1996) employed both relative price variable and real exchange rate variable in the per capita real tourist expenditure equation. The Lee et al. (1996) exchange rate variable was a real exchange rate instead of a market exchange rate variable, and was calculated from the deflating of the relative exchange rate index by the relative consumer price indices of Korea, for each of the eight origin countries. Thus, the effect of the relative price factor was reflected in both the relative price and real exchange rate variables.

The real exchange rate variable introduced by Lee et al. (1996) assumed that the use of the substitution opportunity was only possible between the origin countries and the destination, without considering the price effect of competitive destinations. As such, the price-type variable of Lee et al (1996) did not incorporate any 'third country effect' as captured by the 'substitute price' variable in Gonzalez and Moral (1995). The transportation variable was also excluded from the Lee et al. (1996) study, due to lack of data availability and the problem of multicollinearity between airfare and income variable.

Two diagnostic problems were found in the estimated models of Lee et al. (1996). First, when a Durbin Watson (D-W) probability test was used, an autocorrelation was found in the three estimating models. In this study, a Cochrane-Orcutt procedure was employed to improve the efficiency of the parameter estimates for all three estimating models. Second, multicollinearity was detected in two of the estimating models. This was not a surprising discovery, because the researchers used the elements of relative price in both the relative price and the real exchange rate variables in a single equation tourism demand model. In an attempt to reduce the overall variances, those models were re-estimated using the ridge regression approach.

The regression results indicated that the models explained the variation of the dependent variable reasonably well. The income variable was found to be significant and the income elasticity is high, ranging from 1.18 (Taiwan) to 14.32 (the Philippines). The relative price variable was only statistically significant, at 5% error, in the models used for the Philippines, the United Kingdom and Japan. Lee et al. (1996) concluded that the income, relative prices and real exchange rate had significant impacts on foreign tourist expenditure in Korea. The coefficients of real exchange rate were found statistically significant in five of seven models. These findings were consistent with the proposed hypotheses of Gerekais (1965), and Martin and Witt (1987), all of whom found that international tourists reacted sensitively to fluctuations in the real exchange rate, which affected the level of real purchasing power for tourists.

While the previous studies on tourism demand relied heavily on the ordinary least square estimation method, **Pyo, Uysal and Warner (1996)** employed a seemingly unrelated regression (SUR) method to estimate the relationship between the economic determinants, with a particular focus on the effect of price-type factor on tourism demand levels. They also used this method to overcome some of the diagnostic problems inherent in econometric models. Such are the problem of multicollinearity and other problems caused by data aggregation.

The major advantages of using the SUR method instead of the OLS method are that the SUR method is marginally more efficient when compared to the single OLS estimation method, because it manages the correlation between the disturbance terms (unexplained variances) of a system model more effectively. Pyo, Uysal and Warner (1996) put strong emphasis on the substitute price of alternative destinations for model specification. In their study, tourist expenditure data in the United States were regressed on income and on the two sets of price-type variables (own price and substitute price) for each of eight major tourist origin countries. The eight origin countries were Canada, Mexico, Japan, the United Kingdom, Germany, France, Italy and the Netherlands.

The study found that, in the screening process, the two sets of relative price variables were highly correlated with each other, which indicated a multicollinearity problem. The results, which should be interpreted with caution, indicated that the income elasticity lies in the range from -0.302 (Canada to U.S.) to 2.69 (inland European countries to U.S.). It also indicated that Canadians thought of United States tourism as an inferior good, whereas long-haul inland European countries considered United States tourism a luxury good. The own price elasticity was found to be in the range of -2.79 (United Kingdom to U.S) to -4.28 (Japan to U.S.), which indicated that the Japanese were the most price-sensitive travellers. After a comprehensive examination of the cross-elasticity of demand, Pyo, Uysal and Warner (1996) concluded that the most competitive rival of the United States tourism was Canada, particularly for the Japanese and Inland European origin countries.

The review of econometric tourism demand models indicated that they are focused on a static framework, with an assumption that the underlying variables adjusted completely within the current period. However, there could be time lag for tourists, to allow them to adjust their destination preferences with respect to changes in some of the underlying variables. In order to take dynamic effects into consideration, Hui and Yuen (1996) and Morley (1998) attempted to modify the static framework by either adding a lagged dependent variable or developing a formal theoretical model for the dynamic structure.

Hui and Yuen (1996) investigated a habit persistence hypothesis on inbound Japanese tourism demand in Canada during the period from the first quarter of 1980 to the fourth quarter of 1991, using quarterly data in log-linear form. Hui and Yuen (1996) used a lagged dependent variable as their habit persistence variable by assuming that a tourist had the tendency to return to the same country if that person visited the country and liked it.

Hui and Yuen (1996), in contrast to the real exchange rate variable adopted by Gonzalez and Moral (1995), Lee, Var and Blaine (1996), and Jensen (1998) defined the exchange rate variable as a nominal exchange rate, expressed as Canadian dollars per Japanese yen. Thus, the effect of relative price level was not incorporated in the Hui and Yuen (1996) model. And although Japanese travellers were most certainly long-haul ones in terms of travelling to Canada, transportation cost was ultimately not included in the equation. The tourist arrival was then specified as the function of income, nominal exchange rate, seasonal dummy variable, and the lagged dependent variable. Hui and Yuen (1996) found that the lagged dependent variable was statistically significant at 5% error in all models, which indicated that the habit persistence effect had played an important role in the travel decision for Japanese tourists. The habit variable was also found to be consistently important throughout all estimation periods. Although the nominal exchange rate variable was significant only in two forecasting models of the Hui (1996) study, Hui and Yuen (1996) found that nominal exchange rate was more powerful than income in terms of forecasting ability and stability.

Hui and Yuen (1996) carried out the ex-post forecast by running a regression model with an estimation period from 1980 to 1990, and then used a selected model to forecast tourist arrivals in 1991. The estimating procedures were repeated on the second regression models using data collected from 1980 to 1989 and, on the third round, collected from 1980 to 1988. The process was continued until the statistical results indicated an independent variable that became insignificant or a wrong expected sign appeared. Afterwards, Hui (1995) employed the criterion of the root mean square percentage to evaluate the forecasting power of the model. The results of the root mean square percentage error criterion indicate that the model that includes the variables of exchange rate and lagged value of Japan visitor arrivals has the best forecasting power.

Morley (1998) attempted to develop a formal theoretical model with the dynamic structure of tourism demand based on the information flows. Within tourism demand literature, the dynamic specification of the tourism demand function was not new. In the earlier studies, Fuji and Mak (1980) indicated that a dynamic structure was likely to be an integral part of the tourism demand model. Although the inclusion of a lagged dependent variable as a proxy for habit formation or the word of mouth effect had been explored previously, the Morley (1998) dynamic model showed some advance from the previous studies. Morley argued clearly that the choice of destination for a potential tourist is constrained by the information they have about the area. This implies that the higher the number of tourists coming from an origin country (X) to the destination country (Y) in the past facilitates a greater spread of information about country Y within country X. The number of tourists who have travelled in the past to country Y from country X should thus be correlated positively with the current tourist flow to country Y from country X. Morley (1998) also described the three important channels for tourism flows: the deliberate search, the unsought encounter, and the word of mouth effect. In contrast to the study undertaken by Hui and Yuen (1996), Morley's dynamic model allowed for time-varying demand elasticities in the estimated models.

Similar to Gonzalez and Moral (1995) and Lee, Var and Blaine (1996), Morley's own price variable was represented by the real exchange rate. However, the economic interpretation of real exchange rate by Morley (1998) differed from other studies, including the Gonzalez and Moral (1995), Pyo, Uysal and Turner (1996) and Kim and Song (1998). First, Morley (1998) distinguished between the origin and destination effects of the real exchange rate. Morley (1998) argued that the relative effects of the appreciation or depreciation of the real exchange rate differed in two cases: The tourist origin currency changed in value, relative to other currencies, and the tourist destination currency changed in basic value. He argued that all tourists destinations became more (or less) expensive from the view of outbound tourists, based on the status of their own currency, and that any change in the price levels at the destination, or changes in the nominal exchange rate of the destination currency, created a change at the destination only. In order to achieve a more reliable price effect, it would be necessary to include separate variables to represent such effects. Morely (1998) also included income and fare variables in the study's estimation. The study's econometric models were used to make estimations for seven major origin countries, with annual data taken during the period from 1972 to 1992. The seven origin countries are New Zealand, the United States, United Kingdom, Canada, Germany, Japan and Malaysia.

The results of the Morley (1998) study indicated that strong growth in tourism demand was driven by a rise in income levels at the place of origin, rather than a change in relative prices. Moreover, a test of the elasticity-income relationship suggested that incomes correlate strongly in a positive manner over time in all countries. More importantly, income elasticities of demand were small for either relatively low- or high-income earners, though it increases considerably for middle range earners.

As we review tourism demand estimation literature, we find that the majority of studies, including Gonzalez and Moral (1995), Lee, Var and Blaine (1996), Pyo, Uysal and Turner (1996) and Morley (1998), concentrated on investigating the effect of economic determinants on tourism demand. In contrast, Crouch, Schultz and Valerio (1992), Lee (1996) and Qiu and Zhang (1995), placed a much stronger emphasis on the effects of promotional expenditures (1. total marketing expenditures and 2. advertising only expenditures) and social determinants. Crouch et al. (1992) investigated the impact of marketing activities on tourist arrivals in Australia. The study used ordinary least square estimation to estimate the model parameters using annual data in the log-linear form for five major origin countries, covering a period from the 1970s to the late 1980s.

The demand for each country's tourist arrivals was specified as a positive function of marketing expenditure, income, own price and airfare. Both the total marketing expenditure of the Australia Tourist Commission, and the advertising-only expenditure in nominal Australian dollars, was calculated by multiplying the nominal exchange rate between the origin country and Australia, and then dividing the result by the consumer price index of the origin country. This measurement was thought to reflect closely the real purchasing power of marketing expenditures in the particular origin country. The own price variable in this model was measured by the nominal exchange rate adjusted by the relative price index for each origin country. Generally speaking, the estimated elasticities appeared to be consistent with the results of other similar studies during the period of the 1980s. The best-fitted marketing elasticity ranged from 0.11 to 0.25 for the United States and New Zealand, respectively. It is important to note that the total marketing expenditure was found to be superior in explanatory power to the variable of advertising expenditure in four of the five cases. The results suggest that the international marketing activities of the Australia Tourism Commission have played a statistically significant role in influencing inbound tourism.

The **Lee (1996)** study could be considered a supplementary study to Lee, Var and Blaine (1996). Lee (1996) estimated the effect of marketing by adding the new variable of marketing expenditure into the tourism demand equation. Except for a few studies, such as Uysal and Crompton (1984), Carey (1991) and Crouch et al. (1992), previous research rarely investigated the effect of marketing expenditure in the area of tourism demand, due to the problem of data availability and reliability. Regardless, Lee (1996) investigated the effect of promotional expenditures on international tourism demand in Korea.

Similar to Lee, Var and Blaine (1996), Lee (1996) employed the tourism demand equation with annual data from seven major tourist origin countries, using the OLS method. Ultimately, the marketing variable was used for only four models, Japan, the United States, Hong Kong and Germany, owing to data constraints. The empirical results indicated that the marketing expenditure variables were statistically significant, with positive signs from the Japan, United States and Hong Kong models. The elasticities of promotional expenditures were inelastic in all cases, ranging from 0.05 to 0.07.

While many past time series studies have concentrated on investigating the effect of economic determinants and marketing expenditure on tourism demand, **Qiu and Zhang (1995)** attempted to fill the gap by investigating the effects of social determinants (i.e. crime rate and immigration statistics) on tourism demand. Previous studies selected a functional form based on a survey of past empirical literature, but Qiu and Zhang (1995) instead chose between the linear and log-linear forms to create an inbound tourism demand model, using statistical experiments.

Qiu and Zhang's (1995) immigration variable was determined by calculating the number of annual immigrants to Canada arriving from each origin country. The study further explained their economic rationale that immigration levels should positively impact on the number of tourist arrivals. The crime rate variable was measured by employing a combination of data on violent offences, sexual assaults and robberies to discover the measure of safety for tourists. Qiu and Zhang (1995) hypothesised that any significant change in crime rate could potentially affect a tourist's decision to travel to Canada. Selected social determinants, per capita income, the nominal exchange rate, the travel price index, dummy variables and a time trend were used to estimate the number of tourist arrivals and expenditures. The researchers estimated all equations using the OLS method, with the results reported on a country pair basis. They then applied the Box-Cox residual sum of square statistics to determine whether or not the linear or the log-linear form was the appropriate functional form. Contrary to the common belief that the log-linear form is better than the linear, empirical results indicate that statistical evidence exists that their results does not support this universal agreement. The social determinants of crime rate variable and the immigration variable were found to be significant in only one or two individual equations. It implied that the economic determinants were found to be more important than the social determinants in explaining the tourist's decision to travel to Canada. Finally, the relative significance of the economic and social determinants was varied with respect to the origin countries.

In conclusion, this study could be regarded as a step to further our understanding on the relationship between social determinants in the tourism demand equation. However, it also indicated that there was inadequate statistical evidence to support the use of social determinants in the tourism demand equation, based on the Canadian evidence.

Although a majority of the past studies examined tourism demand by employing aggregate data of the flow of tourists, Morris, Wilson and Bakkalis (1995) and Turner, Reisinger and Witt (2000) investigated the disaggregate data of the flow of tourists and, in particular, of business travellers.

Morris, Wilson and Bakalis (1995) attempted to identify determinants of tourist flows to Australia from its three largest origin countries: the United Kingdom, Germany and Italy, based on disaggregate data. The researchers divided the total visitor arrivals into four categories, according to the purpose of their visit. Twelve different models were constructed, based on the purpose of the tourists' visit and their countries of origin.

Morris, Wilson and Bakalis (1995), in accordance with the adaptive expectation framework, such as the ones used in Bond (1979), adopts the permanent income variable for each origin country, defined as the geometric distributed lag function of the logarithm of real income.

The study used the own price variable to represent the price-type factor of European visitor arrivals to Australia. In the case of the all-European model, the tourism-share weighted own price index was constructed for the estimation. However, the 'substitute price' variable that is normally used to reflect the price effect of 'alternative destinations' was not found in this model. Similar to other Australian tourism demand models, Morris, Wilson and Bakalis (1995) included the fare variable to reflect the actual cost of tourism because of Australia's geographical isolation in respect to other origin countries, with the exception of New Zealand. The dynamic of the time trend variable was also added to capture factors that change slowly and cannot be measured by other underlying variables.

For the All-European model, the income elasticity and the own price elasticity were found to be 6.04 and -0.46 for all-purpose visitors, respectively. For holiday visitors only, the income and own price elasticity were found to be 10.2 and -0.24, respectively. Ultimately, the model indicated that the European vacation travellers were more sensitive to income than price. Finally, the results of diagnostic statistics indicated that the Morris, Wilson and Bakalis (1995) model passed all tests of serial correlation, functional form and normality of residuals, and there was little difference between the All-European model and the models for Germany and Italy.

The forecasting power of the All-European model was further assessed by the RMSPE predictive criterion. The estimated results were 11.8% error for the business travel (calculated from the difference of forecast value and the actual value for the model of all visitors), 23.7% error for the model of tourists on holidays, and 11.5% error for the model of tourists visiting relatives.

One additional remark should be made. In their study, Morris, Wilson and Bakalis (1995) suggested that researchers should not rely primarily on the econometric forecasting, but should rather select the most powerful model for predictive purposes from a range of forecasting models.

In a similar study, **Turner, Reisinger and Witt (2000)** employed structural equation modelling to analyse quarterly disaggregate data on tourist flows, in particular on the tourist flows of business travellers from the United Kingdom to seven major destinations during the period from 1978 to 1995. From the total outbound tourists from the United Kingdom, aggregate data were divided into three categories: travellers on holidays, on business, and visiting relatives. The major advantage of the structural equation model centred on its capability to analyse the relationships between a set of independent X variables (which may correlate with each other) and a set of dependent Y variables (the three types of tourists in this study). Thus, these three flow types could be selected simultaneously as dependent variables.

The objective of Turner, Reisinger and Witt (2000) was to study the differential impact of economic determinants with respect to the purpose of the tourist's visit. The authors suggested that economic determinants are the major determinants of business tourist flows, while both economic and non-economic determinants played a significant role in determining holiday and relative-visiting flows. In particular, the authors suggested that there is a strong link between business travel and trade volume.

The results of Turner, Reisinger and Witt (2000) found that economic variables explained business travel exceptionally well for all origin countries. Likewise, two new variables introduced to measure business confidence and consumer confidence were found to be significant in several cases, and should be recommended in future studies as a leading indicator for measuring the future power of consumption on tourism demand.

Certain social determinants such as the variable of visiting relatives, when compared with economic variables, played a limited role in determining flow of visitors. Amongst the seven cases, only two indicated any significance because of the social variables. This is consistent with the findings of Qiu and Zhang (1999), in which the social determinants were insignificant in determining tourism demand. Since a structural equation had not been broadly applied in econometric modelling, these results should be interpreted with caution.

Past studies on single-equation tourism demand estimation frequently assumed that, from the standpoint of the tourist destination over the short to medium -term, the supply of tourist services was perfectly elastic. For example, a group of tourism demand studies in Turkey, including Uysal and Crompton (1984) and Var, Mohammed and Icoz (1990) focused on the demand-side determinant in Turkish tourism demand models. Alternatively, **Icoz, Var and Kozak (1994)** attempted to further our understanding on supply-side determinants by investigating the supply-related factors that affected tourism demand of major European countries from 1982 to 1993 in Turkey.

Icoz, Var and Kozak (1994) chose to employ the supply-side related factors by counting the number of ministry-licensed hotel beds and the number of incoming travel agencies in Turkey. They included the consumer price index and nominal exchange rate in their tourism demand equations to represent the demand-side determinants. Thus, their single equation model included both demand-side and supply-side determinants. The authors assumed that there should be a positive relationship between the change in the number of licensed beds or the number of travel agencies in Turkey in correlation with the number of visitor arrivals in Turkey.

The empirical results indicated that supply-side determinants only slightly affected the numbers of tourists arriving from Switzerland, Italy, France and Greece.

4.3 Review of Econometric Model of Tourism Demand (Single Equation) – Evidence based on Cross-Sectional and Pooled Time Series – Cross-Sectional Model (1990s)

Quantitative tourism demand models are normally estimated using time-series, cross-sectional and pooled data (time-series data combined with cross-sectional data). As the factors involved are different with respect to the characteristics of data, the review of such literature should be reported separately. In this section, we review three major studies based on the pooled data to investigate the inbound tourism demand.

Tremblay (1989) attempted to improve the reliability of elasticity estimates by re-estimating the tourism demand model in Australia using pooled time-series, cross-sectional data. The objective of the study was to determine the causal relationship between the selected economic determinants and tourist expenditures and arrivals or departures in Australia. Two factors should be noted with regard to the research. First, the own price variable was represented by a market exchange rate and relative price variable, rather than a single real exchange rate variable. Following the Artus (1972) study, Tremblay (1989) argued for using two separate variables to represent the own price effect, based on the assumption that potential travellers, when deciding upon a destination, have a better and more up-to-date idea of exchange rates than the location's relative prices.

The other major contribution of the study was its explanation of the construction methodology of the weighted aggregate index in tourism demand models. Tremblay (1989) seriously considered the moving weight scheme as employed by Lin and Sung (1983) for the process of the weighting-scheme selection, because it allowed for changes in tourism demand share to reflect any changes in the market over the estimation period. Although the fixed weight and moving weight methods were theoretically comparable, Tremblay (1989) ultimately selected the fixed weighting scheme because of the practical restrictions that appeared in the computation methods of the moving weight scheme.

Tremblay (1989) chose to use the fixed weighted indices of transportation cost, real income, and the two sets of price-type variables regressed with tourism receipts and arrivals data for each of the 18 European countries. In summary, the empirical results varied with respect to each of the origin countries. Tremblay (1989) conclude that further improvements in travel research will rely in finding new data constructing methods that will improve the reliability of international tourism demand estimates. Overall, Tremblay's (1989) contributions on weighting methodology provided a direction for the construction of the weighted substitute price index in this research.

Carey (1991) was the only tourism demand model that examined tourism demand in the Caribbean region. This study investigated the effect of income, price, distance, population, and promotional expenditures on aggregate tourist arrivals and tourist arrivals excluding tourists not staying in hotels. In particular, this study examined the effect of government promotional expenditures on tourism demand. Promotional expenditure data were taken from the government tourist budget statistics in this period. Although most Caribbean countries maintained a fixed exchange rate system with the United States, Carey's (1991) own price variable was defined as the relative price index deflated by the relative market exchange rate index. This was due to the substantial volatility that still existed in the market exchange rates of origin countries outside the United States and, in particular, within European countries.

Carey (1991) reported the empirical results of the models estimated with aggregate and disaggregate data separately. These results indicated that all the explanatory variables, with the exception of own prices, played a significant role in determining the decisions to travel to the islands. The income and promotional expenditure elasticity played a less significant role in the model, with the exclusion of those tourists not staying in hotels. Despite the small sample size, Carey (1991) concluded that promotional expenditure was an important factor in tourism demand, and recommended further investigation of the subject.

Covington, Thumberg and Joweyin (1994) employed the pooled time-series cross-sectional data to study the relationship between United States tourism demand and the economic determinants for thirty origin countries during the period from 1966 to 1987. In particular, the main focus of the study was income effect in the tourism demand model.

The income variable in the Covington, Thumberg and Joweyin (1994) study was represented by either the real per capita disposable income or the annual change in growth rate of income of tourists. It was assumed that, subject to the law of diminishing return, tourism demand normally increases at a decreasing rate with respect to the growth rate of income. It follows that the expected sign of annual growth in income was assumed to have a negative impact on tourist arrivals. Surprisingly, the elements of relative price and exchange rate were completely excluded from this model. However, transportation cost and time trend data were included, in the models with two separate income variables.

All the underlying variables in the pooled models, with the exception of Central American regions, were signed correctly, but only the transportation cost and income variables were statistically significant in the majority of cases in this study. In contrast to other econometric analysis, Covington, Thumberg and Joweyin (1994) employed the standardised coefficient method broadly employed in social science studies. Overall, the results from all of the regions indicated that the two sets of income variables were statistically significant and correctly signed. The Covington, Thumberg and Joweyin (1994) study further illustrated the stated hypothesis that the income effect on tourism demand is increasing at a decreasing rate, which is consistent with the law of diminishing returns.

4.4 Review of Econometric Models of Tourism Demand – Evidence based on Models with Alternative Cointegration and Error Correction Approaches

In this section, a review of the selected study of econometric models of tourism demand, based on alternative approaches of co-integration analysis, is presented.

The most serious technical problem in estimating tourism demand that employs time series data using the classical multivariable regression model is the non-stationary properties of most time series variables. This problem may lead to spurious relationships among the underlying variables in the estimated equations. To tackle this problem, the econometric technique that is frequently applied in empirical literature is the cointegration and error correction approaches. The Engle-Granger (1987) approach (Engle-Granger approach hereafter), Wickens and Bresuch (1988) approach, Johansen (1988, 1991, 1995), and Johansen and Juselieus (1990, 1992) approaches (Johansen approach hereafter) have been applied to single equation modelling of tourism demand over the past decades. Those cointegration approaches were used to examine the economic determinants of tourism demand in the following studies: Divisekera (1995), Kulendran (1996), Seddighi and Shealing (1997), Lathiras and Siriopoulos (1998), Kim and Song (1998), Jensen (1998), Vogt and Wittayakorn (1998), Kulendran and Wilson (2000b), and Dritsakis (2004)

This section presents a review of tourism demand studies that are based on the alternative cointegration and error correction approaches. In particular, we concentrate on the following key aspects of cointegration analysis: (1) pre-modelling testing procedures, i.e., unit root tests results and interpretation; (2) selection of independent and dependent variables and the definition of variables; (3) estimation procedures and the results of existing cointegration relationships; (4) a selection of preferred short-run ECMs; (5) the empirical results of ECMs and their interpretations.

Divisekera (1995) was the first tourism demand study to develop single-equation econometric models of tourism demand in Australia based on the cointegration and error correction approach. This study applied Johansen's Full Information Maximum Likelihood (FIML) procedures to investigate whether the underlying variables in the tourism demand equation were cointegrated. To estimate the short-run income and price elasticity of tourism demand, the error-correction term compiled from the statistically significant cointegrating vector was incorporated with the short-run dynamic ECM. Subsequently, Divisekera (1995) compared the plots of fitted values for each ECM with its actual value, to evaluate the forecasting accuracy of ECMs.

Two major contributions should be noted resulting from the Divisekera (1995) study. First, Divisekera (1995) dealt with the specification bias that resulted from the omission of the appropriate proxy for the 'substitute price effect' in tourism demand models. Divisekera (1995) defined the substitute price index as the exchange rate adjusted relative prices of a selected competitive destination, for each of the selected origin countries. Although the substitute price variable was added to the model, it was uncertain whether the substitute price of a single competitive destination for each origin country, randomly selected from the list of alternative destinations, was sufficient to represent the overall effect of the substitute price in tourism demand equations. Despite the empirical findings of Martin and Witt (1987), Divisekera (1995) believed that the consumer price index is a poor indicator for tracking the changes in tourism prices in tourist destinations. To obtain reliable estimates of price-type variables, Divisekera (1995) constructed a set of tourism price indices that reflected more closely the variation of actual price levels a tourist faced. The study used the four most important source markets of Australian tourism: models for New Zealand, the United Kingdom, the United States and Japan were developed, using estimations of annual data in double log form taken from the period between 1973 and 1992.

Divisekera (1995) applied the Dickey-Fuller, Augmented Dickey-Fuller, and the Philips and Perron unit root tests to establish the integration orders of the underlying variables. The results of all unit root tests suggested that the underlying variables were integrated of order one. As indicated by Divisekera (1995), the econometric procedures of the Engle-Granger two-stage approach (1987) ignored the short-run dynamics in the cointegrating regression, and Divisekera believed that the Johansen procedure was a better approach to produce more reliable long-run and short-run parameter estimates. The results of a maximum eigenvalue test and trace test statistics showed that three cointegrating vectors were found in the models of tourist demand for Japan, the United States and the United Kingdom, and two cointegrating vectors were found in the New Zealand model. The results of all of the long-run models in the Divisekera (1995) study indicated that a cointegration relationship exists. The results further indicated that transportation price variable was found to be the most important factor in the long-run model, possibly due to Australia's geographical isolation. This was consistent with the results of other Australia tourism demand studies, which showed that the transportation cost appears to be the most significant economic determinant in deciding on a destination, particularly for long-haul models. Finally, Divisekera (1995) specified the short-term general dynamic model with lags up to second order for each of the independent variables in a differenced form, and an error correction term. The results of diagnostic test statistics suggested that the preferred short-run models were well specified.

In the Divisekera (1995) study, the statistical results of the ECM indicated that the most important determinant in the short-run model was the income variable, rather than the transportation cost variable that was most important in the long-run model. In addition, the error-correction coefficient of the short-run model was relatively low, ranging from 0.39 (New Zealand) to 0.05 (Japan). Visitors from Japan were most sensitive to income and the price factors in the short-run model, followed by those from New Zealand, the United States, and the United Kingdom.

In terms of forecasting performance, Divisekera (1995) compared the plots of the fitted and the actual values of the ECMs used on each of the four origin countries. Overall, the study concluded that derived dynamic ECMs could be implemented to forecast visitor arrivals one or two years in advance. However, the research did not compare with the results of the ECMs used with forecast values derived from other alternative forecasting models such as ARIMA, nor did it evaluate models that examine common predictive criteria for forecasting performance, such as MAPE.

In a similar study, **Kulendran (1996)** investigated the economic determinants of international tourism demand in Australia, using the cointegration approach. Rather than using annual data as Divisekera (1995) did, Kulendran (1996) employed quarterly data in a log-linear form to estimate the long and short-run relationships between the economic determinants and inbound tourist flows to Australia. He, too, used data collected from 1975 to 1995, from Australia's four major tourist markets, the United States, Japan, the United Kingdom and New Zealand.

Kulendran (1996), following the tradition of Blackwell (1970), Bechdolt (1973), Gunadhi and Boey (1986) and Divisekera (1995), employed actual numbers of tourist arrivals in Australia as the dependent variable. However, the data collection of income and own price variable varied with respect to each of the four origin countries. For example, Kulendran (1996) used the real GDP for the United Kingdom model, real GNP for the United States and Japan models, and production-based GDP for the New Zealand model, as a proxy for the income effect. The own price variables were represented by a relative price index adjusted using the market exchange rate between Australia and each of the four origin countries, with the exception of Japan. For the Japanese model, the weighted own price index was calculated using the weighted index of the relative cost of transportation and the relative cost of living in Japan. Similar to the methodology of Divisekera (1995), Kulendran (1996) arbitrarily chose only one alternative destination for each origin country to represent the substitute price. Again, the travel fare variable was included because of Australia's geographical isolation, but Kulendran (1996) measured this using one-way economy airfare data, which were calculated according to the origin country's own currency. Finally, a set of dummy variables was added to reflect the effect of political disturbances (e.g. a pilots' strike), changes in social policy (Japan), and special events.

Due to the nature of the quarterly data, Hylleberg, Engle, Granger and Yoo (HEGY) unit root test was employed instead of DF and ADF tests to deal with the problem of seasonality and determine the order of integration of all of the underlying variables. The HEGY regression model was estimated in various ways: (1) using an intercept; (2) using an intercept with a time trend; (3) using intercepts and seasonal dummies; and (4) using intercepts, seasonal dummies and time trend only. The results of HEGY indicated that the underlying variables were non-stationary, and concluded that the classical regression analysis was improper for estimations of tourism demand in Australia.

After establishing an order of integration, the Johansen approach was employed to estimate the cointegrating relationship between tourist arrivals and their economic determinants. The results of log-likelihood ratio statistics indicated that there was at least one statistically significant long-run relationship between tourist arrivals, income, price, and airfare for each origin country. This implied that underlying variables are cointegrated. The estimated long-run income elasticity was found to be quite flexible, and ranged from 1.30 (New Zealand) to 4.65 (Japan). This suggested that the long-haul travellers from Japan were more sensitive to income factors than short-haul travellers from New Zealand. The results are consistent with those from the Crouch (1994a) study, which found that long-haul tourists are more income-sensitive than short-haul tourists. The long-run own price elasticity was greater than 1 (in absolute value) for the United States and New Zealand, and close to 1 (in absolute value) for the United Kingdom and Japan. Finally, the travel cost elasticity had an expected negative sign, with a range from -0.67 (United States) to -2.89 (United Kingdom). Overall, the estimated long-run results were consistent with the results reported by Divisekera (1995).

The error-correction term in the short-run model was derived from the statistically significant cointegrating vector. Due to the characteristics of quarterly data, the short-run dynamic model was considered with four lags of changes in the independent variables, rather than the two lags in Divisekera's (1995) study. Only the significant independent variables were reported in Kulendran's (1996) study, similar to the reporting procedures of Divisekera (1995). The empirical results suggested that the error-correction terms were significant at the 95% level for all models. Surprisingly, the short-run income variable was insignificant, and was deleted from all four error correction models. As well, the short-run, own price elasticity was only significant in the Japan and New Zealand models. Overall, there was not much empirical supporting evidence found in the short-run model.

Both ex-post and ex-ante forecasts of quarterly tourist arrivals were directly derived from ECMs in the Kulendran (1996) study. The ex-post forecasts generated from the ECM were found to be very close to the actual value of tourism demand. However, the Kulendran (1996) study neither evaluated the forecasting performance of the preferred ECM by any of the common predictive criteria, such as MAPE or the Theil Index, nor did it compare with other time-series specifications, such as ARIMA. However, Kulendran (1996) indicated that comparisons of forecasts should be conducted to explore whether the ECM provides better forecasts than the time series models in the further research.

Overall, it is therefore logical to conclude that the differences of the elasticity estimates between the Kulendran (1996) and Divisekera (1995) studies were related to the selection of the independent variables, the frequency of the data, the measurement of independent variables, and the effectiveness of the modelling strategy.

Kim and Song (1998) performed the first tourism demand study in South Korea based on the cointegration and error correction approach. While past studies concentrated on finding explanations for past demand levels, Kim and Song (1998) placed much emphasis on examining the ex-post forecasting ability of ECM model that would fill the gap of knowledge in South Korean tourism demand studies. Ex-post forecasts of the ECMs were compared in their study not only with actual value, but also with forecasted value derived from seven alternative specifications, including ARIMA, NAÏVE, etc., over a number of different forecasting horizons. Thus, the study was able to indicate whether the recent development in econometrics could improve the forecasting performance of the econometric models for determining tourism demand. The study used annual data collected over a period of 32 years from 1962 to 1994 to complete an empirical investigation of tourism demand. It selected Japan, the United States, the United Kingdom and West Germany as the tourism supply markets, because of their status as South Korea's four biggest tourist origin countries.

There are a few important points worth mentioning with regard to the Kim and Song (1998) study's model specifications. In contrast to Kulendran (1996) and Divisekera (1995), Kim and Song (1998) selected a trade volume variable that could capture the effect of business arrivals in South Korea, as it was estimated that more than 30% of the total arrivals in South Korea were business travellers, during the 1990s. Among other economic determinants, both national disposable income and gross domestic product were selected to represent income effect. In the end, the choice of proxy variables was determined solely by statistical experiment rather than by economic justification.

Similar to the Martin and Witt (1987) study, Kim and Song (1998) adjusted the relative consumer price index to the corresponding exchange rates to reflect the variation of price competitiveness. In contrast to Lee, Var and Blaine (1996), Kim and Song (1998) simply included travel costs, measured by the round-trip fare cost from each of the four major origin countries to Korea. Their choice of the substitute destination to determine the substitute price variables was not arbitrarily chosen, as it was in the previous studies of Kulendran (1996) and Divisekera (1995). Instead, they captured their 'substitute price effect' using a set of relative price variables from tourism demand models. Thailand, Singapore, Malaysia, the Philippines, China and Japan were chosen as the Kim and Song (1998) study's potential single substitute destinations, and the final decision was determined by the results of statistical experiments rather than by consulting predetermined professional opinions. However, Kim and Song (1998) did not attempt to construct a weighted substitute price variable in their study. Finally, they used dummy variables to capture the effect of special events and political disturbances.

Rather than using the HEGY unit root test employed by Kulendran (1996), Kim and Song (1998) selected both the ADF and the Philips and Perron (1988) tests to determine the number of unit roots, because of the characteristic of annual data. The results of the ADF test demonstrated that all the underlying variables were integrated of order one. In the original cointegrating regressions, Kim and Song (1998) first estimated all the economic determinants and the set of country pair, substitute price variables using the OLS approach. The empirical results suggested that the underlying variables in each of the long-run cointegrating regressions were cointegrated.

Similar to the findings of Kulendran (1996) and Divisekera (1995) in Australia, Kim and Song (1998) found the long-run income elasticity quite high, ranging from 1.5 (Germany) to 3.0 (United Kingdom), indicating that South Korea was considered a luxury destination. The real trade volume elasticity was found to be significant in all models, but the demand was price inelastic (price elasticity less than one) and significant at the 95% level in the United Kingdom and United States long-run models. According to the estimated coefficients of the alternative destinations' substitute price variable in the tourism demand model for each of four origin countries, Malaysia and China were found to be the main competitive destinations, rather than Singapore and Thailand.

The results of the CIDW statistics indicated that the variables of cointegrating regression for all origin countries in the Kim and Song (1998) study were cointegrated. To estimate the short-run elasticity of demand, Kim and Song (1998) incorporated the residuals of the statistically significant cointegrating vector into their error-correction model. All the preferred ECMs were well specified, as they passed a number of standard diagnostic tests, such as the LM test of autocorrelation and RESET test of functional form. The short-run income elasticity lay between the values of 0.761 and 2.25, indicating that current income variables also played an important role in the short-run tourism demand. However, the own price variables were statistically significant only in the United Kingdom and United States models, with a range from -0.218 to -0.372.

The ex-post forecasting horizon in the Kim and Song (1998) study covered both short- and long-term periods, ranging from one to ten years. The first difference in the total number of visitor arrivals was used as a dependent variable for all ECMs, rather than counting the total visitor arrivals. Kim and Song (1998) adopted a simple NAÏVE model as a benchmark, while they employed other alternative specifications, such as SMA, AR (1), ARIMA and VAR, to compare the data with ECM to make a relative forecasting performance evaluation.

Subsequently, Kim and Song (1998) evaluated the forecasting results of the ECMs and alternative specifications, based on the various forms of predictive criteria, including MAE, RMSE and Theil Inequality coefficients. Using the results of various predictive criteria, Kim and Song (1998) concluded that the ECM produced the most accurate specification in the United Kingdom and the United States models. However, the ARIMA model appeared to outperform the ECM in Germany and Japan, respectively. They indicated that Japan and German's bad performance is positively related to misspecification and this may due to be omission of important explanatory variables and inappropriate use of proxy variables. Overall, Kim and Song (1998) concluded that the econometric models of tourism demand based on the modern econometric approaches perform better than the time series model in most origin countries.

In a similar study, **Lathiras and Siriopoulos (1998)** applied the co-integration approach to identify the long-run equilibrium relationship between Greece inbound tourism demand and the selected economic determinants. Similar to the frameworks set out by the Kulendran (1996), Divisekera (1995) and Kim and Song (1998) studies, Lathiras and Siriopoulous (1998) evaluated the forecasting power of the error-correction model over the ex-post forecasting period. However, future demand forecasting remained unexamined. Lathiras and Siriopoulous (1998) focused on six important tourist-generating markets for Greece: estimations were made for tourists coming from the United Kingdom, Germany, France, Italy, the United States and Holland, using annual data in a logarithmic form recorded from 1960 to 1995, a period of 36 years.

In contrast to the studies of Kulendran (1996), Divisekera (1995) and Kim and Song (1998), **Lathiras and Siriopoulos (1998)** selected per capita tourism demand rather than the absolute numbers of tourists as their dependent variable to capture the population growth in their six origin countries. Likewise, they used the per capita gross domestic product (from the origin countries) as a proxy for the effect of income. Moreover, they adopted both the relative prices between Greece and each origin country and the market exchange rate in the tourism demand model to represent the own price effect. In accordance with the Divisekera (1995), Kulendran (1996) and Kim and Song (1998) studies, the 'substitute price effect' was also considered in this study, represented by the market-share, moving weighted substitute price index. This index was defined as a ratio of the real cost of tourism in Greece relative to the real cost of the tourism index in the substitute destinations, weighted by the relative market share of the arrivals from generating countries relative to those to competing destinations.

Lathiras and Siriopoulous (1998) followed the lead of the Lin and Sung (1983) study's index construction methodology, in which the moving weighted system was employed to allow subsequent variations of the pattern of demand over the entire estimation period. The Lathiris and Siriopoulos (1998) study's construction methodology of the weighted substitute price variable was superior to those used in other tourism demand studies, because they used a group of countries that had substantial market share weights instead of single country, substitute price variable. Although, the selection of the number of substitute destinations was decided subjectively, this was more successful than the single country variable used in the Kulendran (1996) and Divisekera (1995) studies. In contrast to the other tourism demand studies, Lathiris and Siriopoulos (1998) did not include the cost of travel to Greece in their investigations.

Lathiris and Siriopoulos (1998) used both Dickey and Fuller, and Augmented Dickey and Fuller tests to discover the time- series properties of the underlying variables in their levels and differences form. The DF and ADF results suggested that all the differenced series were I (0), and the level series were I (1). Similar to Kulendran (1996) and Divisekera (1995), Lathiris and Siriopoulos (1998) employed the Johansen FIML method to test for a cointegration relationship. Because annual demand data were used in this study, a lag length of order 2 was initially chosen to allow for appropriate lag length in the VAR model to ensure Gaussian errors. The results of the maximum eigenvalue and trace statistics based on the VAR model with unrestricted intercepts and zero linear trend indicated that, with the exception of the United States, there was at least one long-run equilibrium relationship for each model. Although, the exchange rate variable was insignificant in some models, it was found to be a crucial factor for maintaining a stable long-run relationship between tourism demand and its explanatory variables. As well, Lathiris and Siriopoulos (1998) discovered a positive income coefficient for all countries but Holland. The results for Holland indicated that tourism in Greece was considered as an inferior product. Finally, the long-run own price elasticity of demand was found to have a wide range, from -1.31 (United Kingdom) to -4.53 (France).

In the general ECMs for short-run estimation, Lathiras and Siriopoulos (1998) selected an order of lag length of up to two for each independent variable. All of the error-correction terms of the preferred ECMs were found to be significant and negative, with relatively high absolute value of coefficients. This suggested that the long-run data played an important role in the process of the adjustment to the equilibrium condition. The short-run results provided concrete evidence that the variation in the per capita income and the own price had a significant short-run effect on tourism demand. However, of the six origin countries, the weighted substitute price variable was statistically significant only in the United Kingdom and Italy models at 90% level. This implied that Greek tourism had certain market power over their competitors in the tourism markets of Germany, France, the United States and Holland.

Finally, Lathiris and Siriopoulos (1998) applied the preferred ECMs to forecast tourism demand for the period from 1994 to 1995. They compared the ex-post forecast value of tourism demand, derived from the ECM, with the actual value. They also employed the Theil Inequality index to evaluate the ECM's forecasting performance. Although the model did not generate a perfect forecast, the statistical results, compiled from the predictive criterion of the Theil inequality tests, showed that the estimated short-run ECMs had strong forecasting power.

Jensen (1998) combined an ordinary demand and market share model into a demand function of tourism demand to estimate the income and price elasticity of demand for each of Denmark's six most important tourist-generating countries, based on the annual data in a log-linear form, calculated during the period from 1960 to 1995. Because of a limited number of observations on tourism demand, Jensen (1998) selected Wicken and Breush (1988) approach instead of Johansen approach in his study.

In contrast to the common measures of tourist expenditure and arrivals, the number of nights spent and the deflated currency exchange statistics measures were used to represent Denmark's level of tourism demand. The real income and two sets of price-type variables (the own price index and the substitute price index) were selected as economic determinants. Transportation costs were also included in the long-haul market model. Real demand was defined by either the annual turnover, compiled from the number of nights spent, multiplied by the daily spending in 1996, or from the currency exchange value of one-day visitors and cross-border trade. The own price index was defined as the Danish consumer price level relative to the consumer price level of the origin countries, adjusted by the nominal exchange rate. Similar to Gonzalez and Moral (1995), the weighted substitute price variable was defined as the Danish price level relative to the prices of destinations competing with Denmark for tourists, adjusted by the nominal exchange rate. The 'substitute price effect' was also incorporated to capture the effect of change in the relative competitiveness, because international tourism became more and more competitive during the period of the study. All the series of dependent and explanatory variables were tested for the order of integration. The results of Dickey and Fuller test indicated that most series are I(1) variables.

In order to select the most preferred tourism demand models including or excluding a time trend, two sets of relative prices and GDP, including tourism expenditure data or currencies exchanged at the border, were estimated separately. The preferred model was selected on the basis of standard deviation, t-values, expected sign, reasonable elasticity, and the absence of autocorrelation. The long-run income elasticity (based on accommodation figure equation) was found to be in the range of 0.50 (United Kingdom) to 4.25 (Sweden). The long-run average price elasticity was - 1.5, indicating that any domestic tourism price-cutting or competitive devaluation strategy would probably increase the nominal turnover of international visitors arriving in Denmark. The long-run income and own price elasticity in Germany, Denmark's most important market, at approximately 2 and -1.5, respectively, indicates that Danish tourism was considered a luxury good for price-sensitive German tourists. The null hypothesis of non-cointegration is rejected at the 95% level for Germany, the U.S.A and Sweden, implying that a well-defined long-run relationship can be found for these three countries.

The above survey of the studies with the application of cointegration techniques found that almost all studies were concentrated on the country-pairs econometric models of tourism demand. In contrast, **Vogt and Wittayakorn (1998)** attempted to investigate the effects of a weighted aggregate income and weighted aggregate relative price on Thailand's aggregate export of tourism. In Vogt and Wittayakorn (1998), an Engle-Granger two-step procedure was applied to estimate the long and short-run elasticity of the weighted aggregate income and weighted aggregate price with respect to tourism exports on an aggregate level based on a disequilibrium framework. The Vogt and Wittayakorn (1998) study of the economic determinants was exclusive: they did not attempt to examine the forecasting power of an ECM, nor did they consider any further work on future forecasting of tourism demand.

There are a few important issues to note with regard to the model specifications in the Vogt and Wittayakorn (1998) study. First, the indices of income and own price, with 1985 as the base year, were weighted with respect to the changes in the composition of Thailand's tourism expenditures for selected origin countries. Second, in accordance with the Gray (1966), Artus (1972), Little (1980), Lee et al. (1996), and other studies, Vogt and Wittayakorn (1998) applied the nominal exchange rate index as a proxy for own-price competitiveness. This is based on the hypothesis that "Prices are seldom completely known in advance by travellers, so that the price level foreseen by the potential traveller will depend predominantly upon the exchange rate of his domestic currency and hearsay evidence. Even the influence of the own price variable is undoubtedly complex, the exchange rate can be expected to be a prime indicator of expected price" (Gray, 1966). Vogt and Wittayakorn (1998) measured the own price variable using a tourism-expenditure, weighted nominal exchange rate index. However, they specified neither the choice between arithmetic and geometric averaging, nor the choice between a fixed weight and a moving weighted methodology, for their construction of the weighted index.

Vogt and Wittayakorn (1998) assumed that the demand for tourism exports was defined as a function of permanent levels of income and relative prices, instead of the current income and current relative price. Vogt and Wittayakorn (1998) tackled the problem of spurious regression with the application of Engle and Granger cointegration procedures for empirical investigation. The results of ADF unit root test statistics indicated that the level variables were I (1). The stationary results of the ADF unit root test for residuals, derived from the cointegrating regression, indicated that the underlying variables in the tourism demand models were cointegrated. According to their calculations, the estimated long-run own price elasticity of demand for Thailand's tourism exports was -0.891, and the income elasticity was 2.34. Finally, the short-run own price elasticity and income elasticity of demand was, respectively, -1.2 and 1.93. However, only the short-run price elasticity of demand is significantly different from zero.

While the previous studies concentrated on the examination of tourism demand on an international level, **Seddighi and Shealing (1997)** used quarterly data to investigate the effects of economic determinants on domestic tourism demand in the region of Northumbria in North-east England. Similar to other studies of international tourism demand models based on modern econometric approaches, they employed Johansen multivariate cointegration procedures to test for the cointegration relationship. Associated ECMs were constructed to test short-run relationships for the period from the first quarter of 1972 to the second quarter of 1992. Seddighi and Shealing (1997) also produced ex-post forecasts for the domestic tourism demand in Northumbria for the period from the third quarter of 1992 to the fourth quarter of 1994.

Seddighi and Shealing (1997) selected explanatory variables on the economic theory alone. The effect of income was represented by personal disposable income in nominal terms. For the price factors, Seddighi and Shealing (1997) seriously considered using the tourist price index. However, the own price variables were eventually represented by the consumer price index. The transportation costs variable was excluded from the study because of the problem of multicollinearity, and, because reliable data were not available.

Since this study focused on the domestic tourism demand, a few distinct features stand out. First, in the modelling exercise, the authors constructed an implied consumer price deflator for empirical investigation, derived from the total consumption expenditure on all other general goods at current prices divided by average consumption expenditures at constant prices.

Seddighi and Shealing (1997) entered the implied price deflator of total consumer expenditures into the tourism demand model as a proxy for general price index. In addition, the model assumed homogeneity of degree one, implying that domestic tourism in the region of Northumbria was a function of relative price and real total disposable income. Thus, the own relative price variable in the equation was represented by the nominal price of tourism in Northumbria, divided by the implied price deflator of the total consumer expenditures. The variable of real income was represented by the nominal personal disposable income divided by the implied price deflator of total consumer expenditure.

Seddighi and Shealing (1997) used ADF unit root tests to establish the same order of integration for all underlying variables. The results indicated that all the variables in level form were integrated of order one. The results of both trace and eigenvalue tests suggested that there was at least one cointegrating vector with respect to the underlying variables specified in the model. The long-run income and own price elasticity were found to be extremely high, with coefficients of +19.76 and -9.03, respectively.

In summary, the own price, real income, and the error-correction term were significant and correctly signed in the short-run model. The study indicated that those variables appeared to have a notable impact on the short-run demand for tourism in the region.

Seddighi and Shealing (1997) concluded that the ECM successfully predicted that the actual value results of the ex-post forecasts indicated all of the relevant turning points. However, supportive evidence from forecasting performance indicators, such as MAPE, RMSE, etc., was not available. This study contributed to the empirical literature of the tourism demand strictly in the context of domestic tourism.

Irrespective of how representative the dependent variables were, almost all of the researchers experienced considerable difficulties in classifying the number of visitor arrivals or expenditures of visitors according to the purpose of their visit. Following the pioneer studies of Divisekera (1995), the review of previous literature indicated that all of the studies that applied cointegration and error-correction approaches were based on aggregate data. Prior to the work of Kulendran and Wilson (2000b), none of the studies investigated disaggregate tourist data based on the cointegration approach, such as travel for the purposes of business or visiting relatives.

The **Kulendran and Wilson (2000b)** study was the first to investigate the relationship between the economic determinants and demand for business travel in Australia by examining quarterly data on business travel and using the cointegration and error-correction approach. Four of Australia's biggest travel and trading partners, the United States, the United Kingdom, New Zealand and Japan, were used as the tourism generating countries.

Kulendran and Wilson (2000b) used a standard tourism demand model, modified to investigate the characteristics of business travellers. They made their estimates using quarterly data in double-log form, and used the Johansen FIML approach to estimate the long-run relationship between business travel and economic determinants during the period from the first quarter of 1982 to the fourth quarter of 1996. The estimation procedures employed by Kulendran and Wilson (2000b) in this study appears to be quite similar to those of the Kulendran (1996) study.

Cleverdon (1985) and Kulendran and Wilson (2000b) selected six independent variables to investigate the effect of economic determinants on businesses tourism demand. They were the real income of the origin country, the indicators of that country's openness to trade, the real income of the destination country, real imports, holiday travel, and the relative price. The number of business travellers coming from the United States, the United Kingdom, Japan and New Zealand were selected to represent the flow of such tourists to Australia, based on their relative rankings in their international trade activity with the country. Because the data used in this study were quarterly, a HEGY unit root test was employed to check for the level of integration. The results indicated that the underlying variables had the same order of integration. Based on likelihood ratio statistics, two significant long-run relationships were identified for the United States and the United Kingdom and four significant relationships were identified for New Zealand, and only one for Japan. The results implied that New Zealand, the United States and the United Kingdom enjoyed a more stable long-run relationship with Australia than with Japan.

In the study, all estimated long-run elasticities were correctly signed. In the New Zealand and United States models, demand is income elastic (income elasticity greater than one). Likewise, the openness to trade variable showed a positive correlation with business travellers, and its elasticity showed positive and greater than one in the United Kingdom and Japan models.

However, the overall results of the preferred short-run ECM were statistically insignificant. The results indicated that all the variables except error-correction term were statistically significant at the 95% level. Therefore, we must conclude that the Kulendran and Wilson (2000) business travel study has considerable scope for further development.

Kulendran and Wilson (2000b) evaluated the forecasting power of the ECM using the benchmark NAÏVE and standard ARIMA testing models. Criteria of MAPE and RMSPE were employed to evaluate the forecasting performance of the ECM, NAÏVE and ARIMA models for the period from the first quarter of 1997 to the fourth quarter of 1997. The results of the MAPE and RMSPE models suggested that the ECMs were outperformed with other specifications in the case of the United States, the United Kingdom and Japan, while the NAÏVE model was found to be the best model in the case of New Zealand.

Dritsakis (2004) applied the Johansen's maximum likelihood approach to investigate the economic determinants of tourism demand for Greece. Dritsakis (2004) focused on two most important sources of tourism for Greece: estimations were made for tourists coming from the United Kingdom and Germany, using annual data in a logarithmic form recorded from 1960 to 2000, a period of 41 years.

In contrast to the studies of Lathiras and Siriopoulos (1998), Dritsakis (2004) selected the absolute numbers of tourist arrivals as their dependent variable. Data on real GDP per capita, real private consumption expenditure per capita, and real expenditure on consumption services were used as real income variables. Moreover, Dritsakis (2004) adopted both the relative prices and the real exchange rate variables, to represent the tourism price effect. Thus the effect of the relative price factor was reflected in both the relative price and real exchange rate variable. In contrast to Lathrias and Syriopoulos (1998), the cost of transportation variable was included.

Dritsakis (2004) applied both DF and ADF tests to discover the time-series properties of the underlying variables. The DF and ADF test results indicate that all the underlying variables in the Germany and U.K. models (with the exception of tourism price variable) are I (1) variable. The results of the trace statistics based on the VAR (3) models for both origin countries, with intercept and a linear deterministic trend indicated that there was at least one long-run equilibrium relationship for each model. The estimated long-run elasticities with respect to tourist arrivals showed that all coefficients are elastic for the U.K. model. While the real income per capita is elastic, the real transportation costs and real exchange rate are both inelastic for tourist arrivals in the Germany model.

In the general ECMs for short-run estimations, Dritsakis (2004) selected an order of lag of two for each independent variable. The empirical results of preferred ECMs indicated that the single period lag of visitor arrivals, real per capita income, real transportation cost, and real exchange rate played a significant role in determining the short-run tourism demand for Germany and the United Kingdom. All of the error correction terms of the preferred ECMs are statistically significant, with expected negative sign. Overall, the results of diagnostic tests indicated that both preferred ECMs are well specified.

4.5 Review of Econometric Models of Tourism Demand – Hong Kong Evidence (1983-2003)

Lin and Sung (1983) were considered pioneers to develop an econometric model to measure international tourism in Hong Kong. Regression models were first estimated using time series data for all origin countries, Appendix E, Table E .1, Model 1 and Model 2) for the period from 1962 to 1978. Both total tourist arrivals and aggregate tourist expenditures were selected as dependent variables. Lin and Sung (1983) regressed the two dependent variables with the moving weighted index of the per capita real national income of the origin countries, the moving weighted index of the local-currency relative price, the moving weighted index of the exchange rate, the moving weighted index of the origin countries' populations, the trade volume, a time trend, and two dummy variables.

The Lin and Sung (1983) tourism demand model assumed that the demand function was a homogeneous of degree zero with respect to own price and income. The cross-elasticity between the demand for tourism and other consumption goods and competitive destinations, with the exception of domestic tourism, is zero. Moreover, Lin and Sung (1983) developed cross-sectional models to investigate the variation of the characteristics among the twenty-eight tourist-generating countries that would affect the demand. The period of study covered 1973 to 1978 and 1974 to 1978 for tourist arrivals and tourist expenditure models, respectively (Appendix E, Table E.2, Model 1 and 2). In contrast to time-series models, the cost of transportation variable was included as one of the major economic determinants in the cross-sectional models only. Lin and Sung (1983) selected the trade volume variable based on the total value of bilateral visible trade to reflect the increasing role of business travel in Hong Kong. For an efficient estimation, the researchers developed the models with the pooled data.

In the time series model, Lin and Sung (1983) found that the income variables were elastic for both the tourist expenditure and the arrivals models, as indicated in Appendix E, Table E.1, Model 1 and Model 2. The income elasticity with respect to tourist expenditures was found to be 1.9, while the income elasticity with respect to the tourist arrivals was as high as 3.9, as also indicated in Appendix E, Table E.1, Model 1 and Model 2. The price elasticity in the tourist expenditure model was –1.4, while the price elasticity in the tourist arrivals models was found to be -0.77. The time trend variable was finally dropped in both equations, because of its high correlation with the income variable.

Apart from the estimation of the visitor arrivals and expenditures equation, to obtain the equation of per capita tourist expenditures, Lin and Sung (1983) subtracted the equation of tourist arrivals from that of tourist expenditures. The empirical results of the study's tourist expenditures equations are shown in Appendix E, Table E.1, (Model 3). The results of the per capita tourist expenditure equation indicated that the estimated income elasticity was -1.99. The estimated relative price elasticity was -0.6, while the exchange rate elasticity was -1.2. The negative sign of the income elasticity was not surprising because the number of short-haul travellers (less per-capita expenditures) grew faster than that of long-haul travellers (more per-capita expenditures).

Since the estimation procedures are different from the time-series and cross-sectional models, the regression results of the Lin and Sung (1983) cross-sectional models are presented separately in Appendix E, Table E.2.

In contrast to the results based on the time-series models, the results of the cross-sectional regression models showed that income variables were elastic in both tourist expenditures and arrivals. The income elasticity of tourist expenditures lay in the inelastic region, ranging from 0.284 in 1974 to 0.246 in 1976 (Appendix E, Table E.2, Model 1), while income elasticity of tourist arrivals were ranged from 0.32 in 1973 to 0.205 in 1977 (Appendix E, Table E.2, Model 2). It is consistent with past empirical tourism demand literature that the income elasticity derived from cross-sectional data was much smaller than the time-series data. However, the transportation cost elasticity was similar for both tourist expenditures and arrivals models, ranging from -0.84 in 1975 to -0.96 in 1978 (Appendix E, Table E.2, Model 1).

The results indicated that the transportation variable is also an important determinant in the tourism demand models. Moreover, trade elasticity lay between 0.619 in 1974 to 0.582 in 1977 (Appendix E, Table E.2, Model 1), while population elasticity, which only appeared in the tourist arrivals equation, ranged from 0.21 in 1976 to 0.27 in 1974 (Appendix E, Table E.2, Model 2).

In analysing the models with pooled cross-sectional data (Appendix E, Table E.2, Model 1 and Model 2), the regression results indicated that all of the underlying variables were inelastic in both the models of tourist arrivals and expenditures.

The income elasticity with respect to tourist expenditure and arrivals was 0.278 and 0.247 (Appendix E, Table E.2, Model 1 and Model 2), respectively. The estimated population coefficient was 0.24 in the pooled data models of the tourist arrivals equation, which was slightly less than the estimated per capita income coefficient of 0.247 (Appendix E, Table E.2, Model 1 and Model 2). Finally, the trade volume and transportation elasticity, with respect to the pooled data of tourist expenditures and arrivals, were 0.570 and 0.573 and -0.885 and -0.88, respectively.

There were certain limitations of the Lin and Sung (1983) study that are worth mentioning. In the time-series models, Lin and Sung (1983) placed the entire emphasis on economic determinants, neglecting the other underlying factors that affect the propensity to travel. Moreover, the use of CPI as a proxy for national income deflators and tourist price indices has the potential of being unable to reflect actual prices faced by the tourist, and it may affect the overall results. In addition, Lin and Sung (1983) omitted the 'substitute price effect' in their study. Another serious problem with this study was the problem of spurious regression, which was caused by the non-stationary properties of the time-series data in level form. Lin and Sung (1983) seemed not to address any remedies for those econometric problems, which could lead to a bias, and hence inaccurate and unreliable results.

Similar to other tourism demands studies published in the 1980s, Lin and Sung (1983) model has only 13 degrees of freedom in their time series model, that was small when developing the econometric model for analyzing tourism demand.

We believe there is strong need to re-develop an econometric model of tourism demand for Hong Kong, applying the more advanced econometric techniques that are available today, to improve the reliability of parameter estimates and the forecasting performance of the Lin and Sung (1983) model.

Qu and Lam (1997) developed econometric time-series models to identify the determinants of the travel demands of Mainland Chinese arriving in Hong Kong during the period from 1984 to 1995. The researchers applied a stepwise multiple regression approach to select the 'best' subset of seven exogenous variables. It is possible that their choice of the stepwise strategy was made because there were only twelve annual observations in their models.

The seven exogenous variables included four dummy variables, per capita disposable income in China, relative consumer price index, and exchange rate in a linear form. Similar to Lin and Sung (1983), Qu and Lam (1997) excluded the cost of transportation variable from their study. The four dummy variables were the introduction of package sightseeing tours (1987), the 4th June incidents in Beijing (1989), the Gulf War (1990), and the relaxation of visa requirements (1993). However, Qu and Lam (1997) did not include the real trade volume variable in their models.

Qu and Lam (1997) found that, of the seven exogenous variables, only the disposable income and relaxation of visa requirements variables were statistically significant to tourist arrivals from the mainland. These were selected and used in the preferred model to explain the travel demand for Mainland Chinese tourists. These explanatory variables were selected based on the criteria imposed by the stepwise multiple regression strategy. The estimated results from the final equation indicated that the model explained 99% of the variation in the number of Mainland Chinese tourist arrivals.

The relative ratio of the Beta2 value between the two selected variables in the final model suggested that the variable of disposable income per capita had more than 26 times the impact of the relaxation of visa requirements on tourist arrivals in 1993. Therefore, Qu and Lam (1997) concluded that the variation of income was the most important factors affecting inbound tourists from China to Hong Kong. Furthermore, the diagnostic tests of the variance inflation factor and the Durbin-Watson test indicated that there was no significant effect of multicollinearity or autocorrelation.

It is important to note that the results of the Qu and Lam (1997) study should be interpreted with considerable care, as there were only nine degrees of freedom available, which was very small when developing the econometric model for determining tourism demand.

Although most previous empirical studies were based on the results of both econometric and time series models, **Law and Au (1999)** employed an alternative modelling strategy to forecast tourism demand. They used a supervised feed-forward neural network model to forecast the number of Japanese tourist arrivals in Hong Kong for the period from 1967 to 1997. The forecasted figures of Japanese tourist arrivals, as derived from the neural network model, were compared not only to actual tourist arrivals, but also to a forecast value derived from various alternative model specifications including OLS, NAÏVE, moving average, and single exponential smoothing. They employed the predictive criterion of the MAPE to evaluate the forecasting accuracy. The only node that appeared in the output layer was the Japanese travel demand, represented by the number of Japanese tourists flowing into Hong Kong. Alternatively, a total of six nodes were found in the input layer of the neural network. The six nodes were the relative service price index, the foreign exchange rate, the real gross domestic expenditure per capita, the average hotel rate in Hong Kong, the population in Japan, and marketing expenditures. Similar to the Lin and Sung (1983) and Qu and Lam (1997) studies, the researchers excluded transportation costs, due to a lack of available data.

Twenty samples were randomly selected to form a training set among the thirty samples entities. The remaining ten nodes were used as comparison tools to measure the forecasting accuracy between the actual data and the predicted value, as derived from the neural network model.

The results assessed by the MAPE criterion indicated that the forecast value derived from the neural network reflected the variation with the actual data very closely. Moreover, Law and Au (1999) compared the forecast values based on the neural network model with the forecast values derived from other alternative specifications. The empirical results of MAPE showed that the neural network models produced better forecasts than the forecasts generated from the NAÏVE, multiple regression, exponential smoothing, and moving average models.

This study could be regarded as a first attempt to forecast visitor arrivals in Hong Kong from Japan, based on a neural network model. Law and Au (1999) fully utilised the strength of using a neural network model to forecast a small sample in this study. However, the neural network model has constraints in yielding parameter estimations and evaluating the significance of the determinants of the tourism demand, as compared to the multiple regression or cointegration and error-correction approaches. In the estimation procedures used to produce ex-ante forecasts of dependent variables, a neural network model was required to produce accurate forecasts using independent variables.

Hiemstra and Wong (2002) employed the tourism demand models that included indicator or dummy variables to investigate the economic determinants of inbound tourism demand in Hong Kong. Monthly data was used to give sufficient data points for analysis after the onset of the Asian financial crisis in the last quarter of 1997 and the change in sovereignty of Hong Kong that occurred in July 1997. In addition, the researchers desired to keep the overall length of time studies as short as possible because of the dynamics of the industry and policy and structural changes affecting tourism in both Hong Kong.

The researchers chose January 1990 to December 1998 for their estimation. The set of origin countries as selected by the researchers included Japan, Mainland China, Taiwan, Thailand, Australia, the United Kingdom, and the United States. These markets account for nearly 80% of total tourist arrivals in Hong Kong during the period studied. The income and price-type variables were employed in the Hiemstra and Wong (2002) study. Those variables were real GDP per capita, own price variable and market exchange rate variable. In the Hiemstra and Wong (2002) study, the substitute price variable was also included to investigate the 'third country' competitive effect in the model. The weighted substitute price index was defined as a tourism price index in Hong Kong relative to prices in a predetermined set of major substitute destinations. Wage rate variables were included as a refinement upon GDP data and a proxy for disposable income, while the short-term interest rate variable was introduced to reflect the current status in time t within the business cycles. Finally, the researchers included two indicator variables and one dummy variable that capture the effect of seasonality, the effect of devaluation of Asian currencies after Asian financial crisis, and the effect of turnover of sovereignty.

Hiemstra and Wong (2002) found that the models fitted the data reasonably well, with total R^2 ranging between 0.727 for the Taiwan model to 0.931 for Mainland China's model. The income variables were statistically significant for Australia, Mainland China, Taiwan and United States models. The demand was income elastic (an income elasticity greater than one) for the Australia and Mainland China model, while the demand was income inelastic (an income elasticity less than one) for United States and Taiwan. Amongst the price-type variables, the results suggested that the real exchange rate variable was most relevant in explaining tourism demand in Hong Kong. In addition, the interest rate variable was statistically significant in Mainland China, Japan and Taiwan. Moreover, the results of the dummy variable suggested that the coefficient of sovereignty turnover variable was statistically significant for all models at the 90% level (with the exception of Thailand). Finally, the variable for the effect of seasonality was found to be a factor in explaining tourist arrivals in Hong Kong. Himestra and Wong (2002) suggested that there are several opportunities for further research that could improve the findings of their study. Those include the new way of measuring prices related to tourism and the development of cointegration models.

Song and Wong (2003) was the first tourism demand study to develop an econometric model of tourism demand in Hong Kong based on a Time Varying Parameter approach. The researchers' Time Varying Parameter procedures allow for the relaxation of the assumptions of parameter constancy in the traditional ordinary least square method. Based on the estimation procedures of the approach, the Kalman Filter method was applied to deal with the behaviour change of tourists' overtime. Song and Wong (2003) focused on six important long-haul origin countries for Hong Kong: estimates were made for tourists coming from the Australia, Canada, France, Germany, United Kingdom and United States, using annual data from 1973 to 2000, a period of 28 years.

Song and Wong (2003) selected the tourist arrivals from the selected origin countries as their dependent variable. The GDP instead of personal disposable income was selected to represent the effect of income, because the tourist arrivals data contain a relatively large proportion of business travellers. Similar to Kim and Song (1998), Song and Wong (2003) adjusted the relative consumer price index to the corresponding exchange rates to reflect the relative cost of living in the destination. Their substitute price variable was represented by a weighted index of selected countries and regions. China, Taiwan, Singapore, Thailand, Korea and Japan were considered to be the substitute destinations based on geographical and cultural characteristics. Finally, China was excluded in the construction of substitute price index due to the limited availability of the data. Thus, the substitute price index was calculated by weighting the exchange rate-adjusted relative consumer price index of each of the five substitute destinations, according to the share of international tourism arrivals for each of them in the total international tourism arrivals across all five countries.

The empirical results indicate that the own price and substitute price variables are statistically significant at the 95% level in all models, while the income variable is statistically significant at the 99% level for all models, except for the Australian model. Song and Wong (2003) found that the long-run income elasticity was quite elastic for all origin countries except Australia, ranging from 0.233 (Australia) to 2.907 (United States and Canada). However, the results indicate that Hong Kong tourism demand is price inelastic for all origin countries, with the exception of the United States, ranging from -0.175 (Germany) to -1.013 (United States). The values of substitute price elasticity were mostly low, with the exception of German model. In addition, Song and Witt (2003) attempted to investigate the evolution of the demand elasticites over time. The diagrams of Kalman Filter estimates of coefficients indicate that the income elasticity, own price elasticity and cross-price elasticity change over the estimation period. For example, the income elasticity was 2.5 to 3.0 for the U.K. model, and 3.0 to 4.0 for the U.S. model, during the period from 1975 to 1985. However, the value declined to around 1.8 for the United Kingdom and 2.2 for United States in 1990, and it remained constant until 1997 for both countries. After 1997, the income elasticity increased to 2.1 for the United Kingdom and decreased to 1.70 for the United States in 2000. In conclusion, the empirical results of Song and Witt suggested that the Time Varying Parameter approach is more appropriate than the traditional modelling approach in analysing tourism demand.

4.6 Critical Appraisal of Empirical Literature of Tourism Demand Estimation

The reliability of parameter estimates obtained from previous econometric models of tourism demand differed in the selection of appropriate explanatory variables, the method of measurement of economic variables, the frequency of data, the soundness of the modelling strategy, and the estimation procedures applied to modelling and forecasting. Our review of the various econometric models of tourism demand indicated that there is currently room for further improvements to develop a modern econometric model to estimate tourism demand. This is consistent with the findings of Witt and Witt (1995) and Hiemstra and Wong (2002) that considerable scope exists for improving the model specification techniques employed on econometric forecasting of tourism demand.

Our review indicated that, with regard to the selection and measurement of economic variables, selecting and measuring an income proxy is somewhat problematic. In particular, the decision to make long distance travel plans involves a large expenditure on the part of the tourist, and is not only influenced by the tourist's current annual income, but also the expected future stream of income. Regardless, most previous researchers only captured the effect of the current year's income, without considering the tourist's expectation of future streams of income in their tourism demand equations. The assumption about the use of current income variable reflected the behaviour of only those tourists who were not forward looking in making travel decisions. Thus, the predominant use of the current-year income variable in the tourism demand model may not be quite appropriate, leading to some theoretical and empirical fallacies.

Some studies attempted to use the permanent income index, compiled from the geometric average of past income, in their tourism demand models. However, with regard to the quantitative measurement of the permanent income index, our review indicated that the selection of the weighting factor in the construction of permanent income index appears to be somewhat arbitrary, and did not necessarily indicate any economic or statistical justification.

If travel decisions required large expenditures on the part of a tourist, a variable representing the asset wealth position of tourists appears to be an important missing variable in previous econometric models of tourism demand. Our review of literature indicated that none of the previous studies attempted to include a proxy for a tourist's asset wealth position, nor did any variables reflect the expectation of future capital income of the tourist in the tourism demand model under the permanent income- life cycle hypothesis (PI-LCH). Therefore, it is particularly important to include terms to represent the process in which a tourist's decision-making changes with respect to the wealth (asset wealth) and the expectation of the discounted present value of future income (human wealth).

Apart from the income and asset wealth variable, the price type variables are another important determinant in tourism demand equations. Our review of empirical literature indicated that the own price variable was normally included in the tourism demand equation in the form of market exchange rate, relative price, or the real exchange rate. However, the price of competing/complementary destinations has at times been ignored as a variable of substitute price in the models. In addition, a potential tourist could make the selection of one tourist destination over another based on price, or whether or not he/she can afford it over something else as a luxury item. For example, European or American tourist may have to decide whether he or she would prefer to purchase a new plasma TV set or take a vacation in East Asia. Previous studies normally excluded the possibility that a tourist might substitute tourism for other luxury items.

Some studies did investigate the effect of substitute price: however, the definition of the substitute price was consistently unclear. The omission of the substitute price variable in previous literature led to the problem of specification bias, as indicated by Taplin (1982). He suggested that, unlike consumers choosing goods and services that they consumed on a daily basis, and where habit-persistence provides a motivation to ignore substitutes, tourists take a different approach when deciding to visit abroad. For those studies in which the substitute price index of a range of competing destinations was included in the tourism demand models, the substitute price indices generally lacked the support of a well-argued economic rationale and/or statistical justification.

We found that the majority of the past studies have failed to investigate empirically the appropriate functional form of selected tourism demand model. The functional form has not received proper treatment because most researchers have considered it as unimportant. Although the common use of the log-linear functional form was based on the traditional import and export demand function, this universal agreement has more recently been challenged by statistical experimentation. For example, the Qiu and Zhang (1995) study, which measured inbound Canadian tourist flows, has failed to support the traditional view that the log-linear form is necessarily better than the linear functional form. We therefore believe that there should be more investigation into the validity of the commonly used log-linear functional form of econometric modelling for tourism demand.

Apart from uncertainties arising from lack of precision in the measurement of the variables and the functional form, a majority of the previous studies of tourism demand normally selected their independent variables on an ad hoc basis. It is possible that this modelling strategy might result in mis-specifications in the equations, and create biased results, because relevant independent variables were omitted. More importantly, most parameter estimates appearing in the literature before the mid-1990s were mostly obtained from models which output estimates using the classical OLS procedures. In this regard, the reliability of such past studies may be questioned also on technical grounds. Researchers often used time-series data in level terms for analysis, with the OLS procedures to obtain the estimates of coefficients. However, it is highly possible that spurious regression may be detected if a non-stationary process follows the level term of time-series data.

Until the late 1980s, the problem of spurious regression was likely to be solved using new advancements in time-series econometrics. Since 1995, econometric studies of tourism demand started to apply the cointegration approach to their models to forecast tourism demand. However, those econometric models of tourism demand, which are based on cointegration and error correction approaches, remain far from perfect. The Engle-Granger (1987) and Johansen (1988, 1991, 1995) and Johansen and Juselius (1990, 1992) approaches, for example, required that all the underlying variables be integrated in the same order. Our review of the literature indicates that, in some of the studies, it is questionable whether or not the same order of integration is followed for all underlying variables. As well, more and more research is indicating that the popular unit root tests generally lack power. Thus, there is a need to look for alternative approaches for further investigations into tourist demand.

Cointegration analysis, as proposed by Pesaran and Shin (1998), can be considered an alternative that can be used to tackle the problem of unit root tests, to ensure the reliability of the estimated parameter. However, our review of empirical literature did not indicate any empirical evidence proving this possibility, based on the Pesaran and Shin (1998) approach.

In our review of previous studies of international tourist flows to Hong Kong, we cannot exclude the possibility that the previous models experienced problems with spurious regression. Moreover, we believe that there is room for improvement in the measurement and specification of income and price variables in these studies. Overall, the previous results may be biased because of the omitted variables, the use of inappropriate proxy variables and the inappropriateness of the econometric procedures used, because the researchers did not consider the properties of the time-series data. As a result, the parameter estimates and econometric forecasts generated from those previous models may not be reliable and accurate. We believe there is urgent need to develop an econometric model of tourism demand in Hong Kong, applying the cointegration and error correction approach.

4.7 Chapter Summary

In this chapter, we have reviewed the relevant empirical literature of single equation tourism demand estimation, focusing on the cointegration and error correction approach. Our survey of literature indicates the possibility of significant errors in the measurement and specification of income and price-type variables in the tourism demand models. Our review also suggests that independent variables of some previous studies were included without discussion of the role of such factors within the special context of tourism demand. We examined the choice of income proxies, and found that the predominant use of current income alone has led to some theoretical uncertainties. In addition, we found that the effect of the substitute price should be re-estimated with an improved measured form of the weighted substitute price index. More importantly, we suggest that long-haul travel decisions, which incur significant costs for the visitor, are not only influenced by current income, but also by tourists' future expectations of income and their position of asset wealth.

We also question the reliability of the econometric approaches of some of the existing studies. Some employed the OLS method to obtain their parameter estimates, despite the fact that those estimated. equations were subject to the problem of spurious regression. Although cointegration analysis has been widely suggested as a solution to spurious regression, there is a recognised problem in relying on unit root tests as a pre-test in building a model, because of the lack of power in the test. In summary, we concluded that if there are errors in measurement and specification of major variables, such as the inappropriate ways of measuring income and price variables and econometric procedures, such as inappropriate uses of OLS procedures, Engle and Granger or Johansen procedures in estimating the non-stationary variables, the final parameter estimates will be biased, inefficient, or inconsistent and are possibly generate an inappropriate value. Overall, our review of tourism demand literature strongly indicated that there is a need to re-examine the economic determinants of tourism demand, and to produce more reliable parameter estimates and accurate econometric forecasts of inbound tourism demand.

In the next chapter, we will review and thoroughly discuss major conceptual and theoretical issues in relation to the methodology of developing an econometric model of tourism demand.

Chapter 5 Research Methodology

5.1 Introduction

In the last chapter, we reviewed the major studies of relevant econometric models of tourism demand based on single-equation approach. Our review of the empirical literature indicated that there is a need to re-examine some of the models and their results. Following a brief review on the modelling and forecasting framework of the tourism demand, our main task is to develop an improved version of an econometric model of tourism demand. In addition, we also present the research methods and the procedures we have employed in this study.

The chapter is arranged as follows: Sections 5.2 and 5.3 explore the major econometric approaches used to model and forecast tourism demand. Section 5.4 is a re-examination of the significant role of income, price-type and wealth variables in the tourism demand model. Section 5.5 presents the specifications of the single equation econometric models of tourism demand, based on a cointegration and error correction approach, used to estimate and forecast tourism demand in Hong Kong. Sections 5.6 to 5.9 are an explanation of the empirical procedures we have used to model and forecast Hong Kong's tourism demand, and Section 5.10 is the chapter summary.

5.2 Selection of Modelling Methodology

One of the major topics in the tourism economics literature is the tourism demand estimation and forecasting based on quantitative approaches. As special cases of econometric models, some earlier tourism demand estimation studies in the 1970's used the gravity models or trip-generation models (Laber, 1969, and Crampton and Tan, 1973) to estimate tourism demand. Crouch (1994a) mentioned that geographers typically employ gravity model approach which focuses on geographic and demographic factors in estimating tourism demand. For those earlier gravity type model studies, Uysal and Crompton (1985a) point out that those models are somewhat similar in form to regression models, except that they focus more on the effects of distance or journey time as a constraint that affects travel. However, Uysal and Crompton (1985a) indicated that it is not popular because of a number of weaknesses. First, distance alone may not always be an accurate measure of frictional retardation. Second, there was lack of accuracy of basic data, and danger of multicollinearity. Third, there was difficulty of forecasting individual explanatory variables in the gravity-type models. In a similar study, Witt and Witt (1995) indicated that the Gravity model is not particularly popular in recent years, because it lacks a firm theoretical foundation and the final form of the gravity model closely resembles the demand function.

During the last three decades, there have been a significant number of econometric models of tourism demand, such as the AIDS models, that are based on the system of equations approach and appear frequently in empirical tourism demand estimation literature (White, 1985, Sypripoulos and Sinclair, 1993, De Mello, 2002 and Durbarry and Sinclair, 2003). The AIDS model embodies the principles of consumer demand theory and is appropriate for estimating tourism demand in the form of expenditure shares in a range of destinations, to which the major shares of expenditure are attributed. Although this approach has strong theoretical foundations for tourism demand estimation and is excellent for testing of economic theories, it is technically inflexible, because each estimating equation must incorporate the same independent variables, functional form and lag structures for the equations to be estimated simultaneously.

In addition, system equations models of tourism demand must make an assumption that tourist make decisions according to its 'axioms of consumer choice'. "These state that an increase in price results in lower demand (negativity), the sum of individuals expenditure is equal to total expenditure (adding up condition), the sum of individual proportional change in expenditure and all prices have no effect on quantities purchased or the budget allocation (homogeneity), and the consumer's choices are consistent (symmetry)" (Sinclair and Stabler, 1997).

In the context of the microeconomic foundations of the system equations model, the definition of tourism demand as expenditure is preferred to the absolute number of arrivals. However, Artus (1972) indicated that the availability and poor quality of data on tourist expenditure limits the applications of the AIDS model in the econometric analysis of tourism demand. In addition, because of the limitations on the degrees of freedom in the context of a large numbers of independent variables, the model is more suitable for modelling and forecasting in a small number of destinations. Although De Mello (2002) considered and tested the dynamic factors in their system equations models, for some earlier models based on system of equations approach, the greatest weakness of the complete system demand studies was their failure to take account of dynamic factors in the tourism demand equations.

Due to the inherent limitations of the gravity and the system equation models, researchers exploring quantitative models of tourism demand have instead focused on the application of a single equation model of tourism demand, estimated within a static context. Those users of single-equation models, such as Gray (1966), Artus (1972), Bond (1979) and Uysal and Crompton (1984), generally justify their decision on the basis that, with regard to the modelling of international tourism demand, the explanatory variables can be assumed to be predetermined: the analyst can ignore the problem of simultaneity of supply and demand, because the smaller demand by foreigners for tourism services, compared to the demand by nationals, causes supply to be largely perfectly elastic. Similar to the system equations models, the methodology of this single equation approach was also far from perfect. First, regression models of tourism demand must make assumption that the underlying variables in the model must be stationary. Second, the error terms of the regression model must normally be distributed with a zero mean, a constant error variance, and must not correlate with each other. Although we have seen that in the single equation context the importance of dynamic factors has acknowledged by introducing some lagged variables, many single equation tourism demand model paid less attention to the possible non-stationarity of income and price variables.

In addition, a review of the empirical performance of classical regression model, as written by Nelson and Plosser (1982), stated that the empirical evidence of the regression models was, in fact, discovered to be in contrast to the classical assumptions of regression models. Nelson and Plosser (1982) found that the economic time series data used in regression models were actually not stationary in their level terms. In a recent study on tourism demand in the East Asia and Pacific region (EAP), Chu (1998) produced results that were consistent with those of Nelson and Plosser (1982). Chu (1998) found that most time-series economic data and tourist arrivals data in level form in the Asian-Pacific countries were non-stationary. This means that if an economic series is not stationary, its mean, variance and covariance may change with respect to time. The classical OLS procedures appeared to overlook these characteristics, the results of such modelling are open to the criticism of spurious regression.

5.2.1 Shortcoming of Traditional Econometric Methodology – Problem of Spurious Regression

Spurious regression normally refers to estimating models that produce very high R^2 and t statistics, even when no meaningful relationship exists between the two sides of the equation (Granger and Newbold, 1974). The high level of correlation between underlying variables actually reflects the trend components existing in the time series model rather than the true causal relationship between the underlying variables. In this regard, the F-statistic is not capable of explaining the variation of the dependent variables in the model, because it does not follow Fischer's F distribution under the null hypothesis. It follows that if a researcher ignores the time series properties of the underlying variables, an OLS estimator could be biased and inconsistent. The findings of the econometric models of tourism demand in Hong Kong by Lin and Sung (1983), as examined in the previous chapter, may thus not have revealed a true long-run relationship between the level of tourism demand and its economic determinants. These studies are therefore open to the spurious regression criticism.

In developing more reliable econometric models, researchers have tried to apply a 'differenced variable' approach to tackle the problem of spurious regression, instead of the level variables. This assumes that most differenced variables follow a stationary process. Although the method of 'differencing' satisfies the stationary condition, the economic inferences derived from such estimated parameters have little significance. This problem is even more serious if the regression model's underlying variables exhibit a long-run equilibrium relationship, because the relevant long-run information may be lost after the differencing procedures have been completed.

Davidson et al. (1978) suggested an alternative solution for the spurious regression problem, involving the use of an 'error correction mechanism' with the application of Hendry-type testing down procedures. The first step of this solution is to use a general auto-regressive distributed lag model that is capable of retaining the lost long-run information by combining level variables and the differenced variables in the same estimated model. The insignificant variables will be deleted until the most preferred model is derived. However, the Davidson et al. (1978) 'general to specific' methodology is not without problems, because even if the long-run information can be captured, the level terms may not necessarily follow a stationary process. If the level terms are not stationary, the problem of spurious regression remains unsolved.

5.2.2 Merits of Modern Econometric Methodology – Cointegration and Error Correction Approach

Our review of literature indicates that the time series variables in the tourism demand equation are most likely to be non-stationary, we therefore consider the cointegration approach to account for the possibility of spurious regression. The cointegration approach, developed by Engle and Granger (1987), could be regarded as the most feasible solution for tackling spurious regression. Engle and Granger (1987) define the cointegration state as two (or more) series of data, linked to form an equilibrium relationship and moving closer together over time, resulting in the difference between them being stationary, even if the individual series is non-stationary. Their advancement of this approach has permitted subsequent researchers to examine equilibrium relationships of underlying variables without encountering spurious regression problems. In this approach, information about long-run relationships between underlying variables is retained in the (stationary) cointegrating vector. If the underlying variables are cointegrated, an adjustment process must be employed to prevent an error in the long-run relationship considered more significant over time.

While the differencing approach contains only short-run information, a co-integrating vector comprises the parameters of a long-run equilibrium relationship, and corresponds to the parameters of the error correction term in the error correction model. It is therefore almost certain that estimating a dynamic equation using a differenced variable alone in the modelling process to estimate a dynamic equation is not an acceptable solution for solving spurious regression. Technically, an ECM is a better model, because it contains information on the model's short- and long-run properties, and employs disequilibrium error as a process of adjustment.

There are several advantages of using the error correction model to investigate tourism demand in this study. First, if a set of variables is cointegrated in the same order, there exists a valid error correction representation of the data (Engle and Granger, 1987), on the basis of the 'Granger Representation Theorem'. Second, the ECM contains a set of level terms that are cointegrated to give a stationary error term. As well, the cointegration and error correction approaches are capable of capturing a more complicated dynamic process than the static OLS approach that concentrates on the long-run equilibrium relationship. Finally, a cointegrating vector offers highly consistent estimates of long-run equilibrium vectors. Stock (1987) demonstrated that OLS estimates are highly consistent if the economic time series in an equation are cointegrated. The cointegration and error correction approaches have thus been used effectively as a remedy for the problem of spurious regression.

The cointegration and error correction models have been used successfully in some areas of economics since the late 1980s. However, these models have only been applied quite recently in the tourism demand literature. Since the mid-1990s, two main cointegration approaches have been used to model and forecast tourism demand: the Engle and Granger (1987) residual-based approach, (Engle and Granger approach, hereafter) and the Johansen maximum likelihood approach (Johansen, 1988, 1991, 1995) and Johansen and Jusselius (1990, 1992). (Johansen approach, hereafter).

Other procedures are also available to test the existence of long-run relations. Park (1992) introduced the auxiliary regression procedures and Stock and Watson (1988) investigated the stochastic common trends approach. More recently, Pesaran and Shin (1998) had developed the autoregressive distributed lagged modelling approach of cointegration analysis. All are alternative approaches that can be effectively used to model and forecast tourism demand.

5.2.3 Cointegration Analysis of Tourism Demand – Selection of Engle and Granger and Johansen Approaches

Although the Engle and Granger approach had been used to test for the existence of long-run relationships in tourism demand equations, there are several disadvantages to this technique. First, if more than one cointegrating relationship exists among the underlying variables, the approach is only able to obtain 'a linear combination of these vectors'. This means that the model does not provide a means of analysing the number of possible cointegrating vectors, and instead relies heavily on super-convergence results. Second, Banerjee et al. (1986) ascertained that static OLS cointegrating regressions might have substantial bias in some small sample estimations. The researchers did indicate, however, that the Engle and Granger approach is effective when used to analyse long-run cointegration relationship.

The Johansen FIML approach, alternatively, provides a unified framework for the estimation and testing of cointegrating relations, and is a particularly worthwhile tool in a multi-variable context. Philips (1991) proved that the Johansen maximum likelihood estimator was highly consistent, symmetrically distributed, and asymptotically median-unbiased. Thus, the Johansen FIML approach should be considered the powerful tool for the testing of the stable long-run relationship in a multi-variable context. Subsequently, Gonzalo (1994) produced results that were similar to Philips (1991). The researcher found that the Johansen maximum likelihood procedure performed better than other estimators, including the Engle and Granger (1987) ordinary least square procedure and the Stock (1987) non-linear least square procedure. However, Johansen approach is not without problems. Technically, the maximum likelihood procedure is an asymptotical efficient estimator. Therefore, when the Johansen procedures are applied to small sample, the parameter estimates will be subject to small sample bias. Since this study will be using 16 to 41 annual observations, it is on the borderline for concern about this small sample problem. We decide to consider both Engle and Granger and Johansen approaches to account for the possibilities of multiple long-run relationships and sensitivity to small sample problems.

5.2.4 Cointegration Analysis of Tourism Demand – Selection of Pesaran Approach

Recently, there has been growing consensus that the popular unit root tests used lack power. Either the estimation procedures of Engle and Granger or the Johansen FIML approach require prior knowledge of the order of integration of underlying variables (the number of unit roots). Based on the

Engle and Granger and Johansen FIML approaches, the pre-modelling testing for the order of integration is technically the first essential step required to determine long-run cointegration relationships and the subsequent estimation using the preferred ECM. This introduces a further degree of uncertainty into the analysis of long-run relationship, because there is considerable doubt as to the properties of power and size of the traditional DF/ADF unit root test. Moreover, the power of the DF/ADF test is likely to be low when moving average terms are present or where the disturbances are heterogeneously distributed.

The bound testing procedure, developed by Pesaran and Shin (1998), could be regarded as an alternative solution to the Engle and Granger and Johansen FIML approaches, both of which create uncertainty in identifying the correct order of the integration of the underlying variables. The Pesaran and Shin (1998) model has the potential to tackle empirical uncertainties resulting in low power within the unit root testing procedures. The bound testing procedure is a single equation estimation technique in which the traditional ARDL approach has been rehabilitated and used in a time series econometric modelling format. This approach, however, has merits, because of its assumptions of available testing procedures, irrespective of whether the underlying variables are I(0), I(1), or mutually cointegrated. More importantly, Banerjee et al. (1993) have shown that an ECM-based cointegration test will be more powerful than the residual-based Engle-Granger test, and will generally give unbiased estimates of the long-run relationship and standard t-statistics for conducting statistical tests of significance. In addition, Pattichis (1999) concluded that the Pesaran test is expected to be very useful in applied studies that cannot use the maximum likelihood estimation procedures suggested by Johansen, due to a small sample size.

In contrast to the other two traditional approaches, which have been widely used, the Pesaran procedure has rarely been applied in any structured tourism demand study that focuses on examinations of economic determinants.

5.3 Selection of Forecasting Methodology – Merits of Dynamic ECM Forecasting

Contemporary tourism demand forecasting models fall into two major types: qualitative and quantitative approaches. Qualitative methods are called 'judgmental methods'. For example, an expert-opinion technique stresses the importance of the qualitative insight that allows the expert opinions of selected participants to be expressed under certain specified conditions.

Quantitative forecasting methods can be classified into two main categories: causal methods (single equation ECMs, regression models and system equations models, etc.) and time-series models (AR1 and ARIMA, etc.). Causal modelling techniques in tourism demand are used to identify the relationship between dependent variables (tourism demand) and independent variables (economic and social/political determinants). Time-series modelling techniques, on the other hand, involve the use of past information taken from a time-series to forecast value at a future time. Time-series tourism demand forecasting methods thus rely completely on the past performance data to forecast future events.

While the time-series specification is developed solely for forecasting purposes, causal econometric models are also capable of investigating cause-and-effect relationships. Unlike the time-series models, the causal model allows the researcher to undertake forecasts with respect to alternative scenarios under the condition of what-if forecasting in the context of performing future forecasts. Previous literature on tourism demand often suggested that econometric models might be considered for forecasting purpose. However, most studies focused mainly on the investigation of the economic determinants of tourism demand. Even if some causal models were applied for forecasting purposes, the concentration of their use was on evaluating the forecast accuracy over the period of ex-post forecasting. Ex-ante forecasting (future demand forecasting) with alternative scenarios has been rarely investigated.

As for empirical evidence, the empirical results of Witt and Witt (1995) concluded that the forecasting accuracy generated from the causal model using the classical regression technique was below average. The forecasting results generated from OLS models were less accurate when compared to the NAIVE model and other time-series specifications, such as ARIMA. This is consistent with the findings of Makridakis (1986), who said that econometric models are not necessarily more accurate forecasting tools in some areas of economics and business when compared to certain time-series models. However, Witt and Witt's (1995) conclusions were drawn from a review of empirical results of tourism demand models with a classical econometric approach that dominated the quantitative studies of tourism demand estimation over the period from 1970 to 1994.

Researchers started to apply the cointegration approach to modelling and forecasting economic time-series data in the late 1980s. Engle and Yoo (1987), for example, showed that the ECM performed reasonably well in the medium-to-long-term forecasting horizon. In a similar study, Hoffman and Rasche (1996) indicated that the ECM outperformed other estimators in the longer term forecasting horizon. In the context of tourism demand modelling and forecasting, Lathrias and Syriopoulous (1998) also demonstrated in their study that the ECM possessed good forecasting power when predicting tourism demand. In a similar study, Kim and Song (1998) found that when they used an ECM instead of the classical regression model (OLS), its power seemed to outperform other time-series models in forecasting tourism demand in some of South Korea's selected tourist-generating countries. This supports the hypothesis that the forecasting accuracy of the econometric model could be possibly improved by using the cointegration and error correction approaches.

5.3.1 Selection of Forecasting Methodology – Merits of Scenario Forecasting

In contrast to the time-series model, either a static regression model or a dynamic ECM model is required to generate the forecast value of independent variables over the estimation of future demand. Normally, a standard ARIMA model is applied to forecast the future value of the independent variables (economic determinants). However, the ARIMA's baseline forecast is unable to generate reasonable results when there are structural changes of an economic environment. Examples of this are the first and second oil crisis, Gulf war crisis, and the 1997 Asian Financial Crisis.

Alternatively, when faced with a volatile economic environment, the scenario-type forecasting method is capable of generating alternative forecasts using 'what-if' scenarios. With the exception of Schwaninger (1989), Scenario projection has not received attention in the tourism demand literature. We contend that scenario-type forecasting is particularly worthwhile for tourism demand forecasting, since the international economic and political environment had been more and more volatile.

In this study, we introduce alternative scenarios forecasts to reflect the likely state of Hong Kong's and the origin country's economy. Each scenario will be constructed in accordance with the hypothetical situations: the most likely situation, the optimistic situation, and the pessimistic situation.

5.4 Model Specification of Tourism Demand – A Re-examination

Following a brief review of modelling and forecasting framework of tourism demand, in this section, we attempt to explain the process of model specification. Based on the analysis of our critical appraisal of empirical literature of tourism demand estimations, we will re-examine the choice of income proxies and the nature of competition among alternative destinations for better evaluating and testing the effect of income and relative price in tourism demand model.

5.4.1 Role of Permanent Income in Tourism Demand Model (Permanent Income-Life Cycle Hypothesis) - Re-examination of Income Effect in Tourism Demand Estimations

The empirical literature suggests that current income play a central role in tourism demand models (Crouch, 1994b). More recently, Sinclair and Stabler (1997) indicated that the majority of tourist demand model depends on the level of tourists' current income in estimating and forecasting tourism demand. However, researchers in tourism demand estimation, such as Sinclair and Stabler (1997) would consider the replacement of total lifetime financial resources by current income as a serious misspecification based on the idea of the permanent income-life cycle hypothesis (Friedman, 1957, Modiglani and Brumberg 1954, and Ando and Modiglani, 1963).

The basic idea of the permanent income-life cycle model is to apply ideas of intertemporal allocation when deciding on how much to consume in the current period. This assumes that the tourist arranges his consumption over time, subject to resources at his disposal, so as to maximize their utility. However, by making the assumption of current income hypothesis in the previous studies, such previous research has ignored the debates within the economic literature concerning intertemporal choice in allocating their consumption.

Since there has been lack of empirical literature testing and evaluating the permanent income-life cycle theories within the context of the tourism demand estimation, in this research, we make an assumption that tourists may follow the change in permanent income based on the 'Permanent income- Life Cycle Hypothesis' instead of current income hypothesis in making their travel decisions. We make this assumption on the basis that tourist consumption decisions involve intertemporal choice. Since the permanent income-life cycle hypothesis cannot apply to consumers who are subject to credit constraint, we make an assumption that the unconstrained consumers are free to borrow up to the limit of their future expected income, paying off their debts in future years. Lastly, we assume the tourists are in absence of 'time preference proper' for consumption and that the real interest rate is zero.

Although permanent income hypothesis (PIH) based on Friedman and life cycle hypothesis (LCH) based on Modiglani are very similar, there are some essential differences. First, the difference between permanent income and life cycle hypothesis lies in time horizon. A formal version of the permanent income hypothesis suggested the consumption is postulated to be the function of permanent income that is the annuity value of the sum of expected human wealth and asset wealth

(Total Wealth), discounted over to an 'indefinitely long time horizon", while for the life-cycle hypothesis, consumption is determined by the value of expected lifetime resources over the life-span that consists of human wealth and asset wealth in a separate form. Second, there is no distinction between labour income (human wealth) and capital income (asset wealth) in the total wealth function based on the version of permanent income hypothesis, while the labour income (human wealth) and capital Income (asset wealth) are two individual variables in the household's total expected lifetime resource (total wealth) based on the life-cycle hypothesis. However, according to Deaton (1992), if the permanent income based on permanent income hypothesis is taken to be the annuity value of expected lifetime resources over the life span instead of the annuity value of total wealth over an 'indefinitely long time horizon' the two theories are very close. In addition, it is important to indicate that in a perfectly competitive world with complete certainty the measures of total wealth based on the version of permanent and life cycle hypothesis would be exactly equal because in such a world the value of asset wealth (non-human wealth) would be exactly equal to the discounted sum of future series of capital income from them.

The theory of permanent income-life cycle hypothesis allows tourist consumption to be dependent on the tourist's expectation of total wealth (the value of expected lifetime resources over the life-span). The total wealth is an expected value that is predicted by the level of previous and current income level based on an adaptive expectation mechanism. This suggested that the theory of permanent income-life cycle hypothesis reflected the behaviour of tourist's "forward looking" in tourism consumption. Forward-looking consumption theories suggest that tourists will only increase their current consumption and reduce saving only when people perceive an increase in income to be permanent (annuity value of income based on expected total wealth). The forward-looking tourist is therefore as much concerned about the future so that the assumption that the income effect depends solely on current income becomes a special case within a more general model under the assumption of permanent income-life cycle hypothesis. This implies that, under the permanent income-life cycle hypothesis, current income is significant only in so far as it contributes to the total wealth, either directly as a component or indirectly by influencing expectations of future income.

For those forward- looking tourists, the actual changes in consumption are a function of predicted changes in expected future income or permanent income. A range of theories of expectations of future income has been proposed in the empirical literature. Although some of the empirical work has attempted to use the results of consumer surveys for predicting the expectation of future income, the vast majority of studies have relied on some proxying techniques. Since the behaviour of past income is likely to contain relevant information about their likely future income, much attention has been focused on the construction of permanent income index based on the mechanism of adaptive expectation. Following the empirical literature, we constructed our permanent income variable based on the theory of adaptive expectations. The construction of a permanent income variable based on the theory of adaptive expectations and the grid search procedure of most preferred income variable in the tourism demand equations will be discussed in Section 5.7.2.

5.4.2. Role of Wealth (Asset Wealth) in Tourism Demand Model – A First Investigation of Wealth Effect in Tourism Demand Model

The role of household asset wealth (non-human wealth) as components in the consumption function is one of the most controversial theoretical debates in economics. Economists failed to reach consensus on the significance of asset wealth in the aggregate consumption function. According to the permanent income-life cycle hypothesis, consumption is a function of a household's total wealth that includes human and asset wealth that includes its human, financial and physical assets.

The level of tourism demand, particularly from the long-haul market, is not only affected by the flow of labour income, derived from the stock of human wealth, but also the flow of capital income, derived from the stock of asset wealth. For the forward-looking tourists, calculating their current level of tourism demand requires not only the formulation of a theory of expectations with respect to their labour income (human wealth) but also to assess the change in their capital income (asset wealth). Such assumption implies that if tourists anticipate a change in their asset wealth, they are likely to alter their plans to travel. This indicates that the tourism demand equation must include variables that measure the effect of change in both human and asset wealth.

However, previous tourism demand models did not reflect upon the importance of a tourist's asset wealth. The majority assumed that tourism demand was explained by the tourist's current income. This indicated that those studies omission of tourist's asset wealth, both physical and financial assets, left the tourism demand equation dependent solely on the tourist's labour income as the only financial resources available for consumption, posed a theoretical limitation. This suggests that our research should further investigate the role of asset wealth that plays in the tourism demand equation.

5.4.3 Introducing Share Price Variable in Tourism Demand Model

The importance of the asset wealth as emphasized by the 'life cycle' hypothesis is the main reason for including the share price index in the tourism demand function. Based on this hypothesis, we argue that it is necessary to assume that tourists will make their decision on travel by taking account of the change in asset wealth. Although most studies suggest that wealth (asset wealth) effect in consumption is significant, the composition and measures of asset wealth varies from one study to another. In most cases, the asset wealth levels are linked to liquid and fixed assets, such as deposits, stocks, properties, etc. It follows that tourists' asset wealth might change over time with respect to changes in real assets, liquid assets, or the level of most liquid assets. For the measurement of total wealth effect in the area of consumer economics, much hinges on maintaining the distinction between labour income (human wealth) and capital income (asset wealth). Despite the fact that total wealth in Frediman's formulation (Friedman, 1957) is defined as the discounted sum of future receipts including income derived from both human and assets wealth, the empirical literature of consumer economics suggests that the use of a distinct asset wealth variable in conjunction with the use of expected or permanent labour income variable in their consumption models based on the total expected lifetime resources in Modiglani's formulation. [Modiglani and Brumberg (1954), and Ando and Modiglanli (1963)]

Empirical studies, such as Howard (1978), relied heavily on liquid asset data to demonstrate the level of asset wealth in modelling consumption, because other asset data were not readily available. Even actual asset data are available and used in Howard (1978), such figures are considered highly unreliable. It indicates that, even where actual asset series are available, it may be preferable to rely on proxies or on methods that do not require the use of actual asset data. For example, Poterba and Samwick (1995) used change in stock prices to investigate the asset wealth effect in consumption function. They stressed the importance of market value of stock as a form of asset wealth within the consumption function, and argued that changes in stock wealth (proxy for asset wealth) can be an indicator for the level of consumption expenditure because a rise in stock prices makes people with stock investments feel richer and this leads them to spend more based on their added asset wealth. In addition, the stock market and its increasingly popular method of investment provides investors with a sense of stability and liquidity in recent years, it is acceptable to assume that the performance of stock price reflect the expectation of future asset income of an investor. We assumed that the rise in stock prices, enhancing the asset wealth of the individual, relaxes the liquidity constraints and makes consumption more appealing. In contrast, when the stock of asset wealth drops, consumers tend to consume less and save more with respect to their labour income in order to maintain their total wealth intact.

In summary, the role that the changes in share price index play in the tourism demand equation has two implications. First, any changes in asset wealth (non-human wealth) of tourists assumed to be correlated with the price levels of shares. Second, the share price is an indicator for tourists to reformulate their valuation on their asset wealth or change their expectations on future capital income (non-human wealth) and ultimately to make their future travel decisions. In this research, we attempt to use the share price index to investigate the effect of asset wealth within the tourism demand equation. One noteworthy point must be mentioned. We have considered the use of property price index as a proxy of asset wealth in our tourism demand model, but ultimately deleted it due to the availability and reliability of the property price index data. More importantly, for some of the origin countries, most property owners are unable to benefit from the paper gains resulting from rising property prices because of the credit constraints. Housing wealth is therefore a more illiquid asset, as compared to stock wealth.

5.4.4 Role of Relative Price Competitiveness in Tourism Demand Model – Re-examination of Price Effect in Tourism Demand Model

Earlier studies of tourism demand concentrated on the ways in which the variation of income affected demand. However, Crouch (1994b) indicated that international tourists are also responsive to the change in international price competitiveness of tourist destinations. This implies that the price competitiveness of a tourist destination depends not only on its own price, but also on the substitute prices of alternative destinations, and on domestic prices within the origin countries. Even though the price competitiveness of a location's tourist industry is a critical determinant of its success within the world tourist market, Witt and Witt (1995) indicated that the definition of international price competitiveness of tourism has yet to be defined in tourism demand estimation.

Martin and Witt (1987) indicated that the appropriate form of own price variables used in the tourism demand model remained unclear. They mentioned that either the market exchange rate variable or the relative price index as a single variable, the market exchange rate variable and a relative price variable as two separate variables and a single real exchange rate variable were the most popular forms representing price competitiveness. A vast majority of studies argued that the sole use of nominal exchange rate as the indicator of price competitiveness, as used in Gray (1966), was theoretically deficient and even, at times, misleading. The researcher, such as Edward (1987) contended that, even when the nominal exchange rate in a destination became more competitive, in relation to the origin countries, this advantage could ultimately be offset by the relatively high inflation rate in the destination.

Some tourism demand literature, including Loeb (1982), Martin and Witt (1988), and Lathiras and Syriopoulos (1995), considered the relative price and nominal exchange rate as two separate explanatory variables representing price competitiveness. However, in Kim and Song (1998), price competitiveness was reflected by the single variable of real exchange rate variable (the nominal exchange rate adjusted for differences in relative inflation rate). The researchers preferred the form of the real exchange rate variable than the nominal exchange rate particularly in the long-run estimation. However, they did not indicate whether it was theoretically or statistically sound to use the price-type variable as separate variables of the relative price index, the relative market exchange rate index, or as a single variable of the real exchange rate index, in their tourism demand model.

Besides, according to Uysal and Crompton (1985b) and Gonzalez and Moral (1995), two measures of the relative price-type variables could be considered to measure a destination's tourism price competitiveness in the international market. First, own price competitiveness between destinations and their origin countries could be measured by the index of the real exchange rate that commonly appears in the empirical literature of international economics. Second, both studies suggested that particular attention must be paid to the relative price competitiveness between destinations and their most competitive rivals.

Technically, it is possible to measure relative price competitiveness of substitute destinations using the weighted substitute price index that is an alternative form of the real effective exchange rate in the export and import demand function. By definition, the real effective exchange rate index is the weighted nominal exchange rate index adjusted by the weighted relative price index between the trading partners and the exporting country. A detailed explanation of real effective exchange rate index is also available in Freris, Lee and Shum (1996). As the indicator of the own price competitiveness, the own tourism price (real exchange rate index) measures only the substitutability of domestic tourism of the origin countries for the proposed destination. In contrast, the indicator of relative price competitiveness measured by the weighted substitute price index is capable to reflect the degree of substitutability effects of the destination's keenest rivals with respect to the selected origin countries.

5.4.5 Introducing Weighted Substitute Price Index (Rival Search Process) in Tourism Demand Model

Earlier tourism demand equations often ignored the effect of changes in competitive rivals' prices.

The omission of the substitute price appears to be the major cause of specification bias in previous tourism demand models. The formal debate between Uysal and Crompton (1985b) and Witt and Martin (1987b) on the construction methodology of the weighted substitute price index in tourism demand equations suggested a strong need for further re-examination of the substitute price index in the tourism demand model. This is particularly important since the late 1980s, because the international tourism market has become more and more competitive. Regardless, our review of the literature indicated that only a few researchers seriously considered the importance of the effect of relative price competitiveness on tourism demand. For those studies in which the weighted substitute price index was included, the nature of competition among alternative destinations and construction methodology of the weighted substitute price index was not properly explained.

The most serious technical problem in measuring the weighted substitute price index is distinguishing whether or not alternative destinations are complements or substitutes for the destination. In order to determine the nature of competition among alternative destinations, previous studies, such as Uysal and Crompton (1985a) often formed lists of competitor rivals based on professional opinion instead of statistical or economic justification. In another study, White (1985) felt that geographical proximity determines two destinations are complements or substitutes. However, Anastasopoulos (1984) indicated that a country's keenest rival may not be among its closet neighbours. In addition, Crouch (1994b) indicated that few studies have explicitly considered the nature of competitive or complementary relationship between countries. Although the majority of studies, with the exception of Kim and Song (1998) implicitly assume that all countries are competitive destinations to a greater or lesser extent, it is empirically important for researchers to distinguish between substitutability and complementary effect for each alternative destination with respect to each origin countries when developing a weighted substitute price index.

In the major tourism demand studies using cointegration approach, Kulendran (1996), Kim and Song (1998) and Lathiras and Siriopoulos (1998) studies attempted to examine the 'third country competitive effect' by incorporating their substitute price variable into tourism demand models. However, theoretical and statistical justification had yet to be defined properly. In particular, a well-argued economic rationale for the selected set of substitutes had not been provided, nor any statistical evidence for the 'range of destinations' selected as substitutes in past studies had provided. In order to determine the nature of competition among the alternative destinations, we have selected a 'range of destinations' as competitive rivals of Hong Kong's tourism on the basis of our new way of estimation process of 'competitive rivals' search procedures in this research. The estimation procedure will be discussed in Section 5.7.5.1. In addition, following Sinclair and Stabler (1997), we assume the expectation of future changes in prices and exchange rates are less likely to be significant determinants of demand than past rates, given most tourists' lack of information and uncertainty about future movements in them.

5.5 Econometric Model of Tourism Demand – Hong Kong

In our econometric model of Hong Kong's tourism demand, we assume economic factors dominate destination choice. International tourist flows to Hong Kong are specified as a single equation demand function of the variables of the preferred permanent income index, the share price index, the own price index, the weighted substitute price index, the real trade volume index, the cross-country dummy variables, and the origin country-based dummy variables. We have developed a single equation country-pairs model for each of Hong Kong's identified Big Six tourist origin countries. In this research, the system equations approach is not considered for two major reasons. First, the availability of country-pairs tourist expenditure in Hong Kong is limited, and the quality of data may not be reliable. Second, owing to the small sample size of the range from 16 to 41, the system equations approach is not appropriate for estimating tourism demand in a large numbers of origin countries with different sample size. In this research, while the major short-haul markets for Hong Kong are Japan, China, Taiwan, the major long-haul markets are the United States, Germany and the United Kingdom. Our study employs various non-nested test statistics and choice criterion (i.e. Davidson and Mackinnon (1981) double length regression test statistics and Vuong's (1989) likelihood function criterion) for testing the choice between linear and log-linear tourism demand equations. The tourism demand model for each of the six origin countries is represented by the following equation:

$$TA_{it} = a1 + a2Yp_{it} + a3SP_{it} + a4Po_{it} + a5Pc_{it} + a6TV_{it} + X_i DUM_i + X_j DUM_j + e_t \text{..............}(5-1)$$

where

TA_{it} = number of visitor arrivals in Hong Kong from origin country i (i=1 represents Japan, i=2 represents Taiwan, i=3 represents China, i=4 represents the United States, I=5 represents the United Kingdom, i=6 represents Germany) at time t

Yp_{it} = index of real permanent income of origin country I at time t

SP_{it} = index of share price of origin country i at time t

Po_{it} = index of own price index of origin country i at time t

Pc_{it} = index of weighted substitute price index of origin country at time t

TV_{it} = index of real trade volume measured by total imports, exports and re-exports between Hong Kong of origin country i, at time t.

$DUMi$ = origin-country dummy variables:

$DUMMY74$ = first oil crisis 1974, 1974-1975 = 1, otherwise = 0

$DUMMY80$ = second oil crisis 1980, 1979-1980 = 1, otherwise = 0

$DUMMY89$ = Beijing incident 1989, 1989- 1990 = 1, otherwise = 0

$DUMMY91$ = Gulf-War crisis 1991, 1991= 1, otherwise = 0

$DUMMY97$ = turnover of Hong Kong sovereignty, 1997, 1997 =1, otherwise= 0

$DUMMY98$ = Asian financial crisis late 1997, 1998=1, otherwise = 0 (for EAP origin countries only)

$DUMj$, = country-based dummy variables for selected origin countries.

$DUM87JAP$ = Japanese social policy to encourage travel in 1987, 1987-1999 =1, otherwise=0

$DUM88TAI$ = liberalisation of Taiwanese travel to China late 1987, 1988-1999 = 1, otherwise = 0

$DUM90GER$ = reunification of Germany 1990, 1991-1999 =1, otherwise = 0

$DUM87CHI$ = introduction of travel package to Hong Kong in 1987, 1987-1999=1, otherwise = 0

$DUM93CHI$ = relaxation of visa requirements for Chinese tourists in 1993, 1993-1999 = 1, otherwise = 0

5.6 Data Sources, Period of Study and Choice of Functional Form

5.6.1 Sources of Data

This research employed time-series annual data to measure international tourism demand for Hong Kong. The selection of the economic variables was made on the basis of data availability, reliability and measurability. The raw data are sometimes converted into an appropriate index form as determined by economic and statistical theory. The major tourist arrival data have been collected from various reports published by the Hong Kong Tourism Board (HKTB) and the Yearbook of Tourism Statistics published by the World Tourism Organisation (WTO). The data series on inflation and exchange rate of Hong Kong have been extracted from the Hong Kong Monthly and Annual Digest of Statistics, while the data series of inflation, exchange rate, population, share price index and nominal GDP of the tourist generating countries have been collected from International Financial

Statistics. For the source markets of China and Taiwan, the economic data have been extracted from the China Statistical Bureau, the Statistical Yearbook of China, and the Taiwan Statistical Review.

5.6.2 Period of Study and Choice of Data Type

The estimation period in this research is varied with respect to the availability of data for each of the six origin countries. The estimation period for the equations for the United States, Germany and Japan covers a period of 41 years from 1959 to 1999. Due to data constraints, the period of study for the United Kingdom model covers the period from 1965 to 1999, a period of 35 years. For Taiwan, the estimation period covers from a period of 32 years from 1968 to 1999, while for China, Hong Kong's most rapidly growing market, the period covered is from 1984 to 1999, a period of only 16 years. We have also considered the choice of Panel Data method in estimating our tourism demand model, but finally excluded it based on two reasons. First, both the study of the determinants of tourism demand and forecasting are the major objectives of this research. Second, most of our single equation models (with the exception of China model) have sufficient time series data to overcome the problem of estimation bias caused by insufficient sample size in time series model.

5.6.3 Selection of Functional Form

In this study, the specification of the international tourism demand model has been modified from the standard log-linear export and import demand model. However, our review of the empirical literature of tourism demand models indicated no evidence of its superiority when developing a tourism demand model, when compared to the linear form. In addition, international economic theory provides little guidance on the appropriate functional form for use in modelling tourism demand. Lee, Var and Blaine (1996) found that the log-linear model displayed some superiority over the linear form on the basis of the statistical results within their studies. However, in the step of Fuji and Mak (1981), Qiu and Zhang (1995) used the Box-Cox residual sum of squares statistics to determine the preferred functional form (linear or log-linear form) in estimating tourism demand. The results of Qiu and Zhang (1995) indicated that there is little empirical evidence supporting the universal agreement that the log-linear form is better. The selection problem of the functional form is common to all empirical research in the tourism demand literature reviewed; however, it has not been handled adequately. Further investigation is required.

In this research, we prefer to use statistical experiment instead of theoretical justification or universal agreement to determine the most appropriate functional form for modelling tourism demand. As the log-linear form and the linear form have different dependent variables, we cannot simply estimate each equation and choose the functional form that yields the largest R^2. In this research, several functional form tests are employed to determine the appropriate functional form for making accurate estimations. The definition of the functional form tests will be discussed in Section 6.1.2, and the results of the functional form tests are presented in Section 6.13 and Appendix C.

5.7 Definition of Economic Variables, Expected Sign and Index Construction Methodology

Given the econometric models of international tourist flows to Hong Kong in Equation 5.1, we will explain the definition of the economic variables and the expected signs of the coefficient. In addition, we employ the explanation of the theoretical and statistical methodology that will be employed to convert the secondary data into an index form appropriate for empirical investigation.

5.7.1 Definition of Tourism Demand – Number of Tourist Arrivals

Our review of literature indicates that international tourism demand is normally represented by the variables of total number of tourist arrivals, tourist nights spent, and tourist expenditures. Some researchers, such as Jud and Joseph (1974), Rosenweig (1986), Kulendran (1996), and Kim and Song (1998), used the actual number of tourist arrivals as a measure of tourism demand. Alternatively, a significant number of tourism demand studies, such as, Artus (1972), Little (1980), and Pyo, Uysal and Warner (1996), had used tourist expenditure data to represent tourism demand. However, Artus (1972) indicated that the poor quality of data on foreign travel expenditures limits the conclusion that can be derived from an econometric analysis of international travel flows.

While the number of tourist arrivals measures the absolute size of a market, the total tourist expenditures and total nights stayed are measures of the total goods and services consumed by a tourist. In this research, the number of tourist arrivals is used to represent the level of tourism demand in Hong Kong, because of the limited data availability of tourist expenditure for our selected origin country and reliability of the tourist expenditure data series in Hong Kong. More importantly, Crouch (1994a) Indicated that demand theory suggests that the demand variable used to estimate elasticities of demand should represent the number of arrivals. Some studies modified the dependent variable to become international tourism demand per capita, it is clear, therefore, that the impact of population changes is ignored in many cases. In this study, the total number of tourist arrivals refers to the actual number of arrivals in Hong Kong, but is not necessarily the actual number of people travelling to Hong Kong. This is because a tourist who visits Hong Kong several times during the year will be counted each time as a new arrival. Likewise, the same person visiting Hong Kong several times during a single trip will be counted each time as a new arrival. The number of tourist arrivals is extracted from either the Visitor Arrivals Statistics of HKTB, or formerly HKTA, and the definitions are provided in Chapter 2.

5.7.2 Measuring Income Effect in Tourism Demand Model

5.7.2.1 Definition of Permanent Income Index

Travelling abroad is generally considered a type of a luxury good. Thus, an income variable must be included to represent this within the econometric model of tourism demand. Economic theory assumes that tourism demand is generated from per capita disposable income or discretionary income. Divisekera (1995) defined discretionary income as the income after tax, rent or mortgage and other constant expense. It therefore seems most appropriate to include the per capita disposable or discretionary income to compile the permanent income index in our tourism demand model. However, reliable data about disposable and discretionary income are difficult to get, particularly from China and Taiwan. In addition, real disposable income per capita or consumption expenditure may not truly reflect decisions made by business tourists who travel to Hong Kong for business purposes rather than on vacation. Indeed, descriptive statistics indicated that, since the late-1980s, more than 30% of the travellers arriving in Hong Kong are business travellers. To mitigate this problem, we have selected the annual data of real per capita GDP to compile our permanent income index in this study.

5.7.2.2 Construction of Permanent Income Index and Proxy Variable Search for Preferred Permanent Income Index – Grid-Search Process

As indicated in Section 5.4.1, tourism demand depends on expectations about future income based on permanent income-life cycle hypothesis so that it is not possible to model tourism demand without modelling income. When we attempt to relate permanent income hypothesis to actual data, there are obvious problems in measuring permanent income. While most of the published data series of income are the level of current income, current or measured income is clearly different from the theoretical concept of permanent income. Since the actual data of the permanent income index are generally unavailable, we are required to construct the permanent income index for the estimation of tourism demand. Because of the assumption that expectations are adjusted in relation to the past values of tourist's income, we adopt an adaptive expectations mechanism to measure the permanent income series. In addition, we assume that the permanent income follows a distributed lag formulation with geometric declining weights. In contrast to the work of Bond (1979), the choice of weighting factor for the most preferred permanent income index is left to 'empirical observation'. The following equation shows the structure of the permanent income index:

$$Yp_t = \lambda Y_t + \lambda(1-\lambda)Y_{t-1} + \lambda(1-\lambda)^2 Y_{t-2} + ... + \lambda(1-\lambda)^n Y_{t-n.} ....(5-2)$$

where

Y_{p_t} = permanent income index at time t

λ = weighting factor, lying between 0 and 1

Y_t = real GDP per capita at time t

Y_{t-1} = real GDP per capita at time t-1

$Y_{t-n.}$ = real GDP per capita at time t-n

The adaptive expectation mechanism renders permanent income as an exponentially weighted average of all observed measured income, with weights summing to unity within the time series context. The weighting factor or the smoothing constant controls the weight given to recent observation of income in determining the value of the permanent income index. A large weighting factor shows that the permanent income index will contain a large proportion of the most recent level of income. It implies that the distinction between the permanent income and current income is not clear-cut so that the use of current income in the tourism demand model is not a serious misspecification. In contrast, if the weighting factor is close to zero, the calculated value of the permanent income index will include a small percentage of the most recent income. A value of weighting factor close to zero implies that the distinction between permanent and current income is clear-cut so that the use of current income poses a serious misspecification. The weighting factor should be lying within the range of 0 to 1 to reflect the fact that potential tourists will only partially base their decision to travel upon their current income. In contrast to the current income hypothesis, we use a geometric declining weight to take into account the fact that tourists assign only a proportional weight to their current and nearest income when assessing their permanent income. Bond (1979) produced a permanent income index over a period of the past six semi annual measure of a tourist's income. However, the researcher chose a weighting factor arbitrarily, without any statistical or theoretical justifications. However, it is important to allow the statistical data to choose a value of weighting factor, because it is generally assumed that the long-haul tourist might have a response less on the most current income compared to the short-haul tourist. In this study, our models allow the statistical data to choose a value of weighting factor, because we believe that inbound tourists flows to Hong Kong from different origin countries should be able to select different weighting factors with respect to the purpose of their travel, the distance of travel, and the possibility of credit restraint. This indicate that our statistical procedures of the grid search process of preferred permanent income variable allows the tourism demand to depend on the preferred combination of current, past income in predicting their expected lifelong financial resources.

In order to select the appropriate value of λ in Equation 5-2, we have selected a preferred permanent income index that produces the preferred results of R^2 and cointegration tests in the tourism demand equation. The selection process is conducted by means of a grid search method. The grid search selects an appropriate value of weighting factor based on a method of trial and error. Due to data constraints, the grid values for weighting factor starts from 0.3 instead of 0.1 and ends at 1, with each running by an increment of 0.1 initially and, if necessary, with addition running by an increment of 0.01. We run the regression for each potential Y_{tp} (permanent income series) with other selected economic determinants in each of our tourism demand models. We select the preferred value of λ on the basis of the R^2 and the cointegration test. The value of the selected weighting factor may differ with respect to each country of origin. Two important statistical constraints must be mentioned: first, the selected permanent income index must also be I(1) variables. Even if the I(0) permanent income index produces a better statistical fit in terms of the R^2 and cointegration tests, we do not accept the I(0) permanent income index as the preferred permanent income index, because the estimation procedures of cointegration analysis require that all the underlying variables be integrated with the same order, and those underlying variables are normally the I(1) variables. Second, the current income variable may also be selected in the final model if it produces the better statistical fit and is the I(1) variable.

5.7.2.3 Expected Signs of Permanent Income Index – Grid Search Process

The empirical literature of tourism demand indicates that tourism consumption is normally regarded as a luxury item. We therefore expect that the coefficient of the permanent income index should have a high positive sign. That is, an income elasticity of greater than one implies that a one percentage change in income will result in more than one percentage change in tourism demand. In a review of findings of elasticity based on current income variable, Witt and Witt (1995) found that the value of estimated elasticities vary considerably, ranging from 0.4 to 6.6. The median value of 2.4 strongly suggests a prior expectation about the luxury nature of foreign tourism. In the study of tourism demand in the EAP region of Korea, Lee, Var and Blaine (1996) found that the per capita current income elasticity values ranged from 1.18 (Taiwan) to 14.32 (Philippines). The results of an econometric model estimated by Kim and Song (1998) also indicated that the long-run current income elasticity was found to be high and greater than one, ranging from 1.5 (Germany) to 3.0 (United Kingdom). One point must be mentioned that, the current income elasticity of tourism demand cannot be directly comparable to the elasticity of the permanent income variable.

5.7.3. Measuring Wealth Effect (Asset Wealth) in Tourism Demand Model

As indicated from section 5.4.2, the weakness of the distributed lag formulation of permanent income index in equation 5-2 is their incompleteness. The most serious drawback of distribution lag permanent income is the omission of assets and the information formulating the forward-looking expectation of future income in the demand function of tourism demand. Changes in asset wealth have long been considered a major factor affecting consumption, particularly the consumption of luxuries. In this study, we considered the movement of the share price is also a good indicator for the tourists in assessing their asset wealth.

5.7.3.1 Definition of Share Price Index – New Variable In Tourism Demand Model

To examine the effect of asset wealth, we have included the share price index in our tourism demand model. The share price indices employed in our research are shown in Table 5.1.

Table 5.1 Definition of Share Price Index – Selected Origin Countries

Japan	The index, base 4 January 1968, refers to average daily closing prices for all shares listed on Tokyo exchange.
Taiwan	Taiwan weighted share price index series, compiled from Taiwan statistical review.
United Kingdom	The index, based on average daily quotations of 500 industrial ordinary shares, base 1985.
Germany	The CADX share price index of the Deutsche Borse A.G., 30 December 1987.
United States	The industrial share price index of Standard and Poor Corporation for Industrials companies on the New York Exchange, based on daily closing quotations, base 1941-43.

Note. China excluded due to problem of small sample size. Source: International Financial Statistics and Taiwan Statistical Review.

5.7.3.2 Expected Sign of Share Price Index

The coefficient of asset wealth elasticity could be either positive or negative for each of the five origin countries. If the destination's tourism is considered an inferior product by the tourist origin country, the share price elasticity is expected to be negative. Alternatively, if the tourism product is considered a normal good, the share price elasticity is expected to be positive or highly positive.

5.7.4 Measuring Own Price in Tourism Demand Model

5.7.4.1 Cost of Travel and Cost of Living

The own price variable consists of two price elements: the cost of travel to the destination, and the cost of living at the destination. The cost of travel has normally been represented in the tourism demand model by the price of transportation as an independent variable. The empirical literature of tourism demand reviewed in this study indicated that the cost of transport variable is an important determinant in long-haul travel, such as the Australian tourism demand model, in which the overall contribution of the transportation cost could be substantial. In addition, omitting transportation costs from our tourism demand equation might create a statistical bias. Although the theoretical justification for including transport cost in the tourism demand model is important, most earlier empirical tourism demand studies that included the transport price variable, such as Gray (1966), Jud and Joseph (1974), and Martin and Witt (1988), reported relatively insignificant statistical results.

In this research, the transportation cost variable is not considered for several reasons. First, the availability of transportation costs was limited, and the quality of data is unreliable. In addition, it is difficult to combine into a single transportation cost variable both the different charges on different modes of transport, and different charges on the same mode. Second, the empirical literature reviewed indicated that the inclusion of the transportation price variable in some of the previous models of tourism demand, for example Fuji and Mak (1980) and Uysal and Crompton (1984), was a major source of multicollinearity problems in some studies' tourism demand equations. This is because the variables of income and airfare were highly correlated. Thirdly, Crouch (1994b) and in the more recent studies, Morris, Wilson and Bakalis (1995) and Kim and Song (1988) concluded that the cost of transportation variable was relatively insignificant in their estimated models. Finally, Turner et al. (2000) indicated that the transportation cost variables were insignificant in determining the demand for business tourism. Given the increasing volume of business tourists, resulting from the structural change of the Hong Kong economies, the cost of transportation variables should not be considered as a major economic determinant of tourism demand in Hong Kong.

Following the tradition of Lin and Sung (1983) and Song and Wong (2003), the cost of transportation variable is not included in our tourism demand equation. In addition, the cross price elasticity between the demand for tourism and other goods, with the exception of domestic and competitive rivals tourism are assumed to be zero in our demand model.

Since the 1990s, the specification of price-type factors had been dominated by the tourist cost of living variable, rather than the transportation cost variable. The appropriate cost of living variable includes all goods and services a tourist buys from the time he or she leaves home to the time of return. Martin and Witt (1987) suggested that, in econometric forecasting models, the exchange rate adjusted consumer price index (either alone or together with a separate exchange rate variable) is a reasonable proxy for the cost of living, but that exchange rate on its own is not an acceptable proxy. Our review of literature indicated that Gray (1966), Artus (1972), Crouch (1994b) and Lee et al. (1996) argued that the cost of living variables were represented separately by nominal exchange rate and relative price variable. However, the majority of studies employ real exchange rate as one component of the cost of living. The cost of living variable or own tourism price variable employed in previous tourism demand models was similar to the real exchange rate variable used in econometric models of export demand.

5.7.4.2 Definition and Formula of Own Tourism Price Index

In this research, the cost of living variable is represented by the various forms of real exchange rate variable used frequently in econometric models of export demand instead of nominal exchange rate alone or nominal exchange rate and relative price as two separate variables. Although it is argued by Loeb (1982) and Uysal and Crompton (1985a) that in the tourism demand function, the effect of own price and substitute price should be combined into a single weighted relative price variable to reflect the overall tourism price, we suggested that the own price and substitute price variable should be included separately in tourism demand model. This allow for more flexibility on relevant parameters. The own tourism price index is calculated by the relative consumer price indices adjusted by the exchange rate indices of the destination relative to each origin country. The basic calculation for the own price index is specified as follows:

$$Po_{i\,jt} = \left(\frac{ER_{ijt}}{ER_{ijB}} \right) * \left(\frac{PH_{it}}{PF_{jt}} \right) * 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5-3)$$

Where

$Po_{i_{jt}}$ = Index of own price index between home destinations (i) and origin countries (j) at time t.

ER_{ijt} = Index of relative exchange rate index between home destination (i) and origin countries (j) at time t (selected origin country currency per one unit of home destination currency at time t),

ER_{ijB} = Index of relative exchange rate index between home destination (i) and origin countries (j) at base year, base year = 100 (selected origin country currency per one unit of home destination currency at time t)

PH_{it} = Index of price level of home destination (i) at time t, base year =100

PFj t = Index of price level of origin country (j) at time t, base year =100

t = 1, ..., m time periods

j = 1, ..., n origin countries

i = home destination

As indicated in Equation 5-3, the first element of the own price index (real exchange rate index) is the index of relative exchange rate index, $\left(\frac{ER_{ijt}}{ER_{ijB}}\right)$. The index of relative exchange rate measures the relative change of exchange rate between each of the six origin countries and the home destination. The relative exchange rate index is set to 100 at the base year. Any rise in the index above 100 indicates that the destination currency is appreciating against the currency of the origin country, and a drop below 100 indicates that the destination country currency is depreciating against the currency of the origin country.

The second element of the own price index (real exchange rate index) is the index of relative inflation between the origin country and the destination at time t. The index of relative inflation $\left(\frac{PH_{it}}{PF_{jt}}\right)$ is initially set to 100 for each of the six origin countries and destination at the base year. Any subsequent increase above 100 indicates that the rate of inflation in the destination is higher than in the origin country over the period under study. In the same manner, any subsequent drop below 100 indicates that the rate of inflation in the destination is less than in the origin country.

5.7.4.3 Selection of Proxy for Tourism Price Index

The value of the own tourism price index may differ with regard to the choice of the price index in equation 5-3, (e.g. the tourist service price index, the consumer price index, the wholesale price index). We defined the own price index as an index of the relative price adjusted by the relative exchange rate. The most obvious problem is how one selects the appropriate price index to reflect the variation of relative price level facing by the tourist. Martin and Witt (1987) and Morley (1994) concluded that the CPI (Consumer Price Index) is an acceptable proxy index for the price levels a tourist faces. However, Barry and O' Hagan (1972), Loeb (1982), Divisekera (1995) stated that the tourist price index was the most appropriate price index in constructing an own tourism price index.

Therefore, a tourist price index was constructed to measure the change in the price levels of the basket of relevant goods and services consumed by the tourist in the study of Divisekera (1995). He constructed his own tourist price indices based on the belief that the indices could reflect more closely the variation of actual tourist price levels. Several price indices are also available for such selection, including the wholesale price index, the export price index, the retail price index, service price index and the commodity price index. Amongst such choice, the CPI appears to be the better proxy for the tourism price level, because it is able to cover a wide spectrum of goods and services consumed by the tourist. As shown in Chapter 4, the majority of tourism demand studies reviewed continued to employ the CPI as the proxy for the tourist price index. In this study, we employ the CPI as the proxy for the tourist price index for the compilation of own price index because of the limited data and the conclusion of Martin and Witt (1987) and Morley (1994).

5.7.4.4 Interpretation of Own Tourism Price Index

This study's own price index is set to 100 for each origin country with the destination at the base year. Any increase above 100 indicates that the destination (Hong Kong) has lost its price competitiveness on tourism services relative to the domestic tourism services of the origin country. Alternatively, any fall below 100 signals that the tourism price competitiveness of the destination (Hong Kong) has improved relative to that of the origin country. The coefficients of the own tourism price index are expected to be negative.

5.7.5 Measuring Substitute Price in Tourism Demand Model

International tourists normally compare the real tourism price between domestic destinations and their proposed destination. Tourists might also consider a range of alternative destinations that are in competition with the proposed destination before finally selecting their final destination. Martin and

Witt (1988) concluded that substitute prices play an important role in determining the demand for international tourism, but there is considerable variation in importance according to tourist origin. There is thus a strong need for Hong Kong's tourist industry to pay particular attention to the changes in the relative prices of the most competitive alternative East Asia and the Pacific region destinations. Based on the findings of Gonzalez and Moral (1995), we have constructed a weighted substitute price index that applies the rival search process results to reflect the impact on the destination's (Hong Kong's) tourism demand with respect to changes in the relative price competitiveness of a selected range of alternative destinations.

5.7.5.1 Nature of Competition - Selection of Competitive Rivals (Rival Search Process)

Our review of the empirical literature of tourism demand indicated that there was inadequate investigation of the effect of a substitute price index in previous tourism demand models. In the context of tourism, it is very difficult to identify and separate the substitute and complementary destinations on a priority basis. While Uysal and Crompton (1984) select the number of substitute destinations on a very subjective basis, we introduce the rival search process to select the most competitive rivals (substitute destinations) to Hong Kong in terms of tourism demand for each of five origin countries (excluding China) for the construction of a weighted substitute price index. The following steps explain the new way of selection based on the process of rival search:

1. First, we compiled a list of eight of the biggest potential competitors for each of five origin countries (excluding China). The potential competitors in the East Asia and Pacific region for each of the origin countries were chosen from a list of the top eight competitor countries on the basis of their market share rankings as the top alternative destinations in the East Asia Pacific Region over the period from 1995 to 1999.

2. Second, we regressed the variables of country-pair substitute price of the big eight potential competitors and other economic determinants with the number of tourist arrivals for each of our five selected origin countries. The results of the regression model indicate whether these eight potential competitors are in fact substitutes or complements for Hong Kong's tourism market for each of the five origin countries. The five origin countries we have selected are the United States, the United Kingdom, Germany, Japan and Taiwan.

   In this research, we distinguish the relationship of substitutes and complements by the examination of statistical signs of the estimated coefficients of the country-pair substitute price variables of the selected potential competitive rivals in the regression model for each selected origin country. A positive sign indicates that there is a competitive relationship with Hong Kong and the alternative country could act as a substitute destination; a negative sign indicates the alternative country has a complementary relationship with Hong Kong.

3. Third, for each of the five origin countries, if the country-pair's substitute price variable produces a positive statistical sign, we will classify it as a competitor and therefore a substitute for Hong Kong as a tourist destination for that origin country. We will classify potential competitors that produce a negative sign as complementary destinations, and will exclude them from the construction of the weighted substitute price index.

4. Finally, after selecting Hong Kong's major competitive rivals for tourism for each of the five origin countries, we will proceed to the construction of the weighted substitute price index. The weighted substitute price index for each of five origin countries is defined as the weighted index of real cost of domestic tourism relative to the real cost of tourism at the substitute destinations, selected from the competitive rival search process, as done in Step 1 and 2. The formula of the weighted substitute price index will be presented in Section 5.7.5.2.

5.7.5.2 Definition and Formula of Weighted Substitute Price Index – Construction of Weighted Substitute Price index

The index of the weighted substitute price is calculated from a number of bilateral country-pair substitute price index estimations. It extends the estimates of a country-pair substitute price into the multilateral context of a range of substitute destinations. The formula of the weighted substitute price index can be computed by attaching a country's market-share weights to each bilateral real exchange rate estimate, thus yielding:

$$Pc_{ijt} = REA_t * WA_t + REB_t * WB_t + REC_t * WC_t + ...REZ_t * WZ_t ....(5-4)$$

where

Pc_{ijt} = index of weighted substitute price index for each tourist origin country at time t

REI_t = country-pair substitute price estimate between selected competitive rivals and origin countries, at time t., I = A, B, Z. (selected substitute destinations)

WI_t = market share weight of selected competitive rivals faced by visitors from each origin country.

$\sum_{I=A}^{Z} WI_t = 1$, I = A, B, ...Z, selected competitive rivals of Hong Kong.

Alternatively, equation 5-4 can be written as follows:

$$Pc_{ijt} = \sum_{I=A}^{Z}\left\{\left[\frac{ER_{ijt}}{ER_{ijb}}\right]*\left[\frac{PR_{it}}{PF_{jt}}\right]\right\}*[WI_t] \qquad (5-5)$$

t = 1, ...n time period

where

Pc_{ijt} = index of weighted substitute price for each of five tourist origin countries with respect to home destination (Hong Kong) at time t,

ER_{ijt} = index of country-pair exchange rate index between the currency of selected competitive rival and origin country currency at time t (Unit of origin country's currency per one unit of selected competitive rival's currency)

ER_{ijb} = index of country-pair exchange rate index between selected competitive rival and origin country currency at base year, base year = 100 (Unit of origin country currency per one unit of selected competitive rival's currency at base year.

PR_{it} = price level of selected competitive rival of Hong Kong at time t, base year =100

PF_{jt} = price level of selected origin country at time t, base year =100

I = selected competitive rivals for each origin country

J = selected tourist origin countries

$\sum_{I=A}^{Z} WI_t = 1$; I = A, B, ...Z., market share weight of selected competitive rivals for each of five origin countries.

WI_t = number of visitors of each competitive rival (for each of five origin countries) divided by total sum of visitor arrivals in all selected competitive destinations (for each of five origin countries).

5.7.5.3 Selection of Weighting System – Construction of Weighted Substitute Price Index

As indicated in Section 5.7.4.3, we selected the consumer price index as a proxy for the tourist price index. While Uysal and Crompton (1984) selected the set of substitute destinations and the corresponding weights subjectively, we derived a substitute price index by allocating weights to each substitute destinations, selected by our competitive rival process, where the attached weights are derived from the relative market share of most competitive rivals for each origin countries. The remaining problem we have in our construction of the weighted substitute price index is how to weight (fixed weight or moving weight) the constituent component substitute price index. This is important, because the value of the weighted substitute price index may differ with regard to the choice of the weighting system.

Jensen (1998) compiled his weighted substitute price index for Denmark's competitors for each of six origin countries, using the application of a fixed weighting system. The researcher's fixed weighting system assumed that the share of outbound tourists flows from each of the six origin countries to the competitive destinations would be set at the base year, and would remain constant throughout the whole estimation period. In a similar study, Tremblay (1989) seriously considered using the moving weighting scheme as employed by Lin and Sung (1983), because the methodology allowed for possible changes in market shares throughout the period. This would reflect structural changes in tourism demand over the period of study. However, Tremblay (1989) ultimately selected the fixed weighting scheme on the basis that the moving weight scheme was subject to inconsistencies in the data series that potentially could lead to autocorrelation and interpretation problems, and thus would involve long computation procedures. Regarding the measuring procedures of moving weight system, Loeb (1982), Uysal and Crompton (1984) and Martin and Witt (1988) suggested their moving weight system by averaging tourist flows during the previous 3 years instead of the updating each individual year to capture the effect of changing market share. They believed that their selected weights could represent changes to a destination's tourism price in relation to its selected rivals, and should reflect the relative importance of each change in contributing to the change in the overall measurement of that destination's substitute price. Although Loeb (1982), Uysal and Crompton (1984) and Martin and Witt (1988) suggested average tourist flow during the previous 3 years to capture this effect, in this study, we have chosen to employ the moving weighting system that adjusting the weight every year instead of previous three years average or fixed weighted system to better reflect the changes in the relative importance of each substitute destination for each origin country, throughout the estimation period of our research.

5.7.5.4 Interpretation of Weighted Substitute Price Index

A substitute price index is set to 100 at the base year. For each of the five origin countries, any increase above 100 indicates that the selected group of substitute destinations for Hong Kong's tourism is losing its price competitiveness on tourism services relative to the five selected origin countries. Alternatively, any fall below 100 indicates the tourism price competitiveness of the selected group of substitute destinations is improving its price competitiveness on tourism services relative to the selected five origin countries. The expected sign of the weighted substitute price variable in the tourism demand model is positive.

5.7.6 Definition of Trade Volume Variable

As indicated in Chapter 2, the role of Hong Kong tourism changed with respect to the structural change of the Hong Kong economy in the mid-80s. In addition, our descriptive analysis in Chapter 3 indicated that business-related tourist arrivals constituted more than 30% of total arrivals in Hong Kong in the late 1990s. Based on Lin and Sung (1983) and Kim and Song (1998), we included a bilateral trade volume variable to capture the effects of the business travellers to Hong Kong. To discover this variable, we use the real trade volume variable, as measured by the sum of total exports, re-exports and imports between Hong Kong and the tourist generating country, and adjusted by the changes in price level. The coefficient of the real trade volume is expected to be positive.

5.7.7 Definition of Dummy Variables

Our review of empirical literature of tourism demand estimation indicated that previous studies used dummy variables for a variety of purposes. Frequently, a dummy variable is used to capture an event that might have influenced tourism demand. For example, our selected tourism demand studies had included dummy variables to estimate the impacts of oil crises, economic recession, political instability, Olympics and other sporting events, social policy, foreign exchange restrictions, and turnover celebrations.

According to our findings in Chapters 2 and 3, six origin- country dummy variables should be added to the tourism demand equations. We have added DUMMY74 and DUMMY80 to the model to capture the effect of the first oil crisis in the period of 1973- 1974 and the second oil crisis in the period of 1979-1980, respectively. DUMMY89 is added to investigate the effect of the political incident of Beijing on 4th June 1989, and DUMMY97 is added to explain the effect of turnover of sovereignty of Hong Kong in 1997. In addition, DUMMY91 and DUMMY98 are added to explain the effect of Gulf war crisis and Asian Financial Crisis. In some tourist markets, we have added five additional country-specific variable(s) to the tourism demand equation, as listed in Section 5.5 and Chapter 6.

The coefficient of the 'dummy' variable may be either positive or negative, depending upon the nature of the events that have occurred. For example, with the dummy variable used to represent the 4th June incident in Beijing (1989) in the tourist-generating country model, we anticipated the dummy variable coefficient would have a negative sign. On the other hand, with the dummy variable used to represent the effect of the sovereignty turnover in 1997, we anticipated a positive dummy variable coefficient sign.

5.8 Tourism Demand Estimation – Procedures of Cointegration and Error-Correction Approach

As indicated in the previous sections, if the time series variables in the single equation are not stationary in their level form, an estimation procedures using the cointegration approach is most preferred than the OLS approach in modelling and forecasting tourism demand. In this section, we explain the estimation procedures for the construction of econometric models of a tourism demand model based on the cointegration and error correction approaches.

5.8.1 Testing for Order of Integration – Engle and Granger and Johansen Approach

For the Engle and Granger and Johansen approaches, it is important to investigate whether the time-series data are stationary over time. If the underlying variables are non-stationary over time, an ordinary least square estimation will be mis-specified, which will result in misleading values of R^2 and t-statistics. To investigate that, we will employ several unit root tests on the time-series properties of the visitor arrivals, the real permanent income index, the share price index, the own price index, the weighted substitute price index, and real trade volume index. The unit root tests we employ in this research are the Dickey and Fuller and the Augmented Dickey and Fuller tests.

5.8.2 Estimation Procedures of Cointegration Analysis – Engle-Granger Approach

If the results of the unit root tests in the first step (above) suggest that the underlying variables are integrated with the same order, it implies that they are able to form a cointegrating vector. Based on the Engle and Granger (1987) approach, the second step of the first stage is to run a static regression on variables in level forms to obtain the cointegrating regression representing the long-run relationship among variables. In the third step, we obtain the residuals from the static long-run cointegrating regression. Finally, in the fourth step, we use the Augmented Engle-Granger cointegration test to determine whether the residuals captured from the long-run regressions are cointegrated. In the second stage, the one-period lagged residuals derived from the long-run cointegrating regression are incorporated with the difference form of the underlying variables to estimate tourism demand in the short-run, based on Hendry testing down procedures. The ECM methodology permits the effects of long-run relationship to appear in the short-run estimation. A detailed explanation of the Engle-Granger procedures, with illustration, is provided in Engle and Granger (1987).

5.8.3 Estimation Procedures of Cointegration Analysis – Johansen Approach

Due to the statistical uncertainties of the Engle and Granger approach, we also employ the Johansen FIML approach to analyse the long-run and short-run parameter estimates. Similar to the Engle-Granger two-stage procedures, the first step in the Johansen approach is the pre-modelling tests. After establishing the number of unit roots, the lag lengths of the underlying variables in the VAR model must be determined using either the AIC or SBC criterion to test for the existence of cointegration. In addition, it is necessary to determine whether the VAR model has included the intercepts only, trends only or both intercepts and trends. In the third step, we use the maximum eigenvalue and trace statistics to determine the number of statistically significant cointegrating vectors that exist among the underlying variables in the tourism demand equation. If one or more cointegrating vectors exist, we proceed to derive the long-run parameter estimates from the cointegrating vector. In the second stage, we incorporate the lagged value of the error term, derived from the statistically significant cointegrating vectors, with other underlying variables in differenced form to estimate the tourism demand in the short-run general ECMs. Similar to the Engle-Granger approach, we apply the testing down approach to derive the most preferred ECM. One noteworthy point is that the preferred ECMs, based on the Engle-Granger and Johansen procedures, are required to pass the standard diagnostic test statistics to ensure the validity of the ECM. The description of standard diagnostic tests will be discussed in Section 6.1.2 and in Appendix D. A detailed description of the Johansen FIML methodology, with illustration, is given in Johansen (1988, 1991, 1995) and Johansen and Juselius (1990, 1992).

5.8.4 Estimation Procedures of Cointegration Analysis – Pesaran Approach

Our earlier analysis of the Pesaran and Shin (1998) approach indicated that if doubts exist on the same level of integration for all the underlying variables in the tourism demand model, this approach is particularly worthwhile. We will explain the bounds testing procedures of the Pesaran and Shin (1998) procedures in the next section.

5.8.4.1 Bounds Testing Procedures – Pesaran Approach

The 'bounds testing' procedures of the Pesaran and Shin (1998) approach involve two stages. In the first stage, we use the F-statistics to determine the significance of the lagged levels of the included variables in the underlying autoregressive distributed lag model, as shown in Equation 5.6. The values of the F statistics indicate the existence of the long-run relationship between the underlying variables in the tourism demand models. An unrestricted error correction model (UECM) will be constructed to test for the existence of a long-run relationship, where Y is the dependent variable, the X_1 and X_2 are independent variables, K is the number of lags, and D represents the differences.

$$DY_t = a_0 + \sum_{i=1}^{K} b_i DY_{t-i} + \sum_{i=0}^{K} d_i DX_{1t-i} + \sum_{i=0}^{K} f_i DX_{2t-i} + g_1 Y_{t-1} + g_2 X_{1t-1} + g_3 X_{2t-1} + \mu_t \ldots (5-6)$$

The null hypothesis of non-existence of long-run relationships is tested by the following equation:

$$H_0 : g_1 = g_2 = g_3 = 0$$
$$H_1 : g_1 \neq 0, g_2 \neq 0, g_3. \neq 0 \ldots\ldots (5-7)$$

The relevant test statistic for the existence of cointegration is the value of the F-statistic for the joint significance of g_1, g_2 and g_3 in Equation 5-7. The appropriate critical values tabulated by Pesaran depend on the number of explanatory variables (x), and whether the ARDL model contains an intercept and/ or time trend.

The Pesaran approach gives two sets of critical values, one set assuming that all the underlying variables are I(0), and the second set assuming that all underlying variables are either I(0), or I(1). For each application, this provides a band covering all the possible classifications of the variables into I(0) and I(1). According to Pesaran, if the computed F-statistic falls within the critical bound of the value band, a conclusive inference is inconclusive, and depends on whether the underlying variables are I(1) or I(0). In such a case, the researcher needs to establish the order of integration of the underlying variables before a conclusive inference can be made.

In the first stage of the Pesaran analysis, the null hypothesis of the non-existence of long-run relationship is investigated by testing the Equation 5-6 without lagged level variables. Next, a variable addition test with both differenced and level variables is performed to test the joint significance of the lagged level variables in the equation.

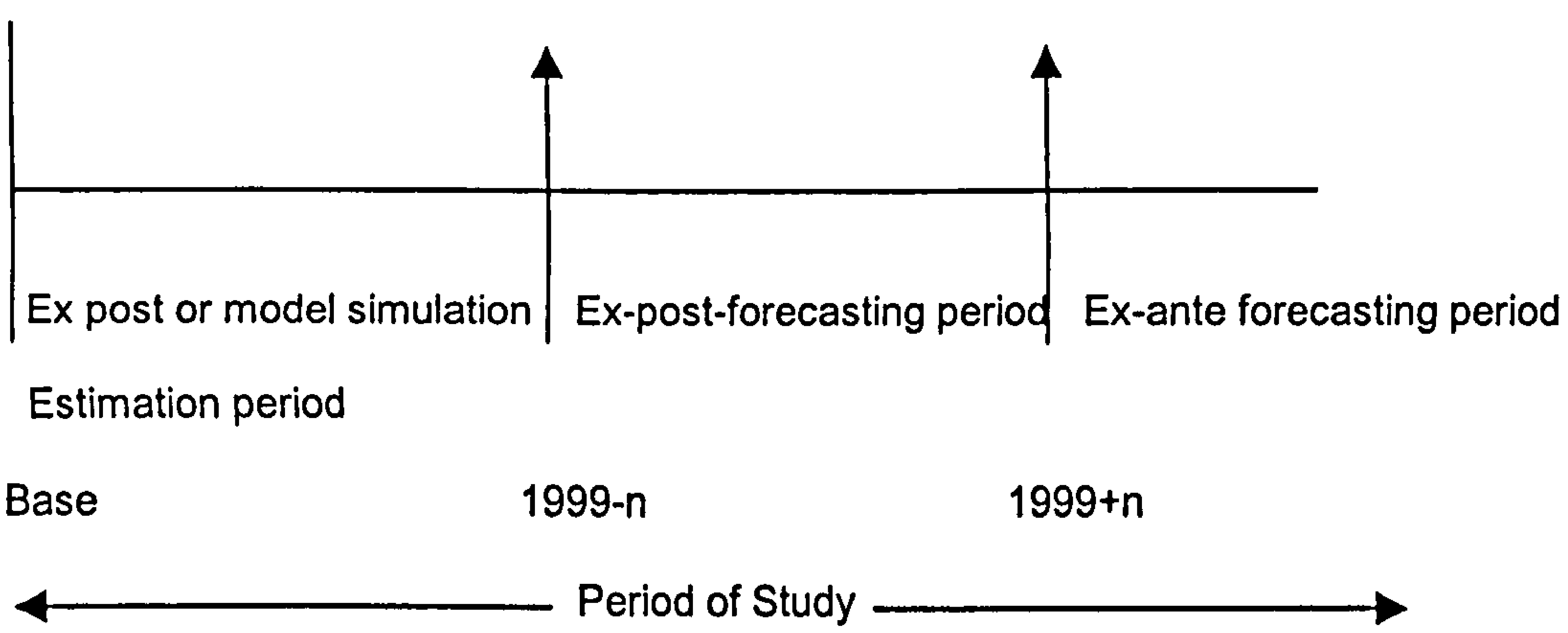
In the second stage of the analysis, a further two-step procedure is applied to estimate the above model. In the first step of the second stage, the orders of the lags for all level variables in the ARDL model are selected, using either AIC or SBC criteria. The maximum lag order set for selection normally depends on the sample size. After establishing the appropriate lags of the long-run ARDL model, we estimate the coefficients of the long-run relations. In the second step, we estimate the associated ECM models derived from the selected long-run ARDL model. The Pesaran and Shin (1998) ECM can be applied also to undertake ex-post and ex-ante forecasts of tourism demand. In Chapter 9, the forecasting results of the Pesaran approach will be compared with the Engle and

Granger and Johansen, Case II and Case III, approaches.

5.9 Forecasting Framework of Tourism Demand Models

This section outlines the procedures required to examine and assess the forecasting accuracy of different types of forecasting models, as shown in Table 5.2. The forecasting methodology, as shown in Figure 5.1, will be applied to evaluate the accuracy of the various types of ECM and time-series models over the period of the ex-post forecast.

Figure 5.1 Forecasting Methodology of Tourism Demand Model



The ex-post forecasting performance of the four types of ECMs, as shown in Table 5.2, is compared with the OLS, ARIMA and NAÏVE models. The NAÏVE model appeared in the list of competing models as a 'benchmark' for evaluating forecasting performances of time-series and econometric models and the ARIMA model appeared as a baseline model for evaluating forecasting performances of econometric models. This model is commonly used to determine the improvements made using causal and time series forecasting methods.

5.9.1 Definition of Forecasting Models and Computational Software for Forecasting Analysis

The estimation of the econometric models (ECM and OLS models) and the calculation of the forecasting error magnitudes are complied from Microfit-4.0 (1997). The ARIMA forecasts are generated from the SAS 8.01, while the calculation of forecasting error magnitude of the NAÏVE and ARIMA models are produced using the EXCEL spreadsheet program. The orders of the ARIMA (p, d, q.) models for each origin country are determined by the examination of autocorrelation function (ACF) and the partial autocorrelation function (PACF), respectively. A detailed explanation of the ARIMA procedures is provided in Box and Jenkins (1976). All seven forecasting models are shown in Table 5.2.

Table 5.2 Definition of Forecasting Models – ECMs/OLS/NAÏVE/ARIMA

Forecasting Models	Remarks
Engle-Granger ECM	Error Correction model based on Engle and Granger (1987) approach
Johansen Case III ECM	Error Correction model based on Johansen approach. This refers to models with restricted intercepts and no trend, Case III, Pesaran and Pesaran (Ch. 7, 1997)
Johansen Case II ECM	Error Correction model based on Johansen model. This refers to models with unrestricted intercepts and no trend, Case II, Pesaran and Pesaran (Ch. 7,1997),
Pesaran ECM	Associated Error Correction model based on the selected ARDL framework of Pesaran and Shin (1998)
Regression Model (OLS)	Regression model estimated based on ordinary least square approach
NAÏVE Model	Forecast value for period (t) is equal to actual value of last period (t-1) (Witt and Witt, 1992)
ARIMA Model	ARIMA stands for autoregressive integrated moving average. The ARIMA model is represented by ARIMA (p, d, q). This model was developed by Box and Jenkins (1976)

In this research, we evaluated not only the forecasting performance of each of the seven forecasting models. We also determined the rankings of five econometric models of tourism demand in terms of forecasting accuracy. Following the conventional practices, the four alternative ECMs and OLS produce ex-post forecasts, whereas ARIMA and NAÏVE produce ex-ante forecasts over the period of ex-post forecasting. The former group is therefore more likely to be at something of advantage in the comparison. However, it is standard practice to use such models as benchmarks for forecasting accuracy evaluation (Joutz F. and Stekler, 2000). We have selected the preferred econometric models based on minimal forecast errors, and will apply these models to produce future demand forecast under the assumption of different scenarios.

5.9.2 Ex-post Forecasting Procedures

Annual time-series data are applied to forecast tourism demand in Hong Kong. As there are some problems with the availability of data, the sample periods of the country-pair equations will vary with respect to each of the six origin countries. One noteworthy point is that the first difference of the total tourist arrivals in the logarithm form is used as a dependent variable for all forecasting models.

Table 5.3 Estimation Period of Study for Seven Forecasting Models – All Origin Countries and Five Ex-Post Forecasting Horizons

Market	Period of Study	Estimation Period for Each Ex-post Forecasting Horizon (year)				
		10	7	5	2	1
Long-haul Market						
U.S.A	1959-1999	1959-1989	59-92	59-94	59-97	59-98
Germany	1959-1999	1959-1989	59-92	59-94	59-97	59-98
U.K	1965-1999	1965-1989	65-92	65-94	65-97	65-98
Short-haul Market						
Japan	1959-1999	1959-1989	59-92	59-94	59-97	59-98
Taiwan	1968-1999	1968-1989	68-92	68-94	68-97	68-98
China	1984-1999	N.A	N.A	84-94	84-97	84-98

As shown in Figure 5.1, the forecasting methodology has three stages. The first stage is the period of ex-post simulation or model estimation. For the markets of the United States, Japan and Germany, the model estimation will begin in the year 1959, and will run forward in the years 1989, 1992, 1994, 1997, and 1998 to generate 10-year, 7-year, 5-year, 2-year and 1-year ex-post forecasts. By simulating the model during the ex-post forecasting period, for which past data for all variables are available, a comparison of the original data series with the simulated series for each explanatory variables can provide a useful test for forecasting accuracy. In this study, the ex-post simulation period was designed for use in model estimating. The ex-post forecasting period is the period used in the model, in the time beyond the model estimation period. In this research, the ex-post forecasting period ranges from a 1-year to a 10-year horizon and the ex-ante forecasts are made by beginning the simulation in the current year and extending it into the future. We must also begin the forecast at the end of the estimation period and extend it into the present to compare the results with actual data. We have selected the period from 1990 to 1999 for the evaluation of forecast accuracy. The accuracy of a forecasting model depends on the error term (E_t) and it is measured by the difference between the forecast value of (F_t) and the actual value of (Y_t) over the period of the forecasting horizon. In this study, we calculate the 1 year, 2 year, 5 year, 7 year and 10 year ahead forecasting error for seven types of forecasting models. We have extended the research from Kim and Song (1998) by applying the procedures of model re-estimation to improve the reliability of forecasting accuracy results. The schedule of the ex-post forecasting with model re-estimations is shown in Table 5.4A.

Table 5.4A Ex-post Forecasting Schedules of Seven Forecasting Models – Process of Model Re-estimations (JAP/TAI/USA/UK/GER)

Estimation Period	Number of Years Forecast Ahead				
	1	2	5	7	10
To 89(1st round)	90	90-91	90-94	90-96	90-99
To 90(2nd)	91	91-92	91-95	91-97	N.A.
To 91(3rd)	92	92-93	92-96	92-98	N.A.
To 92(4th)	93	93-94	93-97	93-99	N.A.
To 93(5th)	94	94-95	94-98	N.A.	N.A.
To 94(6th)	95	95-96	95-99	N.A.	N.A.
To 95(7th)	96	96-97	N.A.	N.A.	N.A.
To 96(8th)	97	97-98	N.A.	N.A.	N.A.
To 97(9th)	98	98-99	N.A.	N.A.	N.A.
To 98(10th)	99	N.A.	N.A.	N.A.	N.A.

We produced the 1-year ex-post forecast (with model re-estimations) by running a forecasting model from the period from 1959 to 1989 for the United States, Germany and Japan, from 1965 to 1989 for the United Kingdom, and from 1968 to 1989 for Taiwan. We used the selected models to produce a forecast for the year 1990 for each of the five origin countries. As indicated in Table 5.4A, we repeated the estimating procedures by running a model from 1959 to 1990 on the second ground. We then used the selected model to produce a forecast for 1991, and continued the process until the model had estimated tourist arrivals from 1959 to 1998 on the tenth ground. The average forecast error of the one-year forecasts (with model re-estimation) using each of the seven forecasting models for each of five origin countries is equal to one-tenth of the sum of the total forecast error, as compiled from the summation of average forecast errors from the first to the tenth round of estimations.

We produce a 2–year ex-post forecast (re-estimation) by running a forecasting model over the period from 1959 to 1989 for the markets of the United States, Germany and Japan, from 1965 to 1989 for the United Kingdom market, and from 1968 to 1989 for the Taiwan market. We used the selected models to forecast tourist arrivals from 1990 to 1991 in the first round for each of the five origin countries. The average forecast error of first round estimation of 2-year forecast (1990-1991) is equal to one-half of the total sum of forecast error over the ex-post forecasting period in 1990 and 1991. We repeated the estimating procedures by running a selected model from 1959 to 1990 for the United States, Germany and Japan, from 1965 to 1990 for the United Kingdom, and from 1968 to 1990 for Taiwan on the second ground. We also used this model to produce the forecast of tourist arrivals from 1991 to 1992. We continued the process until the model produced estimations from 1959 to 1997 for the United States, Germany and Japan, from 1965 to 1997 for the United Kingdom and from 1968 to 1997 for Taiwan on the ninth ground. The overall average forecast errors of 2-year forecasts (with re-estimation) of each of the seven forecasting models for each of the five origin countries is equal to one-ninth of the sum of the total average forecast error, compiled from the summation of average forecast error from the first round to ninth round estimation. We produced the 5–year ex-post forecast (with re-estimation) by running a forecasting model from 1959 to 1989 for the United States, Germany and Japan, from 1965 to 1989 for the United Kingdom, and from 1968 to 1989 for Taiwan. We used the selected models to forecast future tourist arrivals over the period 1990 to 1994. The average forecast error of first round estimation of 5-year forecast (1990- 1994) is equal to one-fifth of total forecast error over the period 1990-1994. We repeated the estimating procedures by running the model from 1959 to 1990 for the United States, Germany and Japan, 1965 to 1990 for the United Kingdom, and 1968 to 1990 for Taiwan on the second ground. We then used the selected models to forecast future tourist arrivals over the period from 1991 to 1995. We continued the ongoing process until the final estimations were made on the sixth ground, and we then generated the forecast of tourist arrivals from 1995 to 1999. The overall average forecast error of the 5-year forecast (with re-estimation) of each of seven forecasting models for each of the five origin countries is equal to one-sixth of the sum of the total forecast error, compiled from the summation of average forecast errors from the first round to sixth round estimation.

We estimated the 7-year ex-post forecast (with re-estimation) by running a forecasting model from 1959 to 1989 for the United States, Germany and Japan, from 1968 to 1989 for Taiwan and from 1965 to 1989 for the United Kingdom. We used the selected models to forecast tourist arrivals over the period from 1990 to 1996 for the 7-year ex-post forecast. The average forecast error of the first round estimation of 7-year forecast (1990-1996) is equal to one-seventh of the total sum of forecast error over the period 1990-1996. This process was repeated until the final estimations were made from 1959 to 1992 for the United States, Germany and Japan, 1965 to 1992 for the United Kingdom, and 1968 to 1992 for Taiwan, to generate forecasts of tourist arrivals for the period from 1993 to 1999. The overall average forecast error of 7-year forecast error of each of the seven forecasting models for each of the five origin countries is equal to one-fourth of the sum of the total average forecast error, compiled from the summation of average forecast error, and generated from the first round to fourth round estimation. We produced the 10-year ex-post forecast by running a forecasting model over the period from 1959 to 1989 for the United States, Germany and Japan, from 1965 to 1989 for the United Kingdom, and from 1968 to 1989 for Taiwan. We used the selected models to produce the 10-year forecast over a period from 1990 to 1999, as compiled from the first round estimation. The average forecast error of first round estimation of 10-year forecast is equal to one-tenth of the total sum of forecast error over the period of 1990-1999. The overall average forecast error of the 10-year forecast is equal to the average forecast error, generated from the first round estimation only.

In this research, the period of forecasts of econometric models set beyond 1999 are defined as the period of ex-ante forecasts. In contrast to ex-post forecast, the values of the explanatory variables are not known, and have to be estimated before the estimation of the tourism demand variable. Overall, we have compiled ten rounds of the 1-year forecast, nine rounds of the 2-year forecast, six rounds of the 5-year forecast, four rounds of the 7-year forecast, and one round of the 10-year forecast, using each of the seven forecasting models for each of the five origin countries. Since the data for the China model are only available for a period of 16 years, it is impossible to generate 7-year and 10-year ex-post forecasts. Therefore, we have produced only the 1-year-, 2-year and 5-year forecasts for China, with re-estimations made independently for each of the seven forecasting models, as shown in Table 5.4B

Table 5.4B Ex-post Forecasting Schedules of Seven Forecasting Models – Process of Model Re-estimation (China)

Estimation Period	One Year Ahead	Two Years Ahead	Five Years Ahead
1984-94 (1st round)	95	95-96	95-99
1984-95 (2nd round)	96	96-97	N.A
1984-96 (3rd round)	97	97-98	N.A
1984-97 (4th round)	98	98-99	N.A
1984-98 (5th round)	99	N.A	N.A

We produced a 1-year forecast (with model re-estimation) for China by running a forecasting model for the period from 1984 to 1994. We then used the selected models to forecast the tourist arrivals in 1995. We repeated the forecasting procedures using a forecasting model for the period from 1984 to 1995 on the second ground, and then used the model to produce a forecast for 1996. We continued the ongoing process until the estimate for the 1984 to 1998 period on the fifth ground was completed. The overall average forecasting error of 1-year forecasts (with model re-estimation) of each of the seven forecasting models was equal to one-fifth of the total sum of the forecast error, as compiled from the average forecast error from the first to the fifth round estimations.

We produced a 2-year forecast for China by running a model over the period from 1984 to 1994. We then used the selected model to produce a 2-year forecast for tourist arrivals from 1995 to 1996. The average forecast error of first round estimation of 2-year forecasts (1995-1996) is equal to one-half of total forecast error over the period 1995-1996. We repeated the estimating procedures, by creating a model to estimate tourist arrivals from 1984 to 1995 on the second ground, and produced the 2-year forecast. We continued the process until the estimation on the fourth ground over the period from 1984 to 1997 was completed. The overall average forecasting error of the 2-year forecast was equal to one-fourth of the total sum of forecast error, compiled from the average error compiled from the first to the fourth round estimation. We produced the 5-year forecast (with re-estimation) for China by using a forecasting model for the period from 1984 to 1994. We then used the selected model to produce a 5-year forecast for the period from 1995 to 1999. The average forecast error of first round estimation of the 5-year forecast (1995-1999) is equal to one-fifth of total forecast error over the period 1995-1999. The overall average forecast error of the 5-year forecast (with re-estimation) for each of the seven forecasting models is equal to the average forecast error compiled from the first round estimation.

5.9.2.1 Evaluation of Forecasting Performance – Mean Square Error (MAE) and Root Mean Square Error (RMSE) Criteria

Our review of the empirical literature of tourism demand indicates that there are few evaluation criteria that are commonly used for the evaluation of forecasting performance. In this study, we have selected two criteria to evaluate the forecasting performance of each of the seven forecasting models of tourism demand for each of six selected origin countries. In the steps of Fuji and Mak (1981) Gonzalez and Moral (1995) and Kim and Song (1998), we applied the criteria of the mean absolute forecasting error (MAE) and the root mean square error (RMSE) to assess the forecasting accuracy of the forecasting models. The main difference between the MAE and RMSE is the consideration of the importance levels of issues regarding error weight. Those who believe all errors should carry equal weight would prefer the measurements of the MAE rather than the RMSE. However, other forecasters prefer to use a root mean square error criterion, because they believe the hypothesis that 'large errors' have a greater-than proportional cost for the decision-makers in comparison to 'small errors'. In this study, we present both measures for comparison. The formulas of the two evaluation criteria selected for the evaluation of forecasting performance of the tourism demand models are shown in Equation 5-8 and Equation 5-9.

The mean absolute error (MAE):

$$MAE = \frac{\sum_{t=1}^{m} |e_t|}{m} \quad \text{.......} (5-8)$$

The root mean square percentage error (RMSE):

$$RMSE = \sqrt{\frac{\sum_{t=1}^{m} (e_t)^2}{m}} \quad \text{.......} (5-9)$$

In equation 5-9, m is the length of forecasting horizon, and Et is the forecasting error of the first difference of visitor arrivals.

5.9.3 Ex-ante Forecasting Procedures – Scenario Forecasting

In the process of scenario forecasting, the first step taken is to determine the forecast values of the explanatory variables with respect to three alternative scenarios in the econometric models of tourism demand. We applied the standard ARIMA model to determine the baseline forecast value of the independent variables for the most likely scenario. We were able to adjust the forecast values of the independent variables with respect to the assumptions of alternative scenarios.

In this study, our forecasting models are constructed to produce forecasts of the changes in tourist flows to Hong Kong for each of six origin countries over the period from 2000 to 2004, a five-year period. It is well known that annual forecasts of tourism demand using econometric models developed from the past trend data are likely to remain reasonably constant over this short time period. As the time period of the projection lengthens, the likelihood of these relationships remaining constant decreases, and the accuracy of econometric forecasts is likely to decline. Moreover, as the errors of the forecast independent variables normally increase with respect to the length of forecasting horizon, therefore, we have set a five-year period as the maximum time possible to make tourism demand forecasts.

In the process of scenario forecasting, we produce each independent forecast value of the independent variables under the assumptions of alternative scenarios. Under the assumption of the most-likely scenario, we applied the ARIMA model to determine the baseline forecast value of the independent variables. We are operating under the assumption of an alternative optimistic scenario independently. The alternative optimistic scenarios include the following five scenarios: first, the permanent income will grow by 1% more than the forecast value produced by the ARIMA model per annum, for each of six selected origin countries. For the Second and third scenarios, we set the own price index to be 1% lower, and the weighted substitute price index to be 1% higher than the forecast value from the ARIMA model, respectively. For the Fourth and Fifth scenarios, we set the real trade volume variable at 1% higher and the stock price variable at 1% higher, or 1% lower than the baseline value, according to the selected estimating model, respectively. Alternatively, the pessimistic scenarios include the following five alternative scenarios: for the first pessimistic scenario, the permanent income will grow by 1% less than the ARIMA value for each of the six selected origin countries. For the second and third pessimistic scenarios, we set the own price index at 1% higher, and the weighted substitute price index at 1% lower per annum than the ARIMA value, respectively. For the Fourth and Fifth pessimistic scenarios we set the real trade volume variable at 1% lower than the baseline value, and the stock price variable at either 1% higher or lower, according to the selected forecasting model, respectively.

5.10 Chapter Summary

Based on the review of the empirical literature of tourism demand, our research framework was developed to re-examine the income, price and wealth effect of tourism demand in order to produce an econometric model that is capable of explaining and forecasting tourism demand with a high degree of validity.

In this chapter, we have explained the merits of using the grid search process based on permanent income-life cycle hypothesis to select the most preferred permanent income index, and of the rival search process to select the most competitive rivals, for constructing a preferred weighted substitute price index for a tourism demand model. Our review of empirical literature indicated that the effect of asset wealth and the role of permanent income have never been thoroughly investigated in any existing econometric models of tourism demand. This is the first time in the empirical literature of tourism demand estimation that the share price index has been included in a tourism demand model. We explained the merits of selecting the share price index as a proxy for asset wealth to capture the wealth effect. In addition, we explained the merits of the application of functional form tests for determining the most appropriate functional form in tourism demand models. We also presented a brief review of the merits and the shortcomings of traditional approaches, as a guide to selecting econometric procedures. To be consistent with the statistical properties of time-series data, we applied the cointegration and error correction approaches to tackle the problem of spurious regression. We used the Engle and Granger and the Johansen FIML procedures to estimate long-run relationships among the underlying variables in tourism demand models and estimated error correction models to examine short-run relationships among the underlying variables. Our review of the empirical literature indicated that there has been growing consensus that says that popular unit root tests generally lack power. There is therefore a need to consider other estimation procedures to ensure the reliability of the empirical results. In this study, we realized the strength of using the Pesaran approach as a supplement to the Engle and Granger and Johansen approaches. We believe that this is particularly worthwhile for cases that have problems in identifying the same order of integration for all of the underlying variables or cases that have small sample size. We also explained the estimation procedures for each of the three alternative cointegration approaches in this chapter.

One purpose of this study is to produce an accurate forecast for predicting tourism demand. Obviously, our preferred econometric models, the ones we would select for future demand forecasting, are those models that make the fewest forecast errors. In this chapter, we have explained in detail the scenario forecasting procedures and the assessment methods of their ex-post forecasting performance. In the next chapter, we will present the empirical results of our tourism demand models for each of six selected tourist origin countries, based on the Engle and Granger and Johansen approaches.

Chapter 6: Cointegration Analysis of Tourism Demand Estimation (Engle-Granger and Johansen Approaches)

6.1 Introduction

In the preceding chapter, we developed an econometric framework for estimating tourism demand in Hong Kong. In this chapter, we present the results and findings of the econometric models of tourism demand based on the alternative cointegration and error correction approaches. The empirical investigation will be conducted by using two alternative cointegration approaches: the Engle and Granger Approach (Engle and Granger, 1987), and Johansen approach (Johansen, 1988, 1991, 1995; and Johansen and Jussellius, 1990,1992). We decided to use both approaches to account for the possibilities of multiple long-run relationships and deal with the small sample problems. Since this study will be using 16 to 41 annual observations, it is on the borderline for concern about this small sample problem. In addition, we made a choice to use country-pairs models instead of aggregate models to account for each origin country's attributes and to produce individual country forecasts. The six tourist origin countries we have selected are classified into two major categories: long and short-haul markets. The short-haul markets are Japan, Taiwan and China, while the long-haul markets are the United States, the United Kingdom and Germany.

This chapter is arranged as follows: in each of six sections (Sections 6.2 to 6.7) we present the estimation results and findings of the long-run cointegrating regression model, and the preferred short-run dynamic ECM for each of the six origin countries. Each of these sections consists of four sub-sections. In the first subsection of section 6.2 to 6.7, we report the results of a conventional Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) unit root tests for testing the order of integration. In the second subsection, we present the results of the selection of preferred permanent income variable based on a grid search process, and the selection of competitive rivals for the construction of substitute price variable based on the process of rival search. In the third subsection, we present and analyse the empirical results for the testing of cointegration relationship: the estimation of long-run cointegrating regression (Engle-Granger), and the long-run cointegrating vector (Johansen). In the fourth section, we present the results of the preferred ECMs and their economic interpretations, based on both Engle-Granger and Johansen approaches. Although there may be some replication of results across origin countries in this chapter, the estimated results and findings are presented based on an individual country approach for two reasons. Firstly, the economic difference exists among alternative origin countries. Secondly, the results of the selection of most preferred permanent income variable and the most competitive rivals for the construction of weighted substitute price index vary substantially among alternative origin countries.

In the final section (Section 6.8), we summarise all major findings in this chapter.

6.1.1 Definition of Terms in Cointegration Analysis

In this study, the term 'statistically significant' indicates that the coefficients are significantly different from zero at the 95% confidence level or the 5% error. The term 'Johansen approach' refers to the work of Johansen (1988, 1990, 1995) and Johansen and Jussellius (1990,1992), the term 'Engle-Granger approach' refers to the work of Engle and Granger (1987), and the term 'Pesaran approach' refers to the work of Pesaran and Shin (1998). The term 'Johansen Model Case III' refers to the VAR model with unrestricted intercepts and no deterministic trends; this refers to the Johansen Case 3 model, shown in Pesaran and Pesaran (Ch, 7, 1997). The term 'Johansen Model Case II' refers to the VAR model with restricted intercepts and no deterministic trends; this refers to the Johansen Case 2 model, shown in Pesaran and Pesaran (Ch, 7, 1997). A detailed explanation of the two cases is provided in the Pesaran and Pesaran (Ch, 7, 1997).

6.1.2 Definition of Diagnostic Tests in Cointegration Analysis

For each ECM, we applied the following standard diagnostic test statistic to test for the validity of the model. These are the Lagrange Multiplier (LM) test developed by Godfrey (1978b), which tests for residual serial correlation; the Jarque and Bera (1980) normality test; the White (1980) heteroscedasticity test; the cumulative sum test (CUSUM); and cumulative sum of squares test (CUSUMSQ) for structural stability, proposed by Brown et al. (1975); the plot of recursive estimate coefficients for discovering structural instability; and the Ramsey (1969) RESET test for discovering the mis-specification of the functional form. The summaries of the results of diagnostic test statistics for each preferred ECMs are provided in Appendix D.

In addition, we apply a number of different statistical procedures in this study to determine the most appropriate functional form of tourism demand model for our investigations. The reported functional form test statistics include the S-test, as proposed by Pesaran and Pesaran (1995) and considered as the simple version of the simulated Cox-test statistics; the BM-test, taken from the Bera and McAleer (1989) study; the DL test from Davidson and Mackinnon (1981); and the PE double-length regression test statistics test from MacKinnon, White and Davidson (1983). In addition, Sargan (1964) and Vuong (1989) likelihood criteria are also used to determine the most preferred functional forms.

6.1.3 Results of Functional Form Tests – Testing Linear Versus Log-linear Models

Further, the results of the reported test statistics of the functional form test suggest that the model with log-linear form is the preferred functional form for all tourism demand models, and the summary of results is reported in Appendix C. Thus, the models with log-linear form will be used for each of six tourism demand models in this Chapter. The results of goodness of fit tests, standard diagnostic tests, non-nested tests of functional form, CUSUM and CUSUMSQ tests for structural stability, and the plot of recursive estimate of coefficients are indicated in appendix D.

6.2 Cointegration Analysis of Tourism Demand (Japan)

6.2.1 Testing for Order of Integration (Japan)

Before estimating long-run relationships among underlying variables in a tourism demand model based on a cointegration approach, we must carry out pre-modelling tests to examine the time-series properties of underlying variables of the tourism demand model. This is an important and essential process, because if any of the underlying variables are non-stationary, an estimation exercise using the ordinary least square (OLS) approach is likely to produce spurious results. To investigate whether the underlying time series variables for the Japan model are stationary, we employ the Dickey and Fuller (DF) and Augmented Dickey and Fuller (ADF) (Dickey and Fuller, 1979) unit root tests to examine the conditions of the stationarity of the time-series data in relation to the form of level and the form of first differences.

That is, to test whether a particular economic time series (X t) is stationary, it is equivalent to test for the significance of β_2, i.e. $H_0 = \beta_2 = 0$ in the Augmented Dickey-Fuller regression in Equation 6-1. If the null hypothesis (Ho) is rejected, then the time series (X t) is said to be stationary.

$$\Delta X_t = \beta_0 + \beta_{1time} + \beta_2 X_{t-1} + \sum_{i=1}^{k} \lambda_i \Delta X_{t-i} + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6-1)$$

where

X_t = underlying variables (either level series or difference series) in tourism demand equation.

Δ = first difference operator, $\Delta X_t = X_t - Xt_{-1}$

k = number of lags

$time$ = time trend

e_t = error term

Functional form = all variables in level of logarithmic (ln) form

Table 6.1 reports the results of the DF/ADF unit root test statistics of the selected level and first difference variables in the Japan tourism demand equation.

Table 6.1 Results of DF/ADF Unit Root Tests (Japan)

Variables	Level with Trend	First Difference with Trend[1]
LnTANAT (visitor arrivals)[15]	-2.48[1]	-4.64[1] **
LnSHARE (share price)	-2.18[0]	-6.39[0] **
LnPPP (own price of tourism)	-1.40[2]	-4.96[3] **
LnRTRAD (real trade volume)	-1.91[3]	-4.80[0] **
Variables	**Level with no Trend**	**First Difference with no Trend**
LnSUB (substitute price)[15]	-1.26[4]	-6.26[3]**
LnRGDPPC (Current income)[15]	-4.13[0]**	-3.82[0]**

Notes:

1. TANAT = total visitor arrivals from Japan by nationality.
2. RGDPPC = current income index (GDP per Capita of Japan)
3. SHARE = share price index for Japan, as taken from Table 5.1
4. PPP = own price index for Japan, as calculated from Equation 5-3.
5. RTRAD = real trade volume measured by total imports, re-exports, and exports between Japan and Hong Kong.
6. SUB = weighted substitute price index of Japan, as calculated from Equation 5-5.
7. Ln = variables in logarithm form.
8. Maximum lag length (k), 4.
9. (**) shows rejection of null hypothesis at 95% significance level, respectively.
10. Since the underlying data generating process is generally unknown, this suggest using the general model with time trend in Equation 6-1 for testing the unit root hypothesis. Enders (1995) noted that unless the researchers know the actual data-generating process, it might seem reasonable to test the unit root hypothesis using the most general model as shown in Equation 6-1. Therefore, all of above unit root tests are initially estimated based on model with intercept and linear time trend in Equation 6-1.
11. MacKinnon's (1991) critical value applied in this test, gives critical value of Table 6.1 as -3.54 and –2.95 at the 95% level for model with constant and trend and model with constant only, respectively.
12. For those time series which show mixed results of the order of integration for the economic variables between the model with constant and linear trend and the model with constant and no trend, the Dickey –Fuller (1981) F-tests statistics for the testing of the presence of linear trends will be applied to determine the preferred model for testing the order of integration for those economic series. However, for those cases with no mixed results, we report the results of ADF unit roots test statistics based on the general regression model with constant and time trend (Equation 6-1)

13. Figures in parentheses, [ ], lag lengths (k) used in ADF regression model in Equation 6-1. In order to determine K, initial lag length of 4 is selected, and fourth lag is firstly tested for statistical significance. If fourth lag is not preferred, lag length is reduced successively until significant lag length is obtained. If first differences (without lag length) are used, ADF test reduces to Dickey-Fuller (DF) test. Once a tentative lag length has been determined, we plot the residuals for diagnostic check.

14. Period of estimation, 1959-1999.

15. The results of ADF unit root test statistics indicate that the series of LnTANAT, LnRGDPPC and LnSUB have mixed unit root results, between the models with constant and linear time trend and the model with constant and no trend. The results of Dickey and Fuller (1981) F-tests statistics indicated that the model with no linear time trend is preferred (with the exception of LnTANAT) for all the above series exhibit mixed results. Therefore, the results of ADF unit root tests statistics of LnRGDPPC and LnSUB in Table 6.1 are based on the estimated results of the model with no linear time trend. The summary of results of Dickey –Fuller (1981) F- test statistics for all series exhibit contradictory results of the number of unit roots are provided in appendix F.

As shown from the results (Table 6.1), the results of the ADF unit root tests (models with linear time trend) indicate that the value of ADF test statistics exceeds the critical value of -3.54 (in absolute value) for the variables of visitor arrivals, own price index, real trade and share price in first differenced form. In addition, the ADF unit root test (models with no linear trend) indicates that the value of ADF unit root test statistics exceed the critical value of -2.95 (in absolute value) for the weighted substitute price variable in differenced form. However, the value ADF unit root test statistics (model with no linear trend) exceed the critical value of –2.95 (in absolute value) for the current income variable in level form. This indicates the current income variable is integrated of order 0. In summary, the findings imply that all of the series of underlying variables, with the exception of current income variable, are integrated of order one.

6.2.2 Model Specification – Proxy Variable Search Process

6.2.2.1 Selection Results of Substitute Destinations – Rival Search Process (Japan)

As indicated from the methodology section, there are several steps required to construct a rival search version of the weighted substitute price index.

In order to determine the nature of competition among a set of Japan's most popular destinations in the region, we must distinguish between the group of substitute destinations and the group of complementary destinations from the list of Japan's most popular destinations in the East Asia and Pacific (EAP) region. This is determined solely by the results of statistical experimentation, as indicated in Chapter 5.

We have selected potential substitute destinations for the Japan model from a list of the eight most popular destinations for outbound tourists from Japan within the EAP region. The destinations selected are Korea, China, Singapore, Taiwan, Guam (U.S.A), the Philippines, Thailand and Australia, based on their largest average market share over a period from 1995 to 1999. We made the ultimate decision to select these substitute destinations for the construction of substitute price variable by using the following statistical experiments.

First, we constructed a multiple regression model that consists of the independent variables of country-pair substitute price variables for eight popular destinations of Japan, other selected economic determinants, and the dependent variable of tourist arrivals from Japan. We then determined an estimation of the numbers for the 'substitute destinations' to use in the construction of Japan's weighted substitute price index, based on the regression results. The regression results (Table 6.2) indicate that Thailand and Australia are the substitute destinations of Hong Kong (with positive sign) for Japanese tourists, while Korea, China, Taiwan, Singapore, the Philippines and the Guam are the complementary destinations (with negative sign).

After determining the major substitute destinations for the weighted substitute price index for the Japan model, and discarding the complementary destinations, the next step involved constructing the 'weighted substitute price index'.

Based on the results shown in Table 6.2, Japan's weighted substitute price index comprises the country-pair substitute price variable of Thailand and Australia. The index is constructed based on the formula of the weighted substitute price index, as shown in Equation 5-5.

Table 6.2 Results of Coefficient Estimates – Selected Country-pair Substitute Price Variables (Japan)

Country -pairs Substitute Price Variables	Coefficient	t-ratio
LnPPJAKOR	- 0.334	- 2.58**
LnPPJACHI	- 0.231	-1.15
LnPPJATAI	- 0.286	- 0.89
LnPPJAUS	- 0.906	- 3.55**
LnPPJASIN	- 0.191	- 0.353
LnPPJAPHI	- 0.048	- 0.27
LnPPJATHA	0.474	1.03
LnPPJAAUS	1.24	3.26**

Notes:

1. PPJAKOR = country-pair substitute price variable of Korea, as calculated in Equation 5-3.
   PPJACHI = country-pair substitute price variable of China, as calculated in Equation 5-3.
   PPJATAI = country-pair substitute price variable of Taiwan, as calculated in Equation 5-3.
   PPJAUS = country-pair substitute price variable of the United States, as calculated in Equation 5-3.
   PPJASIN = country-pair substitute price variable of Singapore, as calculated in Equation 5-3.
   PPJAPHI = country-pair substitute price variable of the Philippines, as calculated in Equation 5-3.
   PPJATHA = country-pair substitute price variable of Thailand, as calculated in Equation 5-3.
   PPJAAUS = country-pair substitute price variable of Australia, as calculated in Equation 5-3.
2. Ln = logarithm form.
3. For descriptions of variables, refer to notes of Table 6.1.
4. ** indicates significance at 95% level

Table 6.3 Results of DF/ADF Unit Root Tests – Selected Country-pair Substitute Price Variables (Japan)

Variables	Level	First Differences
LnPPJASIN	(-) 3.62[1]**	(-) 4.96[2] **
LnPPJATHA	(-) 3.70 [1]**	(-) 5.27[3] **
LnPPJAPHI	(-) 2.22[0]	(-) 6.52[0] **
LnPPPUS	(-) 2.91[1]	(-) 4.67[3] **
LnPPJAKOR	(-) 5.43[1]**	(-) 5.60[0]**
LnPPJACHI	(-) 3.35[1]	(-) 5.05[1]**
LnPPJATAI	(-) 2.87[2]	(-) 6.67{0]**
LnPPJAAUS	(-) 6.53[2]**	(-) 7.67[3]**

Notes:

1. ** indicates rejection of hypothesis of unit root 95% level.
2. All above models introduced using model with intercept and linear time trend in Equation 6-1.
3. Figures in parentheses,[ ], lag lengths (k) used in Equation 6-1.

The second step of the rival search process is to investigate the time-series properties of various country-pair substitute price variables and the weighted substitute price variable.

The results of an ADF unit root test for a series of the country pair substitute price variables, as shown in Table 6.3, indicates that all of the country pair substitute price variables, with the exception of Australia, Korea, Thailand and Singapore, are integrated of order one. Since the country-pair substitute price variable of Australia (one of the substitute destination in the weighted substitute price variables of Japan) is I (0), it is important to check that the results of the ADF unit root test statistics of the weighted substitute price index. The ADF unit root test results (Table 6.1), suggests that the variable of weighted substitute price index of Japan is integrated of order one, indicating that there is no problem in applying the weighted substitute price variable to the tourism demand (Japan) equation.

6.2.2.2 Selection Results of Preferred Permanent Income Variable– Grid Search Process (Japan)

As indicated in Chapter 5, the most preferred income variable employed in the tourism demand model is determined using the statistical procedures of a grid search.

The first step of the grid search process is to investigate the time-series properties for each permanent income index. This is because the preferred permanent income variable must have the same order of integration as the other underlying variables. As indicated by the ADF unit root test results (models with linear time trend) in Table 6.4, the income variable of LnP(100) , LnP(90) and LnP(85) are I(1) variables, but the LnP(80) is not a I(1). However, the ADF unit root test results (models with no linear time trend) indicated that the income variable of LnP(100), LnP(90), LnP(85) and LnP(80) are I(0), indicating the mixed results of the conclusion of the numbers of unit roots , derived from the model with trend and model with no trend. As shown in Appendix F, the results of Dickey and Fuller (1981) F-test statistics for the presence of deterministic trend indicated that the model with no linear time trend is preferred for all of the above income variables. However, the conclusion of using no trend model for the above income variables is drawn based on the borderline case. Enders (1995) notes that if the estimated regression omits an important linear time trend in the Equation 6-1,the power of the t-statistics goes to zero as the sample size increases. This indicates that the omission of a time trend variable in the data series with the presence of time trend could be very serious. Therefore, it is much safer to consider the permanent income series of LnP(100), LnP(90) and LnP(85) in the model of cointegrating regression because those series are classified as I(1) variables based on the results from the model with time trend.

Table 6.4 Results of DF/ADF Unit Root Tests – Selected Permanent Income Variable (Japan)

Variables	Level with Linear Time Trend	First Differences with Linear Trend
LnP(100)	-2.55[3]	-4.30[0]**
LnP(90)	-2.56[3]	-3.86[0]**
LnP(85)	-2.57[1]	-3.66[0]**
LnP(80)	-2.59[1]	-3.45[0]
Variables	**Level with no time trend[8]**	**First Differences with[8] no Linear Trend**
LnP(100)	-4.13[0]**	-3.82[0]**
LnP(90)	-4.37[0]**	-3.40[0]**
LnP(85)	-4.50[0]**	-3.21[0]**
LnP(80)	-4.63[0]**	-3.01[0]**

Notes:

1. Ln = logarithm form.
2. Number in parenthesis ( ) indicates value of smoothing constant, as shown in Equation 5-2.
3. LnP(100) = permanent income index with smoothing constant of 1.00.
   LnP(90) = permanent income index with smoothing constant of 0.90
   LnP(85) = permanent income index with smoothing constant of 0.85.
   LnP(80) = permanent income index with smoothing constant of 0.80.
4. MacKinnon's (1991) critical value applied in this test, gives critical value of Table 6.4 as -3.54 and –2.95 at the 95% level for models with constant and linear trend and models with only constant, respectively.
5. **/* indicates rejection of hypothesis of unit root at 95%/90% level, respectively.
6. Figures in parentheses, [ ], lag lengths used in tests.
7. For those cases that indicate mixed results of the order of integration between the model with trend and the model with no trend, the Dickey-Fuller (1981) F-tests for the existence of linear time trend will be applied to indicate the presence of linear time trend in preferred model for testing the order of integration for those economic series.
8. The results of unit root test indicate that the series of LnP(100), LnP(90), LnP(85) and LnP(80) has mixed results between the model with trend and the model with no trend. The results of Dickey and Fuller (1981) F-tests (shown in Appendix F) indicated that the model with no linear time trend is preferred

for all the above series exhibit contradictory results. However, the F-tests tests statistics of LnP(90) and LnP(85) are close to the borderline region and must be interpreted with caution.

The second step of a grid search process is to select the most preferred permanent income variable from the list of permanent income indices. In comparing the results of the regression models based on the LnP(100), LnP(90) and LnP(85) variables, we discover that the empirical results indicate that the regression model with LnP85 variable produces the maximum R^2 and most preferred cointegration ADF tests statistics. The results of Cointegrating regression (Lnp85) and the Augmented Engle-Granger Cointegration ADF test (Lnp85) are presented in Tables 6.6 and 6.7, respectively.

Table 6.5 Results of R^2 and Cointegration DF/ADF Tests – Selected Permanent Income Variables (Japan)

Permanent Income Series	R^2	Cointegration ADF Test Statistics
LnP(100)	0.9908	-4.21[3]
LnP(90)	0.9912	-4.34[1]
LnP(85)	0.9913	-4.45[1]**

Notes:

1. LnP(85), LnP(90) and LnP(100) , permanent income variables in logarithmic form, with smoothing constants of 0.85, 0.90, and 1.00, respectively.
2. Values of R^2 and cointegration ADF test statistics for each permanent income series are derived from the results of regression models consisting of various selected permanent income variables, relevant economic variables, and visitor arrivals variables from Japan in regression model.
3. Figures in parentheses [ ], are the lag lengths used in the tests and ** indicates significance at 95% level.
4. Although there is doubt on the same level of integration for all underlying variables in Japan model, it is common to conduct tests for cointegration even when the unit root analysis suggests that the level of integration for those variables in the equation are unbalanced.

6.2.3 Testing for Cointegration (Japan)

6.2.3.1 Cointegration Results and Interpretations – Engle-Granger Approach (Japan)

One of the strengths of cointegration analysis lies in the ability to explore both the underlying changes in the dependent variables of long and short-run relationships. In this section, we employed Engle-Granger and Johansen cointegration approaches to test for the existence of cointegration. With the application of the cointegration and error correction approach, we are able to incorporate the long-run information in short-run ECMs.

The first step of the Engle-Granger approach is to estimate the cointegrating regression using the ordinary least square method. We first investigated the long-run general model for Japan that consists of the following economic variables: the current income variable, the own price variable, the weighted substitute price variable, the share price variable, the real trade volume variable, six cross-country general dummy variables, and one country-based dummy variable (DUMMY87JAP). The results of the long-run general model (Japan) are presented in Appendix B, Table B.1.

We first investigated the long-run general model for Japan empirically, in order to determine which economic variables and dummy variables are relevant for the cointegrating regression. Any selected variables found not to be relevant were deleted, and the remaining relevant variables were re-estimated with each I(1) permanent income index for the selection of preferred permanent income variable to obtain the final cointegrating regression model. The results of the cointegrating regression are presented in Table 6.6. Notice that we have not quoted any estimated standard errors for the cointegrating regression (Table 6.6). This is because the cointegrating regression model does not provide consistent estimates of the true standard errors when the regression involves I(1) variables. This implies that we cannot make use the t statistics to help decide which variables should be included in the cointegrating regression. In this study, we decide which variables to include in the cointegrating regression based on prior economic theory, the results of R^2 and cointegration ADF tests. The empirical results shown in Tables 6.5 and 6.6 indicate that the underlying variables of permanent income (Lnp85), the share price, and the own tourism price are relevant, with theoretically expected sign, to include in the cointegrating regression, on the basis of most preferred R^2 and cointegration ADF unit root tests.

The results in Table 6.6 indicate that the cointegrating regression (Lnp85) has a high CIDW statistics. Since the CIDW value of 1.17 in the cointegrating regression is greater than its R^2 value of 0.991, we found that the underlying variables in the Japan model are likely to be cointegrated.

Table 6.6 Results of Cointegrating Regression (Japan)

Series	Coefficient
CONSTANT	11.76
LnP85	2.9
LnSHARE	-0.214
LnPPP	-0.782

Diagnostic Test

$R^2 = 0.991$ DW = 1.17

Notes:
1. For description of variables in cointegrating regression, refer to the notes of Tables 6.1 and 6.5.
2. Except for Durbin-Watson statistic and R^2, no diagnostic statistics reported in Table 6.6.

3. Since the distributions of OLS estimators are non-standard, estimated standard errors cannot be used for hypothesis testing. We decide not to report t-value.

The results of the long-run cointegration regression indicate that all of the demand elasticity is correctly signed. The long-run permanent income elasticity is positive and greater than one, suggesting that travel to Hong Kong is considered a luxury for Japanese tourists. The own tourism price elasticity is smaller than 1, which indicates that tourism demand in Japan is price inelastic. The share price elasticity is negative and smaller than one, which indicates that Japanese tourism demand in Hong Kong is negatively correlated with the movement of Japan share price.

Although the results of the CIDW statistics suggest that the variables in the Japan model are likely to be cointegrated, Banerjee et al. (1986) noted that the power of the CIDW test for rejecting the null hypothesis of no cointegration against alternatives is relatively low. We must investigate the stationarity of the residuals of the cointegrating regression model by applying a cointegration DF/ADF unit root test. Table 6.7 presents the results of the cointegration ADF unit root test statistics of the cointegrating regression.

Table 6.7 Results of Cointegration DF/ ADF Tests (Japan)

	Test Statistics	95% Critical Value
ADF[0]	-3.72	(-4.42)
ADF[1]	**-4.45****	(-4.42)
ADF[2]	-4.08	(-4.42)
ADF[3]	-4.35*	(-4.42)
ADF[4]	-4.18	(-4.42)

Notes:
1. Residual-based cointegration test using Microfit 4.0
2. Maximum lag length, 4
3. */** indicates rejection of hypothesis at 90%/95% level

The results of the ADF [1] statistics confirm that the residuals, error term compiled from the cointegration regression, are likely to be I(0) at the 95% level. We can conclude that a cointegration relationship exists for the preferred long-run model (cointegrating regression), based on the testing procedures of the Engle-Granger approach.

6.2.3.2 Cointegration Results and Interpretations – Johansen Approach (Japan)

As indicated in the methodology section, our econometric model of tourism demand is multivariate. This means there may be multiple cointegrating vectors linking some or all of the included variables. Our analysis of the estimation procedures in Chapter 5 indicated that the approach of Johansen overcame the problems of detecting multiple cointegrating vectors, as associated with the Engle-Granger approach.

In this section, we employ the Johansen approach to examine whether there are one or more cointegrating vectors in the underlying variables of Japan model. Before estimating the existence of the cointegrating relationship based on the Johansen approach, we must decide whether there is a constant term and a linear time trend in the model. Moreover, it is important to determine the appropriate number of lags, K, in the VAR model. In theory, it is better to set a small K because of our small sample size and because of the nature of annual data in this study. However, a small K such as order one may increase the possibility of autocorrelation in the error terms, which may affect the validity of the entire estimation process. Thus, we initially set an order of K=4 and will base the final decision on the statistics of the AIC and SBC criteria.

After examining the empirical results between models with unrestricted intercepts and no trend, models with restricted intercepts and no trend and models with unrestricted intercepts and restricted trends. Therefore, in this chapter, Johansen models are thus estimated based on the VAR(K) model with unrestricted intercepts and the absence of deterministic trends.

Table 6.8 presents the results of AIC and SBC test statistics and the choice criteria required for selecting the order for the VAR model. In the case of the Japan model, the AIC indicates order of 2, but the SBC indicates order of 1.

Table 6.8 Results of Choice Criteria for Selecting Order of VAR Model (Japan)

Order	AIC	SBC
4	107.1	55.6
3	113.7	75.1
2	115.7	89.6
1	114.9	102.0

AIC = Akaike Information Criterion

SBC = Schwarz Bayesian Criterion

Finally, We select the VAR (2) model on the basis of the AIC criterion to avoid the possibility of autocorrelation in the error terms. In Table 6.9, the results for the VAR (2) models with unrestricted intercepts and no trends are shown.

Table 6.9 Results of Johansen Co-integration Test based on λ_{max} and λ_{trace} (Japan)

Maximum Eigenvalue Test					Trace Test				
Null (r=0)	Alternative (r>0)	Statistics	95% CV	90% CV	Null (r=0)	Alternative (r>0)	Statistics	95% CV	90% CV
r=0	r=1	30.5	27.4	25.0	r =0	r ≥1	46.8	48.8	45.7
r ≤1	r=2	9.9	21.1	19.0	r ≤1	r ≥2	16.3	31.5	28.8
r≤2	r=3	4.3	14.9	13.0	r ≤2	r ≥3	6.4	17.9	15.8
r ≤3	r=4	2.1	8.1	6.5	r ≤3	r ≥4	2.1	8.1	6.5

Notes:

1. Trace and maximum eigenvalue statistics for testing null of no cointegration against alternative cointegrating relations among variables in final long-run model (Japan).
2. 95% and 90% of critical values in Table 6.9 are obtained from Pesaran and Pesaran (1997).
3. Period of estimation, 1959 to 1999.
4. Johansen Co-integration tests are estimated based on VAR (2) models.

Starting with the null hypothesis of no cointegrating vector (r=0) among the variables, the trace test statistic of 46.8 exceeds the 90% critical value of 45.7. It implies that we reject the null hypothesis of no cointegrating relation. However, for the null hypothesis of the one cointegrating relation (r≤1) among the variables, the trace statistic of 16.3 is below the 95% and 90% critical values of 31.5 and 28.8, respectively. It implies that the null hypothesis of $r \leq 1$ cannot be rejected at both 95% and 90% confidence levels. Therefore, the cointegration test, based on trace of the stochastic matrix indicates that one cointegrating relation exists at the 90% confidence level.

Since the statistical power of the trace test is relatively lower than the maximum eigenvalue test, it is necessary to confirm the cointegrating relations using the maximum eigenvalue test. The null hypothesis of no cointegration (r=0) is rejected at a 95% critical value based on the results of maximum eigenvalue test and in favour of r=1. We can conclude that one cointegrating vector exists in the Japan model. This confirms that there exists a stable long-run relationship among the tourist arrivals from Japan and the selected economic variables of the permanent income variable [85], the own tourism price variable, and the share price variable.

After determining the existence of cointegration, we must analyse the results of long-run parameter estimates obtained by normalising the cointegrated vector in the Johansen estimates, as shown in Table 6.10.

Table 6.10 Results of Estimated Cointegrated Vectors – Johansen Approach (Japan)

	Johansen case 3
Variables	**Vector 1**
LnTANAT	1.59 (-1.00)
LnP85	-4.38 (2.75)
LnPPP	1.04 (-0.65)
LnSHARE	0.28 (-0.176)

Notes:

1. Values in brackets are shown as normalised co-integrating vectors, that is each value in vector divided by first value in same vector).
2. VAR (2) model are estimated with unrestricted intercepts and no trends.
3. For description of variables shown in Table 6.10, refer to the notes of Tables 6.1 and 6.5.

Table 6.10 presents the results of estimated cointegrated vectors in the Johansen approach for the Japan model. The results indicate that all the coefficients of the independent variables in Vector 1 have the theoretically expected signs. The demand elasticity of the permanent variable is greater than 1, whereas the demand elasticity of the own price variable and share price variable is negative, less than 1.

6.2.4 Estimating ECMs (Japan)

Consistent with the two-stage estimation procedures proposed by Engle and Granger (1987), the dynamic ECM (Engle-Granger) and ECM (Johansen) were specified by incorporating the lagged error term residual (error correction term) compiled from cointegration regression (Table 6.6), and the lagged error term residual, captured from the cointegrating Vector 1 (Table 6.10), as derived from the Engle-Granger and Johansen procedures, respectively.

6.2.4.1 Short-run General ECM – Engle-Granger and Johansen Approaches (Japan)

We start our estimation by using the short-run general ECM shown in Equation 6-2. The long-run estimated coefficients of the long-run cointegration regression (Engle-Granger) from Table 6.6, and the statistically significant cointegrated vector (Johansen) in Table 6-10, are fed into a lagged error-correction term (Z_{t-i}) for the estimation in the general ECM. The inclusion of the error correction term allows the long-run effects to be retained in the estimation of the short-run parameter. The short-run general ECM is specified with the differenced variables with lags up to order of 2 and the lagged error correction term. The short-run general ECM is specified as follows:

$$\Delta X_t = \beta_0 + \sum_{i=1}^{2}\alpha_i \Delta X_{t-i} + \sum_{i=0}^{2}\beta_{1i}\Delta Yp_{85t-i} + \sum_{i=0}^{2}\beta_{2i}\Delta Po_{t-i} + \sum_{i=0}^{2}\beta_{3i}\Delta SP_{t-i}.$$

$$+\theta Z_{t-1} + e_{t.} \qquad \text{...} (6-2)$$

where

X = number of visitor arrivals from Japan in Hong Kong

Yp_{85} = permanent income variable, α = 0.85

Po = own price variable

SP = share price variable

Z_{t-1} = lagged residuals derived from either long-run cointegrating Vector 1 in Table 6.10, or long-run cointegrating regression shown in Table 6.6

Δ = first difference operator

$e_{t.}$ = error term at time t

Period of study = 1959 – 1999

t = time

Functional form = logarithmic form

Since we select the double-log model in equation 6-2, the coefficients associated with the non-dummy variables are estimates of the elasticities. Thomas (1997, page 385) states that " Error correction models do not have to be expressed in logarithmic form but it is convenient to do so for several reasons. Not only does this mean that parameters can be interpreted as elasticites, but also because of the approximation of the equation of 'ln (Yt) – ln (Yt-1) = ln (Yt / Yt-1)', Thomas (1997, equation 13.13) and the calculated value of ln (Yt / Yt-1) is approximately equal to Y t - Yt-1/ Yt-1, first differenced variables (in logarithm form) such as change in Yt and change in Xt, are likely to form stationary series, and are therefore suitable for inclusion in classical regression". Moreover, Thomas (1997, page 379) further supported the use of the logarithms of variables in the error correction model by the following statement " Many non-stationary economic variables become stationary on first differencing. This is especially the case if we work in terms of logarithms of variables, because the first difference then became the proportionate rate of growth". Hence, empirical tourism demand estimation studies based on alternative cointegration approaches, such as Divisekera (1995), Kulendran (1996), Kim and Song (1998) and Dritsakis (2004) employ first differenced variables expressed in logarithmic form in their error correction models. Following the tradition of empirical literature, we have employed the first differenced variables in logarithm form in the error correction models. As shown in equation 6-2, the short-run general ECM comprises two lags on each of the selected dependent and independent variables in the differenced form, and the lagged error-correction term. The lagged dependent variable in differenced form is included in tourism demand functions to allow for the effect of habit persistence and supply constraints. We arrive at the preferred ECM specification when all insignificant differenced variables are deleted from the equation based on Hendry-type testing down procedures and when the most preferred ECMs pass all of the diagnostic checking tests. The most parsimonious specifications of ECM derived from the Engle-Granger and Johansen approaches are presented in Tables 6.11 and 6.12, respectively.

In addition, in Appendix B, Table B.2, we present the results of the general ECM (Japan), based on the Engle-Granger approach. In Table B.3, we present the results of the general ECM (Japan), based on the Johansen approach.

6.2.4.2 Preferred ECM Results and Interpretation – Engle-Granger Approach (Japan)

Table 6.11 shows the results of the Engle-Granger preferred ECM (Japan). The Engle-Granger ECM explains 69.8% of variation of visitor arrivals. The empirical results of standard error test indicated that the relevant economic determinants of short-run Japanese tourism demand for Hong Kong are permanent income (Lnp85) , the share price, and the one period lag of the tourism own price are significant in explaining the variation in tourism demand. We found that the short-run permanent income elasticity (2.3) is smaller than its long-run counterpart (2.9), which suggests that Japanese visitors are less responsive to change in their permanent income in the short run. The short-run own price variable (one period lag) is statistically significant, with the expected sign, in the short-run model. The short-run price elasticity of demand (-0.6) is smaller (in absolute terms) than the long-run price elasticity of demand (-0.8), as shown in Table 6.6. Although the share price index is only statistically significant at the 80% level in the short-run model, it is important for the overall significance of the model. The negative sign of share price index indicated that in the period of declining share market, Japan visitor switch from long to short-haul travel for the tight budget. Overall, the degree of responsiveness of Japan visitor flows to contemporaneous changes in incomes, own tourism price and share price implied in short-run elasticity is appreciably lower than their long-run counterparts. The estimated coefficient of RESEG1 (one lag of error correction term) is statistically significant, with correct negative sign. The value of adjustment parameters is -0.566, indicating the moderate speed of adjustment. Finally, the results of standard diagnostic tests statistics, shown in Table 6.11, demonstrate that the Engle-Granger ECM (Japan) is well specified.

Table 6.11 Results of Preferred ECM – Engle-Granger Approach (Japan)

Coefficient and t-statistics

Variables	Coefficients estimates	t-ratio
CST	0.029 (0.022)	1.31
DLNP85	2.26 (0.394)	5.72**
DLNSHARE	-0.090 (0.061)	-1.47
DLNPPP1	-0.632 (0.224)	-2.83**
RESEG1	-0.566 (0.136)	-4.16**

Goodness of Fit and Diagnostics Tests of Short-run Dynamic Model (Japan): Engle-Granger Approach

$R^2 = 0.73$	$\overline{R}^2 = 0.698$
SER = 0.104	RSS = 0.365
LM(1) = 2.98	RESET(1) = 2.09
NORM(2) = 0.444	HETRO(1) = 0.048

Notes:
1. **/* denote significance at 95/90 % level, respectively.
2. In formulating error-correction mechanism, lag length of disequilibrium error corresponds to length of response (adjustment) to any deviation from long-run path is set to one.
3. RESEG1 = Error Correction Term (Engle-Granger) with one lag.
4. $\overline{R}^2$ = coefficient of the determination adjusted for a degree of freedom.
   RSS = residual sum of squares.
   SER = standard error of estimate.
   LM = Lagrange multiplier tests for autocorrelation.
   NORM = Jarque-Bera normality test statistic.
   RESET = Ramsey's functional form test.
   HETRO = Heteroscedasticity test.
5. D = first difference operator.
6. For description of variables in Table 6.11, refer to Tables 6.1 and 6.5.
7. The critical values for LM, HETRO and RESET are 3.84 and the critical value of NORM is 5.99 based on chi square distribution for 1 and 2 degree of freedom at 95% level, respectively.
8. Figures in the brackets ( ) are the standard errors of coefficient estimates.

6.2.4.3 Preferred ECM Results and Interpretation – Johansen Approach (Japan)

The results of the Johansen ECM is not similar to the results of the Engle-Granger ECM. The estimated results of standard error test, as shown in Table 6.12, indicates that the selected permanent income variable and the tourism own price variable (with one lag) are statistically significant in explaining the variation of Japanese tourism demand in the short-run. The Johansen ECM explained 71.4% of variation in tourist arrivals and the short-run income elasticity of 1.5 (Johansen) is smaller than the short-run income elasticity of 2.3 (Engle-Granger). Also, the short-run own price variable (with one lag) is statistically significant with its elasticity, –0.5, and is smaller (in absolute value) than the short-run price elasticity of –0.6 (Engle-Granger). Thus, in the short-run, while Japan visitors are highly sensitive to changes in incomes, they are less sensitive to price. Finally, based on the Johansen procedures, the estimated coefficient of RESJO1, -0.569, is slightly higher (in absolute value) than the value of RESEG1, -0.566, which indicates a faster speed of adjustment. Finally, the results of the standard diagnostic tests of the preferred Johansen ECM indicate that the model is well specified.

Table 6.12 Results of Preferred ECM – Johansen Approach (Japan)

Coefficient and t-statistics

Variables	Coefficient Estimates	t-ratio
CST	6.49 (1.41)	4.61**
DLnP85	1.55 (0.398)	3.88**
DLnPPP1	-0.542 (0.214)	-2.53**
RESJO1	-0.569 (0.124)	-4.60**

Goodness of fit and Diagnostic Test Statistics

R^2 = 0.736 $\bar{R}^2$ = 0.714

SER = 0.101 RSS = 0.357

LM(1) = 2.02 RESET(1) = 2.88

NORM(2) = 0.288 HETRO(1) = 0.188

Notes

1. RESJO1 = Error Correction Term with one lag, based on Johansen Approach.
2. For descriptions of variables in Table 6.12, refer to the notes of Tables 6.1 and 6.5.

6.3 Cointegration Analysis of Tourism Demand (Taiwan)

6.3.1 Testing for Order of Integration (Taiwan)

The first step of the cointegration analysis of tourism demand for Taiwan is to investigate the time-series properties of the underlying variables in the tourism demand model. The results of the ADF unit root tests are presented in Table 6.13.

Table 6.13 Results of DF/ADF Unit Root Tests (Taiwan)

Series	Level with Time Trend	First Difference with Time Trend
LnTANAT	-2.54 (4)	-4.59 (0)**
LnRGDPPC	-3.42 (1)	-6.21 (1)**
LnPPP	-1.08(0)	-6.67(0)**
LnSHARE	-2.62(0)	-6.22(0)**
LnRTRAD	-1.38 (3)	-4.65(0)**
LnSUB	-2.95 (0)	-6.48(0)**

Notes:

1. Ln indicates series in logarithm form.
   TANAT = total tourist flows to Hong Kong from Taiwan by nationality.
   RGDPPC = per capita current income (real gross domestic product per capita of Taiwan).
   SHARE = share price index of Taiwan, taken from Table 5.1.
   PPP = own tourism price variable of Taiwan, based on Equation 5-3.
   RTRAD = real trade volume index of Taiwan, measured by totalling the sum of imports, exports and re-exports between Taiwan and Hong Kong.
   SUB = weighted substitute price index of Taiwan, calculated from Equation 5-5
2. ** indicates significance at 95% level, respectively.
3. All above series are estimated with models with intercepts and linear time trend, shown in equation 6-1.
4. Figures in parentheses ( ), lag lengths used in ADF unit root tests.
5. For other explanations, refer to notes of Table 6.1.
6. The results of The ADF unit root test indicate that all the series in Table 6.13 have no mixed results, between the model with constant and linear trend and the model with constant and no linear trend. Following our reporting guideline, we show all the results of unit root test statistics based on the general regression model with the model with constant and time trend.

The results of the ADF unit root test of stationarity indicate that the value of the ADF statistics is above of the critical value of -3.54 (in absolute value) for all underlying variables in first differenced form. Moreover, all the ADF test statistics is below the critical value of –3.54 for all variables in level form. We therefore conclude that all the underlying variables in the Taiwan model are classified as I(1) variables.

6.3.2 Model Specification – Proxy Variable Search Process

6.3.2.1 Selection Results of Substitute Destinations – Rival Search Process (Taiwan)

According to the market share analysis, the eight most popular destinations in the EAP Region for Taiwanese outbound tourists are Japan, Singapore, Korea, Indonesia, Malaysia, Philippines, Australia and Thailand. We determined the ultimate decisions for the basket of substitute destinations solely by using rival search process. The results of the regression model, as shown in Table 6.14, indicates that Japan, Singapore, Korea and Indonesia (positively signed) are classified as substitute destinations, whereas Malaysia, the Philippines, Australia and Thailand (negatively signed) are classified as complementary destinations to Hong Kong tourism for Taiwanese outbound travel.

Table 6.14 Results of Coefficient Estimates – Selected Country-Pair Substitute Price Variable (Taiwan)

Variables	Coefficient	t-ratio
LnPPTAIJAP	0.556	0.993
LnPPTAISIN	3.076	1.811
LnPPTAIKOR	1.92	2.32**
LnPPTAIIND	0.643	2.29**
LnPPTAIAUS	-0.0173	-0.022
LnPPTAIMAL	-2.18	-1.83
LnPPTAIPHI	-0.084	-0.108
LnPPTAITHA	-3.05	-1.74

Notes:
1. LnPPTAIJAP, LnPPTAISIN, LnPPTAIKOR, LnPPTAIIND, LnPPTAIAUS, LnPPTAIMAL, LnPPTAIPHI and LnPPTAITHA , country-pairs substitute price variables in logarithm form of Taiwan: Japan, Singapore, Korea, Indonesia, Australia, Malaysia, the Philippines and Thailand.
2. ** indicates statistically significance at 95% level.

The weighted substitute price variable for Taiwan comprises the country-pairs substitute price variables for Japan, Singapore, Korea and Indonesia based on the results of Table 6.14. Although the results of ADF statistics of the country-pair substitute price variable in Table 6.15 indicate that the Japan substitute price variable is integrated of order zero, the weighted substitute price variable is integrated of order one, as shown in Table 6.13. This indicates that the substitute price variables is integrated of same order with other variables in the tourism demand model.

Table 6.15 Results of DF/ADF Unit Root Tests – Selected Country-pair Substitute Price Variables (Taiwan)

Substitute Price Variable	Level with Time Trend	Difference with Time Trend
LnPPTAIJAP	-4.31(2)**	-5.95(0)**
LnPPTAISIN	-2.18(3)	-7.14(0)**
LnPPTAIKOR	-3.56(2)	-5.91(0)**
LnPPTAIIND	-3.39(0)	-6.21(0)**
LnPPTAIMAL	-3.0(2)	-6.19(0)**
LnPPTAIPHI	-2.03(4)	-5.87(0)**
LnPPTAIAUS	-3.08(0)	-7.02(0)**
LnPPTAITHA	-2.76(4)	-6.18(0)**

Notes:

1. ** indicates rejection of hypothesis of unit root at 95% level.
2. All above models estimated based on models with intercept and linear time trend, in Equation 6-1.
3. Figures in parentheses ( ), lag lengths used in the DF/ADF in Equation 6-1.

6.3.2.2 Selection Results of Preferred Permanent Income Variable – Grid Search Process (Taiwan)

We selected the preferred permanent income variable for the Taiwan model using a grid search process. First, we investigated the time-series properties of various series of the permanent income variable with the range set between LnP (100) and LnP (30).

Table 6.16 Results of DF/ ADF Unit Root Tests – Selected Permanent Income Variables (Taiwan)

Permanent Income Series	Level with Time Trend	First Difference with Time Trend
LnP(100)	-3.42[1]	-6.21[1]**
LnP(90)	-3.42[1]	-6.13[1]**
LnP(80)	-3.40[1]	-6.05[1]**
LnP(70)	-3.37[1]	-5.97[1]**
LnP(60)	-3.31[1]	-5.87[1]**
LnP(50)	-3.21[1]	-5.73[1]**
LnP(40)	-3.09[1]	-5.53[1]**
LnP(30)	-2.95[1]	-5.20[1]**

Notes:

1. LnP stands for permanent income indices in logarithm form.
2. LnP100, 90, 80, 70, 60, 50, 40 and 30, values of permanent income index in logarithm form with various weighting factor.
3. All above series estimated with models with intercept and linear time trend.
4. ** indicates rejection of hypothesis of unit root at 95% significance level, respectively.
5. Figure in parentheses [ ], lag lengths used in ADF regression models in Equation 6-1.
6. The results of unit root test indicate that all the permanent income variables in Table 6.17 have no mixed results between the model with constant trend and the model with constant and no time trend.

The results of the ADF unit root test, as shown in Table 6.16, suggest that all of the selected permanent income indices are integrated of order one. In addition, the results of the R^2 and Cointegration ADF test statistics with alternative series of permanent income index suggest that the permanent income index (40) is the most preferred permanent income index because the regression model with the permanent income index (40) produces the most preferred combination of cointegration ADF tests statistics and R square, as shown in Table 6.17.

Table 6.17 Results of R^2 and Cointegration DF/ADF Tests – Selected Permanent Income Variables (Taiwan)

Permanent Income Series	R^2	Cointegration ADF statistics
LnP(100)	0.9906	-4.38[0]**
LnP(80)	0.9917	-4.49[0]**
LnP(60)	0.9926	-4.71[0]**
LnP(40)	0.9929	-4.92[0]**
LnP(30)	0.9925	-4.94[0]**

Notes:

1. LnP100, 80, 60, 40 and 30, permanent income indices in logarithm form with smoothing constants of 1.0, 0.8, 0.6, 0.4 and 0.3, respectively.
2. Values of R^2 and ADF test statistics for various permanent income variables are estimated based on results of regression model that consisting of each selected permanent income index, relevant economic variables and the visitor arrivals in the cointegrating regression. AEG cointegration tests are applied to each regression model to determine the value of cointegration ADF test statistics.
3. Figures in parentheses [ ], lag lengths used in AEG cointegration tests.

6.3.3 Testing for Cointegration (Taiwan)

6.3.3.1 Cointegration Results and Interpretations – Engle-Granger Approach (Taiwan)

The results of the long–run general model for Taiwan tourists are shown in Appendix B, Table B.4. The empirical results in Table 6.18 show that the variables of current income, the own price, the weighted substitute price and Dummy88TAI are relevant and with theoretically expected sign, whereas the variable of the share price, the real trade volume, and other dummy variables are not relevant, on the basis of cointegration ADF statistics. We deleted the irrelevant variables from the long-run general model and re-estimated with each of the selected I(1) permanent income indices to select the long-run cointegration regression. The results of cointegration regression are presented in Table 6.18.

Table 6.18 Results of Cointegrating Regression (Taiwan)

Variables	Coefficient
CST	1.98
LnP(40)	1.95
LnPPP	-1.04
LnSUB	1.62
DUMMY88TAI	1.01

Diagnostic Test

R^2 = 0.993   CIDW = 1.78

Note

1. For description of variables, refer to notes of Tables 6.13 and 6.16.

The results of long-run cointegrating regression model, as shown in Table 6.18, show that all the coefficients of independent variables have the expected sign . The long-run permanent income elasticity is positive and greater than one, suggesting that Taiwanese consider travelling to Hong Kong a luxury product. While the tourism own price elasticity of demand is approximately unitary elastic, the weighted substitute price elasticity is greater than one, indicating that the competition from Hong Kong's major competitive rivals for Taiwan is keen.

The cointegrating regression produced a very high R^2 of 0.993. Since the CIDW value of 1.78 exceeds this value, this indicates the possibility of cointegration. Although the results of the cointegration ADF unit root test statistics (Table 6.19) indicates that no cointegration relationship exists at the 95% confidence level, a cointegration relationship does exist at the 90% confidence level.

Table 6.19 **Results of Cointegration DF/ ADF Tests (Taiwan)**

	Test statistics	Critical Value (95% Critical Value)
ADF[0]	-4.92*	-4.95
ADF[1]	-3.96	-4.95
ADF[2]	-2.84	-4.95
ADF[3]	-3.03	-4.95
ADF[4]	-2.37	-4.95

Notes:

1. Residual-based co-integration test undertaken using Microfit-4.0.
2. Figures in brackets [ ], lag length used in ADF regression model.
3. Maximum lag length, 4.
4. * indicates statistically significance at 90% level.

The results of the Cointegration DF test imply that a long-run relationship between tourist arrivals and the relevant economic variables does exist at the 90% confidence level. As indicated in the methodology section, theoretical limitations exist when using the Engle-Granger cointegration approach to estimate a tourism demand equation. Thus, we apply the Johansen approach to confirm whether or not any cointegration relationships exist for the Taiwan model.

6.3.3.2 Cointegration Results and Interpretations – Johansen Approach (Taiwan)

We estimated the VAR(K) model with unrestricted intercepts and without deterministic trends using the Johansen approach.

The tests statistics of choice criteria for selecting the order of the VAR model is presented in Table 6.20. The results of choice criteria indicate that the AIC selects the VAR (2) model and the SBC selects the VAR (1) model.

Table 6.20 Results of Choice Criteria for Selecting the Order of VAR Model (Taiwan)

Order	AIC	SBC
4	111.1	69.6
3	116.3	85.2
2	120.5	99.7
1	115.6	105.2

AIC = Akaike Information Criterion

SBC = Schwarz Bayesian Criterion

Due to the small sample size of 32, we cannot take the risk of over-parameterisation. Thus, we select the VAR (1) specification for the Taiwan model on the basis of the SBC criterion. The cointegration results from the Johansen ML procedures for the VAR (1) model with unrestricted intercepts and no trends are illustrated in Table 6.21.

Table 6.21 Results of Johansen Cointegration Test based on λ_{max} and λ_{trace} (Taiwan)

Maximum Eigenvalue Test				Trace Test			
Null	Alternative	Statistics	95% CV	Null	Alternative	Statistics	95%C V
r =0	r = 1	47.8	27.4	r = 0	r ≥ 1	64.8	48.9
r <= 1	r = 2	14.3	21.1	r ≤ 1	r ≥ 2	17.0	31.5
r <= 2	r = 3	2.73	14.9	r ≤ 2	r ≥ 3	2.7	17.9
r <= 3	r = 4	0.003	8.07	r ≤ 3	r =4	0.03	8.1

Notes

1. Trace and maximum eigenvalue statistics for testing the null of no cointegration against alternative cointegrating relations among variables in preferred long-run model.
2. 95% of critical values obtained from Pesaran and Pesaran (1997).
3. Order of VAR model is 1, and period of estimation is from 1968 to 1999.
4. Cointegration tests results are based on VAR (1) models with unrestricted intercepts and no trend.

As shown in Table 6.21, both the results of maximum eigenvalue statistics and the trace statistics in the Taiwan model reject r =0 and favour the alternative of r =1 and r ≥ 1, respectively, at the 95% level.

Based on these results, we conclude that the annual data taken from 1968 to 1999 appear to support the existence of a cointegration relationship between tourist arrivals and the relevant economic variables for the Taiwan model. However, when compared with the cointegration results of the Engle-Granger approach, the Johansen approach appears to produce different results.

The results of a long-run coefficient estimate obtained from normalising one cointegrated vector in the Johansen estimates, using the Johansen approach, are presented in Table 6.22.

Table 6.22 Results of Estimated Cointegrated Vectors – Johansen Approach (Taiwan)

Variables	Vector 1
LnTANAT	0.755 (-1.0)
LnP40	-1.34 (1.78)
LnPPPTAI	0.92 (-1.22)
LnSUB	-1.48 (1.96)

Notes:

1. Values in brackets, normalised co-integrating vectors (each value in vector divided by first value in same vector)

The long-run elasticity estimates for the Taiwan model is presented in Table 6.22. It indicates that all the variables in Vector 1 produced the expected sign. The demand elasticity of the permanent income variable is greater than one, and the demand elasticity of the own price variable is slightly above one (in absolute value), indicating the own price elasticity of tourism demand is elastic. The demand elasticity of the weighted substitute price variable is 2.0, indicating that the competition from Hong Kong's competitive rivals is keen for Taiwanese tourists. The results indicate that Taiwanese tourists are highly responsive to changes in permanent income, own price and weighted substitute price.

6.3.4 Estimating ECMs (Taiwan)

6.3.4.1 Short-run General ECMs – Engle-Granger and Johansen Approaches (Taiwan)

We estimated two alternative ECMs to examine the behaviour of visitors travelling to Hong Kong from Taiwan. The results of the general ECM for the Engle-Granger procedures and the general ECM for the Johansen procedures are presented in Appendix B, Tables 6E and 6F, respectively.

As indicated from the empirical results (Table 6.19), we did not find the existence of a cointegration relationship at the 95% confidence level, based on the Engle-Granger approach. However, the result of the Johansen approach suggests that one cointegration relationship does exist at the 95% level.

Equation 6-3 shows the short-run general ECMs that include the relevant economic variables in differenced form with lags up to second order, a dummy variable, and the error correction term either derived from the cointegrating regression based on the E-G approach, or the cointegrating vector based on the Johansen approach.

$$\Delta X_t = \beta_0 + \sum_{i=1}^{2} \alpha_i \Delta X_{t-i} + \sum_{i=0}^{2} \beta_{1i} \Delta Yp_{40t-i} + \sum_{i=0}^{2} \beta_{2i} \Delta Po_{t-i} + \sum_{i=0}^{2} \beta_{3i} \Delta Pc_{t-i} + \sigma_1 D_1 + \theta Z_{t-i} + e_{t.} ......(6-3)$$

where

X = number of visitor arrivals from Taiwan

Yp_{40} = permanent income index, α = 0.40

Po = own price index

Pc = weighted substitute price index

Z_{t-i} = lagged residuals derived from Engle & Granger and Johansen procedures. Cointegrating regression of Engle & Granger, shown in Table 6.18, and cointegrating vector of Johansen procedures, shown in Table 6.22

D_1 = Relaxation of ban on direct travel in 1988, DUMMY88TAI

Δ = operator of first difference

$e_{t.}$ = error term at time t

t = time t

Period of study = 1968 – 1999

Functional form = Logarithmic form

In Appendix B, Tables B.5 and B.6 present the results of the short-run general ECM based on the Engle-Granger approach, and the general ECM based on the Johansen approach, respectively. The results of the preferred ECMs, based on Engle-Granger and Johansen approaches, are presented in Tables 6.23 and 6.24, respectively.

6.3.4.2 Preferred ECM Results and Interpretations – Engle-Granger Approach (Taiwan)

The results of the Taiwan ECM, shown from Table 6.23, demonstrate that the ECM explains only 36.4% of the variations of visitor arrivals. The empirical results of standard error test suggested that all the variables, with the exception of the own price variables, are statistically significant in explaining the variation of Japanese tourism demand. In particular, our analysis shows that the one period lagged permanent income variable in differenced form (DLnp401) is the most important determinant to measure the flow of Taiwan visitors, with its high elasticity, 4.8. It appears that this may indicate that the short-run income elasticity is much higher than its long-run counterpart (2.0). This may suggest that visitors from Taiwan respond quite sharply to changes in income in the short-run. Although the own price variable is statistically insignificant, we decide to keep it in the model based on economic rationale, correct expected sign, and it's contribution to the overall significance of the model. Moreover, the coefficient of the weighted substitute price variable is statistically significant, with expected sign. Overall, our analysis shows that visitors from Taiwan are sensitive to changes in income and the substitute price variable, although they are not very sensitive to the change in own price variable in the short run.

The estimated coefficient of RESEG1 is statistically significant at the 95% level, and has the appropriate sign and an adjustment parameter of -0.712, indicating that a rapid speed of adjustment is evidenced. However, our preferred ECM for Taiwan encountered a normality problem, as indicated by the Bera and Jarque (1981) test, and the results of the t- statistics must be interpreted with caution. Overall, our empirical result suggests that the ECM (Engle-Granger) is not well specified.

Table 6.23 Results of Preferred ECM – Engle-Granger Approach (Taiwan)

Coefficient and t-statistics

Variables	Coefficient Estimates	t-ratio
CST	-0.144 (0.128)	-1.126
DLnP401	4.76 (1.91)	2.50**
DLnSUB	1.35 (0.44)	3.04**
RESEG1	-0.712 (0.31)	-2.32**
DLnPPP	-0.31 (0.53)	-0.579

Goodness of fit and Diagnostic Tests Statistics

R^2 = 0.452 $\overline{R}^2$ = 0.364

SER = 0.214 RSS = 1.15

LM(1) = 0.29 RESET(1) = 0.002

NORM(2) = 42.91** HETRO(1) = 2.17

Notes

1. ** indicates rejection of hypothesis at 95% level.
2. D = operator of first difference.
3. Since we do not reject normality assumption of regression residuals (shown by Jarque-Bera test), the validity of t statistics is low.
4. For description of variables, refer to the notes of Tables 6.13 and 6.16.
5. Figures in the parentheses are the standard error of estimates.

6.3.4.3 Preferred ECM Results and its Interpretations – Johansen Approach (Taiwan)

When we compare the results of the Engle-Granger ECM (Table 6.23) with those of the Johansen ECM (Table 6.24), we find that the short-run parameter estimates from the Engle-Granger method differ from those obtained from the Johansen method. The Johansen model explains 75.4% of the variation in visitor arrivals. The empirical results of standard error test suggest that the permanent income variable, own price variable (first lag) and DUMMY88TAI variable are significant in explaining the variation of Taiwanese tourism demand. While we deleted the weighted substitute price variable in the Johansen ECM, our analysis suggests that the coefficient of the own price variable (with one lag) is statistically significant with its elasticity, -0.95.

The estimates obtained from the Johansen method for the elasticity of the permanent income variable (3.7) are lower than those based on the Engle-Granger method (4.8). In particular, the Johansen method also suggests that the Dummy88TAI variable is correctly signed and statistically significant. Finally, the coefficient of the error correction term from the Johansen ECM is correctly signed and significant at the 95% level. Overall, the empirical results suggest that the Johansen ECM is well specified.

Table 6.24 Results of Preferred ECM – Johansen Approach (Taiwan)

Coefficient and t-statistic

Economic Variables	Coefficient Estimates	t-ratio
CST	1.09 (0.255)	4.28**
DLnP40	3.73 (1.291)	2.89**
DLNPPP1	-0.956 (0.292)	-3.27**
DUMMY88TAI	0.816 (0.13)	6.34**
RESJO1	-0.692 (0.118)	-5.88**

Goodness of fit and Diagnostic Tests Statistics

R^2 = 0.788 $\bar{R}^2$ = 0.754

SER = 0.133 RSS = 0.445

LM(1) = 0.083 RESET(1) = 0.291

NORM(2) = 2.30 HETRO(1) = 0.33

Notes.

1. ** indicates rejection of hypothesis at 95% level.
2. RESJO1 = error correction term with one lag based on Johansen Approach.

6.4 Cointegration Analysis of Tourism Demand (China)

6.4.1 Testing for Order of Integration (China)

In this section, we employed the ADF unit root test to determine the stationarity condition of all underlying variables in the China model. As our sample size for China is small (16), it is not statistically possible to include all of the economic variables in the tourism demand model, as shown in Equation 5-1. Due to the data availability and reliability, the share price variable and the weighted substitute price variable are deleted them from the tourism demand model (China).

Table 6.25 Results of DF/ADF Unit Root Tests (China)

Variables	Level with Time Trend	First Differences with Time Trend	Second Differences with Time Trend
LnRGDPPC[7]	-6.23(3)**	-3.02(3)	-7.79(1)**
LnPPP	-1.19(0)	-5.61(0)**	N.A.
LnRTRAD	-1.02(0)	-3.85(1)	4.15(1)**
Variables	**Level with No Trend**	**First Differences with No Trend**	**Second Differences with No Trend**
LnTANAT[7]	-1.08 (0)	-3.01(1),	-3.69(0)**

Notes

1. Ln = series in logarithm form.
2. TANAT = total tourist arrivals in Hong Kong from China by nationality.
3. RGDPPC = current income variable of China (real gross domestic product per capita).
4. PPP = own tourism price variable of China.
5. RTRAD = real trade volume measured by total sum of imports, exports and re-exports
6. ** indicates the statistically significance at 95% level.
7. All above series are tested with models with an intercepts and a time trend in Equation 6-1.
8. Maximum lag is 3.
9. 95% critical values of models with intercept and trend and models with intercepts and no trend, are -3.87 and -3.15 (for level variables), -3.93 and –3.18(for first difference variables) and –4.0 and –3.22 (for second difference variables), respectively.
10. Figures in parentheses ( ), lag lengths used in tests.
11. The results of ADF unit root test indicate that the series of LnTANAT and LnRGDPPC have mixed results, between the model with trend and the model with no trend. The results of Dickey and Fuller (1981) F-tests indicated that the model with constant and linear time trend is preferred for the series of LnRGDPPC but the model with constant no trend is preferred for the series of LnTANAT. The summary of the results of Dickey and Fuller (1981) F test statistics is presented in appendix F.

As shown from the results (Table 6.25), ADF unit root test statistics (models with intercepts and time trend) indicate mixed results of the numbers of unit root for the underlying variables. While the series of the real trade volume is I (2) variable, the current income and own tourism price series are I (0) and I(1) variables, respectively. In addition, the ADF unit root test results (models with no trend) indicated that the series of visitor arrivals are I(2) variable. Based on the results of ADF unit root test statistics in Table 6.2.5, we concluded that the series of current income is I(0), the series of own price is I(1) and the series of visitor arrivals and trade volume are I(2) variables. Due to the small sample size of 16 observations and mixed unit root test results, the estimated econometric models estimated based on the Engle-Granger and Johansen approaches should be interpreted with caution.

6.4.2 Model Specification – Proxy Variable Search Process

6.4.2.1 Selection Results of Preferred Permanent Income Variable – Grid Search Process (China)

The statistical search for the preferred permanent income variable follows the process of a grid search. The first step is to investigate the time-series properties of each individual permanent income index to confirm that the preferred permanent income variable has the same order of integration as the other underlying variables. Table 6.26 presents the results of the ADF unit root tests for the selected permanent income series.

Table 6.26 Results of DF/ADF Unit Root Tests – Selected Permanent Income Variable (China)

Permanent Income series	Level with Time Trend[6]	First Difference with Time Trend[6]
LnP (100)	-6.23[3]**	-3.02[3]
LnP (90)	-6.25[3]**	-3.30[3]
LnP (80)	-6.53[3]**	-3.82[3]
LnP (70)	-6.12[3]**	-3.98[3]
LnP (60)	-5.97[3]**	-4.37[3]**

Notes
1. Figures in brackets (), value of smoothing constant.
2. LnP100, 90, 80, 70, and 60 are various permanent income variables in logarithmic form.
3. All above series introduced using intercepts and linear time trend.
4. ** indicates rejection of hypothesis of unit root at 95% level.
5. Figures in parentheses [ ], lag lengths used in Equation 6-1.
6. The results of unit root test indicate that the series of LnP(100), LnP(90), LnP(80), LnP(70) and LnP(60) has mixed results, derived from the model with trend and the model with no trend. The results of Dickey and Fuller (1981) F-tests statistics indicated that the model with constant and time trend is preferred for all the above series of permanent income variable.

The results of ADF test statistics shown in Table 6.26 indicate that LnP(100), LnP(90), LnP(80), LnP(70) and LnP(60) are integrated of order 0. Although the variables between LnP(50) to LnP(30) were subject to the measurement error due to the limited data, it is essential to investigate whether the permanent income indices within the range from LnP50 to LnP30 are also integrated of order 0. The results of the ADF unit root test, as shown in Table 6.27, confirm that the indices of LnP (50), LnP(40) and LnP(30) are also the I(0) variables. Since all the permanent income series are I (0) variables, we have no choice to select I (0) permanent income series in the cointegrating regression. However, the results must be interpreted with caution.

Table 6.27 Results of DF/ADF Unit Root Tests – Selected Permanent Income Variables, LnP50- LnP30 (China)

Permanent Income Series	Level with Time Trend[5]	First Difference with Time Trend[5]
LnP(50)	-8.49[3]**	-4.87[3]**
LnP(40)	-5.64[3]**	-5.16[3] **
LnP(30)	-5.7[3]**	-5.57[3] **

Notes:

1. LnP(50), LnP(40) and LnP(30), values of permanent income indices in logarithm form with smoothing constants of 0.50, 0.4, and 0.30, respectively.
2. All above series are estimated based on models using intercepts and linear time trend in Equation 6-1.
3. ** indicates statistically significance at 95% level.
4. Figures in parentheses [ ], lag length used in ADF regression model of Equation 6-1.
5. The results of unit root test indicate that the series of LnP(50), LnP(40), and LnP(30) has mixed results between the model with trend and the model with no trend. The results of Dickey and Fuller (1981) F-tests indicated that the model with constant and time trend is preferred for all the above series exhibit mixed results.

The second step of grid search involves the selection of the most preferred permanent income variable from the list of permanent income index series. The results of Cointegraton ADF and R^2 tests indicate that we select the model with an index of LnP100 (the current income variable), as shown in Table 6.28. This indicates that the China data appears to be best explained by a current income model in which the majority of Chinese tourists have their tourism consumption constrained by current income. This finding is consistent with the Permanent income-life cycle hypothesis that the PI-LCH cannot apply to tourists who are constrained by credit restraint.

Table 6.28 Results of R^2 and Cointegration DF/ADF Tests – Selected Permanent Income Variables (China)

Permanent Income Series	R^2	Cointegration ADF Test Statistics
LnP(100)	0.9941	-3.39[1]
LnP(90)	0.9938	-3.24[1]
LnP(70)	0.9926	-2.96[1]
LnP(50)	0.9903	-2.77[1]
LnP(30)	0.9870	-2.72[1]

Notes

1. Values of R^2 and cointegration ADF test statistics estimated from regression models with selected economic variables and each selected candidate of permanent income index and visitor arrivals.
2. Permanent income index that produces best cointegration ADF test and R^2 results is selected as relevant permanent income variable in cointegrating regression.
3. Figures in parentheses [ ], lag lengths used in tests.

4. When using time series data, it is often assumed that the data are integrated with same order. However, it is well known that popular unit root tests often suffer poor size and power properties, particularly for the small sample size. This has meant that in practical applications, it is quite common for our china model to be tested for cointegration even the unit root analysis suggests that the time series properties of the underlying variables in the equations may be unbalanced.

6.4.3 Testing for Cointegration (China)

6.4.3.1 Cointegration Results and Interpretations – Engle-Granger Approach (China)

Table B.7 in Appendix B presents the results of the long-run general model (China).The results of regression test of the general model indicated that current income and real trade volume variables are classified as the relevant variables. The own price and other dummy variables are not relevant for the long-run cointegration regression because the inclusion of those irrelevant variables in the cointegrating regression affect the overall explanatory power of the cointegrating regression.

The analysis started from estimating the cointegrating regression using the OLS method. The cointegrating regression was obtained, as shown in Table 6.29, after all of the irrelevant variables were deleted from the long-run general model.

Table 6.29 Results of Cointegrating Regression (China)

Series	Coefficient
CST	-2.93
LnRGDPPC	1.74
LnRTRAD	0.537

R^2 = .0.994 DW = 1.71

The results of the cointegrating regression for the China model indicate that both the current income index (LnRGDPPC) and the real trade volume variable carry the expected sign and are considered relevant. The current income elasticity is positive and greater than 1, indicating that travel to Hong Kong is considered a luxury good for visitors from Mainland China. The significance of the real trade volume variable in the cointegration regression (China) is not surprising, because China is currently the largest trading partner with Hong Kong.

The ADF unit root tests for the residuals, derived from the cointegrating regression, as shown in Table 6.30 indicate that the underlying variables in the China model are not cointegrated at both the 95% and

90% levels. The results of Engle-Granger methods suggest that no cointegration relationship exists between the tourism demand from China and the economic determinants of current income and trade volume.

Table 6.30 Results of Cointegration DF/ADF Tests (China)

	Test statistics	95% Critical value
ADF[0]	-2.88	-4.53
ADF[1]	-3.39	-4.53
ADF[2]	-2.82	-4.53
ADF[3]	-3.09	-4.53

Notes:
1. Residual-based cointegration test using Microfit 4.0.
2. Figures in brackets [ ] , lag length used in ADF regression model of Equation 6-1.
3. Maximum lag length = 3.

6.4.3.2 Cointegration Results and its Interpretations – Johansen Approach (China)

Since the results of the Engle-Granger approach indicated that the underlying variables in the China model are not cointegrated, we employed the Johansen approach to test for cointegration to provide more supportive evidence about the state of cointegration.

Before estimating the existence of the long-run relationship, it is important to determine the appropriate lag length k. As the sample size (16) is small, we have no choice but to set the maximum order of k=2 to avoid the possibilities of over-parameterisation, and based the final decision on the results of the AIC and SBC criteria. The results of the test statistics and choice criteria for selecting the order of the VAR model in Table 6.31 indicate that the AIC selects order 2 and SBC selects order 1.

Table 6.31 Results of Choice Criteria for Selecting Order of VAR Model (China)

Order	AIC	SBC
2	60.6	54.9
1	59.6	56.8
0	-41.2	-41.2

AIC = Akaike Information Criterion

SBC = Schwarz Bayesian Criterion

Due to the very small sample size of 16, we cannot take the risk of over-parameterisation, We chose the VAR (1) model with unrestricted intercepts and no trends based on the SBC criterion.

In the Table 6.32, we present the results of the Johansen cointegration test based on λ_{max} and λ_{trace} statistics.

Table 6.32 Results of Johansen Cointegration Test based on λ_{max} and λ_{trace} (China)

Maximum Eigenvalue Test					Trace Test				
Null	Alt	Stat	95%CV	90%CV	Null	Alt	Stat	95%CV	90%CV
r=0	r=1	22.8	21.1	19.0	r =0	r≥1	28.9	31.5	28.8
r≤1	r=2	5.5	14.9	13.0	r ≤1	r≥2	6.1	17.9	15.8
r≤2	r=3	0.62	8.1	6.50	r ≤2	r≥3	0.62	8.1	6.50

Notes:

1. Trace and maximum eigenvalue statistics for testing null of no cointegration (r=0) against alternative cointegrating relations among variables in final long-run model (China).
2. 95% of critical values in Table 6.32 obtained from Pesaran and Pesaran (1997).
3. Order of VAR is 1, period of estimation 1984 to 1999.
4. Cointegration tests statistics are based on VAR (1) models with unrestricted intercepts and trends.

The cointegration tests, based on both the maximum eigenvalue and the trace of the stochastic matrix uniformly reject the null hypothesis of zero cointegrating vectors (r=0), at the 95% and 90% confidence level respectively, and favour the existence of a single cointegrating vector. Starting with the null hypothesis of no cointegrating vector (r=0) among the variables, the trace statistics is 28.9, which is above the 90% CV of 28.8. The trace statistics of the null hypothesis of the less than one cointegrating relation among the variables is 6.1, which falls below the 90% LV of 15.8. In addition, the null hypothesis of no cointegrating vector (r = 0) is rejected , according to the results of maximum eigenvalue test, at a 95% critical value. We can confirm that there is one cointegrating vector in the cointegrating regression, as we cannot reject the null hypothesis of $r \leq 1$.

Overall, the empirical results of the state of cointegration are mixed, because a cointegration relationship, based on the Engle-Granger approach, is not found, whereas the Johansen approach suggests that a cointegration relationship does exist.

Table 6.33 Results of Estimated Cointegrated Vectors – Johansen Approach (China)

Variables	Vector 1
LnTANAT	2.79(-1.00)
LnRGDPPC	-4.28(1.53)
LnRTRAD	-1.56 (0.558)

Note 1. Figure in brackets are normalised cointegrated vectors.

As indicated from the results in Table 6.33, both the coefficient estimates of income and real trade volume variables are theoretically correctly signed for the China model.

6.4.4 Estimating Error Correction Models (China)

We used two dynamic error correction models to examine the short-run behaviour of visitor flows from China to Hong Kong, based on both the Engle-Granger and the Johansen methods.

6.4.4.1 Short-run General Model -- The Engle-Granger and Johansen Approach (China)

We started by using a general ECM and delete the insignificant variables until we achieved the best specification. We included all of the relevant variables in differenced form with lags up to second order in the short-run general ECM. In addition, we also included the disequilibrium error Z_{t-i} (Table 6-29 and Table 6-33), captured from either the cointegrating regression or estimated cointegarting vector to reflect the long-run effects in the estimation of the short-run models. Due to the very small sample size (16), we included only two economic determinants in differenced form with lags up to the first order in the short-run general model. No dummy variable were included in this model.

$$\Delta X_t = \beta_0 + \sum_{i=1}^{2} \alpha_i \Delta X_{t-i} + \sum_{i=0}^{2} \beta_{1i} \Delta Yp_{100t-i} + \sum_{i=0}^{2} \beta_{2i} \Delta TV_{t-i} + +\theta Z_{t-i} + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots(6-4)$$

where

X_t = the number of visitor arrival from China

Yp_{100} = permanent income index, α equals to 1.00

TV = real trade volume measured by total imports, exports and re-exports between China and Hong Kong

Z_{t-i} = the lagged residuals derived from long-run cointegrating regression, as shown in Table 6-29 or Table 6-33

e_t = error term at time t

Δ = operator of first difference

Period of study = 1984 -- 1999

Functional form = logarithmic form

The short-run general ECM contained 2 lags of the permanent income series, the real trade volume in differenced form, and the lagged error correction term. While the results of the general ECM using the Engle-Granger procedures are shown in Appendix B, Table B.8, the results of the general ECM using the Johansen procedures are shown in Appendix B, Table B.9.

6.4.4.2 Preferred ECM Results and Interpretations – Engle-Granger Approach (China)

Table 6.34 Results of Preferred ECM – Engle-Granger Approach (China)

Coefficient and t-statistics

Variables	Coefficient	t-ratio
CST	-0.039 (0.468)	-0.083
DLnRGDPPC	1.91 (0.585)	3.27**
DLnRTRAD1	0.307(0.148)	2.07**
RESEG1	-0.777(0.255)	-3.04**

R^2 = 0.818 $\bar{R}^2$ = 0.768

SER = 0.062 RSS = 0.042

Goodness fit and Diagnostic Tests

LM(1) = 0.005 RESET(1) = 0.073

NORM(2) = 0.572 HETRO(1) = 0.087

Notes:

1. ** indicates significance at 95% level.
2. In formulating error-correction mechanism, lag length of disequilibrium error corresponds to deviation from long-run path.
3. RESEG1 = error correction term with one lag based on Engle and Granger approach

Table 6.34 shows the results of the Preferred ECM (Engle and Granger). This ECM explains 76.8% of the variations of visitor arrivals coming from China. The empirical results of standard error tests indicate that the current income variable and one period lag of real trade volume variable in differenced form are correctly signed and statistically significant at 95% level. Contrary to the common belief, the short-run demand elasticity of current income variable of 1.9 is larger than its long-run counterpart (1.7), suggesting that Chinese visitors are more sensitive to change in their current income in the short-run. The short-run demand elasticity of the real trade volume variable (with one lag) is 0.307, which is smaller than its long-run counterpart (0.5). The estimated coefficient of the error correction term is statistically significant, and the value of the adjustment parameters is -0.777, indicating very fast speed for adjustment. Since we cannot establish the cointegrating relationship using the Engle-Granger approach, the results of ECM (Engle-Granger) must be interpreted with considerable care.

6.4.4.3 Preferred ECM Results and Interpretations – Johansen Approach (China)

Table 6.35 Results of Preferred ECM – Johansen Approach (China)

Coefficient and t-statistics

Variables	Coefficients	t-ratio
CST	-1.55 (0.335)	-4.63 **
DLnRGDPPC	2.17 (0.52)	4.15 **
RESJO1	-0.781 (0.173)	-4.51**

R^2 = 0.815 R^2 (adjusted) = 0.784

SER = 0.059 RSS = 0.042

Diagnostic Test

LM(1) = 0.435 RESET(1)= 0.044

NORM(2) = 0.312 HETRO(1)= 0.055

Notes:

1. ** indicates significance at 95% level.
2. In formulating error-correction mechanism, lag length of disequilibrium error corresponds to length of response (adjustment) to deviation from long-run path. In estimating above ECM, we set K equal to 1.
3. RESJO1 = Error correction term with one lag based on Johansen approach.

When comparing the empirical results of Tables 6.34 and 6.35, we see that the short-run coefficients estimates based on the Johansen method differ from those based on the Engle-Granger method. The Johansen ECM (China) explains 78.4% of variation of visitor arrivals. The empirical results of standard error tests suggest that the current income variable is the only explanatory variable that remains in the Preferred ECM, as the real trade volume variable is statistically insignificant and has been deleted from the Preferred ECM (Johansen). In particular, the results of the Johansen ECM show that the estimated permanent income elasticity based on the Johansen method (2.2) is higher than the estimated elasticity based on the Engle-Granger method (1.9). The coefficient of the error correction term (Johansen) is correctly signed and significant at the 95% level. Finally, the estimated coefficient of -0.781 is slightly higher than (in absolute value) estimates from the Engle-Granger approach, indicating fast speed of adjustment.

6.5 Cointegration Analysis of Tourism Demand Model (United States)

6.5.1 Testing for Order of Integration (United States)

The first step of cointegration analysis for visitors arriving from the United States is to investigate the time-series properties of the underlying variables in the tourism demand model. We applied the ADF unit root tests to test for the stationarity of the level series and the first difference series of the underlying variables in the United States model. The results are presented in Table 6.36.

Table 6.36 Results of DF/ADF Unit Root Tests (United States)

Variables	Level with Time Trend	First Difference with Time Trend
LnTARNA	-2.45 [1]	-4.93 [0] **
LnSUB	-1.76 [1]	-4.36 [0] **
LnSHARE	-0.685 [2]	-6.30 [0] **
LnRTRAD	-1.765 [4]	-5.87 [0] **

Table 6.37 Results of DF/ADF Unit Root Tests - Income and Own price Variables (United States)

Variables	Level without Time Trend[7]	First Difference without Time Trend[7]
LnPPP[7]	-1.96[3]	-3.12 [0] **
LnRGDPPC[7]	-2.48[4]	-4.18[0}**

Notes for Tables 6.36 and 6.37:

1. TARNA = total visitor arrivals from United States by nationality.
   RGDPPC = current income index, real gross domestic product per capita of United States.
   SHARE = index of share price, as taken from Table 5.1.
   PPP = own price of tourism of United States, calculated from Equation 5-3
   RTRAD = real trade volume, measured by total imports, re-exports, and exports of United States.
   SUB = weighted substitute price index of United States, calculated from Equation 5-5.
   Ln = logarithm form
2. ** indicates rejection of null hypothesis of unit root hypothesis at 95% level.
3. 95% critical values, 3.54 (with time trend) and 2.95 (without time trend).
4. All above series estimated with models with intercept with linear time trend and models without linear time trend.
5. Maximum lag length, 4.
6. Figures in parentheses, [ ], lag lengths used in test.
7. The results of unit root test statistics indicate that the series of LnRGDPPC and LnPPP have mixed results, between the model with time trend and the model with no time trend. The empirical results of Dickey and Fuller (1981) F statistics indicated that the series of income and own price variables are not subject to linear time trends. Although the Dickey-Fuller (1981) F tests indicate the series of LnRGDPPC should be estimated without time trend, the conclusion is drawn on a borderline basis. The results must be interpreted with cautions.

The results of ADF unit root tests statistics (models with time trend), as shown in Table 6.36, indicated that the variables of visitor arrivals, the weighted substitute price, the share price, and the trade volume are integrated of order 1. In addition, the results of the ADF unit root test (model without time trend), shown in Table 6.37, indicated that the current income variable and own price variable are I (1) variables.

Based on the ADF unit root test statistics in Table 6.36 and 6.37, we concluded that all the underlying variables are integrated of order one. However, the Dickey-Fuller (1981) F test statistics in Appendix F indicates that the F-statistics of current income variable falls on a borderline region, the results of ADF unit root test results of the series of current income variable based on the model with no trend must be interpreted with caution.

6.5.2 Model Specification - Proxy Variable Search Process

6.5.2.1 Selection Results of Substitute Destinations – Grid Search Process (United States)

In this section, we identify the most competitive substitute destinations for Hong Kong's tourism for U.S. outbound tourists within the EAP region. The regression results in Table 6.38 show that Japan, Thailand and Malaysia are the substitute destinations of Hong Kong, whereas Australia, Korea, the Philippines, Taiwan and Singapore are considered as complementary destinations. It follows that the country-pair substitute price variables for Japan, Thailand and Malaysia are selected for the construction of the rival search version weighted substitute price index.

Table 6.38 Results of Coefficient Estimates – Selected Country-Pair Substitute Price Variables (United States)

Variables	Coefficient	t-ratio
LnPPUSJAP	(+) 0.274	(+) 1.73
LnPPUSTHA	(+) 0.043	(+) 0.119
LnPPUSMAL	(+) 0.852	(+) 2.05**
LnPPUSSIN	(-) 0.840	(-) 1.72
LnPPUSTAI	(-) 0.042	(-) 0.29
LnPPUSPHI	(-) 0.188	(-) 1.56
LnPPUSAUS	(-) 0.427	(-) 1.89
LnPPUSKOR	(-) 0.297	(-) 3.09**

Notes:

1. LnPPUSJAP, LnPPUSTAI, LnPPUSMAL, LnPPUSSIN, LnPPPUSTHA, LnPPPUSPHI, LnPPPUSAUS and LnPPPUSKOR, country-pair substitute price variables between United States with Japan, Taiwan, Malaysia, Singapore, Thailand, the Philippines, Australia and Korea, respectively.
2. Selected economic variables and eight country -pair substitute price variables are the independent variables of regression models; only estimation results of country-pair substitute price variables reported.
3. ** indicates the significance at 95% level.

The results of ADF unit root tests for the country-pair substitute price variables are shown in Table 6.39. The results of ADF unit root tests indicate that all country-pair substitute price variables (with the exception of Singapore and Korea) for the selected substitute destinations (with positive sign) are integrated of order 1. More importantly, as shown in Table 6.36, the ADF unit root test indicates that the weighted substitute price variable is also a I(1) variable.

Table 6.39 Results of DF/ADF Unit Root Tests – Selected Country-pair Substitute Price Variables (United States)

Permanent Income Series	Level with Trend	First Difference with Trend
LnPPPJAP	-2.91 [1]	-4.67[3]**
LnPPPTHA	-3.12 [3]	-5.11 [1]**
LnPPPMAL	-2.47 [1]	-5.09 [1]**
LnPPPSIN	-3.89 [1]**	-4.76[1]**
LnPPPTAI	-2.95[3]	-5.14[0]**
LnPPPPHI	-2.82 [1]	-5.60 [0]**
LnPPPAUS	-2.78[1]	-4.31 [1]**
LnPPPKOR	-5.81 [1]**	-5.86 [0]**

Notes:

1. **indicates rejection of hypothesis of unit root at 95% significance level.
2. All the above series are estimated with models using intercepts and linear time trend.
3. Figures in parentheses [ ], lag lengths used in DF/ADF tests.

6.5.2.2 Selection Results of Preferred Permanent Income Variable – Grid Search Process (United States)

We applied a grid search process to select the best income index proxy for the preferred income in the tourism demand model. The results of the ADF unit root tests (model with time trend), as shown in Table 6.40, indicate that all of the potential permanent income index series are integrated of order 0. Conversely, the results of the ADF unit root tests (model without time trend) indicate that LnP100, LnP80 and LnP60 are integrated of order one. Since the empirical results of Dickey and Fuller (1981) F test statistics indicated that the series of Lnp(100), LnP(80), LnP(60) and LnP(40) are statistically superior to test with the models with no linear time trend. Therefore, based on the unit root test results of the model with no trend, we concluded that the LnP100, LnP80 and LnP60 are I(1) variable. In examining the cointegration results of the models using alternative permanent income indices (Table

6.41), we selected the model with an index of LnP80 as the cointegrating regression, because it produced the best statistics of R^2 and appropriate cointegration ADF test.

Table 6.40 Results of DF/ADF Unit Root Tests – Selected Permanent Income Variables (United States)

Permanent Income Indices	Level with Trend	First Difference with Trend
LnP(100)	-4.06 [1]**	-4.11 [1]**
LnP(80)	-4.09 [1]**	-4.09 [0]**
LnP(60)	-4.07 [1]**	-3.95 [1]**
LnP(40)	-4.00 [1]**	-3.61 [1]**
Permanent Income Indices	**Level without Trend**	**First Difference without Trend**
LnP(100)[7]	-2.48[4]	-4.18 [0]**
LnP(80)[7]	-2.55 [0]	-4.09 [1]**
LnP(60)[7]	-3.04 [0]	-3.89{1}**
LnP(40)[7]	-4.00[0]**	-3.44 [1]**

Notes:

1. LnP , permanent income indices.
2. Figures in ( ), indicate value of smoothing constant.
3. LnP100, 80, 60 and 40, values of permanent income indices with smoothing constants of 1.0, 0.8, 0.6 and 0.4, respectively.
4. All above series introduced using intercepts with and without linear time trend.
5. ** indicates rejection of hypothesis of unit root at 95% significance level.
6. Figures in parentheses [ ], lag lengths used in models.
7. The results of unit root test indicate that the income series of LnP(100), LnP(80), LnP(60) and LnP(40), between the models with trend and the model with no trend. The results of Dickey and Fuller (1981) F-tests indicated that the model with no trend is preferred for testing the series of LnP(100) , Lnp(80), LnP(60) and LnP(40). However, the F-statistics falls on borderline region and the mixed results of the unit roots, the results must be interpreted with cautions.

Table 6.41 Results of R^2 and Cointegration DF/ADF Tests – Selected Permanent Income Variables (United States)

Permanent Income Indices	R^2	Cointegration ADF statistics
LnP(100)	0.9891	-5.86[1]**
LnP(80)	0.9893	-5.71 [1]**
LnP(60)	0.9892	-5.47 [1]**
LnP(40)	0.9884	-5.15 [1]**

Notes:

1. Values of R^2 and the cointegration ADF statistics for each selected permanent income series obtained from regression models consisting of selected economic determinants and alternative permanent income index.
2. Preferred permanent income variables selected on basis of largest R^2 and acceptable statistics of AEG cointegration tests.
3. Figures in parentheses, [ ], lag length used in cointegration ADF tests
4. ** indicates rejection of null hypothesis of unit root at 95% confidence level

6.5.3 Testing for Cointegration (United States)

6.5.3.1 Cointegration Results and Interpretations) – Engle-Granger Approach (United States

Since the findings of the ADF unit root test statistics from the United States tourism demand model suggested that the underlying variables have same unit root numbers, we proceeded to test for the existence of a cointegration relationship. The first step of the Engle-Granger method is to estimate the long-run cointegrating regression.

The results of the long-run general model are shown in Table B.10 in Appendix B. The results of the long-run general model show that the variables of the current income, the own tourism price, the real trade volume, and Dummy89 are correctly signed and relevant. Conversely, the variables of the share price, the weighted substitute price and other dummy variables are found not to be relevant, based on the results of cointegration tests. Hence, we deleted the irrelevant variables from the original long-run general model, and re-estimated with each I(1) permanent income variables to obtain the cointegrating regression. The results of the preferred long-run model (cointegrating regression) are presented in Table 6.42.

The cointegrating regression produced a positive R^2 of 0.9893 and CIDW value of 1.4, indicating that the residuals from the cointegrating regressions are likely to be I (0). The results of cointegrating regression also show that all the variables have expected signs. As well, all selected economic variables and DUMMY89 are relevant for the cointegrating regression, with the exception of the substitute price variable and share price variable.

The importance of the real trade volume variable is consistent with the fact that the United States is a major trading partner with Hong Kong, with a relatively large proportion (about 40% in the late 1990s) of arrivals from the United States falling in the business tourist category. Dummy89 is also a relevant variable in the cointegrating regression, which indicates that United States visitor flows were highly affected by the 4th June 1989 incident in China. This indicates a negative correlation between tourist arrivals from U.S. and the June Fourth incidence in China, 1989.

Table 6.42 Results of Cointegrating Regression (United States)

Series	Coefficient
CST	16.84
LnP80	1.45
LnPPP	-0.843
LnRTRAD	0.454
DUMMY89	-0.237

R^2 = 0.989 DW =1.40

Table 6.43 presents the results of the ADF unit root tests for residuals in the cointegrating regression. The results of the Augmented Engle-Granger cointegration test, shown in Table 6.43, demonstrate that the null hypothesis of no cointegration is rejected at the 95% confidence level, and suggests that a cointegration relationship exists.

Table 6.43 Results of Cointegration DF/ ADF Tests (United States)

	ADF test statistics	95% critical value
ADF[0]	-5.14**	-4.81
ADF[1]	-5.71 **	-4.81
ADF[2]	-4.29	-4.81
ADF[3]	-3.66	-4.81
ADF[4]	-4.99**	-4.81

Notes:

1. Residual-based co-integration test are estimated with Microfit 4.0
2. Figures in brackets [ ], lag lengths used in regression models.
3. Maximum lag length, 4
4. **/* indicate rejection of hypothesis at 95%/90% significance level, respectively

6.5.3.2 Cointegration Results and Interpretations – Johansen Approach (United States)

We also applied Johansen's maximum likelihood approach to test for cointegration. As shown in Table 6.44, for the United States model, the AIC indicates order 2 but the SBC indicates order 1. However, a VAR of order 1 based on the SBC indicates possibility of autocorrelations at the estimation stage. Finally, we selected the VAR (2) model in order to reduce the possibility of autocorrelations in the stage of estimation.

Table 6.44 Results of Choice Criteria for Selecting Order of VAR Model (United States)

Order	AIC	SBC
4	212.2	157.4
3	215.1	173.2
2	218.5	189.5
1	211.7	195.6

AIC = Akaike Information Criterion

SBC = Schwarz Bayesian Criterion

Table 6.45 illustrates the results of the maximum eigenvalue and trace statistics of the Johansen ML procedures for the VAR (2) models with unrestricted intercepts and without trends.

As shown in Table 6.45, the statistics on both the maximum eigenvalue test and the trace test uniformly reject the null hypothesis of no cointegrating vectors, suggesting that there exists one cointegrating vector. Starting from the null hypothesis of no cointegrating vector ($r = 0$) among all the variables, the analysis produced a trace statistic of 59.6, which is higher than the 95% CV of 48.9. However, the null hypothesis of $r \leq 1$ cannot be rejected, since the test statistic of 28.6 is lower than the value of 31.5. Likewise, the maximum eigenvalue test also indicates that there exists only one cointegrating vector, implying that we cannot reject the null hypothesis of no cointegration ($r \leq 1$) at a 95% critical value, because the maximum eigenvalue statistic of 15.5 is lower than the 95% CV of 21.1.

Table 6.45 Results of Johansen Cointegration Test based on λ_{max} and λ_{trace} (United States)

Maximum Eigenvalue Test				Trace Test			
Null (r=0)	Alternative (r>0)	Statistics	95% CV	Null (r=0)	Alternative (r>0)	Statistics	95% CV
r=0	r=1	31.0	27.4	r=0	r≥1	59.6	48.9
r≤1	r=2	15.5	21.1	r≤1	r≥2	28.6	31.5
r≤2	r=3	10.3	14.9	r≤2	r≥3	13.1	17.9
r≤3	r=4	2.8	8.1	r≤3	r≥4	2.8	8.1

Notes:

1. Trace and maximum eigenvalue statistics for testing null of no co-integration against alternative cointegrating relations among variables in final long-run model (United States).
2. 95% critical values in Table 6.46, obtained from Pesaran and Pesaran (1997).
3. Order of VAR = 2; period of estimation, 1959-1999.
4. VAR (2) model is estimated with unrestricted intercepts and no trends .

Table 6.46 Results of Estimated Cointegrated Vector – Johansen Approach (United States)

Variable	Vector 1
LnTARNA	1.98(-1.00)
LnP80	-1.76 (0.892)
LnPPP	1.63(-0.826)
LnRTRADE	-1.04(0.528)

Notes:

1. Values in ( ), normalised co-integrating vectors (each vector value divided by first value in same vector).

Table 6.46 presents the results of the estimated cointegrated vectors in Johansen's estimation for the United States model. The results indicate that all the coefficient estimates of the independent variables in Vector 1 carry the expected signs. Both the permanent income elasticity and the tourism own price elasticity is low, indicating the U.S tourist is not sensitive to both income and price in the long-run. The demand elasticity of the real trade volume index is +0.5, indicating that a one percent increase in the real trade volume will lead to a positive 0.5 percent increase in visitor arrivals from the United States. This indicates that changes in visitor arrivals from the United States are, in part, caused by the changes in real trade volume in the Hong Kong long-run model.

6.5.4 Estimating ECMs (United States)

6.5.4.1 Short-run General ECMs – Engle-Granger and Johansen Approaches (United States)

The results of the short-run general ECMs for the United States are provided in Appendix B. Tables B.11 and B.12 in Appendix B present the results of the general ECM, as shown in Equation 6-5, based on the Engle-Granger and Johansen approaches.

$$\Delta X_t = \beta_0 + \sum_{i=1}^{2} \alpha_i \Delta X_{t-i} + \sum_{i=0}^{2} \beta_{1i} \Delta Yp_{80_{t-i}} + \sum_{i=0}^{2} \beta_{2i} \Delta Po_{t-i} + \sum_{i=0}^{2} \beta_{3i} \Delta TV_{t-i} + \sigma_1 D_1$$
$$+ \sigma Z_{t-i} + e_t \text{..} (6-5)$$

where

X_t = number of visitor arrivals from U.S.A.

Yp_{80} = permanent income index, α equals 0.8

Po = own price index

TV = real trade volume measured by total imports, exports and re-exports between U.S.A. and Hong Kong

Z_{t-i} = lagged residuals derived from Engle-Granger and Johansen procedures

D_1 = Dummy 89, 4th June 1989 incident in China.

e_t = error term at time t

Δ = operator of first difference

Period of study = 1959 – 1999

Functional form = logarithmic form

6.5.4.2. Preferred ECM Results and its Interpretations – Engle-Granger Approach (United States)

The results of the preferred ECM, as shown in Table 6.47, indicate that the Engle-Granger ECM explains 56.5% of the variation of United States visitor arrivals. Overall, the short-term behaviour of U.S. tourist flows exhibits a marked difference from that of other origin countries. The empirical results of standard error test suggest that tourism own price, the real trade volume, and the DUMMY89 variable are statistically significant with the expected signs for the tourism demand function in Hong Kong. However, the permanent income variable (with one lag) is only statistically significant at 80% confidence level and the demand elasticity of the permanent income variable is 0.9. It is inelastic and smaller than its long-run counterpart (1.5). The short-run own price, (-0.6), is inelastic, and smaller than its long-run counterpart (-0.8) in absolute terms. Both of the coefficients on the short-run income and the own price elasticity are smaller than their long-run counterparts, as suggested by microeconomic theory. The coefficient of the real trade volume (0.4) is statistically significant, and the elasticity is smaller than its long-run counterpart (0.5). The Dummy89 variable is statistically significant with correct negative sign, which indicates that the 1989 Beijing incident in 1989 had a significant negative effect on the tourist arrivals from the United States. This suggests that visitors from the United States were sensitive to that period of political unrest in China.

The estimated coefficient of RESEG1 is statistically significant, and the value of the adjustment coefficients is -0.732, which indicates a rapid speed of adjustment process. The diagnostic results, shown in Table 6.47, prove that short-run ECM (E-G) for the United States passed all diagnostic tests. Overall, the Engle-Granger ECM model (US) is well specified.

Table 6.47 Results of Preferred ECM – Engle-Granger Approach (United States)

Coefficient and t-statistics

Variables	Coefficient Estimates	t-ratio
CST	0.028 (0.02)	1.40
DLnP801	0.852 (0.556)	1.53
DLnPPP	-0.629 (0.244)	-2.58**
DLnRTRAD	0.409 (0.118)	3.46**
DUMMY89	-0.158 (0.054)	-2.94**
RESEG1	-0.732 (0.153)	-4.79**

$R^2 = 0.622$ $\bar{R}^2 = 0.565$

SER = 0.073 RSS = 0.174

Diagnostic Test

LM(1) = 1.63 RESET(1) = 1.64

NORM(1) = 0.854 HETRO(1) = 0.344

Notes:

1. ** indicates significance at 95% level.
2. In formulating error-correction mechanism, lag length of disequilibrium error corresponds to length of response (adjustment) to deviation from the long-run path. In estimating above ECM, we set K equal to 1.

6.5.4.3 Preferred ECM Results and its Interpretations – Johansen Approach (United States)

The results of the preferred ECM (Johansen), as shown in Table 6.48, indicate that the short-run coefficient estimates for visitor arrivals from the United States appear to be similar to those of the preferred ECM (Engle-Granger). The Johansen ECM explains 59.5% of the variation in the visitor arrivals from the United States and the results of standard error tests indicate that all the estimated coefficients, except the permanent income variable are statistically significant at the 95% level. In spite of statistical insignificance, the income variables is retained in the equation on the grounds of economic argument where a coefficient is not statistically significant, this does not mean that there is no relationship between the explanatory and dependent variable, the insignificance may be a results of problems with the power of the statistical tests. Mccloskey and Zilak (1996) have suggested that if a coefficient is statistically insignificant but has the expected sign and is economically significant, then the explanatory variable should be retained in the model, whereas if the coefficient does not have the expected sign or is economically insignificant the variable should be rejected. The short-run income elasticity of demand is 0.6, produced by the Johansen procedures, is smaller than the Engle-Granger's 0.9. Likewise, the short-run price elasticity of demand is -0.5 (Johansen), which is smaller (in absolute value) than that of Engle and Granger, -0.6. The coefficient of error correction term of Johansen (RESJO1) is -0.562, against –0.732 as derived from the Engle-Granger.

The short-run trade elasticity of demand is 0.4 (Johansen), slightly smaller than the value of 0.41 (Engle and Granger). The coefficient of the real trade income variable is statistically significant in both E-G and Johansen ECM, with expected sign, indicating that the trade volume variable is also one of the important economic determinants within the tourism demand model for the United States.

Finally, the coefficient of the error correction term (Johansen) is correctly signed, and significant at the 95% level, with theoretically expected sign. It appears that the Johansen ECM (US) is well specified because it passes all the diagnostic tests.

Table 6.48 Results of Preferred ECM – Johansen Approach (United States)

Coefficient and the t-statistics

Variables	Coefficient Estimates	t-ratio
CST	8.08 (1.75)	4.62**
DLnP801	0.608 (0.51)	1.20
DLnREXC1	-0.499 (0.222)	-2.25**
DLnRTRADE	0.402 (0.117)	3.45**
DUMMY89	-0.213 (0.054)	-3.96**
RESJO1	-0.562 (0.122)	-4.61**

R^2 = 0.649 R^2 (adjusted) = 0.595

SER = 0.07 RSS = 0.162

Diagnostic test

LM(1) = 0.237 RESET(1) = 0.416

NORM(2) = 1.91 HETRO(1) = 0.105

Note ** indicates significance at 95% significance level.

6.6 Cointegration Analysis of Tourism Demand (United Kingdom)

6.6.1 Testing for Order of Integration (United Kingdom)

The results of ADF unit root tests (model with time trend), as shown in Table 6.49, indicate that the series of visitor arrivals, the tourism own price, the share price, the weighted substitute price, and the real trade volume variables are all I(1) variables. The income variable, however, is a I(0) variable. Due to the mixed unit root results of income and visitor variable, we apply the Dickey Fuller (1981) time trend test to investigate whether the current income variable contains a time trend. The results of Dickey and Fuller (1991) time trend test indicate that the current income variable is preferred to be tested with a model with linear time trend. Therefore, we concluded that all the underlying variables (with the exception of income variable) are I(1) variables.

Table 6.49 Results of DF/ADF Unit Root Tests (United Kingdom)

Variables	Level with Time Trend	First Differences with Time Trend
LnTARES	-0.539 [0]	-5.5[0] **
LnRGDPPC[5]	-3.73[3]**	-4.01[0] **
LnPPP	-2.04 [1]	-3.95[0] **
LnSHARE	-2.75[1]	-4.88[0]**
LnRTRAD	-2.43 [1]	-4.30[0]**
LnSUB	-2.62[1]	-4.66[0]**

Notes:

1. TARES = total visitor arrivals from United Kingdom by country of residence.
   RGDPPC = real gross domestic product per capita of United Kingdom
   SHARE = index of share price.
   PPP = own price of tourism of United Kingdom, as calculated from Equation 5.3.
   RTRAD = real trade volume measured by total imports, re-exports, and exports between the United Kingdom and Hong Kong.
   SUB = weighted substitute price index of United Kingdom as calculated in Equation 5.5
   Ln = logarithm form
2. ** indicates rejection of hypothesis of unit root at 95% confidence level.
3. All above series estimated with models with intercept and linear time trend and models with intercept only.
4. Figures in parentheses, [ ] lag lengths used in testing for the unit root.
5. The results of ADF unit root test suggest contradictory results of LnRGDPPC between the model with trend and the model without trend. The Dickey Fuller (1981) F-statistics indicate that the series of LnRGDPPC is preferred to be testing with time trend.

Table 6.50 Results of Coefficient Estimates – Selected Country-pair Substitute Price Variables (United Kingdom)

Variables	Coefficient	t-ratio
LnPPTHA	1.14	(+) 0.888
LnPPSIN	-1.17	(-) 0.822
LnPPJAP	1.09	(+) 2.57**
LnPPMAL	-0.119	(-) 0.118
LnPPCHI	-0.945	(-) 2.61**
LnPPPHI	0.488	(+) 0.945
LnPPAUST	1.24	(+) 1.67
LnPPKOR	-1.14	(-) 2.19**

Notes:

1. LnPPTHA, LnPPSIN, LnPPJAP, LnPPMAL, LnPPCHI, LnPPPHI, LnPPAUST and LnPPKOR are country-pair substitute price variables between United Kingdom and Thailand, Singapore, Japan, Malaysia, China, Philippines, Australia and Korea, respectively.
2. ** indicates rejection of hypothesis at 95% confidence level.
3. Insignificant economic determinants deleted from regression.

Table 6.51 Results of DF/ ADF Unit Root Tests – Selected Country-pair Substitute Price Variables (United Kingdom)

Permanent Income Series	Level with Trend	First Differences with Trend
Substitute Destination		
LnPPPAUS	-3.9[1]**	-5.14[3]**
LnPPPTHA	-3.37[2]	-4.05[3]**
LnPPPJAP	-3.02[1]	-4.85[3]**
LnPPPHI	-3.84[3]**	-5.68[0]**

Notes:

1. ** indicates rejection of hypothesis of unit root at 95% confidence level.
2. All above series estimated with models with intercepts and linear time trend.
3. Figures in parentheses, [ ] lag lengths used in tests.

6.6.2 Model Specification – Proxy Variable Search Process

6.6.2.1 Selection Results of Substitute Destinations – Rival Search Process (United Kingdom)

According to the market share for outbound tourists from the United Kingdom to the EAP region over the period from 1995 to 1999, the eight most popular tourist destinations are Singapore, Thailand, Japan, Korea, China, Malaysia, the Philippines and Australia. The results in Table 6.50 shows that Japan, Thailand, Australia and the Philippines are substitute destinations. In addition, the results in Table 6.51 shows that the country-pair weighted substitute price variables of all selected alternative destinations (with the exception of Australia and the Philippines) are integrated of order 0. However, as shown in Table 6.49, the weighted substitute price variables is integrated of order one.

6.6.2.2 Selection Results of Preferred Permanent Income Variable – Grid Search Process (United Kingdom)

As shown in Table 6.52, the results of the ADF unit root tests (models with time trend) indicate that the current income (LnP100) and permanent income (LnP80) variables are I (0) variables; however, the results of the ADF unit root tests (models with no trend) indicate that the permanent income series of LnP50 and LnP30 are I (1) variables. Due to the I(0) nature of LnP100 and LnP80, we decide to select the preferred permanent income series between Lnp50 and Lnp30 based only on the R^2 and best cointegration results. As shown in Table 6.53, since the cointegration regression model, by including LnP30, produces the best results of R^2 and cointegration ADF statistics, the permanent income series with 0.3 weighting factor has been selected as the preferred permanent income variable in the cointegrating regression.

Table 6.52 Results of DF/ADF Unit Root Tests – Selected Permanent Income Variables (United Kingdom)

Income Series	Level with Time Trend	First Differences with Time Trend
LnP(100)[7]	-3.74[3]**	-4.01[0]**
LnP(80)[7]	-3.76[1]**	-3.90[1]**
Income Series	**Level without Time Trend**	**First Difference without Time Trend**
LnP (50)[7]	-0.766 [4]	-3.61[1]**
LnP (30)[7]	-1.96 [0]	-3.31[4]**

Notes:

1. LnP, permanent income indices.
2. Figure in bracket ( ), value of weighted factor of permanent index.
3. LnP100, 80, 50 and 30, permanent income indices in logarithm form with smoothing constants of 1.0, 0.8, 0.5 and 0.3, respectively.
4. The 95% critical value for the ADF statistics are –2.95 and -3.54 for models with intercepts only and the models with intercepts and linear time trend, respectively.
5. ** indicates statistically significance at 95% confidence level.
6. Figures in parentheses [ ], lag lengths used in ADF regression model.
7. While the empirical results of Dickey-Fuller (1981) time trend test indicate the variables of LnP100 and Lnp80 are subject to linear time trend, the Lnp50 and Lnp30 are not subject to linear trend.
8. LnP(100) and LnP(80) were estimated based on models with linear time trend and LnP(50) and LnP(30) were estimated based on models without linear time trend.

Table 6.53 Results of R^2 and Cointegration ADF Test – Selected Permanent Income Variables (United Kingdom)

Permanent Income Variables	R^2	Cointegration Test Statistics
LnP(100)	0.9531	-2.70[1]
LnP(80)	0.9576	-2.65[1]
LnP(50)	0.9645	-2.69[4]
LnP(30)	0.9723	-2.73[1]

Notes:

1. LnP(100), LnP(80), LnP(50) and LnP(30), permanent income indices in logarithm form with smoothing constants of 1.0,0.8,0.5 and 0.3, respectively.
2. Values of R^2 and the cointegration ADF test statistics for each permanent income indices was estimated from regression models consisting of other relevant economic variables in the cointegrating regression.
3. Since LnP(100) and LnP(80) are I(0) variables, the results of LnP(100) and LnP(80) are used for indication purpose.

6.6.3 Testing for Cointegration (United Kingdom)

6.6.3.1 Cointegration Results and Interpretations – Engle-Granger Approach (United Kingdom)

The first step of the Engle-Granger (1987) two-stage estimation procedures is employed to estimate a long-run general model. Using OLS procedures, we estimated the following long-run relationship between tourist arrivals, their economic determinants and the six cross-country dummy variables. Appendix B, Table B.13 shows the results of the long-run general model for the United Kingdom.

The results of the long-run general model show that the variables of current income, the tourism own price, the weighted substitute price and DUMMY89 are relevant, with expected sign, whereas the share price, real trade volume and other dummy variables are irrelevant in the cointegrating regression.

We deleted the irrelevant variables from the general model and re-estimated with each I(1) permanent income index to obtain the preferred long-run model (cointegrating regression), the results of which are shown in Table 6.54.

Table 6.54 Results of Cointegrating Regression (United Kingdom)

Series	Coefficient
CST	14.34
LnP30	4.72
LnPPP	-1.1
LnSUB	0.606
DUMMY89	-0.203

R^2 = 0.972 DW = 0.60

The results of cointegrating regression, as shown in Table 6.54, indicate that all variables produced the expected sign. The long-run permanent income elasticity is very high and positive, suggesting that United Kingdom visitors would consider travelling to Hong Kong a luxury good . The own price variable has expected sign, with coefficients greater than one, indicating that United Kingdom tourists are also sensitive to the level of own price. The analysis also shows that DUMMY89 is relevant, with expected sign, in the cointegrating regression.

The cointegrating regression produced a very high R^2 of 0.972 and the CIDW value is 0.60. It appears to reject the existence of cointegration. Nonetheless, the CIDW test has such low power that we decide to employ the Engle-Granger cointegration test to determine the state of cointegration for visitor arrivals from the United Kingdom.

Table 6.55 presents the results of the cointegration ADF test. The results confirmed that a long-run cointegration relationship does not exist for this model at the 95% level, because the value of -2.73(ADF(4)) lies below the critical value of -4.90.

Table 6.55 Results of Cointegration DF/ ADF Tests (United Kingdom)

	Test Statistics	95% Critical Value
ADF(0)	-2.47	-4.90
ADF(1)	-2.58	-4.90
ADF(2)	-1.95	-4.90
ADF(3)	-1.96	-4.90
ADF(4)	-2.73	-4.90

Notes:

1. Residual-based cointegration test using Microfit 4.0.
2. Figures in brackets, lag length used in ADF regression model in Equation 6-1.
3. Maximum lag length, 4.

6.6.3.2 Cointegration Results and Interpretation – Johansen Approach (United Kingdom)

Since the results from the Engle-Granger approach do not suggest any cointegration relationships, we employed the Johansen procedures to examine whether or not the cointegrating regression models have one or more cointegrating vectors. As indicated earlier, we estimated a VAR model with unrestricted intercepts and no trends for the tourism demand in U.K.. We used the AIC and SBC criteria to select the order for the VAR model. Table 6.56 presents the choice criteria test statistics for selecting the order of the VAR model for the United Kingdom.

Table 6.56 Results of Choice Criteria for Selecting Order of VAR Model (United Kingdom)

Order	AIC	SBC
4	199.7	150.9
3	198.2	160.9
2	198.3	172.5
1	194.8	180.4

AIC = Akaike Information Criterion

SBC = Schwarz Bayesian Criterion

For the United Kingdom model, the AIC indicates order four, but the SBC indicated order one. Since we have a short time series (36 observations), we cannot take the risk of over-parameterisation. We deleted the suggestion of a VAR (4) model based on the AIC criterion. Therefore, in the U.K. model, we have selected a VAR model of order 1 on the basis of the SBC criterion.

The cointegration tests based on both the maximum eigenvalue and the trace statistics uniformly rejected the null hypothesis of no cointegrating vectors. Conversely, they favoured the existence of one or at least one cointegrating vector among the variables. As indicated in Table 6.57, the trace statistic is 80.3, well above the 95% critical value of 48.9. However, the null hypothesis of $r \leq 1$ and $r \leq 2$ cannot be rejected at a 95% level. Thus, the cointegration test, based on a trace of the stochastic matrix, indicated that there exists one cointegrating vector. The results of the maximum eigenvalue analysis indicated that we do not reject a null hypothesis of $r \leq 1$ at the 95% level. Overall, the results of trace statistics suggest that there is one cointegrating vector in the cointegrating regression at the 95% level.

Table 6.57 Results of Johansen Cointegration Test based on λ_{max} and λ_{trace} (United Kingdom)

Maximum Eigenvalue Test					Trace Test				
Null (r=0)	Alternative (r>0)	Statistics	95% CV	90%	Null (r=0)	Alternative (r>0)	Statistics	95%	90%
r=0	r=1	58.5	27.4	25.0	r=0	r≥1	80.3	48.9	45.7
r≤1	r=2	16.3	21.1	19.0	r≤1	r≥2	21.8	31.5	28.8
r≤2	r=3	5.5	14.9	13.0	r≤2	r≥3	5.5	17.9	15.8
r≤3	r=4	0.052	8.1	6.5	r≤3	r≥4	0.052	8.1	6.5

Notes:

1. Trace and maximum eigenvalue statistics are used for testing the null of no cointegration against alternative cointegrating relations among variables in preferred long-run model (United Kingdom).
2. 95% critical values in Table 6.57 obtained from Pesaran and Pesaran (1997)
3. Order of VAR is 1, and period of estimation is 1965 to 1999.
4. Cointegration test statistics are estimated based on VAR (1) model with unrestricted intercepts and no trend.

Table 6.58 presents long-run elasticity estimates obtained from normalising the cointegrated vector using the Johansen estimation procedures.

Table 6.58 Results of Estimated Cointegrated Vectors – Johansen Approach (United Kingdom)

Variables	**Vector 1**
LnTARES	0.534 (-1.0)
LnP30	-3.15 (5.9)
LnPPP	0.572 (-1.07)
LnSUB	-0.802 (1.5)

Notes:

1. Values in ( ), normalised cointegrating vectors (value in vector divided by first value in same vector).

The results indicate that the coefficients of the permanent income index (Lnp30), the tourism own price index and the weighted substitute price index produce the correct signs. The permanent income variable (Lnp30) is highly elastic, indicating that Hong Kong tourism is considered a luxury product for visitors arriving from the United Kingdom. Both the own price and substitute price are also elastic. The results indicate that visitors from the United Kingdom are highly sensitive to changes in permanent income, own price, and weighted substitute prices.

6.6.4 Estimating ECMs (United Kingdom)

6.6.4.1 Short-run General ECMs – Engle-Granger and Johansen Approaches (United Kingdom)

Using the results of the cointegrating regression and the statistically significant cointegrating vector, as shown in Tables 6.54 and 6.58, we estimated a dynamic ECM for the United Kingdom market. We began by creating a general ECM based on the Engle-Granger and Johansen approaches. We included all relevant economic determinants in differenced form, with lags of up to the second order and an error correction term derived from the cointegrating regression (Engle-Granger) or statistically significant cointegrating vector (Johansen) in the short-run general model. Apart from the economic variables, short-run dummy variables were added to represent the effect of the 'one off' events.

$$\Delta X_t = \beta_0 + \sum_{i=1}^{2} \alpha_i \Delta X_{t-i} + \sum_{i=0}^{2} \beta_{1i} \Delta Yp_{30t-i} + \sum_{i=0}^{2} \beta_{2i} \Delta Po_{t-i} + \sum_{i=0}^{2} \beta_{3i} \Delta Pc_{t-i} + \sigma_1 D_1 + \theta Z_{t-i} + e_t .....(6-6)$$

where

X_t = number of visitor arrivals from U.K.

Yp_{30} = permanent income index, $\alpha = 0.3$

Po = own price index

Pc = weighted substitute price index

D_1 = Dummy 89

e_t = error term at time t

Δ = operator of first difference

Period of study = 1959 – 1999

Functional form = logarithmic form

Appendix B, Tables B.14 and B.15, present the results of the general ECMs based on the Engle-Granger and Johansen approaches.

Starting with the general model (Appendix B, Table B.14), we employed Hendry-type testing down procedures until we arrived at a most preferred ECM. Table 6.59 presents the results of the selection process, based on the Engle –Granger approach.

6.6.4.2 Preferred ECM Results and Interpretations – Engle-Granger Approach (United Kingdom)

Tables 6.59 and 6.60 present the results of the preferred short-run ECM. Since our cointegration analysis did not find any cointegration relationships, based the Engle-Granger approach, the E-G ECM should be interpreted with caution.

The Engle-Granger ECM explains only 39.8% of the variation of the dependent variables from the United Kingdom model. Since none of the past values of the independent variables was found to be statistically significant, the results of standard error tests show that UK visitor arrivals are sensitive to current changes in economic factors, and the past movements have little influence. The permanent income variable is not significant, and the income elasticity of demand is measured at 1.0, indicating that the short-term permanent income elasticity is smaller than its long-run counterpart at 4.7. This may suggest that visitors from the United Kingdom are less sensitive to changes in income in the short-run. The coefficient of the short-run own price variable elasticity is statistically significant, and, at -0.6, is smaller (in absolute value) than its long-run counterpart at -1.1. Similarly, the coefficient of the short-run substitute price variable is statistically significant. The substitute price elasticity of 0.6 is also smaller than its long-run counterpart at 0.61. Overall, the United Kingdom visitors are found to be highly responsive to change in the own price and substitute prices, but less responsive to changes in their permanent income in the short-run. One important point must be mentioned that the Dummy89 variable is not statistically significant; however, it is an important variable for the overall significance of the model. The estimated error correction coefficient (-0.304) is statistically significant, with expected sign.

We must emphasise, however, that Hong Kong was a British colony for the period from 1842 to 1997. It is more likely that economic variables alone may not fully explain the variations of the U.K. tourism demand in the former British Crown colony. The tie factors such as, cultural and social- political relationships between U.K. and Hong Kong may have strong impacts on U.K. visitors travelling to Hong Kong. However, the cultural and social- political aspects are beyond the scope of this study.

Table 6.59 Results of Preferred ECM – Engle-Granger Approach (United Kingdom)

Variables	Coefficients Estimates	t-ratio
CST	0.077 (0.029)	2.64**
DLnP30	1.04 (0.90)	1.16
DLnPPP	-0.613 (0.238)	-2.58**
DLnSUB	0.581 (0.232)	2.51**
DUMMY89	-0.074 (0.063)	-1.18
RESEG1	-0.304 (0.09)	-3.37**

R^2 = 0.489 $\overline{R^2}$ = 0.398

SER = 0.083 RSS = 0.192

Diagnostic test

LM(1) = 0.224 RESET(1) = 0.041

NORM(2) = 0.246 HETRO(1) = 3.13

** indicates rejection of hypothesis at 95% level

6.6.4.3 Preferred ECM Results and Interpretations – Johansen Approach (United Kingdom)

The Johansen model explains only 27.4% of the variation of dependent variables, which is obviously smaller than the 39.8% of the Engle-Granger ECM. The empirical results of standard error tests suggest that the single period lag of permanent income variable is statistically significant at the 90% level, and its elasticity of 3.2, which is smaller than its long-run counterpart (5.4). This indicates that the income variable was statistically insignificant at the 95% level in both E-G ECM and Johansen ECM.

The own price and weighted substitute price elasticity of demand are -0.8 and 0.9, respectively. Both the own price and weighted substitute price variable are statistically significant at the 95% level. However, the Dummy89 variable is statistically significant only at the 90% confidence level.

The estimated coefficient of RESJO1 is -0.302 and statistically significant. This is smaller than the value of -0.304 (in absolute value) determined by the Engle-Granger procedures. Overall, both the Engle-Granger and Johansen ECM do not explain the tourism demand particularly well. We therefore suggest that further research should be focused on U.K tourists by taking account of the relationship with Hong Kong as a British Colony.

Table 6.60 Results of Preferred ECM – Johansen Approach (United Kingdom)

Variables	Coefficient Estimates		t-ratio
CST	3.18	(1.47)	2.16**
DLnP301	3.22	(1.73)	1.86*
DLnPPP	-0.747	(0.26)	-2.88**
DLnSUB	0.906	(0.26)	3.46**
DUMMY89	-0.177	(0.092)	-1.93*
RESJO1	-0.302	(0.145)	-2.09**

R^2 = 0.387 $\overline{R}^2$ = 0.274

SER = 0.092 RSS = 0.229

Diagnostic test

LM(1) = 0.434 RESET(1) = 2.91

NORM(2) = 0.402 HETRO(1) = 2.26

Note 1. */** indicate rejection of hypothesis at 90%/95% error level

6.7 Cointegration Analysis of Tourism Demand (Germany)

6.7.1 Testing for Order of Integration (Germany)

In this section, we analyse the tourist arrivals from Germany to Hong Kong. The results of the ADF unit root tests are provided in Table 6.61.

Table 6.61 Results of DF/ADF Unit Root Tests (Germany)

Variables in Equation	Level with Time Trend	First Differences with Time Trend
LnTANAT	-1.65[1]	-4.97[1]**
LnPPP	-1.43[1]	-5.45[1]**
LnSUB	-2.62[0]	-5.60[0]**
LnSHARE	-1.82[1]	-5.61[1]**
LnRTRAD[6]	-0.559[1]	-5.66[1]**
LnRGDPPC[6]	-2.41[4]	-6.88[1]**

Notes:

1. TANAT = total visitor arrivals from Germany by nationality.
   RGDPPC = Germany's real gross domestic product per capita.
   SHARE = index of share price as listed in Table 5.1.
   PPP = own price of tourism of Japan, calculated from Equation 5-3.
   RTRAD = real trade volume measured by total imports, re-exports and exports.
   SUB = weighted substitute price index of Germany, calculated from Equation 5-5.
2. ** indicates rejection of hypothesis of unit root at a 95% significance level.
3. All above series introduced using models in Equation 6-1.
4. 95% critical value of ADF unit root test is 3.54 (with time trend).
5. Figures in parentheses, lag lengths used in tests.
6. The results of ADF unit root test indicate that the series of LnRTRAD and LnRGDPPC suggested mixed results of the order of integration, between the models with time trend and the models with no trend. The results of Dickey-Fuller (1981) F-statistics indicate that the series of LnRTRAD and LnRGDPPC are subject to a linear time trend in the model.

The ADF unit root test statistics (models with linear time trend), shown in Table 6.61, suggest that all the underlying level variables in the German model are integrated of order 1.

6.7.2 Model Specification – Proxy Variable Search Process

6.7.2.1 Selection Results of Substitute Destinations -- Rival Search Process (Germany)

The results of market share analysis suggested that the EAP region's eight most popular tourist destinations for Germany's tourist market are Thailand, Singapore, China, Australia, Malaysia, Korea, Indonesia and Japan.

The selection of substitute destinations is decided by performing a rival search process. The regression results in Table 6.62 indicate that Thailand, Indonesia, Singapore and Japan are the substitute destinations, whereas China, Australia, Korea and Malaysia can be classified as complementary destinations and therefore deleted from the model.

Table 6.62 Results of Coefficient Estimates – Selected Country-pair Substitute Price Variables (Germany)

Variable	Coefficient	t-ratio
LnPPGERTHA	+ 1.57	+ 3.83**
LnPPGERIND	+ 0.033	+ 0.742
LnPPGERJAP	+ 0.068	+ 0.26
LnPPGERSIN	+ 0.066	+ 0.106
LnPPGERCHI	- 0.578	- 4.21**
LnPPGERAUS	- 1.01	- 3.13**
LnPPGERKOR	- 0.463	- 4.58**
LnPPGERMAL	- 0.571	- 1.33

Notes:

1. LnPPGERTHA, LnPPGERMAL, LnPPGERIND, LnPPGERCHI, LnPPGERAUS, LnPPGERSIN, LnPPGERKOR and LnPPGERJAP - relative tourism price variables between Germany and Thailand, Malaysia, Indonesia, China, Australia, Singapore, Korea and Japan, respectively.
2. ** indicates rejection of hypothesis at 95% confidence level.

Table 6.62 shows that the German weighted substitute price index comprises the country-pair substitute price variables of Thailand, Indonesia, Japan and Singapore. Although the results of ADF unit root tests in Table 6.63 indicate that the country–pair substitute price variable of Indonesia (one of the selected substitute destination of German weighted substitute price index) is integrated of order 0, the German weighted substitute price index is integrated of order 1, as shown in the results of unit root tests in Table 6.61.

Table 6.63 Results of DF/ADF Unit Root Tests – Selected Country-pair Substitute Price Variables (Germany)

Series	Level	First Differences
LnPPPTHA	-2.96(1)	-4.69(0)**
LnPPPJAP	-3.15(0)	-7.34(0)**
LnPPPIND	-4.0(0)**	-5.60(0)**
LnPPPMAL	-3.44(4)	-4.85(0)**
LnPPPSIN	-3.15(1)	-4.53(0)**
LnPPPCHI	-3.19(1)	-5.63(0)**
LnPPPAUS	-4.00(3)**	-5.20(3)**
LnPPPKOR	-4.64(1)**	-6.25(0)**

Notes:

1. ** indicates rejection of hypothesis of unit root at 95% significance level.
2. All above series are estimated with models with an intercepts and linear trend.
3. Figures in parentheses, ( ), are lag lengths used in tests.

6.7.2.2 Selection Results of Preferred Permanent Income Variable– Grid Search Process (Germany)

In this section, we employ the grid search process to select the preferred permanent income variable. First, we investigated the time series properties of the various permanent income indices, ranging from the weighting factor of 0.9 to 0.3. The results of the ADF unit root tests are shown in Table 6.64.

Table 6.64 **Results of DF/ADF Unit Root Tests – Selected Permanent Income Variables (Germany)**

Permanent Income Variables	Level with Time Trend	First Differences with Trend
LnP(100)	-2.41[4]	-6.88[1]**
LnP(90)	-2.53[1]	-6.40[1]**
LnP(80)	-2.43[1]	-6.30[1]**
LnP(70)	-1.93[1]	-6.05[1]**
LnP(60)	-2.17[1]	-5.98[1]**
LnP(50)	-2.05[4]	-5.76[1]**
LnP(40)	-2.16[4]	-5.49[1]**
LnP(30)	-2.40[4]	-5.12[1]**

Notes:

1. LnP, permanent income indices in logarithmic form.
2. Figures in ( ), value of smoothing constant.
3. LnP100, 90, 80, 70, 60, 50, 40 and 30, values of permanent income indices, with smoothing constants of 1.0, 0.9,0.8,0.7,0.6,0.5,0.4 and 0.3, respectively.
4. All above series are estimated based on models using intercepts and linear time trend.
5 **indicates rejection of hypothesis of unit root at 95% significance level.
6. Figures in parentheses, [ ], are lag lengths used in tests.
7. The results of unit root test indicate that the series of LnP(100), LnP(90), LnP(80), LnP(70), LnP(60), LnP(50), LnP(40) and LnP(30) have mixed results of the number of unit roots, between the model with trend and the model with no trend. The results of Dickey and Fuller (1981) F-test statistics indicated that the model with a linear time trend is preferred for all the above permanent income series.

The ADF unit root test results, as shown in Table 6.64,suggest that all of the permanent income index series are integrated of order 1. This indicates that all of the permanent income variables are available for selection in the German cointegrating regression. Among the I (1) permanent income index variables, we ultimately chose LnP(30) as the permanent income variable in the German cointegrating regression, because it produces the most preferred results on R^2 and cointegration ADF tests, as shown in Table 6.65.

Table 6.65 Results of R^2 and Cointegration ADF Tests – Selected Permanent Income Variables (Germany)

Permanent Income Variables	R^2	Cointegration ADF Tests Statistics
LnP(100)	0.9789	-5.63[1]**
LnP(80)	0.9847	-5.60[1]**
LnP(50)	0.9916	-5.49[1]**
LnP(30)	0.9941	-5.63[1]**

Notes:

1. LnP100, 80, 50 and 30, permanent income indices with smoothing constants of 1.0, 0.8, 0.5 and 0.3, respectively.
2. Values of R^2 and cointegration ADF test statistics for each permanent income index are obtained from regression model consisting independent variables of each candidate of income index and relevant economic determinants, with respect to visitor arrivals from Germany.
3. Figures in parentheses [ ], lag lengths used in ADF regression model in Equation 6-1.
4. ** indicates statistically significance at 95% confidence level.

6.7.3 Testing for Cointegration (Germany)

6.7.3.1 Cointegration Results and its Interpretations – Engle-Granger Approach (Germany)

The first step of the Engle-Granger two-stage estimation procedure is to estimate the long-run general model in order to discover the long-run relationship between the underlying variables in the German model. Appendix B, Table B.16 presents the results of the long-run general model (Germany).

We estimated the general model and deleted all the irrelevant variables. We continued the process by estimating the model with various alternative permanent income indices until we obtained our long-run cointegrating regression.

Table 6.66 Results of Cointegrating Regression (Germany)

Series	Coefficient
CST	-12.56
LnP30	3.59
LnPPP	-0.61
LnSHARE	0.188
DUMMY91GER	0.424

$R^2 = 0.994$ CIDW = 1.25

The cointegrating regression analysis suggests that the permanent income, own price, share price and DUMMY91GER variables are selected in the long-run tourism demand model. We deleted the weighted substitute price index and the real trade volume index in the cointegrating regression because they are not relevant for the cointegrating regression. The variable of DUMMY91GER is also relevant with expected sign for the long-run model, indicating that the re-unification of Germany produced a significant impact on German visitors to Hong Kong.

The cointegrating regression produced a very high R^2 of 0.994 and the CIDW value of 1.25, suggesting the existence of cointegration.

Table 6.67 Results of Cointegration DF/ADF Tests (Germany)

	Test Statistics	Critical Value
ADF(0)	-3.83	(-4.81)
ADF(1)	-5.63**	(-4.81)
ADF(2)	-3.59	(-4.81)
ADF(3)	-3.83	(-4.81)
ADF(4)	-3.21	(-4.81)

Notes:

1. Residual-based cointegration test using Microfit 4.0
2. Figures in brackets indicate 95% critical value.
3. Maximum lag length , 4.
4. ** indicates rejection of hypothesis at 95% significance level, respectively.

Table 6.67 shows that the value of the ADF unit root test with one lag is -5.63, which exceeds the critical value of -4.81 (in absolute value). This confirms that the residuals from the cointegrating regressions are likely to be I(0)s. The ADF unit root tests of the residuals (model with one lag) suggest that a long-run cointegration relationship exists among the underlying variables in the German model.

6.7.3.2 Cointegration Results and Interpretations – Johansen Approach (Germany)

Since the German tourism demand model is multivariate, we need to apply the Johansen approach to test for the existence of a cointegration relationship.

Table 6.68 Results of Choice Criteria for Selecting Order of VAR Model (Germany)

Order	AIC	SBC
4	210.5	155.7
3	212.7	170.8
2	202.1	173.1
1	205.5	189.4

Table 6.68 presents the results of the test statistics and the choice criterion used to select the order of the VAR model. Since we have a short time-series, we cannot take the risk of over-parameterisation. In the German model, we have selected a VAR (1) model on the basis of the SBC criterion, instead of a VAR (3) based on the AIC criterion.

Table 6.69 presents the results of VAR (1) models with unrestricted intercepts and no trends. Both the maximum eigenvalue and the trace statistics suggest that there exist two cointegrating vectors. It appears that the higher number of cointegrating vectors will ensure a higher stability of the system overall.

Table 6.69 Results of Johansen Cointegration Test based on λ_{max} and λ_{trace} (Germany)

Maximum Eigenvalue Test				Trace Test			
Null (r=0)	Alternative (r>0)	Statistics	95% CV	Null (r=0)	Alternative (r>0)	Statistics	95% CV
r=0	r=1	51.6	27.4	r=0	r≥1	90.3	48.8
r≤1	r=2	33.2	21.1	r≤1	r≥2	38.8	31.5
r≤2	r=3	3.7	14.9	r≤2	r≥3	5.5	17.9
r≤3	r=4	1.8	8.1	r≤3	r=4	1.8	8.1

Notes:

1. Trace and maximum eigenvalue statistics for testing null of no cointegration (r=0) against alternatives cointegrating relations among variables in preferred long-run model (Germany).
2. 95% critical values in Table 6.21 obtained from Pesaran and Pesaran (1997).
3. Order of VAR = 1, period of estimation 1959 - 1999
4. Cointegration tests are estimated on VAR (1) models with unrestricted intercepts and no trends.

Starting with the null hypothesis of no cointegration (r=0) amongst the variables, the trace statistic is 90.3. This figure is well above the 95% critical value of 48.8. Moreover, using the null hypothesis of one cointegrating relation (r ≤1) amongst the variables, we discovered that the trace statistic is 38.8, well above the 95% critical value of 31.5. This indicates that the null hypothesis of r=0 and r≤1 are both rejected. Conversely, the results of the trace statistics indicate that the null hypothesis of r≤2 and r≤3, at a 95% level of significance, cannot be rejected.

The maximum eigenvalue test suggests that, since the null hypothesis of (r $\leq$ 1) (more than one cointegrating relation) is rejected, there suggests two cointegrating vectors . Similar to the results of the trace statistics, the maximum eigenvalue test fails to reject the null hypotheses of r ≤ 2 and r ≤ 3. We therefore concluded that both the maximum eigenvalue and the trace statistics tests suggest that there exist two cointegrating vectors

Table 6.70 presents the results of the long-run parameter estimates as obtained from normalising the two cointegrated vectors using the Johansen procedures.

Table 6.70 Results of Estimated Cointegrated Vectors – Johansen Approach (Germany)

	Vector 1	Vector 2
LnTANAT	-0.394 (-1.0)	0.672 (-1.0)
LnP30	-0.81 (2.05)	-2.39 (3.56)
LnPPGER	0.604 (-1.53)	1.38 (-2.05)
LnSHARE	-0.091 (0.23)	-0.213 (0.317)

Notes:

1. Values in ( ), normalised co-integrating vectors (value in each vector divided by first value in the same vector).

The finding of multiple cointegrating vectors in the Germany model implies that there is more than one long-run relationship among the underlying variables under consideration. Regarding the case of detecting the multiple cointegrating vector, Dickey, Jansen and Thornton (1993) point out that the more cointegrating vectors there are, the more stable the system and it is then desirable for an economic system to be stationary in as many directions as possible. One should notice about the empirically determined cointegrating vectors that when there is more than one cointegrating vector, there is a dilemma in choosing the right one among them. Muscatelli and Hurn (1992) stated that whenever there exists more than one cointegrating vector, we must choose only the vector that must make economic sense, if the objective of the study is to investigate the economic relationship between the underlying variables. As demonstrated by the above two cointegrating vectors, the variables in Vector 2 have shown more responsiveness to the selected economic variables. Where a situation of more than one cointegrating vector exists, we must select the vector that is more economically sensible. We therefore selected Vector 2 for the German model, because all of the independent variables in Vector 2 have shown higher responsiveness to the variation of tourism demand than Vector 1.

6.7.4 Estimating ECMs (Germany)

6.7.4.1 Short-run General ECM – Engle-Granger and Johansen Approaches (Germany)

To examine the short-run behaviour of German visitors to Hong Kong, we constructed a dynamic ECM to capture the dynamic adjustment of the underlying variables. The short-run general model initially included all of the economic determinants in differenced form, with lags up to second order. These were selected based on the cointegration regression. We also included the Dummy91 variable to capture the effect of the re-unification of Germany in 1991, and the error correction term.

$$\Delta X_t = \beta_0 + \sum_{i=1}^{2} \alpha_i \Delta X_{t-i} + \sum_{i=0}^{2} \beta_{1i} \Delta Yp_{30t-i} + \sum_{i=0}^{2} \beta_{2i} \Delta Po_{t-i} + \sum_{i=0}^{2} \beta_{3i} \Delta SP_{t-i} + \sigma_1 D_1 + \sigma Z_{t-i} + e_t \text{......}(6-7)$$

where

X_t = number of visitor arrivals from German

Yp_{30} = permanent income index, α equals to 0.3

Po = own price index

SP = share price in Germany

Z_{t-i} = lagged residuals derived from cointegrating vector of E & G and Johansen procedures

D_1 = Dummy 91, dummy variable for re-unification of Germany in 1991.

e_t = error term at time t

Δ = first difference form

Period of study = 1959 – 1999

Functional form = logarithmic form

While Appendix B, Table B.17 shows the results of the general ECM, based on the Engle-Granger approach, Appendix B, Table B.18 presents the results of the general ECM using the Johansen approach.

6.7.4.2 Preferred ECM results and Interpretation – Engle-Granger Approach (Germany)

Table 6.71 Results of preferred ECM – Engle-Granger Approach (Germany)

	Coefficient	t-ratio
DLnTANATI	0.31 (0.139)	2.24**
CST	0.031 (0.024)	1.32
DLnP30	1.64 (0.832)	1.97*
DLnPPP	-0.242 (0.181)	-1.33
DLnSHARE1	0.051 (0.087)	0.59
RESEG1	-0.567 (0.145)	-3.90**

R^2 = 0.594 $\overline{R^2}$ = 0.533

SER =0.088 RSS = 0.255

Diagnostic Tests

LM(1) = 0.021 RESET(1) = 0.227

NORM (2) = 1.28 HETRO(1) = 1.50

Notes:

1. ** indicates significance at 95% confidence level.
2. In formulating error-correction mechanism, lag length of disequilibrium error corresponds to length of response (adjustment) to deviation from long-run path. In estimating above ECM, we set K equal to 1.

Table 6.71 presents the results of the preferred ECM (Engle-Granger). The Engle-Granger ECM explains 53.3% of the variation of German visitor arrivals. The empirical results of standard error tests suggest that the variable of visitor arrivals (lag-one period) from Germany is statistically significant, with expected sign, suggesting that the habitual persistence effect is important to the German tourism demand equations. The permanent income variable and the tourism own price variable are statistically significant, at the 90% and 80% level, respectively, and with expected sign. The single period lag of share price variable is not statistically significant, but it is relevant for the overall statistical significance of the model. The short-run permanent income elasticity (1.6) is smaller than its long-run counterpart (3.6), suggesting that German visitors are more sensitive to the change in permanent income in the long-run. Likewise, the short-run own tourism price elasticity (-0.2) is smaller than its long-run counterpart (-0.6). In addition, the short-run share price elasticity (0.1) has a smaller value than its long-run counterpart (0.2). This suggests that German visitors are less responsive to changes in their wealth status and the expectations of income in the short-run. The estimated coefficient of the error correction term is -0.567 and is statistically significant, implying that if demand is 100% out of its long-run equilibrium, a 56.7% adjustment towards its equilibrium should subsequently take place within a year.

6.7.4.3 Preferred ECM Results and Interpretation – Johansen Approach (Germany)

Table 6.72 presents the results of the preferred Johansen ECM model . The Johansen ECM explains only 37.2% of the variation of German visitor arrivals.

Table 6.72 Results of Preferred ECM – Johansen Approach (Germany)

Variables	Parameter Estimates	t-ratio
CST	-1.44 (0.506)	-2.84**
DLnP30I	2.58 (0.707)	3.65**
DLnPPGER	-0.478 (0.22)	-2.18**
DLnSHAREI	0.137 (0.104)	1.31
DUMMY91GER	0.117 (0.061)	1.91*
RESJO1	-0.23 (0.078)	-2.94**

$R^2 = 0.454$ $\overline{R^2} = 0.372$

SER = 0.102 RSS = 0.343

Diagnostic test

LM(1) = 0.584 RESET(1) = 2.22

NORM(2) = 1.31 HETRO(1) = 0.98

*/** indicates rejection of hypothesis of unit root at 90%/95% level.

When we compare the results shown in Tables 6.71 and 6.72, we can confirm that the explanatory variables selected for the Engle-Granger method appear to be different from those for the Johansen method. The results of the standard error test suggest that the permanent income variable (with one lag), and the tourism own price variable are statistically significant at the 95% level, while the Dummy91GER variable and the share price variables are statistically significant at the 90% and 80% level, respectively and have the expected sign. Although the DUMMY91GER variable is not included in the short-run ECM (Engle-Granger), the Johansen ECM model can still produce significant results, suggesting that the reunification of Germany had a significant and positive effect on German tourism arrivals in Hong Kong in the short-run. The coefficient of the error correction term in the Johansen ECM is correctly signed, and significant at the 95% level. However, the estimated error coefficient -0.23

(Johansen) is smaller (in absolute value) than the error coefficient derived from the Engle-Granger procedure (-0.567).

6.8 Chapter Summary

In this chapter, we employed econometric modes for each of the six tourist origin countries to analyse the effects of major economic factors on inbound tourist flows to Hong Kong. We followed the estimation procedures of Engle and Granger and Johansen approach to estimate and test long-run cointegrating relationship and develop short-run dynamic ECM models to examine tourism demand in Hong Kong. The key results and findings are summarised below.

The results of ADF unit root tests indicated that the time- series properties of tourist arrivals and other underlying economic variables in level term exhibit non-stationary properties in all models. These findings strongly indicate that we cannot apply the classical OLS approach to estimate all the tourism demand for Hong Kong. Instead, we have applied the cointegration approach to estimate tourism demand. The cointegration results based on Johansen approach suggest that there was at least one cointegrating vector in the tourism demand model for each of the six origin countries. However, the results of the Engle-Granger approach do not appear to suggest any existence of cointegration relationships in the United Kingdom, and China models. Amongst the economic factors, the permanent income and own price variables are the two important items affecting tourism demand, followed by weighted substitute price, share price and the trade volume.

The empirical results of the grid search process of preferred permanent income variable indicated that the selected weighting factor of the preferred permanent income variable ranging from 0.3 for the long haul markets of Germany and the United Kingdom to 1.00 for the short haul market of China. Overall, the average selected weighting factor of the permanent index is 0.608 for all origin countries. While the average weighting factor is 0.467 for the three long-haul models (tourists from the West), the average weighing factor is 0.75 for the three short-haul models (tourists from the East). These findings appear to disagree with those previous studies, such as Lin and Sung (1983), particularly the long-haul models, which used current income variable to estimate and test the effect of income in tourism demand model. Our findings indicates that permanent income model has proved to be superior to current income model because the coefficients of the permanent income variable were more significant than current income variable in all long-run cointegrating regressions and associated ECMs for all origin countries, with the exception of the long-run and short-run models for China. These findings suggested that in those empirical studies, such as Lin and Sung (1983), which have assumed that tourism demand depends solely on current income variables, the relationship between tourism demand and its determinants have been mis-specified and the calculated elasticities is inaccurate.

The own price variable was also considered an influential economic determinant in the tourism demand models. The coefficients we derived were relevant with the expected signs in all of the cointegrating regressions, with the exception of the long-run model of China and the short-run model for Taiwan and China. As indicated earlier, this study is the first time the share price variable has been included in the tourism demand equation to capture the effect of asset wealth in a tourism demand equation. The empirical results indicated that the share price coefficients were statistically significant for Japan and Germany. Our analysis in Chapter 3 indicated that the Japanese and German markets have relatively large proportions of leisure travellers. The results of our analysis suggest that the share price index, proxy variable for measuring the effect of asset wealth, may be a more important determinant in modelling demand for leisure travellers than previously understood.

The rival search process for substitute destinations was conducted in this chapter to select Hong Kong's most competitive rivals for each of the five origin countries, with the exception of China. The purpose of the rival search was to aid in selecting the substitute destinations for the construction of the weighted substitute price index, and to improve the overall statistical significance and reliability of the estimated coefficients of substitute price variable. The empirical results suggested that Singapore, Thailand, Australia, and Japan are major competitors for Hong Kong's tourism industry. Also indicated was that the coefficients of the weighted substitute price variable were significant in the models for the United Kingdom and Taiwan.

As the role of Hong Kong's tourism market changed in the mid-1980s with respect to the structural change of the Hong Kong economy, we included a trade volume variable to capture the effects of the increase in business travellers to Hong Kong. The empirical results suggested that the coefficients of the trade volume variable were significant to the United States and China. We expect this to be the case, because the United States and China are Hong Kong's major trading partners.

Moreover, results from the dummy tests suggested that the coefficients of DUMMY89 (The Beijing incident) were statistically significant to both the United States and the United Kingdom. DUMMY88TAI variable was significant to tourist flows from Taiwan; and DUMMY91GER variable had a significant impact on the flow of tourists to Hong Kong from Germany. Overall, visitors from Taiwan, Germany and United Kingdom were most sensitive to income and the price factors in the long-run models, followed by Japan, China and United states.

Finally, the error correction term was statistically significant, with the anticipated signs, for the models of all country-pairs based on the Engle-Granger and Johansen approaches indicating that the long-run data had played an important role in the error correction models. The selected vectors that produced error correction terms were proved to be significant, with anticipated signs, suggesting that the independent variables with tourism demand are interconnected over a longer term.

Overall, the Preferred ECMs were well specified on the basis of acceptable goodness of fit statistics and diagnostic test statistics for each of the six origin countries. All the models passed a range of diagnostic tests, including the Bera-Jarque normality test (with the exception of the Taiwan model, Engle-Granger), Lagrange multiplier test statistics for serial correlation, heteroscedasticity, and Ramsey RESET tests for functional form were also successfully performed. Further, as demonstrated in Appendix D, the CUSUM, CUSUMSQ statistics and the plot of recursive estimates fell consistently within their 95% confidence level, suggesting that the estimated ECMs were all stable. Further, the results derived from the functional form test, as presented in the Appendix C, suggest that the log-linear form is the preferred functional form for all models

Also of importance is that our empirical analysis suggests that there were some doubts in establishing constant levels of integration for all underlying variables in the models for the United States, Japan, and China. Thus, the econometric models of tourism demand based on Engle and Granger and Johansen approaches may not be capable to produce reliable estimates for those models.

In the next chapter, we have supplemented the Pesaran approach with the Engle-Granger and Johansen approaches to estimate tourism demand. This approach is considered to supplement the latter approaches because the model is applicable, irrespective of whether the underlying variables have the same levels of integrations.

Chapter 7: Cointegration Analysis of Tourism Demand Estimation (Pesaran Approach)

7.1 Introduction

In the last chapter, we employed Preferred ECM (Engle-Granger) and Preferred ECM (Johansen) to analyse the effects of major economic factors on tourism demand in Hong Kong for each of the six origin countries. The diagnostic results of the CUSUM and CUSUMSQ tests and the plot of recursive estimates of coefficients from alternative ECMs in Appendix D indicated that the Preferred ECMs we are using are relatively stable over the entire estimation period. There are, however, some uncertainties in establishing the same number of unit roots for all of the underlying variables in the tourism demand models for the United States, Japan and China. The results for these country-pairs models aggravate a further degree of empirical uncertainties for our cointegration analysis of tourism demand.

The main purpose of this chapter is to structure an alternative econometric approach of cointegration analysis for tourism demand by incorporating the recently developed autoregressive distributed lagged modelling cointegration approach, developed by Pesaran and Shin (1998), for each of the six selected tourist origin countries. Technically, the Pesaran and Shin (1998) cointegration analysis has some advantages over the Engle and Granger and Johansen approaches. First, the Pesaran and Shin (1998) approach is applicable irrespective of whether the underlying variables are integrated of the same order. In this way, the pre-testing problems and the involved uncertainty in unit root tests are avoided. Second, the Pesaran approach also estimates the long and short-run components simultaneously, removing problems associated with omitted variables and autocorrelation. Third, the advantage of the Pesaran approach over Engle-Granger approach is that in the first stage the error term in the Autoregressive Distributed Lag Model tends to be independent and identically distributed and therefore the diagnostic statistics and the standard error of the coefficients are standard and the normal critical value can be used for testing purposes. Finally, the ECMs based on the Engle and Granger, and Johansen approaches appear to perform poorly in the tourism forecasting literature. According to Schwert (1989) and Kulendran and King (1997), it is recognized there is a problem of relying on unit root tests as a pre-test in building models, due to their low powers. Since the research objectives of this study are to produce more reliable coefficient estimates and more accurate econometric forecasts based on a modern econometric approach, the alternative approach we develop here appears to be able to produce an alternative parameter estimates which can then be deployed in our tourism demand forecast model (in Chapter 6) to produce more accurate forecasts.

This chapter is arranged as follows. In the following six sections (Sections 7.2 to 7.7), we present the empirical results for each of the six origin countries' econometric models based on the Pesaran and Shin (1998) approach (Pesaran approach hereafter). Each section consists of five sub-sections. The first sub-section presents the specifications of the unrestricted error correction model (UECM) of tourism demand. The second and third sub-sections analyse the result of the F test statistics of the UECM model to determine the existence of long-run relationship and select the orders for the ARDL model based on the AIC and SBC criteria. The fourth and fifth sub-sections analyse the empirical results of the selected ARDL model and its associated ECM. Finally, Section 7.8 summarises the major results and findings of this chapter.

7.2 Cointegration Analysis of Tourism Demand – Pesaran Approach (Japan)

The ADF unit root tests (model without trend) indicates that the LnP85 is a I(0) variable, while the unit root tests results (model with trend) suggests that the LnP85 is a I(1) variable. The results of the ADF unit root tests for the Japan tourism demand equation indicate that doubt exists when establishing that the underlying variables possess the same level of integration. We have chosen to employ the Pesaran approach because of the mixed results of preceding unit root analysis. We do so to supplement the Engle and Granger and Johansen approaches, to ensure the reliability of our findings of cointegrating relationships.

7.2.1 Estimating Unrestricted Error Correction Model (UECM) – Pesaran Approach (Japan)

Equation 7-1 represents the first stage of the Pesaran analysis that an UECM is established for the testing for long-run relationship. The relevant variables contained in Equation 7-1 were estimated with the double-logarithm form annual data for a period between 1959 and 1999.

$$\Delta Y_t = a_0 + a_1 time + \phi Y_{t-1} + \sigma_1 X_{1_{t-2}} + \sigma_2 X_{2_{t-1}} + \sigma_3 X_{3_{t-1}} + \sum_{j=1}^{p-1} b_{0j} \Delta Y_{t-j} + \sum_{j=0}^{q_1-1} b_{1j} \Delta X_{1,t-j}$$
$$+ \sum_{j=0}^{q_2-1} b_{2j} \Delta X_{2,t-j} + \sum_{j=0}^{q_3-1} b_{3j} \Delta X_{3,t-j} + e_t \quad \ldots\ldots (7-1)$$

where

Y_t = visitor arrivals, Japan

X_1 = permanent income index (0.85), Japan

X_2 = own price index, Japan

X_3 = share price index, Japan

$time$ = time trend

e_t = error term

Functional form = logarithmic form

We initially set p= q1 = q2 = q3 = 2,3 over the sample period, which we believe is the appropriate maximum order for the small sample size. The relevant variables are selected on the basis of the estimation results of Engle- Granger and Johansen approaches.

7.2.2 Testing for Long-run Relationship – Pesaran Approach (Japan)

The Pesaran approach involves a two-stage analysis. The first stage involves the testing of the null hypothesis of the non-existence of a long-run relationship among the underlying variables in Equation 7-1. If the long-run relationship among underlying variables is established in the first stage, both long-run and short-run parameters are estimated in the second stage estimation. In the first stage, we first test the model consisting of only the differenced variables with appropriate lags. Next, we perform a variable addition test to analyse the joint significance of the variables with respect to their lagged levels. The empirical results of the F- statistics are presented in Table 7.1.

Table 7.1 Results of F-Statistics –Testing for Existence of Long-Run Relationships (Japan)

1. Lagged structure	2. F-Statistics: Based on Regressions with Intercept and No Trend	3. F-Statistics: Based on Regressions with Intercept and Trend
P, q1,q2, q3.	F (Y_1, X_1, X_2, X_3,)	F (Y_1, X_1, X_2, $X_{3,}$ time)
2,2,2,2.	6.90**	5.31**
3,3,3,3.	5.00**	3.84
Critical bounds (95%)	3.22- 4.38	4.07 – 5.12

Note. 1. ** indicates rejection of null hypothesis of Equation 7-2 at 95% confidence level.

The lagged structure in Column 1 refers to the lag- order of the explanatory variables with the first difference, as shown in Equation 7-1. The UECM is estimated with the OLS procedures.

The relevant variables used in tourism demand UECM for Japan are consistent with the long-run model of Engle- Granger and Johansen, as demonstrated in Chapter 6. The F statistic is used to indicate whether or not a stable long-run relationship will exist in the UECM. The null hypothesis of the non-existence of a long-run relationship among all variables (in equation 7-1) against the alternative hypothesis of the existence of a long-run stable relationship is described in Equation 7-2.

$$H_0 : \sigma_1 = \sigma_2 = \sigma_3 = 0$$
$$H_1 : \sigma_1 \neq 0, \sigma_2 \neq 0, \sigma_3. \neq 0 \quad \ldots\ldots (7-2)$$

The F-statistics, as shown in Table 7.1, demonstrate that the null hypothesis of no long-run relationships is rejected. The F-value of 6.90 (model with order 2 and no trend) is higher than the upper bound critical value of 4.38 (based on 4 explanatory variables and no trend). Since the F-test statistics lies outside the upper bounds of the critical values, it is not required to confirm the conditions of the same number of unit roots for all of the underlying variables in Equation 7-1. We can conclude that there is the existence of a long-run relationship between the dependent variable and independent variables.

The results of F-test statistics of the Pesaran approach support the findings of the Engle and Granger and Johansen approaches in that there are stable long-run relationships among the tourist arrivals and their economic determinants for Japan.

7.2.3 Selecting Orders of ARDL Model – Pesaran Approach (Japan)

After establishing a stable long-run relationship in the first stage, we then proceed to the second stage estimation of both long and the short-run parameters. The first step of the second stage involves the selection of the number of lags for all level variables in the ARDL model (shown in Equation 7-1), based on the Akaike Information Criterion (AIC) or the Schwartz Baynesian Criterion (SBC). The maximum of two lags are used. In the Japan model, the results of the SBC and AIC criteria indicate the selection of the ARDL (2, 2, 1, 0.) as the most preferred model.

7.2.4 Results of ARDL (2, 2, 1, 0) Model – Pesaran Approach (Japan)

The second step of the second stage of the Pesaran approach involves the coefficients estimates analysis by taking account of the selected SBC ARDL (2, 2, 1, 0.) model. Equation 7-3 reports the estimated coefficients and the related statistics for the period 1959 to 1999. In particular, the t-statistics are reported in parentheses.

$$Y_t = \underset{(7.08)}{10.35} + \underset{(4.03)}{0.567}\, Y_{t-1} - \underset{(-3.32)}{0.41}\, Y_{t-2} + \underset{(3.94)}{2.00}\, X_{1t} - \underset{(-2.16)}{1.63}\, X_{1t-1} + \underset{(3.37)}{1.91}\, X_{1t-2}$$
$$- \underset{(-0.76)}{0.127}\, X_{2t} - \underset{(-2.67)}{0.567}\, X_{2t-1} - \underset{(-3.91)}{0.159}\, X_{3t}. \ldots\ldots (7-3)$$

$R^2 = 0.996$ $\overline{R^2} = 0.995$

SER = 0.093 RSS = 0.258

LM (1) = 2.00 RESET (1) = 0.009

NORM (2) = 2.47 HETRO (1) = 0.221

The results of diagnostic statistics, as shown in Equation 7-3, indicate no evidence of model mis-specification. The static long-run coefficient estimates of the corresponding SBC ARDL (2, 2, 1, 0.) model for measuring tourism demand for Japan are presented in Equation 7-4.

$$Y_t = \underset{(16.45)}{12.27} + \underset{(27.38)}{2.70} X_{1t} - \underset{(-6.29)}{0.823} X_2 - \underset{(-4.30)}{0.188} X_3 \ldots\ldots (7-4)$$

The long-run estimated coefficients carry the theoretically expected sign.

In summary, the permanent income variable has a positive effect on tourism flows from Japan, while the own price and the share price variable have a negative effect. We also find that the long-run permanent income elasticity of tourism demand is statistically significant and positive. The estimated income elasticity is + 2.7, indicating the high income elasticity. Moreover, the own price elasticity and share price elasticity of tourism demand are both negative and statistically significant.

7.2.5 Associated ECM Results and Interpretation – Pesaran Approach (Japan)

The final step of the Pesaran approach involves the construction of the ECM (Pesaran). The results of the estimated associated error-correction model based on the SCB ARDL (2, 2, 1, 0.) model are presented in Equation 7-5.

$$\Delta Y_t = \underset{(7.08)}{10.35} + \underset{(3.32)}{0.41} \Delta Y_{t-1} + \underset{(3.94)}{2.00} \Delta X_{1t} - \underset{(-3.37)}{1.91} \Delta X_{1t-1} - \underset{(-0.76)}{0.127} \Delta X_{2t} - \underset{(-3.91)}{0.159} \Delta X_{3t}$$
$$- \underset{(-6.89)}{0.843} ECM_{t-1} \ldots\ldots (7-5)$$

Where

ECM in equation 7-5 = Error Correction Term, derived from Equation 7-4.

Finally, the results of the error correction representation for the SCB ARDL (2, 2, 1, 0.) model indicate that the error correction term is statistically significant, with high t-value at -6.89. Finally, the magnitude of the error correction term is -0.843, indicating a fast speed of convergence to equilibrium.

7.3 Cointegration Analysis of Tourism Demand – Pesaran Approach (Taiwan)

As mentioned in the previous chapter, our ADF unit root tests suggest that there exist no uncertainties in establishing the same level of integration for all of the underlying variables for the Taiwan model. However, it is well known that ADF unit root tests suffer from low size and power properties. We therefore, employ the Pesaran approach to determine that there exists a long-run relationship among the underlying variables.

7.3.1 Estimating UECM – Pesaran Approach (Taiwan)

To supplement the Engle and Granger and Johansen approaches, we constructed the econometric model to measure tourism demand based on the Pesaran approach. The exercise will provide us with more empirical evidence for the long-run relationships among the underlying variables for the Taiwan model. The following UECM specification is estimated for the period from 1968 to 1999.

$$\Delta Y_t = a_0 + a_1 time + a_2 Dummy + \phi Y_{t-1} + \sigma_1 X_{1_{t-1}} + \sigma_2 X_{2_{t-1}} + \sigma_3 X_{3_{t-1}}$$
$$+ \sum_{j=1}^{p-1} b_{0j} \Delta Y_{t-j} + \sum_{j=0}^{q_1-1} b_{1j} \Delta X_{1,t-j} + \sum_{j=0}^{q_2-1} b_{2j} \Delta X_{2,t-j} + \sum_{j=0}^{q_3-1} b_{3j} \Delta X_{3,t-j} + e_t \dots\dots\dots\dots\dots\dots\dots (7-6)$$

where

Y_t = visitor arrivals, Taiwan

X_1 = permanent income index (40), Taiwan

X_2 = own price index, Taiwan

X_3 = weighted substitute price index, Taiwan

$DUMMY$ = lifting of travel ban in Taiwan (DUMMY88TAI)

$time$ = time trend

e_t = error term

Functional form = logarithmic form

We estimated the UECM using the double-log form, with annual data taken over the period from 1968 to 1999 for the testing for long-run cointegration relationships. The maximum lag order is set to three because of the small sample size of 32.

7.3.2 Testing for Long-run Relationships – Pesaran Approach (Taiwan)

Table 7.2 presents the results of the Pesaran F-test statistics.

Table 7.2 Results of F-Statistics – Testing for Existence of Long-run Relationship (Taiwan)

Lag structure	F-Statistics: Based on Regressions with Intercept and No Trend	F-Statistics: Based on Regressions with Intercept and Trend
P, q1, q2, q3.	F ($Y_1, X_1, X_2, X_{3,\,\mathrm{Dummy}}$)	F (Y_1, X_1, X_2, X_3, Dummy,Time)
2,2,2,2.	7.04**	5.81**
3,3,3,3.	4.91**	4.91*
Critical bounds (95%)	3.22 – 4.38	4.07 – 5.12

Note */** indicate significance at 90%/95% level.

It appears that our empirical results reject the null hypothesis of non-existence of long-run relationship. The F-statistics derived from the UECM model (order 2 with no trend) and the UECM model (order 2 with trend), are 7.04 and 5.81, respectively. One can see that both F-statistics are higher than their respective critical values of 4.38 (with no trend) and 5.12 (with trend). The results suggest that the model with a small number of lags and no trend is preferred, as shown in Table 7.2.

7.3.3 Selecting Orders of ARDL Model – Pesaran Approach (Taiwan)

After establishing a stable long-run relationship for the Taiwan model in the first stage, we must now select its lag order to establish the long-run model. The empirical results indicate that the R-bar squared criterion selects the ARDL (1, 1, 2, 1.) model as the most preferred ARDL model.

7.3.4 Results of ARDL (1, 1, 2, 1) Model – Pesaran Approach (Taiwan)

Equation 7-7 presents the tourism demand estimates for Taiwan's long-run ARDL (1,1,2,1) model.

$$Y_t = \underset{(1.04)}{1.23} + \underset{(1.60)}{0.20}Y_{t-1} + \underset{(2.13)}{3.21}X_{1t} - \underset{(-1.11)}{1.79}X_{1t-1} - \underset{(-1.77)}{0.622}X_{2t} - \underset{(-2.12)}{0.970}X_{2t-1}$$
$$+ \underset{(2.29)}{0.809}X_{2t-2} + \underset{(1.63)}{0.597}X_{3t} + \underset{(2.49)}{0.803}X_{3t-1} + \underset{(6.72)}{0.974}Dummy88 \quad (7-7)$$

where

R^2 = 0.995 $\qquad \bar{R}^2$ = 0.993

SER = 0.126 $\qquad$ RSS = 0.316

LM (1) = 0.092 $\qquad$ RESET (1) = 2.00

NORM (2) = 1.04 $\qquad$ HETRO (1) = 0.135

The diagnostic statistics analysis indicates that the ARDL (1, 1, 2, 1.) model passes all of the diagnostic tests. Thus we conclude that there is no evidence of mis-specification.

Equation 7-8 presents the estimate of the long-run parameters of the ARDL (1, 1, 2, 1.)

$$Y_t = \underset{(1.05)}{1.54} + \underset{(14.27)}{1.78} X_{1t} - \underset{(-4.39)}{0.978} X_{2t} + \underset{(4.77)}{1.75} X_{3t} + \underset{(7.94)}{1.22} Dummy_t \text{..........................} (7-8)$$

We find that the long-run permanent income, own price, weighted substitute price and the Dummy variable are statistically significant, with expected sign. The magnitude of permanent income elasticity, own price elasticity, weighted substitute price elasticity and the lift on the ban of travel coefficients are 1.8, –0.98, 1.8 and 1.2, respectively.

7.3.5. Associated ECM Results and Interpretations – Pesaran Approach (Taiwan)

Equation 7-9 shows the results of the associated error-correction model that represents the ARDL (1, 1, 2, 1.) model.

$$\Delta Y_t = \underset{(1.04)}{1.23} + \underset{(2.13)}{3.21} \Delta X_{1t} - \underset{(-1.77)}{0.622} \Delta X_{2t} - \underset{(-2.29)}{0.809} \Delta X_{2t-1}$$
$$+ \underset{(1.63)}{0.597} \Delta X_{3t} + \underset{(6.72)}{0.974} Dummy88 - \underset{(-6.41)}{0.80} ECM_{t-1} \text{..} (7-9)$$

where ECM = Error correction term, derived from Equation 7-8

$\overline{R^2}$ = 0.782 SER = 0.126

RSS = 0.316 DW = 2.08

F = 18.79

In Equation 7-9, the permanent income, the weighted substitute price and the Dummy88 variable all have positive effect on tourist from Taiwan in the short-run. However, the own price variable is negative. The error correction coefficient is statistically significant, with estimate of -0.8, suggesting a high speed of convergence to equilibrium.

7.4 Cointegration Analysis of Tourism Demand – Pesaran Approach (China)

We show in Section 6.4.1 that the annual data series of the underlying variables in the China model are integrated with a different order, ranging from the order zero to order two. This creates some problem of empirical estimation of the previous analysis of long-run relations based on the Engle-Granger and Johansen approaches. Moreover, while the results of the Johansen approach indicate the existence of long-run relationship among the underlying variables, the results based on the Engle and Granger approach did not suggest the existence of long-run relationship. This creates some problem of empirical estimation of the previous analysis of long-run relations based on the Engle-Granger and Johansen approaches. Due to the small sample of 16, the estimated parameters derived from the Engle-Granger and Johansen approaches may be subject to small sample bias. In the next section, we estimate the UECM model for tourism demand for China based on the Pesaran approach to provide more empirical evidence on the long-run relationship.

7.4.1 Estimating UECM – Pesaran Approach (China)

Equation 7-10 is an UECM specification of the China Model, and is estimated in double-log form with annual data for a period from 1984 to 1999. Given the small sample size (16), a higher lag order cannot be established. The maximum lag order, in this case, is then set at p= q1=q2 =2. This indicates that the maximum order of the underlying variables is 2.

$$\Delta Y_t = a_0 + a_1 time + \phi Y_{t-1} + \sigma_1 X_{1t-1} + \sigma_2 X_{2t-1} + \sum_{j=1}^{p-1} b_{0j} \Delta Y_{t-j} + \sum_{j=0}^{q_1-1} b_{1j} \Delta X_{1,t-j}$$

$$+ \sum_{j=0}^{q_2-1} b_{2j} \Delta X_{2,t-j}. + e_t \text{...} (7-10)$$

where

Y_t = visitor arrivals, China

X_1 = permanent income index (100), China

X_2 = trade volume index in real terms, China

$time$ = time trend

e_t = error term

Functional form = logarithmic form

As shown in Section 6.4, the own price index variable for China was statistically insignificant, with unexpected sign. The own price index was therefore deleted from the analysis.

7.4.2 Testing for Long-run Relationships – Pesaran Approach (China)

Table 7.3 shows the results of the Pesaran F-test statistics derived from the double-log form of the annual time-series data over the period from 1984 to 1999.

Table 7.3 Results of F-Statistics – Testing for Existence of Long-run Relationships (China)

Lag structure	F-Statistics: Based on Regressions with Intercept and No Trend	F-Statistics: Based on Regressions with Intercept and Trend
P, q1, q2	F (Y_1, X_1, X_2)	F (Y_1, X_1, X_2, Time)
2,2,2.	2.86	2.26
Critical bounds (95%)	3.79 – 4.86	4.90 – 5.87

The results of F-statistics indicate that the UECM model cannot reject the null hypothesis of non-existence of a long-run relationship. The F-statistics of 2.86 (model with order 2 and no trend) and 2.26 (model with order 2 and trend) lie much lower than their respective critical values of 4.86 and 5.87, respectively, at the 95% confidence level. The finding here is consistent with Engle-Granger approach but contrast to those found with the Johansen approaches in Chapter 6.

7.4.3 Selecting Orders of ARDL Model – Pesaran Approach (China)

Both the AIC and SBC criteria selected the ARDL (1, 1, 0.) model. The following section (7.4.4) shows the empirical results of the ARDL (1, 1, 0.) model.

7.4.4 Results of ARDL (1, 1, 0) Model – Pesaran Approach (China)

Equation 7-11, which is based on the AIC or SBC criterion, has been selected as the ARDL model (1,1,0) to perform the long-run estimation for tourist arrivals from China. We cannot include the constant term in Equation 7-11 because of the limited number of observations.

$$Y_t = \underset{(3.11)}{0.575} Y_{t-1} + \underset{(3.67)}{2.50} X_{1t} - \underset{(-2.23)}{1.76} X_{1t-1} + \underset{(2.46)}{0.122} X_{2t} \ldots\ldots\ldots\ldots (7-11)$$

where

R^2 = 0.993 $\bar{R}^2$ = 0.991

SER = 0.078 RSS = 0.066

LM (1) = 0.052 RESET (1) = 3.13

NORM (2) = 1.30 HETRO (1) = 0.187

** indicates rejection of hypothesis at 95% significance level.

The Diagnostic test of ARDL (1, 1, 0.) model passes all the diagnostic tests.

Equation 7-12 shows the results of the long-run coefficients based on the ARDL (1, 1, 0.).

$$Y_t = \underset{(7.09)}{1.74} X_{1t} + \underset{(2.42)}{0.288} X_{2t} \ldots\ldots\ldots\ldots (7-12)$$

The variables of permanent income and real trade volume are statistically significant, with expected signs. These results reveal that any increases in permanent income and real trade volume should lead to an increase in visitor arrivals from China over the long run.

7.4.5 Associated ECM Results and Interpretations – Pesaran Approach (China)

Equation 7-13 shows the results of associated short-run ECM, based on the ARDL (1,1,0) model specifications.

$$\Delta Y_t = \underset{(3.67)}{2.50}\Delta X_{1t} + \underset{(2.46)}{0.122}\Delta X_{2t} - \underset{(-2.29)}{0.425}ECM_{t-1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(7-13)$$

where

ECM = Error Correction Term, derived from Equation 7-13

R^2 = 0.711 $\quad$ $R^{2\,(adjusted)}$ = 0.632

SER = 0.077 $\quad$ RSS = 0.066

DW= 2.01 $\quad$ F = 13.53

The ECM-ARDL (1, 1, 0.) model shows that the error correction term is statistically significant, with a t-value of –2.29. Thus, the findings of the error correction model support that there exists a unique cointegrated and stable long-run relationship.

7.5 Cointegration Analysis of Tourism Demand- Pesaran Approach (United States)

The empirical results of the pre-modelling test for the underlying variables of the United States model (Section 6.5.1) indicate that uncertainties exist on the level of integration. The Pesaran analysis is therefore an extremely important tool, because there are some doubts on determining the same level of integration for all underlying variables.

7.5.1 Estimating UECM – Pesaran Approach (United States)

Equation 7-14 shows the UECM specification for the testing of long-run relationships of the U.S. model.

$$\Delta Y_t = a_0 + a_1 time + a_2 Dummy + \phi Y_{t-1} + \sigma_1 X_{1t-1} + \sigma_2 X_{2t-1} + \sigma_3 X_{3t-1} + \sum_{j=1}^{p-1} b_{0j}\Delta Y_{t-j}$$
$$+ \sum_{j=0}^{q_1-1} b_{1j}\Delta X_{1,t-j} + \sum_{j=0}^{q_2-1} b_{2j}\Delta X_{2,t-j} + \sum_{j=0}^{q_3-1} b_{3j}\Delta X_{3,t-j} + e_t \ldots\ldots\ldots\ldots\ldots(7-14)$$

where

Y_t = visitor arrivals, U.S.A

X_1 = permanent income index (80), U.S.A.

X_2 = own price index, U.S.

X_3 = trade volume in real terms, U.S.A.

$Dummy$ = 4th June 1989 incident in China (DUMMY89)

$time$ = time trend

e_t = error term

Functional form = logarithmic form

7.5.2 Testing for Long-run Relationships – Pesaran Approach (United States)

The UECM (United States) is estimated using the logarithmic form of the annual time series data for the period from 1959 to 1999. The maximum order is set to 3 because of the small number of observations. We estimated the F-statistics (Y1, X1, X2, X3) among the underlying variables to determine whether a long-run relationship exists among the underlying variables. The results of the F-statistics are presented in Table 7.4.

Table 7.4 Results of F-Statistics – Testing for Existence of Long-Run Relationships (United States)

Lagged structure	F-Statistics: Based on Regressions with Intercept and No Trend	F-Statistics: Based on Regressions with Intercept and Trend
P, q1, q2, q3.	F (Y_1, X_1, X_2, X_3,)	F (Y_1, X_1, X_2, X_3, time)
2,2,2,2.	6.57**	5.29**
3,3,3,3.	3.83	3.07
Critical bounds	3.22 – 4.38	4.01 – 5.12

Note ** indicates significance at 95% level.

Table 7.4 shows that the F-test based on the model with order 2 and no trend indicates that the null hypothesis of no long-run relationship is rejected. The F-statistic, 6.57 (model with order 2 and no trend) is higher than the upper bound of 4.38 at the 95% confidence level. In addition, the F-statistic, 5.29 (model with order 2 and trend) indicate the rejection of the null hypothesis. This indicates that the results derived from the models with no trend are better than the regression models with time trend. The Pesaran approach provides further evidence to support our findings about the existence of the long-run relationship in the U.S. model based on the Engle-Granger and Johansen approaches in Chapter 6.

7.5.3 Selecting Orders of ARDL Model – Pesaran Approach (United States)

The SBC and AIC criteria selected the ARDL (1, 0, 0, 0.) and ARDL (2, 0, 0, 0.) models, respectively. Although both models were able to pass four of the diagnostic tests, we ultimately selected the AIC ARDL (2, 0, 0, 0.) because of the better results of goodness of fit statistics.

7.5.4 Results of ARDL (2, 0, 0, 0) Model – Pesaran Approach (United States)

Equation 7-15 shows the results of the AIC ARDL (2, 0, 0, 0.) model.

$$Y_t = \underset{(4.6)}{10.58} + \underset{(3.23)}{0.443} Y_{1,t-1} - \underset{(-1.42)}{0.186} Y_{1,t-2} + \underset{(2.14)}{0.68} X_{1,t} - \underset{(-5.36)}{0.558} X_{2,t}$$
$$+ \underset{(6.47)}{0.379} X_{3,t} - \underset{(-2.93)}{0.167} Dummy \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7-15)$$

where

R^2 = 0.993	$\overline{R^2}$ = 0.991
SER = 0.067	RSS = 0.142
LM (1) = 1.02	RESET = 0.92
NORM (2) = 1.35	HETRO (1) = 0.758

Since the above results indicate that the diagnostic statistics do not confirm any evidence of mis-specification, we continue to conduct the estimation of the long-run coefficients, and analysing the associated ECM model with AIC ARDL (2, 0, 0, 0.) specification.

Equation 7-16 shows the static long-run coefficients with the AIC ARDL (2, 0, 0, 0.)

$$Y_t = \underset{(8.53)}{14.24} + \underset{(2.58)}{0.915} X_1 - \underset{(-6.62)}{0.751} X_2 + \underset{(9.66)}{0.509} X_3 - \underset{(-2.57)}{0.224} Dummy \ldots\ldots\ldots\ldots (7-16)$$

The results of Equation 7-16 suggest that the permanent income and real trade volume have a positive effect on United States tourist arrivals. On the other hand, the own price and Dummy89 variables have a negative effect. All the variables are statistically significant, with expected sign, and the findings are consistent with those based on the Engle and Granger and Johansen approaches.

7.5.5 Associated ECM Results and Interpretation – Pesaran Approach (United States)

Equation 7-17 presents the associated ECM model based on the AIC ARDL (2, 0, 0, 0.) model.

$$\Delta Y_t = \underset{(4.60)}{10.58} + \underset{(1.42)}{0.186}\,\Delta Y_{t-1} + \underset{(2.14)}{0.680}\,\Delta X_{1,t} - \underset{(-0.536)}{0.558}\,\Delta X_{2,t} + \underset{(6.47)}{0.379}\,\Delta X_{3,t}$$
$$- \underset{(-2.93)}{0.167}\,Dummy - \underset{(-6.40)}{0.743}\,ECM_{t-1} \ldots\ldots (7-17)$$

where

ECM = Error correction term, derived from Equation 7-16.

$\overline{R^2}$ = 0.636 SER = 0.067

RSS = 0.142 DW = 2.21

F = 12.07

All of the short-run coefficients have the expected signs. The t-statistics (-6.40) associated with the error correction term appear to be statistically significant, with the coefficient of -0.743. Thus, the findings of the error correction model support that there exists a unique cointegrated and stable long-run tourism demand relationship for the U.S.A.

7.6 Cointegration Analysis of Tourism Demand – Pesaran Approach (United Kingdom)

As indicated in Chapter six, while the results based on the Engle and Granger approach did not suggest the existence of long-run relationships in the U.K. model, the results based on the Johansen approach suggest that there exists a long-run relationship at the 95% confidence level. Due to the mixed cointegration results, it is important to employ the Pesaran approach to provide more evidence on the existence of long-run relationship.

7.6.1 Estimating UECM – Pesaran Approach (United Kingdom)

The concern about the ADF unit root tests is whether there exists the same order of integration for all of the underlying variables for the United Kingdom model. To address this concern, we have employed the Pesaran approach to estimate an UECM for the period from 1968 to 1999. Equation 7-18 shows the specification of the UECM model.

$$\Delta Y_t = a_0 + a_1 time + a_2 Dummy + \phi Y_{t-1} + \sigma_1 X_{1t-1} + \sigma_2 X_{2t-1} + \sigma_3 X_{3t-1}$$
$$+ \sum_{j=1}^{p-1} b_{0j}\Delta Y_{t-j} + \sum_{j=0}^{q_1-1} b_{1j}\Delta X_{1,t-j} + \sum_{j=0}^{q_2-1} b_{2j}\Delta X_{2,t-j} + \sum_{j=0}^{q_3-1} b_{3j}\Delta X_{3,t-j} + e_t \ldots\ldots (7-18)$$

where

Y_t = visitor arrivals, U.K

X_1 = permanent income index [30], U.K.

X_2 = own price index, U.K.

X_3 = weighted substitute price index, U.K.

Dummy = Beijing incident in 1989

time = time trend

e_t = error term

The relevant variables and functional form we selected to use in the models based on the Pesaran approach are the same relevant variables and functional form as those we used for the Engle and Granger and Johansen approaches.

7.6.2 Testing for Long-run Relationship – Pesaran Approach (United Kingdom)

We employed the time series data in a logarithmic form with a maximum order of 3 and the estimated F-statistics (Y_1, X_1, X_2, X_3, Dummy) to determine the long-run relationship for the United Kingdom model.

Table 7.5 Results of F-Statistics – Testing for Existence of Long-Run Relationships (United Kingdom)

Lag structure	F-Statistics: Based on Regressions with Intercept and No Trend	F-Statistics: Based on Regressions with Intercept and Trend
P, q1, q2, q3.	F (Y_1, X_1, X_2, X_3, Dummy89)	F (Y_1, X_1, X_2, X_3, Dummy89, Time)
2,2,2,2	1.03	0.984
3,3,3,3	1.32	1.44
Critical bounds (95%)	3.22- 4.38	4.07- 5.12

The calculated F-statistic of 1.03 (model with order 2 and no trend) and 0.984 (model with order 2 and trend) indicate the acceptance of the null hypothesis. The empirical findings reveal that no unique long-run relationship exists between the dependent variable and independent variables. The finding based on the Pesaran approach also indicates that there exists no long-run relationship. This is consistent with our findings based on the Engle-Granger approach in Chapter 6; however, the finding contradicts the finding of the Johansen approach.

7.6.3 Selecting Orders of ARDL Model – Pesaran Approach (United Kingdom)

Although we cannot establish a long-run relationship between the underlying variables for the United Kingdom, we have selected for the estimation the tourism demand model using the ARDL procedures. However, the results must be interpreted with caution. The empirical results of the ARDL model selection test indicate that both SBC and AIC criteria selected an ARDL (1, 0, 0, 0.) model.

7.6.4 Results of ARDL (1, 0, 0, 0) Model – Pesaran Approach (United Kingdom)

We selected the following ARDL model (1, 0, 0, 0.), based on the SBC or AIC criterion.

$$Y_t = \underset{(3.55)}{5.47} + \underset{(4.76)}{0.578} Y_{t-1} + \underset{(3.23)}{2.08} X_{1t} - \underset{(-3.98)}{0.523} X_{2t} + \underset{(2.94)}{0.488} X_{3t} - \underset{(-2.34)}{0.154} Dummy ......(7-19)$$

where

R^2 = 0.994	R^2 (adjusted) = 0.993
SER = 0.082	RSS = 0.175
LM (1) = 0.402	RESET (1) = 0.005
NORM (2) = 0.515	HETRO (1) = 0.186

As shown in Equation 7-19, the results of the diagnostic statistics indicate that there is no evidence of mis-specification in this model.

$$Y_t = \underset{(7.28)}{12.96} + \underset{(21.85)}{4.94} X_{1t} - \underset{(-4.62)}{1.24} X_{2t} + \underset{(4.17)}{1.16} X_{3t} - \underset{(-2.10)}{0.366} Dummy_t ....(7-20)$$

Equation 7-20 shows the long-run coefficient estimates results of the ARDL (1, 0, 0, 0.) model indicate that all of the estimated long-run coefficients are with expected sign. The permanent income and weighted substitute price index variables had a positive effect on tourism demand, whereas the own price and Dummy89 variables had a negative effect. In particular, the magnitude of the coefficients of the permanent income index, the own price index and the weighted substitute price index are all significantly greater than 1. In particular, the magnitude of permanent income elasticity (4.9) seems to be very high and significantly higher than 1.

7.6.5 Associated ECM Results and Interpretations – Pesaran Approach (United Kingdom)

The associated error correction model based on ARDL (1, 0, 0, 0.) specification is presented in Equation 7-21.

$$Y_t = \underset{(3.55)}{5.47} + \underset{(3.23)}{2.08}.\Delta X_{1t} - \underset{(-3.98)}{0.523} \Delta X_{2t} + \underset{(2.94)}{0.488} \Delta X_{3t} - \underset{(-2.34)}{0.154} Dummy$$
$$- \underset{(-3.48)}{0.422} ECM_{t-1} ....(7-21)$$

where

ECM = Error correction term, captured from Equation 7.20. The results of goodness of fit statistics are shown below.

$\overline{R^2} = 0.44$ SER = 0.082

RSS = 0.175 DW = 2.18

All of the estimated coefficients in Equation 7-21 are statistically significant and consistent, with the expected signs. Also, the results are consistent with those results obtained from the ECM models based on the Engle and Granger and Johansen approaches. Finally, the estimated error correction coefficient is -0.422, which is statistically significant at the 95% confidence level, indicating a medium speed of adjustment process.

7.7 Cointegration Analysis of Tourism Demand – Pesaran Approach (Germany)

As mentioned in the previous chapter, our ADF unit root tests suggest that there exist no uncertainties in establishing the same level of integration for all of the underlying variables for the German model. However, we choose to employ the Pesaran approach of cointegration analysis because of the low power on the ADF unit root test and the relatively small sample size of 41. This additional test will supplement the Engle-Granger and Johansen approaches to ensure that the existence of a long-run relationship of the underlying variables is accurate.

7.7.1 Estimating UECM – Pesaran Approach (Germany)

The following UECM (7-22) is estimated to examine the long-run relationship for the period from 1959 to 1999.

$$\Delta Y_t = a_0 + a_1 time + a_2 Dummy + \phi Y_{t-1} + \sigma_1 X_{1t-1} + \sigma_2 X_{2t-1} + \sigma_3 X_{3t-1}$$
$$+ \sum_{j=1}^{p-1} b_{0j} \Delta Y_{t-j} + \sum_{j=0}^{q_1-1} b_{1j} \Delta X_{1,t-j} + \sum_{j=0}^{q_2-1} b_{2j} \Delta X_{2,t-j} + \sum_{j=0}^{q_3-1} b_{3j} \Delta X_{3,t-j} + e_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (7-22)$$

where

Y_t = visitor arrivals, Germany

X_1 = permanent income index [30], Germany

X_2 = own price index, Germany

X_3 = share price index, Germany

Dummy = reunification of Germany, DUMMY91GER

$time$ = time trend

e_t = error term

Functional form = logarithmic form

The model is estimated using the double-log form with a maximum lag order of 3. We estimate the F-statistics (Y_1, X_1, X_2, X_3, Dummy) to determine the existence of a long-run relationship among the underlying variables.

7.7.2 Testing for Long-run Relationship (Germany)

Table 7.6 Results of F-Statistics – Testing for Existence of Long-Run Relationship (Germany)

Lag structure	F-Statistics: Based on Regressions with Intercept and No Trend	F-Statistics: Based on Regressions with Intercept and Trend
P, q1, q2, q3	F (Y_1, X_1, X_2, X_3, Dummy)	F (Y_1, X_1, X_2, X_3, Dummy, Time)
2,2,2,2	4.39**	4.42
3,3,3,3	2.39	2.33
Critical bounds (95%)	3.22 – 4.38	4.07 – 5.12

Note ** indicates significance at 95% level.

The results of the F-statistics in Table 7.6 indicate that the model with the order two and no trend is preferred, because the time trend term is not statistically significant in this UECM. The F-statistics of 4.39 (model of order two with no trend) is higher than the critical value of 4.38 (95%), indicating that there exists a long-run relationship among the underlying variables. This is consistent with our findings based on the two alternative cointegration approaches given in Chapter 6.

7.7.3 Selecting Orders of ARDL Model – Pesaran Approach (Germany)

The results of the ARDL model selection test indicate that the AIC and SBC criteria selected the ARDL (2, 0, 0, 1.) and ARDL (2, 0, 0, 0.) models. We selected the ARDL (2, 0, 0, 0.) model because the ARDL (2, 0, 0, 1.) model was unable the pass the heteroscedasticity tests.

7.7.4 Results of ARDL (2, 0, 0, 0.) model – Pesaran Approach (Germany)

The ARDL model (2, 0, 0, 0.) for the tourist arrivals from Germany is presented in Equation 7-23

$$\Delta Y_t = \underset{(-2.49)}{-5.83} + \underset{(5.43)}{0.78} Y_{t-1} - \underset{(-2.17)}{0.311} Y_{t-2} + \underset{(4.00)}{1.84} X_{1t} - \underset{(-3.13)}{0.431} X_{2t} + \underset{(2.56)}{0.125} X_{3t}$$
$$+ \underset{(3.79)}{0.241} Dummy \ldots\ldots\ldots (7-23)$$

where

$\overline{R^2} = 0.996$

SER = 0.82 RSS = 0.215

LM (1) = 0.467 RESET = 0.844

NORM (2) = 1.66 HETRO (1) = 2.33

We have reported all of the diagnostic statistics. The diagnostic test gives no evidence of mis-specification.

The long-run coefficients based on the AIC ARDL (2, 0, 0, 0) model, estimated over the period from 1959 to 1999, is written as follows:

$$Y_t = -\underset{(-4.30)}{10.99}CST + \underset{(16.40)}{3.47}X_{1,t} - \underset{(-2.57)}{0.814}X_{2,t} + \underset{(2.72)}{0.236}X_{3,t} + \underset{(3.83)}{0.455}Dummy....(7-24)$$

All of the estimated long-run coefficients are statistically significant, with predicted signs.

The permanent income index [30], share price index and Dummy91GER variables had a positive effect on tourist arrivals from Germany, but the own-price variable had a negative effect. The magnitude of the permanent income elasticity is high and elastic, whereas the own price, share price and Dummy are low and significant less than one.

7.7.5 Associated ECM Results and Interpretations – Pesaran Approach (Germany)

Equation 7-25 shows the associated error correction model based on the AIC ARDL (2, 0, 0, 0.) model, estimated for the period from 1959 to 1999.

$$\Delta Y_t = -\underset{(-2.49)}{5.83} + \underset{(2.17)}{0.311}\Delta Y_{t-1} + \underset{(4.00)}{1.84}\Delta X_{1t} - \underset{(-3.13)}{0.431}\Delta X_{2t} + \underset{(2.56)}{0.125}X_{3t}$$
$$+ \underset{(3.79)}{0.241}Dummy - \underset{(4.82)}{0.53}ECM_{t-1}...(7-25)$$

where

ECM = Error Correction Term, derived from Equation 7-24

R^2 (adjusted) = 0.594 SER = 0.082

RSS = 0.215 DW = 2.11

The results indicate that the short-run own price elasticity and the share price elasticity are negative. However, the estimated coefficient of the permanent income is positive and higher than one. As well, the model shows that the error correction term is statistically significant, with a value of -0.53, indicating that a medium speed of adjustment.

7.8 Chapter Summary

In this chapter, the Pesaran and Shin (1998) ARDL cointegration approach was applied to each of six tourism demand models as an alternative to the traditional cointegration approaches to test for the existence of long-run relationships among the underlying variables. The empirical results indicated that all models, except those of the United Kingdom and China, showed the existence of unique and stable long-run relationships.

Having determined the cointegration relationships for each country, we analysed the empirical results of the selected order of the long-run ARDL and their associated error correction models. The empirical results of the Pesaran approach suggested that the models with the least number of lags and no trend were preferable for all models.

Overall, the Pesaran ECMs are well specified on the basis of the results of the goodness of fit statistics. They also passed other standard diagnostic tests, including the Lagrange multiplier test statistics of serial correlation, the Ramsey RESET test of functional form tests, heteroscedasticity and normality tests.

The Pesaran ECM-based cointegration test results indicated that there was no long-run relationship for the United Kingdom and China model, which is consistent with the findings of the Engle-Granger approach, but is contrary to the results of the Johansen approach. Overall, the Pesaran results indicated that permanent income and own price factors are the most influential factors affecting tourism demand.

The results of our econometric models in Chapter 6 and 7 based on the three alternative cointegration approaches suggested that permanent income is the most important economic determinant in measuring tourism demand, followed by own price, weighted substitute price, share price, and trade volume. However, the relative significance of each economic variable with respect to tourism demand might differ with respect to each of the tourist origin countries.

In the next chapter, we attempt to summarise the magnitude of the estimated coefficients of each economic variable with respect to the tourism demand, based on four alternative estimating models from the three alternative cointegration approaches, to explain the variations of impact across markets for each of the six origin countries. Our aim is to use economic analysis to extend our understanding of the behaviour of inbound tourists travelling to Hong Kong from different origin countries, and to better understand the overall nature of Hong Kong tourism demand.

Chapter 8 Economic Interpretations of Estimated Tourism Demand Models

8.1 Introduction

Our survey of empirical literature of tourism demand in Chapter 4 indicated that much attention had been given to estimating the demand elasticities with respect to its economic determinants. It is because of their strong policy implications for the tourist industry and the government bodies of Hong Kong. In addition, it also indicated that the major strengths of the econometric models of tourism demand lies in their potential ability to assess the effects of economic determinants on international tourist flows. Recently, estimated econometric models based on a cointegration and error correction approach are considered as one of the most valuable tools to improve the reliability of elasticity estimates and this may substantiate our understanding of the major factors affecting tourism demand, and enhance our knowledge of inbound tourist behaviour.

Chapters 6 and 7 explain the effects of each economic determinant on inbound tourist flows to Hong Kong from each of the six tourist origin countries applying cointegration approaches. With each economic determinant, we measured the long-run and short-run elasticity on tourist flows, based on the results of the coefficients estimates from the preferred long-run models and their associated dynamic ECMs. The four ECM models used for the economic analysis in this chapter were estimated based on three alternative cointegration and error correction approaches: (1) the Engle-Granger two-stage procedures; (2) the Johansen Case 2, and Johansen Case 3 procedures; and (3) the Pesaran procedures.

Our results in Chapter 6 and 7 show that the application of the country-pairs approach was able to reveal substantial information, in that changes in permanent income, own price, weighted substitute price, share price and real trade volumes have significant impacts on the international tourist flows to Hong Kong from each tourist origin country.

Following the cointegration analysis of tourism demand in Chapters 6 and 7, the purpose of this chapter is to summarise the findings of the measurements of the estimated long- and short-run demand elasticity, presented in Chapters 6 and 7. In particular, we will use these estimated elasticites to assess the effects of a variety of business strategy and government policy options, including pricing and promotional strategies of hotels and airlines, and the public policy of government bodies with respect to each tourist origin country.

This chapter is organised as follows. In Sections 8.2 to 8.7, we present the summary of the results of estimated elasticity of demand. For each section, we also discuss the economic and policy implications of Hong Kong's tourism-related businesses and the government, with respect to the estimated elasticity of permanent income, own tourism price, weighted substitute price, share price, real trade volume and dummy variables for each of the six tourist origin countries. In addition, we will further analyse the variations of tourism demand sensitivity across the tourist origin countries with respect to each economic determinant, and will make special reference to the purpose of travel, the effects of long- or short-run, and the distance of travel. Finally, we summarise all of our major findings in Section 8.8.

8.2 Permanent Income Elasticity

The estimated results of long- and short-run permanent income elasticity of demand for each of the six tourist origin countries are presented in Table 8.1.

Our review of empirical literature indicates that much empirical research derived the results of elasticity estimates from the use of a single technique without considering the extent to which the results would change if alternative techniques were used. In this research, we have chosen to calculate the weighted average estimates of demand elasticities from four estimated error correction models based on three alternative cointegraion techniques. In particular, we derive the weighted average income, own price and substitute price elasticities based on the estimated value of four alternative error correction model. The weighted average estimates appear to produce more meaningful measures by smoothing out any possible extreme values based on single error correction model, More importantly, we have decided to use the weighted average approach (based on alternative cointegration techniques) for the calculation of demand elasticities to account for the possibilities of multiple long-run relationships and to deal with the problem of small sample sizes in the error correction models.

Overall, the derived value of the estimated permanent income elasticity of tourism demand based on alternative long-run models appears to be consistent with expected sign across the country of origin. The overall average estimated (weighted average of the four alternative models for all origin countries) long- and short-run permanent income elasticity of demand is 2.7 and 2.0, respectively. The long-run permanent income elasticity of demand is greater than 1 for all selected origin countries. In particular, the estimates for long-run permanent income elasticity for tourists from the United States vary substantially with respect to alternative estimation procedures, ranging from 0.8 (Johansen, Case 2) to 1.5 (Engle and Granger). This strongly suggests that the structure of the United States long-run model is relatively unstable.

In addition, the magnitude of the average estimates of short-run income elasticity, with the exception of the models for China and Taiwan, is less than the similar estimates in the long-run models. A relatively low short-run permanent income elasticity implies that changes in permanent income might take some time before they affect tourism demand.

8.2.1 Permanent Income Effect on Tourism Demand and Policy Implications

The results of the cross-country elasticity estimates in Table 8.1 indicate that the estimated long-run permanent income elasticity varies substantially with respect to the distance of travel. The results of the long-run average for the long-haul market show that the models for the United Kingdom appear to have the most sensitive average long-run permanent income elasticity (the weighted average of the four alternative models) of 5.3, followed by Germany (3.4) and United States (1.1), whereas the results for the short-haul markets indicate that Japan appears to have the most sensitive average of 2.8, followed by Taiwan (1.9) and China (1.7). The lower income elasticity for the short-haul market is a reflection of lower travel cost, whereas the long haul markets with higher travel cost generally have higher income elasticities. While the long-run average estimates for the three long-haul markets and the three short-haul markets are, respectively, at 3.3 and 2.1, the short-run average for the three long-haul and three short-haul markets is 1.4 and 2.7, respectively. This implies that the estimated short-run and long-run permanent income elasticity are varied with respect to the distance of travel required to reach Hong Kong as one would expect.

In addition, the average estimated short-run elasticity for all long-haul markets varies with respect to each origin country. Among the long-haul markets, Germany has the largest short-run permanent income elasticity of 1.9, followed by United Kingdom (1.6) and United States (0.7). The estimated short-run elasticity of the short-haul markets indicates that Taiwan has the most sensitive short-run elasticity of 3.8, followed by China (2.2) and Japan (2.0).

Overall, the results of the permanent income elasticity tests indicate that Hong Kong tourism could be considered a luxury tourist item for both long- and short-haul tourists. In general, tourist flows from the long-haul market are more sensitive with respect to the changes in long-run permanent income compared to those of the short-haul markets. This is particularly true for Germany and the United Kingdom, where tourists are most income elastic in the long-run models. The results are consistent with Crouch (1994a) study, which found that long-haul vacation tourists are more income sensitive than short-haul tourists. In addition, our findings indicate that the short-run income elasticity of China and Taiwan is much higher than their long-run counterpart, suggesting that visitors from China and Taiwan are more sensitive to the changes in permanent income in the short-run. In comparison, tourists from the United States are found to be less permanent income elastic in both long- and short-run models. This could be the case because of the increasing dominance of United States business tourists in Hong Kong. Such tourists' travel decisions are independent of the changes in their permanent income.

Our finding in this research suggests that Hong Kong tourism can be considered a luxury item. We recommend that the tourism industry should increase production of tourist-related services in times of economic boom, and decrease production in economic recession in the major tourist origin countries. Such services include available hotel rooms and other lodgings, and airlines capacity.

In summary, the results of the estimated elasticity indicate that tourists from the United Kingdom, Germany and Japan are more responsive to the changes in permanent income than those from China, Taiwan and the United States. One possible explanation for this trend is that tourists from the United States, China and Taiwan are more involved in the business and trading activities in Hong Kong. Finally, we found considerable variations in the permanent income elasticity values across the origin countries, suggesting that Hong Kong does not benefit to the same extent from permanent income increases across the origin countries.

Table 8.1 Summary of Results of Permanent Income Elasticity – Alternative ECMs (All Origin Countries)

Long-run Permanent Income Elasticity						
ECMs	Long-haul Markets			Short-haul Markets		
	United States	United Kingdom	Germany	Japan	Taiwan	China
[E&G]	1.5	4.7	3.6	2.9	2.0	1.7
[JO, Case 3]	0.9	5.9	3.6	2.8	1.8	1.5
[JO, Case 2]	0.8	6.5	2.5	2.7	1.7	1.6
PESARAN	0.9	4.9	3.5	2.7	1.8	1.7
Average	1.1	5.3	3.4	2.8	1.9	1.7
Short-run Permanent Income Elasticity						
ECMs	Long-haul Markets			Short-haul Markets		
	United States	United Kingdom	Germany	Japan	Taiwan	China
[E&G]	0.9(1)	1.0	1.6	2.3	4.8(1)	1.9
[JO, Case 3]	0.6	3.2(1)	2.6(1)	1.6	3.7	2.2
[JO, Case 2]	0.2(1)	0.4	2.1(1)	1.5	3.3	2.2
PESARAN	0.7	2.1	1.8	2.0	3.2	2.5
Average	0.7	1.6	1.9	2.0	3.8	2.2

Notes:

1. ECM models taken from Engle and Granger ; Johansen, Case 2 ; Johansen, Case 3 ; and Pesaran approaches to compare results.
2. Figures in parenthesis ( ), number of lags in preferred model.
3. Complete formula for calculations of average elasticity presented in notes of Table 8.2.
4. Average value of elasticties is rounded to one decimal point.

8.3 Own Price Elasticity

The summary in Table 8.2 is the estimated long- and short-run own price elasticity of tourism demand for each of the six countries. The overall average (the weighted average of the four alternative models for all the origin countries, except China) estimated long-run own price elasticity is -1.02. In particular, for the United Kingdom, Germany and Taiwan models, the average is greater than 1 (in absolute value); however, for the Japan and United States models it is less than 1 (in absolute value). In addition, the average estimated short-run own price elasticity for all origin countries is - 0.5. In addition, all the origin countries' estimated short-run own price elasticity is less than one. Both the long and short-run estimated elasticity varies substantially with respect to the alternative estimation procedures used. In particular, the variations of the long-run own price elasticity with respect to the alternative model are higher for the United States and German models. The own long-run price elasticity of demand ranges from -0.8 (Pesaran, Johansen, Case 2 and Engle and Granger) to -1.3 (Johansen, Case 2) for the United States model, and from -0.6 (Engle-Granger) to -3.0 (Johansen, Case 2) for the German model.

8.3.1 Own Price Effect on Tourism Demand and Policy Implications

While the average estimated long-run own price elasticity for the three long-haul markets and the two short haul markets is -1.1 and -0.9, respectively, the average estimated short-run own price elasticity for the three long-haul and two short-haul markets is -0.5 and -0.6, respectively.

In particular, the estimated long-run average (the weighted average of the four alternative estimation procedures in long-run model) own price elasticity of demand for the long-haul models is -1.1; that is, larger than the average of all the short-haul market. In addition, the results indicate that the German model appears to have the highest long-run own tourism price coefficient (-1.3). The United Kingdom's own tourism price coefficient is second highest at -1.1, followed by the United States at -0.9. The estimated average long-run own price elasticity for the short-haul models is -0.9. The Taiwan model produces the most sensitive own price coefficient (-1.02), followed by Japan (-0.8). As indicated in Chapter 6, the own price variable has been deleted from the long-run and short-run models for China because the own price coefficients were statistically insignificant at the 5% error level.

The result of the estimated short-run average own price elasticity of demand for the long-haul model is -0.5. In addition, the estimated short-run average indicates that the own-price elasticity of demand is less than 1 for all long-haul markets. In particular, the United Kingdom and United States models produced the most sensitive elasticity of -0.6, followed by the Germany (-0.4).

The estimated short-run average own price elasticity for all the short-haul markets is -0.6, which is larger than the long-haul models. The result also indicates that Taiwan has the most sensitive elasticity of -0.7, followed by Japan (-0.4). The findings show that the short-run estimate is relatively low for the long-haul and short-haul markets, suggesting that the degree of substitutability is low between Hong Kong tourism and each of the origin country's domestic tourism in the short-run. This implies that the Hong Kong tourism has certain market power over domestic tourism in the United States, the United Kingdom, Germany, Taiwan and Japan.

As indicated in Table 8.2, the average estimated short-run own price elasticity is less than its long-run counterpart. The relatively lower short-run own price elasticity of tourism demand indicates that tourists require time to adjust to the own tourism price changes in the destination country, relative to their origin country. In particular, the results indicate that the own price elasticity of tourism demand in Hong Kong is price elastic in the long run, but price inelastic in the short-run, for the markets of the United Kingdom, Germany and Taiwan. This finding suggests that the total revenue of business firms in the tourist-related industries (e.g. hotels and airlines) might increase initially in the short-run after tourist service prices increase, but will fall over the long-run. Hong Kong's hotels and airline companies should therefore consider both the long- and short-run impact in making price decisions for the United Kingdom, Germany and Taiwan tourists.

Finally, the impact of the own tourism price variable on tourism demand indicates that tourist arrivals in Hong Kong appear to fluctuate considerably with respect to the change of each country's own tourism price index, which could then dampen the effect of the long-term permanent income growth in the origin countries.

Table 8.2 Summary of Results of Own Price Elasticity – Alternative ECMs (All Origin Countries)

Long-run Own Price Elasticity						
ECMs	Long-haul Markets			Short-haul Markets		
	United States	United Kingdom	Germany	Japan	Taiwan	China
[E&G]	-0.8	-1.0	-0.60	-0.8	-1.0	N.A
[JO, Case III]	-0.8	-1.1	-2.1	-0.7	-1.2	N.A
[JO, Case II]	-1.3	-1.0	-3.0	-0.7	-0.9	N.A
PESARAN	-0.8	-1.2	-0.8	-0.8	-1.0	N.A
Average	-0.9	-1.1	-1.3	-0.8	-1.02	

Short-run Own Price Elasticity						
ECMs	Long-haul Markets			Short-haul Markets		
	United States	United Kingdom	Germany	Japan	Taiwan	China
[E&G]	-0.6	-0.6	-0.2	-0.6(1)	-0.3	N.A
[JO, Case III]	-0.5	-0.8	-0.5	-0.5(1)	-1.0(1)	N.A
[JO, Case II]	-0.4(1)	-0.8	-0.5	-0.5(1)	-1.0(1)	N.A
PESARAN	-0.6	-0.5	-0.4	-0.1	-0.8(1)	N.A
Average	-0.6	-0.6	-0.4	-0.4	-0.7	

Notes. 1. Average calculated from following formula:

$$\text{Average} = \frac{\left[[E+G] + \frac{[Jo_{III}]+[Jo_{II}]}{2} + Pesaran\right]}{3}$$

2. The weighted average elasticity estimate is calculated based on a fixed weighting system of four alternative error correction model. The corresponding weights of the Engle-Granger, Johansen (Case 2), Johansen (Case 3) and Pesaran ECMs are 33.33%, 16.67%, 16.67% and 33.33%, respectively. [Note No.1 (Table 8.2) shows the mathematical formula for the calculation of the weighted average estimates of demand elasticities from the four alternative error correction models.]

3. The estimates of long-run elasticites (Taiwan) are rounded to 2 decimal points.

8.4 Substitute Price Elasticity

The results of our econometric models of tourism demand indicated that the weighted substitute price variable is also an important determinant of tourism demand in U.K. and Taiwan models. The results of estimated long- and short-run weighted substitute price elasticity are presented in Table 8.3. The overall average estimated long-run price elasticity (the weighted average of estimates from the four alternative estimation procedures) for two selected origin countries is 1.4, and the average (average of the four alternative estimation procedures for each origin country) long-run elasticity of the weighted substitute price index is both positively signed for the United Kingdom, and Taiwan long-run models. The estimated long-run weighted substitute price elasticity varies with respect to each tourist origin country, and ranges from 1.1 (U.K.) to 1.7 (Taiwan).

The estimated long-run elasticity varies with respect to the alternative estimation procedures for the United Kingdom and Taiwan long-run models. In particular, the variation of the long-run weighted substitute price elasticity is relatively small for the Taiwan long-run model, ranging from 1.6 (Engle-Granger and Johansen, Case 2) to 2.0 (Johansen, Case 3). However, the variation of the elasticity is more substantial for the U.K. long-run model, ranging from 0.6 (Engle-Granger) to 1.7 (Johansen, Case 2).

In addition, the results of these tests indicate that the overall short-run average weighted substitute price elasticity is at 0.7; that is, lower than its long-run counterpart of 1.4 as predicted by economic theory. However, the estimated short-run elasticity is varied with respect to tourist origin countries, ranging from the 0.6 (U.K) to 0.7 (Taiwan).

The substantial difference between the long- and short-run estimated substitute price elasticity indicates that tourists required more time to adjust to the relative price changes between Hong Kong and other regional competitors. It is therefore important for Hong Kong's tourist-related industry to consider both the long and short-run impact of the weighted substitute price on tourism demand.

8.4.1 Substitute Price Effect on Tourism Demand and Policy Implications

The average weighted long-run substitute price elasticity for long-haul tourist origins is 1.1, while for short-haul tourist origin it is 1.7. This indicates that the substitute price elasticity of demand is high for the United Kingdom and Taiwan. The economic impact of the higher weighted substitute price elasticity for the United Kingdom and Taiwan is that competition between Hong Kong and the selected competitors within the East Asia and Pacific region is likely to be strong in relation to the source markets of the United Kingdom and Taiwan in the long-run.

However, the short-run average weighted substitute price elasticity indicates that the elasticity for long- and short-haul markets is less than 1. The short-run weighted price elasticity is averaged at 0.6 (long-haul) and 0.7 (short-haul), respectively. The Taiwan market has the most sensitive short-run weighted substitute price elasticity of 0.7, followed by the United Kingdom (0.6). This indicates that both long-haul and short-haul tourists are more sensitive to the weighted substitute price in the long-run.

The empirical findings indicate that the weighted substitute price variables are statistically insignificant in both the long and short-run models for Germany, the United States and Japan. This suggests that the degree of substitutability between Hong Kong and her competitors in the EAP region is limited with respect to these origin countries, and suggests that Hong Kong's tourism services and those of the regional competitors are characterised by different attributes for Germany, the United States and Japan. Non-price competition, such as improving service quality and unique-promotional strategy, would be more important in maximising the tourism revenue generated from those origin countries.

The United Kingdom and Taiwan long-run models both produce positive and elastic cross-elasticity of demand, implying that an increase (decrease) in the substitute price of selected competitive destinations within the EAP region for these two origin countries might increase (decrease) tourism demand in Hong Kong substantially for tourists coming from the United Kingdom and Taiwan

Table 8.3 Summary of Results of Weighted Substitute Price Elasticity – Alternative ECMs (U.K. and Taiwan)

Long-run Weighted Substitute Price Elasticity					
ECMs	Long-haul Markets			Short-haul Markets	
	United States	United Kingdom	Germany	Japan	Taiwan
[E&G]	N.S.	0.6	N.S	N.S.	1.6
[JO Case III]	N.S	1.5	N.S	N.S.	2.0
[JO Case II]	N.S.	1.7	N.S	N.S.	1.6
PESARAN	N.S.	1.2	N.S	N.S.	1.8
Average	N.S.	1.1		N.S.	1.7
Short-run Weighted Substitute Price Elasticity					
ECMs	**Long-haul Markets**			**Short-haul Markets**	
	United States	**United Kingdom**	**Germany**	**Japan**	**Taiwan**
[E&G]	N.S.	0.6	N.S.	N.S	1.4
[JO Case III]	N.S.	0.9	N.S.	N.S	N.S.
[JO Case II]	N.S.	0.8	N.S.	N.S	0.2
PESARAN	N.S.	0.5	N.S.	N.S.	0.6
Average	N.A.	0.6	N.S.	N.S	0.7

8.5 Share Price Elasticity and Effect on Tourism Demand and Policy Implications

As indicated earlier in the research, this is the first time the effect of the tourist's asset wealth has been assessed in a tourism demand model. The empirical results show that the share price variable is statistically significant only for Germany and Japan, because a relatively large proportion of tourist flows to Hong Kong from those markets are for the purpose of vacation. Since it is generally believed that the demand for pleasure tourists is more sensitive to asset wealth than the business tourists, the insignificance of the share price variable in the models of the United States and Taiwan was not surprising, because a relatively small proportion of tourist arrivals from these two countries to Hong Kong (less than 50%) is associated with pleasure travel.

The results of the long and short-run share price index elasticity for Germany and Japan are presented in Table 8.4. The long and short-run average (weighted average of the four models) share price elasticity for Japan is -0.2. It is negatively signed, and less than 1 for Japan, in both the long and short-run models. A negative inelasticity suggests that a 1% increase in share prices (proxy for asset wealth) will decrease the number of Japanese tourists arriving in Hong Kong by less than 1%. The negatively signed share price elasticity suggests that the Hong Kong tourism services can be considered a lower-end product for short-haul Japanese tourists. Contrary to the results for Japan, the results of long and short-run average share price elasticity for the German model (weighted average of the four models) are 0.3 and 0.1, respectively. The average share price elasticity is positively signed, and less than 1 in the German model, indicating that a 1% increase in share prices in Germany will increase the number of tourist arrivals by less than 1%. This suggests that Hong Kong tourism can be considered a normal good by German tourists.

Table 8.4 Summary of Results of Share Price Elasticity – Alternative ECMs (Germany and Japan)

Long-run Share Price Elasticity					
ECMs	Long-haul Markets			Short-haul Markets	
	United States	United Kingdom	Germany	Japan	Taiwan
[E&G]	N.S	N.S	0.2	-0.2	N.S
[JO Case III]	N.S	N.S	0.3	-0.2	N.S
[JO Case II]	N.S	N.S	0.9	-0.2	N.S
PESARAN	N.S	N.S	0.2	-0.2	N.S
Average	N.S	N.S	0.3	-0.2	N.S

Short-run Share Price Elasticity					
ECMs	Long-haul Markets			Short-haul Markets	
	United States	United Kingdom	Germany	Japan	Taiwan
[E&G]	N.S	N.S	0.1(1)	-0.1	N.S
[JO Case III]	N.S	N.S	0.1(1)	N.S.	N.S
[JO Case II]	N.S	N.S	0.2	N.S	N.S
PESARAN	N.S	N.S	0.1	-0.2	N.S
Average	N.S	N.S	0.1	-0.2	N.S

Our findings indicate that Germany's long-haul market has a positive sign for its share price variable, and Japan's short-haul market has a negative sign. This suggests that the tourism industry should increase production of tourist-related services in times of increase in share price in Germany, but increase production of tourist-related services for Japan in times of decrease in share price in Japan.

8.6 Trade Volume Elasticity and Effect on Tourism Demand and Policy Implications

Table 8.5 shows the results of long and short-run average real trade volume elasticity, using the alternative estimation procedures. As indicated earlier, the real trade volume variables are statistically significant and correctly signed for the United States and China models, which confirmed that the increasing volume of external trade in Hong Kong, resulting from the economic development of the Hong Kong, had generated tourists from those origin countries. The overall average long-run trade volume elasticity is 0.5 and is positively signed and less than 1 for the United States and China models. This implies that the tourist-related business should increase tourist services capacities for the United States and China in times of increase in trading volume of the United States and China. In addition, this finding suggests that Hong Kong Hotels and other tourist-related business should focus setting unique marketing strategies, such as the policies of price discrimination and product differentiation for the United States and China tourists with respect to their purpose of visits.

The estimates of the average long and short-run trade volume elasticity for the United States are 0.5 and 0.4, respectively, while the long and short-run average elasticity for China are, respectively, 0.5 and 0.2. The long-run elasticity of the real trade volume index for the United States model varies slightly with respect to the alternative approaches, ranging from 0.5 (Engle and Granger) to 0.6 (Johansen, Case 2), however, the long-run elasticity of the real trade volume variable for the China model has a larger difference between Pesaran (0.3) and Johansen, Case 3 (0.6).

The short-run real trade volume elasticity for the tourist origins is quite similar when compared with long-run counterparts. The overall average short-run trade volume elasticity is 0.3, and the average coefficients derived from the four alternative estimation procedures range between 0.4 (United States) and 0.2 (China). However, the elasticity of the short-run real trade volume variable for China has a larger variation than the elasticity of the variable for the United States with respect to the findings of the alternative estimation procedures. The short-run trade volume elasticity ranges from 0.3 (Engle and Granger) to 0.1 (Pesaran) for the China model, while the elasticity ranges from 0.3 (Johansen, Case 2) to 0.4 (Engle- Granger) for the United States model.

Table 8.5 **Summary of Results of Trade Volume Elasticity – Alternative ECMs (U.S. and China)**

Long-run Trade Volume Elasticity						
ECMs	Long-haul Markets			Short-haul Markets		
	United States	United Kingdom	Germany	Japan	Taiwan	China
[E&G]	0.5	N.S	N.S	N.S	N.S	0.5
[JO Case III]	0.5	N.S	N.S	N.S	N.S	0.6
[JO Case II]	0.6	N.S	N.S	N.S	N.S	0.5
PESARAN	0.5	N.S	N.S	N.S	N.S	0.3
Average	0.5	N.S	N.S	N.S	N.S	0.5
Short-run Trade Volume Elasticity						
ECMs	Long-haul Markets			Short-haul Markets		
	United States	United Kingdom	Germany	Japan	Taiwan	China
[E&G]	0.4	N.S	N.S	N.S	N.S	0.3(1)
[JO Case III]	0.4	N.S	N.S	N.S	N.S	N.S.
[JO Case II]	0.3	N.S	N.S	N.S	N.S	N.S.
PESARAN	0.4	N.S	N.S	N.S	N.S	0.1
Average	0.4	N.S	N.S	N.S	N.S	0.2

8.7 Dummy Variable Effect on Tourism Demand

In this study, the dummy variables were classified into two major categories. While the cross-country dummy variables were applied to each of the six origin countries, the origin country-based dummy variables were applied only to the individual origin countries concerned. Of all of the cross-country variables, only the DUMMY89 variable appeared to be significant in the tourism demand model in some long-haul markets. Table 8.6 presents the results of the average elasticity of the DUMMY89 variable.

The results indicate that the DUMMY89 variable is a relevant variable in the long and short-run models for the United States and United Kingdom only. The long and short-run average (U.S. and U.K.) coefficient of the DUMMY89 variable is -0.3 and -0.2 for the long-run and short-run models, respectively. They have the correct expected sign. This indicates that the tourist flows from the United States and the United Kingdom were affected by the political incident that occurred in China on 4th June 1989. Contrary to the common belief, the DUMMY97 variable was found to be statistically insignificant in all of the models, and was therefore deleted from the final ECMs. We found it surprising that tourists from both the United Kingdom and China were not affected by announcement effect of the sovereignty turnover in 1997.

Table 8.6 Summary of Results of DUMMY89 Variable Coefficients – Alternative ECMs (U.K. and U.S)

Long-run General DUMMY89 Variable						
ECM Procedures	**Long-haul Markets**			**Short-haul Markets**		
	United States	**United Kingdom**	**Germany**	**Japan**	**Taiwan**	**China**
[E&G]	-0.2	-0.2	N.S	N.S	N.S	N.S
[JO Case III]	N.A	N.A	N.S	N.S	N.S	N.S
[JO Case II]	N.A	N.A	N.S	N.S	N.S	N.S
PESARAN	-0.2	-0.4	N.S	N.S	N.S	N.S
Average	-0.2	-0.3				

Short-run General DUMMY89 Variable						
ECM Procedures	**Long-haul Markets**			**Short-haul Markets**		
	United States	**United Kingdom**	**Germany**	**Japan**	**Taiwan**	**China**
[E&G]	-0.2	-0.1	N.S	N.S	N.S	N.S
[JO Case III]	-0.2	-0.2	N.S	N.S	N.S	N.S
[JO Case II]	-0.2	N.A.	N.S	N.S	N.S	N.S
PESARAN	-0.2	-0.2	N.S	N.S	N.S	N.S
Average	-0.2	-0.2				

Note: Insignificant Dummy variables deleted from final model.

We mentioned earlier in Chapter 3 that the analysis of tourism demand in Hong Kong suggested that five origin country-based dummy variables should be included in some of the models to capture their impacts on tourism demand. The empirical evidence indicated that the DUMMY88TAI and DUMMY91GER variables are statistically significant and properly signed for their respective models. Tables 8.7 and 8.8 present the results of the coefficients of DUMMY88TAI and DUMMY91GER variables.

The long and short-run average coefficients of the DUMMY88TAI variable for Taiwan are, respectively, 1.1 and 1.0. The long and short-run average coefficients of the DUMMY91GER variable for Germany are, respectively, 0.5 and 0.2.

Table 8.7 Summary of Results of DUMMY88TAI Variable Coefficients – Alternative ECMs (Taiwan)

ECMs	Long-run Model	Short-run Model
[E&G]	1.0	N.A
[JO, Case III]	N.A	0.8
[JO, Case II]	N.A	0.9
Pesaran	1.2	1.0
Average	1.1	1.0

Table 8.8 Summary of Results of DUMMY91GER Variable Coefficients – Alternative ECMs (Germany)

ECMs	Long-run Model	Short-run Model
[E&G]	0.4	N.A
[JO, Case III]	N.A	0.1
[JO, Case II]	N.A	0.1
Pesaran	0.5	0.2
Average	0.5	0.2

8.8 Chapter Summary

This chapter reviewed and summarised our empirical findings about Hong Kong's international tourism. The empirical investigation employed the cointegration procedures for each of the six tourist origin countries. The variables considered are permanent income, own price, substitute price, trade volume, share price, and dummy variable elasticities. The estimated demand elasticities suggest that the degree of long- and short-run responsiveness of tourism demand for the selected economic variables vary substantially in relation to the alternative econometric procedures and the tourist origin countries themselves.

We also assessed the economic and policy implications of Hong Kong's tourism industries, based on the findings of elasticities derived from our econometric models of tourism demand. In particular, the estimated income, own price, weighted substitute price, trade volume and share price elasticities were used to assess the effect of a variety of business policy options. The results provide us with a direction in allocating the economic resources within the tourist industry.

Overall, inbound tourist flows to Hong Kong from the major tourist origin countries were all found to be highly responsive to selected economic variables, suggesting that our selected economic determinants for measuring tourism demand explained (with a high degree of confidence) the tourist flows to Hong Kong reasonably well.

We summarise the findings as follows:

1. The overall average long-run permanent income elasticity is 2.7, and lies within the range of 1.1 (United States) to 5.3 (United Kingdom) across the various origin markets. The overall average short-run permanent income elasticity is 2.0, and lies within the range of 0.7 (United States) to 3.8 (Taiwan). These findings suggest that Hong Kong tourism is considered a luxury for the inbound tourist flows to Hong Kong.

2. The own price variable was found to be the second most important factor that affects international tourist flows to Hong Kong. The long-run own price elasticity is averaged at - 1.02 (overall average), and lies within the range from -0.8 (Japan) to -1.3 (Germany), whereas the short-run own price elasticity is averaged at -0.5 (overall average), and lies within the range from -0.4 (Germany and Japan) to -0.7 (Taiwan).

Compared with the previous estimate of current income elasticity of 3.9 based on Lin and Sung (1983), our overall average long-run permanent income elasticity was found to be lower than the estimates of the Lin and Sung (1983). However, our long-run own price elasticity was found to be higher (in absolute value) than the –0.8, presented by Lin and Sung (1983). Instead of using the current income variable as a proxy for the effect of income and OLS approach in the Lin and Sung (1983), we used the permanent income variable and alternative cointegration and error correction approaches in estimating income and price elasticity of demand.

3. We found that the long-run overall average weighted substitute price elasticity is 1.4, and lies within the range of 1.1 (United Kingdom) and 1.7 (Taiwan), while the overall short-run weighted substitute price elasticity is 0.7, and lies within the range of 0.6 (U.K.) and 0.7 (Taiwan). This indicates that the weighted substitute price variable play a role in our tourism demand model.

4. The share price index is statistically relevant and positively signed for the German model but negatively signed for both the long- and short-run Japanese models. The overall average long-run share price elasticity average is 0.3 (in absolute value), and lies within the range of 0.3 (Germany) to -0.2 (Japan), and the short-run share price elasticity average is 0.2 (in absolute value), and lies in

the range of 0.1 (Germany) to -0.2 (Japan). This indicates that Hong Kong tourism can be considered either a normal or lower ended product, depending on the country examined.

5. In contrast to the findings of Kim and Song (1998), the trade volume variable is found to be significant only in the United States and China models. These two countries are Hong Kong's most significant trading partners. The magnitude of the elasticity estimates indicates that the long-run overall average trade volume elasticity average is 0.5. Its short-run counterpart average is 0.3, and lies in the range of 0.2(China) to 0.4 (United States).

6. Visitors from the United Kingdom and Germany are most sensitive to income factors in the long-run models, followed by those from Japan, Taiwan, China and the United States. However, in the short-run models, visitors from Taiwan and China are most sensitive to income factors, followed by those from Japan, Germany the United Kingdom and the United States. Moreover, visitors from Germany and the United Kingdom have the most sensitive long-run own price elasticity, followed by Taiwan, the United States and Japan. However, in the short-run models, visitors from Taiwan are most sensitive to own price factors, followed by the United Kingdom, United States, Japan and Germany. The variation in the relevance of a particular explanatory variable across tourist flows, as well as the estimated elasticity values, is in accordance with Witt and Witt (1995). In addition, it provides additional support of our application of country-pairs approach in estimating tourism demand.

7. There are a few major explanations for the variations in the magnitude of the elasticity estimates found in tourism demand models. First, almost all of the average estimated demand elasticity in the short-run models is less than in their long-run counterparts. The relatively low short-run elasticity of tourism demand implies that any changes in the selected economic determinants might be slow in affecting tourism demand in Hong Kong. This finding has strong economic implications for the Hong Kong tourist industry for making economic decisions, such as pricing by the tourist industry, should be made with consideration taken of the impact, both long and short-run.

Second, distance of travel seems to be another major factor in the variations of the estimates of tourism demand elasticity. In particular, our empirical results indicated that Germany and the United Kingdom markets are more income and price sensitive compared to short-haul markets such as Taiwan and Japan

8. Variations of the estimates of demand elasticity across tourist origins can also be explained by the purpose of a tourist's visit. Tourists from China and the United States, for example, are less income and price sensitive than those from Japan and West Germany. This is because a relatively large

proportion of visitors coming from the United States and China are business tourists, whereas a relatively large proportion of tourists from Germany and Japan are vacation tourists. This implies that Hong Kong's tourist industry should be preparing some pricing and product strategies in different markets with respect to the tourists' purposes for their visits. This conclusion is consistent with Kwack (1972) that business travel was less sensitive to price and income changes.

9. In summary, the results of the error correction models is a powerful tool for the policy-makers in formulating tourism-related policies in the medium term, including (a) destination supply policy, (b) pricing policy, (c) competition policy, (d) taxation policy and (e) Marketing policy. We believe that tourist-related businesses and the Hong Kong Tourism Board should use the estimated elasticitites from error correction models to assess the effects of a variety of business and public policy options, and assist in allocating tourism resources.

One of the major objectives of this study is to investigate whether our dynamic ECM models produce more accurate tourism demand forecasts than static OLS and other alternative time series forecasting models. In the next chapter, we will evaluate the forecasting performance of seven alternative competing forecasting models in the context of measuring international tourism demand in Hong Kong to investigate whether the application of econometric models with a cointegration and error correction approach and the permanent income-life cycle hypothesis in modelling the income variable could improve the forecasting performance of single equation econometric models of tourism demand.

Chapter 9: Evaluation of Forecasting Performance and Scenario Forecasting

9.1 Introduction

Empirical evidence of tourism demand forecasting indicates that there exists no single superior forecasting technique. Martin and Witt (1989b) found that well-fitted econometric models based on traditional econometric approach performed poorly in short-term forecasting, and below average in medium and long-term forecasting, compared to those of time series and Naïve models. In a similar study, Witt and Witt (1995) suggested that the poor forecasting performance of the econometric models based on traditional approach might have been related to problems that occur when one relates non-stationary time-series data with spurious correlation.

Cointegration analysis, its relationship to ECMs and its use in conjunction with the Hendry-type testing down procedures have not yet been applied to the modelling strategy for estimating tourism demand before the mid-1990s. As the cointegration approaches started to be applied as an alternative to static OLS models and time-series models for developing tourism demand forecasting models over the last decade, the results of the relative forecasting performance of the ECMs were rather mixed. A majority of previous ECM models based on cointegration approaches, such as Kulendran and Witt (2001) and Song, Witt and Jensen (2003), indicated that NAÏVE models produce more accurate forecasts than dynamic ECMs. However, Kim and Song (1998) found that dynamic ECM models produce better forecasts than NAÏVE and ARIMA in U.S and U.K models. Due to the mixed results, it is essential to compare the findings of such relevant studies that have placed emphasis on the evaluation of forecasting performance between the dynamic ECM, static OLS and time-series models. A review of these relevant studies is presented in Section 9.2.

One purpose of Chapter 9 is to evaluate the relative forecasting performance of four dynamic ECMs with alternative cointegration approaches, OLS, ARIMA and benchmark NAÏVE forecasting models. Our literature review in Chapter 4 mentioned that only a few econometric models are currently being used to estimate and forecast tourism demand in Hong Kong, based on an OLS approach that does not take into consideration the most recently developed econometric techniques. In this chapter, we investigate whether our econometric tourism demand models, which have incorporated new share price variables, new ways of estimating income and price variables, and alternative cointegration and error correction approaches, could improve the forecasting performance of econometric models of tourism demand in Hong Kong. In Section 9.2, we present a review of relative forecasting performance of previous ECMs and time-series forecasting models. In Section 9.3, we present an evaluation of the results of the ex-post forecasting errors that occur when we use each of the seven alternative forecasting models to forecast tourism demand on the six origin countries, using two evaluative criteria. For Sections 9.31 to 9.3.4, we evaluate the forecasting performance of the four alternative ECMs, using OLS, ARIMA, and NAÏVE models for benchmark comparison purposes. More importantly, we then present further examinations of the relative forecasting performances of the best performing ECMs in Section 9.3.5. In particular, we compare the best performing ECM models with the OLS, NAÏVE and ARIMA models in order to determine whether the recent advances in the cointegration approach can improve the accuracy of econometric models.

In Section 9.3.6, we compare the forecasting performance of the ECM models based on the Pesaran ARDL approach with the Engle-Granger residual-based approach and the Johansen maximum likelihood approaches for the indication of most preferred cointegration approach for forecasting tourism demand. In Sections 9.3.7 and 9.3.8, we present a time horizon and individual tourist origin market analysis of relative forecasting performance with respect to seven forecasting models, respectively.

Another major purpose of this chapter is to produce ex-ante econometric forecasts of tourism demand under the assumptions of alternative scenarios. In Section 9.4, we apply the best performing dynamic ECMs (those with the least forecasting errors) to produce scenario forecasts for possible changes of future tourist flows from each of the six major tourist origin countries over the period 2000 - 2004. In the last section, 9.5, we summarise all the major findings in this chapter.

9.2 Review of Tourism Demand Forecasting Performance – Evidence based on ECMs

Since the 1970s, econometric models of tourism demand focused on the study of the determinants of tourism demand, with emphasis on income and price effect. In our review of tourism demand literature in Chapter 4, we reviewed the major studies concentrating on the determinants of tourism demand. As suggested in those previous studies, those well-fitted tourism demand models normally produce estimations in search of determinants of tourism demand. Estimated elasticity was then used to assess the various policy options. However, the estimated models did not necessarily translate into good forecasting instruments. In essence, the strength of any forecasting model lies in its predictive power, but most tourism demand studies that focused on the estimation of demand elasticity for policy analysis did not attempt to evaluate the forecasting ability of the proposed well-fitted model. More specifically, very few studies had compared their econometric forecasts with actual data or forecast values derived from other time-series specifications and the benchmark NAÏVE model. This oversight could be considered the major shortcoming of earlier tourism demand studies.

In this section, we will review some of the major tourism demand studies that concentrate on the evaluation of forecasting performance among alternative tourism forecasting models for the period, 1989 to 2003. The **Martin and Witt (1989b)** paper could be considered as the first study evaluating the relative forecasting performances of various types of tourism forecasting models. The study selected and compared five time-series models with the static OLS models, using the benchmark NAÏVE models to evaluate the relative forecasting performances. Their results reviewed that when the MAPE criterion was applied to calculate the forecast errors, the NAÏVE1 model produced better forecasts than the static OLS and time-series models in a one-year-in-advance forecasting horizon. When the study extended the forecasting horizon to two years ahead, the ARI (first order autoregressive model) models performed better than the simple NAÏVE models. Overall, the NAIVE1 and autoregressive models appear to generate relatively accurate forecasts, whereas the NAIVE2, Gompertz and Trend Curve Analysis techniques produced relatively inaccurate forecasts.

In general, Martin and Witt (1989b) discovered that the performance of the least square regression type causal model (OLS) was rather poor, ranking fourth out of the seven models tested for both one-year- and two-year-in-advance forecasting. In terms of overall forecasting performance, unexpectedly, the simple NAÏVE model ranked first. Martin and Witt (1989b) indicated that econometric forecasts are not ranked particularly high overall in terms of accuracy, but the position achieved relative to the other forecasting methods varies considerably according to origin country. In another common cited study of summary of tourism demand forecasting, Witt and Witt (1995) found that, in a review of the forecasting performance of the econometric models, econometric forecasting proves to be the most accurate method in just 29% of the 48 cases, followed by NAIVE1 (23%). The lack of consistent superior performance of the econometric models is disturbing, particularly as the no change model performs nearly as well.

Despite the poor forecasting ability, the regression-type models based on the OLS approach are still one of the most popular approaches for developing econometric models of tourism demand in empirical literature. This popularity simply indicates that, although such models may not generate the most accurate forecasts when compared with time series and NAÏVE models, this is not the major purpose of those studies. Instead, the OLS models are used to examine causal relationships between tourism demand and its related determinants.

Witt and Witt (1995) argued that the poor forecasting performance of previous econometric models is mostly due to traditional static OLS approaches that commonly overlook the recent advances in econometric techniques. In particular, those well-fitted models did not attempt to undertake statistical diagnostic checking within the context of time-series data analysis. In addition, most selected econometric models, applied for the evaluation of ex-post forecasting performance, consistently ignored standard diagnostic checking. In fact, cointegration methods were not carried out in any of the tourism demand forecasting studies up to 1992 surveyed by Witt and Witt (1995).

In the mid-1990s, studies that utilised cointegration ECM methodology with proper diagnostic checking tools began to produce ex-post forecasts of tourism demand. Among the tourism demand models based on the cointegration approach, the relative forecasting performance of ECM models was found to be satisfactory in Diviserkera (1995), Seddighi and Shealing (1997), Kim and Song (1998), and Lathiras and Siriopoulos (1998). Diviserkera (1995) was the first to employ ECM models to produce forecasts of tourist arrivals. The empirical results of this study indicated that a derived dynamic ECM could be implemented to produce forecasts of visitor arrivals one or two years in advance.

In a similar study, **Lathiras and Siriopoulos (1998)** employed ECM models to forecast tourism demand over an ex-post forecasting period 1994 - 1995, for each of Greece's major tourist origin countries. The empirical results of this study, as calculated from various evaluative criteria, showed that the short-run ECM possessed strong forecasting power.

Seddighi and Shealing (1997) claimed that the value of ex-post forecasts, as derived from ECM models, could indicate all relevant turning points. However, the relative forecasting performance of the researchers' models was not evaluated using any predictive criteria, such as MAPE, RMSE, etc. Nevertheless, Seddighi and Shealing (1997) indicated that their ECMs were a good forecasting model on short-lead horizons.

In their more rigorous econometric study of tourism demand, Kim and Song (1998) concluded that ECMs posted the most accurate specifications for the origin countries of the United States and United Kingdom, while the ARIMA models appeared to make the best forecasts for Japan and Germany, respectively. Although ECMs were not capable to generate the most accurate forecasts in some models, ECMs produced more accurate forecasts than most of models of moving average models, exponential smoothing models, autoregressive models, VAR models and NAÏVE models for Japan and Germany.

In contrast, the relative forecasting performance of ECMs were found to be unsatisfactory in the studies of Gonzales and Moral (1995), Kulendran (1996), Kulendran and King (1997), Kulendran and Witt (2001), and Song, Witt and Jensen (2003).

In the **Gonzales and Moral (1995)** study, ECM models were compared with a structural time-series model (STSM), the standard ARIMA model, and the transfer-function models, to allow for the evaluation of the relative forecasting performance of ECM models. The researchers discovered that the forecasting performance of the dynamic ECMs was far worse than other time-series and NAÏVE models in terms of forecasting accuracy.

In a similar study, **Kulendran (1996)** produced both ex-post and ex-ante forecasts of quarterly tourist arrivals by the application of an ECM. The empirical results indicated that the application of the ECM to forecast tourist arrivals was not successful, because of a weak power of HEGY unit root test.

In another tourism demand forecasting study, **Kulendran and King (1997)** obtained similar results as Kulendran (1996). These results indicated that the ECMs produce less accurate forecasts (with the exception of Japanese model) than other time-series specifications, including ARIMA, BSM and AR models. According to the analysis of Kulendran and King (1997), and similar to Kulendran (1996), the problem of the weak power of the popular unit root test was identified as the reason for ECM's poor performance.

Kulendran and Witt (2001) compared the relative forecasting performance of a dynamic ECM by comparing the econometric model based on the static OLS approach, to investigate whether or not the forecasting performance of econometric models was poor because of the application of the traditional multivariate regression approach. The criterion of the MAPE was employed to calculate the magnitude of forecasting errors. The relative forecasting performance of the OLS, ECM, NAÏVE, ARIMA and BSM models was compared over the period from 1978(Q1) to 1995(Q4). The statistical evidence in the Kulendran and Witt (2001) study was disappointing, as the dynamic ECMs that employed the applications with recent advances in econometric techniques adopted still failed to produce more accurate forecasts than the NAÏVE and some time-series models, with the exception of ARIMA. However, the ECMs that used the recent econometric techniques were able to produce better forecasts than the models based on the static OLS approach.

Moreover, the Kulendran and Witt (2001) study's time horizon analysis indicated that the ECMs produced the relatively best performing long-term forecasts, whereas the ARIMA models produced the most accurate short-term forecasts.

In a recent study, **Song, Witt and Jensen (2003)** made an attempt to evaluate the relative forecasting performance of six alternative econometric models in the context of international tourism for Denmark. The results of the ex-post forecasts of the six models were compared using ARIMA and NAÏVE models for benchmark comparison. These models were a general autoregressive distributed lag model; two error correction models – one based on the Wickens and Breusch (1988) approach, and the other on the Johansen (1988) maximum-likelihood approach; a reduced autoregressive distributed lag model; an unrestricted vector autoregressive model; and a time-varying parameter model. Both ARIMA and NAIVE models were used as benchmark models, and the study used annual data in double-log form taken over a 25-year period to estimate the tourism demand, from 1969 to 1993. Actual data taken from the period from 1994 to 1997 were retained for the purpose of evaluating the ex-post forecasting performance.

Song, Witt and Jensen (2003) selected Germany, the Netherlands, Norway, Sweden, the United Kingdom and the United States as Denmark's major tourist origin countries. The tourism demand variable was measured by dividing the expenditure-weighted number of nights spent by tourists from each selected origin country (the weights reflected the different daily spending of tourists in various accommodations) by the population of the tourist's origin country. The income variable was represented by the origin country's current real private consumption expenditure per capita. The price variable was defined using the real cost of living for tourists in Denmark, and measured using the Denmark CPI relative to the CPI of each origin country, and adjusted using the market exchange rate to transform the price variable into the value of each origin country's currency. In addition, the substitute price variable represented the relative cost of tourism between Denmark and the substitute destinations for each origin country. It was measured using the cost of living for tourists in Denmark, relative to a weighted average of the cost of living for tourists in each of the alternative destinations. The transportation cost variable was included in the long-haul markets only, and was defined as the travel cost from the selected origin country to Denmark. Five dummy variables, two representing the oil crises, one representing the Gulf War crisis, one for the reunification of Germany, and one for the United States' bombing of Libya, and a time trend variable were also included in the model.

Song, Witt and Jensen (2003) produced one- to four-year ex-post forecasts, based on the six alternative econometric models. The researchers evaluated the relative forecasting performances using MAPE and RMSPE criteria. The empirical results indicated that the TVP model generated the most accurate one-year-in-advance forecasts, followed by the static OLS models. The TVP and static OLS models produced the most accurate two-year-in-advance forecasts, but only the static OLS models produced most accurate three- to four-year-in-advance forecasts. The Johansen ECM and the ARIMA models produced the least accurate forecasts. The results indicated that the NAÏVE models performed with a forecasting accuracy close to the best performing model. The finding indicates that the NAÏVE model performs better than the ECM agrees with empirical results obtained by Kulendran and King (1997) and Kulendran and Witt (2001), but is in contrast to Kim and Song (1998).

Song, Witt and Li (2003) applied the general to specific modelling approach to estimate, test and select the preferred tourism demand model for Thai Tourism. Song, Witt and Li (2003) selected Australia, Japan, Korea, Singapore, Malaysia, the U.K. and the U.S.A as Thailand's major tourist origin countries. Song, Witt and Li (2003) selected the absolute number of tourist arrivals as their dependent variable. Independent variables include current income, own tourism price, substitute price, trade volume and seven dummy variables. In addition, they used one period lag of tourist arrivals to represent the habit persistence effect. In accordance with Kim and Song (1998) studies, the 'substitute price effect' was also considered in this study. In contrast to Kim and Song (1998), Song, Witt and Li (2003) substitute price variable is measured by a weighted average price index of alternative destination instead of a single country-pair substitute price variable in Kim and Song (1998) study. The selection of the number of substitute destinations was decided subjectively based on the geographically proximity in the context of international tourism in Thailand. Singapore, Indonesia and the Philippines were chosen as alternative destinations for Malaysia; Malaysia, Indonesia and the Philippines for Singapore; and Singapore, Malaysia, the Philippines and Indonesia for the country of Australia, Japan, Korea, U.K and the U.S.A.

Seven dummy variables, two representing the oil crisis, two representing the Asian financial crisis, one for the influence of the ' Visit Thailand Year' Campaign, and one dummy variable for Seoul Olympics in 1988, and one for the Korean student demonstration in 1980. The study used annual data collected over a period of 38 years from 1963-2000 for Australia and the U.K. and a period of 33 years from 1968-2000 for the other origin countries.

Song, Witt and Li (2003) derived various specific models from the general ADLM by imposing different restrictions on the parameters. These models are the autoregressive, static, growth rate, partial adjustment, dead start and leading indicator. The most prevailing functional form was selected on the basis of the results of restriction F test statistics. Those selected functional forms are examined in addition to the reduced ADLM, the Wickens-Breusch ECM and the Johansen ECM for the selection of the most preferred forecasting models for Thailand Tourism. The most preferred forecasting models were selected on the basis of a number of strict criteria, including the goodness of fit, diagnostic statistics and expost forecasting ability. The expost forecasting performance was evaluated based on the MAPE and RMSE criterion. The forecasting model that performed relatively well for each of the origin countries is selected to generate ex-ante forecasts for the period up to 2010.

The empirical results indicated that the habit persistence effect is the most important factor that influences the demand for Thai tourism by tourists from all origin countries. The income, own tourism price, cross price and trade volume variables are also important economic variables for Thai tourism, however, the relative importance varies from origin to origin. In particular, trade volume variables are significant only in the case of Singapore and the U.S.A. This is not surprising because both countries generate a relatively high proportion of business travellers. While the significance of the dummy variables varies from origin to origin, the Asia financial crisis had the most widespread impacts on the demand for Thai tourism among the origin countries.

The results of ex-ante forecasts suggested that Korea, Malaysia and Japan are expected to be the largest tourism generating countries by the end of the forecasting period. While the growth rate of tourist arrivals for Korea is predicted to be the highest, the growth rate from the U.K. will be the slowest among the seven origin countries.

In a similar study, **Song and Witt (2003)** employed the general to specific approach to model and forecast tourism demand in South Korea. The models were estimated based on the data on inbound tourism to South Korea from Germany, Japan, the United Kingdom, and the United states. Song and Witt (2003) select the absolute number of tourist arrivals. Independent variables include current income, own tourism price, the substitute price, trade volume, and four dummy variables. In contrast to Kim and Song (1998), Song and Witt (2003) substitute price variable is a weighted average price index of six major competing destinations in Southeast Asia. The models were estimated using annual data for 1962-1994 and the data from 1995-1998 were used for the evaluation of forecasting accuracy.

In accordance with Song and Witt (2003), the preferred forecasting models were selected from the list of static, autoregressive, growth rate, leading indicator, partial adjustment, dead start, finite distributed lag and error correction models based on the goodness of fit, diagnostic statistics and ex-post forecasting ability. The empirical results showed that the lagged dependent variables are highly significant in all models (with the exception of U.K. model), indicating that the habit persistent effect is the most important factor that influences the demand for Tourism in Korea. The income, own price, substitute price and trade volume variables played some role in the model, however, the relative importance varies from origin to origin. In particular, the income and own price variables are not significant in the Germany model and Japan model, however, the estimated models for the United Kingdom and the United States indicated that all the independent variable played a role in determining the demand for Korean tourism by residents of these two countries. Finally, Song and Witt (2003) had demonstrated the use of general-to specific methodology in econometric modelling and forecasting of tourism demand. In summary, the results of forecasting performance of ECM obtained from previous studies differed in the selection of different methodologies used, data frequencies used, different selected explanatory variables and the method of measuring data.

9.2.1 Review of Tourism Demand Forecasting Performance – Hong Kong Evidence

No previous tourism demand studies have attempted to use the ECM model to forecast tourism demand for Hong Kong. The **Lin and Sung (1983)** tourism demand model used the classical least square regression (OLS) technique to model the level of tourist arrivals in Hong Kong. To do so, they assumed a linear function of the economic factors (such as income, price and special events, etc.) existed to influence arrivals. However, the Lin and Sung (1983) model was open to the criticism of spurious regression, because the researchers failed to check the time-series properties of the model's underlying variables.

Law and Au (1999) employed an alternative modelling strategy, using a supervised feed-forward neural network model to forecast the number of Japanese tourist arrivals in Hong Kong. The researchers compared the forecasting performance of the network using various alternative model specifications, including the OLS, NAÏVE, moving average, and single exponential smoothing models. On the basis of the MAPE criterion, Law and Au (1999) found that the neural network model produces better forecasts than the other time-series specifications and the NAÏVE models.

The **Chu (1998)** tourism demand forecasting study focused primarily on the study of countries in the Asia Pacific region, including Hong Kong. Chu (1998) applied six time-series forecasting models, including ARIMA, to examine tourism demand in some of the most popular East Asia and Pacific region destinations to indicate the forecasting ability of several forecasting models. Six time series models are used in Chu (1998) study for forecasting comparison: (1) Naïve 1 model is the benchmark model which the forecast for the period t + 1 is equal to the number of arrivals in period t. (2) Naïve 2 model is the benchmark model which the forecast for period t + 1 is equal to the actual number of arrivals in period t multiplied by the growth rate over the corresponding previous period. (3) Linear trend model is a straight-line regression model that related the time with the number of visitor arrivals. (4) Sinewave model is a time series model that includes a sine function in time to model the cyclic trend in the visitor arrivals model. (5) Holt- Winters model is an extension of the exponentially smoothing time series forecasting model which is made up of the sum of level, linear trend and residuals in the time series model. (6) ARIMA model is a univariate time series model which seeks to model a single variable as an autoregressive moving average process and which may be extended to accommodate seasonalities in the data by using seasonal differences. Each was examined empirically using monthly international arrival data for tourists to Hong Kong, Taiwan, Japan, South Korea, Singapore, Indonesia, Thailand, New Zealand and Australia. However, Chu (1998) did not include any econometric models such as static OLS or dynamic ECMs in the study.

The empirical results of the Chu (1998) time-series models were consistent with Witt and Witt (1995), in that the forecasting error difference was critically dependent on the country being forecasted. The errors, based on the MAPE criterion, indicated that the ARIMA model produced the most accurate forecasts of international tourism demand in the various destinations around the EAP region. Chu (1998) did not attempt to compare the forecasting performance of the econometric models and the time-series models for Hong Kong specifically.

9.3 Forecasting Results of Tourism Demand Model – Summary of Alternative Forecasting Models (All Origin Countries)

In Chapters 6 and 7, we estimated econometric models of tourism demand in Hong Kong based on alternative cointegration approaches. The resulting error correction model appears to perform well as a forecasting tool, providing a useful framework for forecasting the short-run fluctuations in tourist arrivals in Hong Kong. In this section, we will summarise and compare the forecasting performance of the alternative ECMs, OLS, ARIMA and benchmark NAÏVE models for all origin countries over five different forecasting horizons. This allows the researcher to investigate whether the models will have different forecasting power when the length of the forecasting period varies. Witt and Witt (1995) indicated that forecasting based on various time horizons is relevant to decision making. For example, short-term forecasts are required for scheduling and staffing, medium term forecasts for planning tourism facilities and long horizon forecasts for investment in aircraft, theme park, hotel and infrastructures. The bold figures in Tables 9.1A and 9.1B illustrate the first ranking model of the seven competing forecasting models based on the MAE and RMSE criteria, respectively (refer to page 163 and 164). The numbers in the parentheses, ( ), ranging from 1 to 7, rank the seven competing forecasting models, while the capital letters in the box, ranging from A to E, indicate the individual rankings of the five econometric forecasting models (excluding the NAÏVE and ARIMA). Both rankings are indications of how the seven forecasting models and the five alternative econometric models perform in producing forecasts over the period of ex-post forecasting. The Best ECM (Rank A) in Table 9.1A and Table 9.1B indicates the ECMs with the least forecasting errors.

Table 9.1A Summary of Results of Forecasting Performance – (Alternative Forecasting Models, All Origin Countries and Mean Square Error)

(a) Results of One-Year Forecasts (MAE)

Method	U.S.	U.K.	Germany	China	Japan	Taiwan	Average
ECM (E-G)	0.03184 (1) A	0.068166 (1) A	0.10608 (1) A	0.062732 (4) C	0.10125 (1) A	0.14953 (4) B	0.08660 (1) A
ECM (JO II)	0.07394 (6) D	0.08015 (4) C	0.12539 (2) B	0.051417 (2) A	0.10424 (2) B	0.11961 (2) A	0.09245 (2) B
ECM (JO III)	0.06998 (4) C	0.07734 (3) B	0.12748 (3) C	0.056749 (3) B	0.10506 (3) C	0.15587 (5) C	0.09874 (3) C
ECM (PES)	0.058835 (3) B	0.08775 (5) D	0.16883 (6) D	0.13767 (7) E	0.14643 (5) E	0.22969 (7) E	0.13820 (6) D
OLS	0.08121 (7) E	0.23864 (7) E	0.28621 (7) E	0.08628 (5) D	0.14479 (4) D	0.15788 (6) D	0.16583 (7) E
NAÏVE	0.07061 (5)	0.1119 (6)	0.1358 (5)	0.04586 (1)	0.19069 (7)	0.1261 (3)	0.11349 (5)
ARIMA	0.04592 (2)	0.07299 (2)	0.1335 (4)	0.08651 (6)	0.16738 (6)	0.08639 (1)	0.098781 (4)
Best ECM	0.03184	0.068166	0.10608	0.051417	0.10125	0.11961	0.079727

(b) Results of Two-Year Forecasts (MAE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	**0.03190** **(1) A**	**0.06588** **(1) A**	**0.12535** **(1) A**	0.07227 (4) C	**0.10332** **(1) A**	0.16016 (5) C	**0.09314** **(1) A**
ECM (JO II)	0.0706 (6) D	0.07526 (4) C	0.13608 (3) B	**0.04992** **(1) A**	0.10589 (2) B	0.12364 (2) A	0.09356 (2) B
ECM (JO III)	0.06648 (4) C	0.07176 (3) B	0.13921 (4) C	0.05235 (2) B	0.10831 (3) C	0.15333 (4) B	0.09857 (3) C
ECM (PES)	0.04871 (2) B	0.09727 (5) D	0.14730 (6) D	0.12750 (7) E	0.14136 (4) D	0.1963 (7) E	0.12641 (6) D
OLS	0.1003 (7) E	0.29563 (7) E	0.32106 (7) E	0.10359 (6) D	0.14390 (5) E	0.16424 (6) D	0.18812 (7) E
NAÏVE	0.06695 (5)	0.11541 (6)	0.12610 (2)	0.06805 (3)	0.17446 (7)	0.12620 (3)	0.11286 (5)
ARIMA	0.04985 (3)	0.07401 (2)	0.14496 (5)	0.09977 (5)	0.16716 (6)	**0.078002** **(1)**	0.10230 (4)
Best ECM	0.03190	0.06588	0.12535	0.04992	0.10332	0.12364	0.08833

(c) Results of Five-Year Forecasts (MAE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	**0.03050** **(1) A**	0.067504 (2) B	**0.10782** **(1) A**	0.05984 (3) C	**0.09331** **(1) A**	0.16952 (6) D	**0.08808** **(1) A**
ECM (JO II)	0.06386 (5) D	0.06822 (3) C	0.13683 (5) C	**0.05027** **(1) A**	0.10005 (2) B	0.12142 (2) A	0.09010 (2) B
ECM (JO III)	0.06026 (4) C	**0.06486** **(1) A**	0.14595 (6) D	0.05541 (2) B	0.10141 (3) C	0.15288 (4) B	0.09679 (4) C
ECM (PES)	0.04750 (2) B	0.11762 (6) D	0.12571 (3) B	0.10285 (6) D	0.14773 (5) E	0.15998 (5) C	0.11689 (6) D
OLS	0.1377 (7) E	0.56674 (7) E	0.3372 (7) E	0.29285 (7) E	0.12545 (4) D	0.21762 (7) E	0.27959 (7) E
NAÏVE	0.06503 (6)	0.11598 (5)	0.11453 (2)	0.07059 (4)	0.15831 (7)	0.12489 (3)	0.10822 (5)
ARIMA	0.05142 (3)	0.09244 (4)	0.13322 (4)	0.09817 (5)	0.15813 (6)	**0.07509** **(1)**	0.10141 (3)
Best ECM	0.03050	0.06486	0.10782	0.05027	0.09331	0.12142	0.07803

(d) Results of Seven-Year Forecasts (MAE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	0.030622 (1) A	0.070391 (3) C	0.11570 (1) A	N.A	0.09741 (1) A	0.16896 (6) D	0.09661 (1) A
ECM (JO II)	0.068754 (6) D	0.070388 (2) B	0.14059 (5) C	N.A	0.10358 (2) B	0.11605 (2) A	0.09987 (2) B
ECM (JO III)	0.058688 (4) C	0.06403 (1) A	0.14413 (6) D	N.A	0.10525 (3) C	0.15483 (5) C	0.10538 (4) C
ECM (PES)	0.049558 (2) B	0.12699 (6) D	0.12932 (3) B	N.A	0.15443 (5) E	0.15371 (4) B	0.12280 (6) D
OLS	0.1569 (7) E	0.7718 (7) E	0.34418 (7) E	N.A	0.12844 (4) D	0.23219 (7) E	0.3267 (7) E
NAÏVE	0.066161 (5)	0.11711 (5)	0.11595 (2)	N.A	0.16286 (7)	0.12430 (3)	0.11727 (5)
ARIMA	0.05322 (3)	0.085436 (4)	0.138115 (4)	N.A	0.16146 (6)	0.07449 (1)	0.10254 (3)
Best ECM	0.030622	0.06403	0.1157	N.A.	0.09741	0.11605	0.08476

(e) Results of Ten-Year Forecasts (MAE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	0.026164 (1) A	0.06888 (1) A	0.11915 (1) A	N.A	0.09491 (2) B	0.16047 (3) A	0.09391 (1) A
ECM (JO II)	0.088241 (6) D	0.07317 (3) B	0.12627 (3) C	N.A	0.09395 (1) A	0.17981 (5) C	0.11228 (3) B
ECM (JO III)	0.074776 (5) C	0.07554 (4) C	0.12576 (2) B	N.A	0.09681 (3) C	0.28316 (7) E	0.13121 (5) C
ECM (PES)	0.0556 (3) B	0.12925 (6) D	0.13699 (5) D	N.A	0.1471 (5) E	0.2132 (6) D	0.13643 (6) D
OLS	0.11108 (7) E	0.85562 (7) E	0.2935 (7) E	N.A	0.1235 (4) D	0.166 (4) B	0.30994 (7) E
NAÏVE	0.07061 (4)	0.11191 (5)	0.13583 (4)	N.A	0.1907 (7)	0.12605 (2)	0.12702 (4)
ARIMA	0.05543 (2)	0.07273 (2)	0.15637 (6)	N.A	0.16033 (6)	0.08334 (1)	0.10564 (2)
Best ECM	0.026164	0.06888	0.11915	N.A.	0.09395	0.16047	0.09373

Table 9.1B Summary of Results of Forecasting Performance (Alternative Forecasting Models, All Origin Countries and Root Mean Square Error)

(a) Results of One-Year Forecast (RMSE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	0.03184 (1) A	0.068166 (1) A	0.10608 (1) A	0.062732 (4) C	0.10125 (1) A	0.14953 (4) B	0.08660 (1) A
ECM (JO II)	0.07394 (6) D	0.080148 (4) C	0.12539 (2) B	0.051417 (2) A	0.10424 (2) B	0.11961 (2) A	0.09245 (2) B
ECM (JO III)	0.069979 (4) C	0.077337 (3) B	0.12748 (3) C	0.056749 (3) B	0.10506 (3) C	0.15587 (5) C	0.09874 (3) C
ECM (PES)	0.058835 (3) B	0.087746 (5) D	0.16882 (6) D	0.13767 (7) E	0.14643 (5) E	0.22969 (7) E	0.13819 (5) D
OLS	0.08121 (7) E	0.23864 (7) E	0.28621 (7) E	0.08628 (5) D	0.14479 (4) D	0.15788 (6) D	0.16583 (6) E
NAÏVE	0.070614 (5)	0.1119 (6)	0.13583 (5)	0.04586 (1)	0.190693 (7)	0.12605 (3)	0.11349 (7)
ARIMA	0.0459132 (2)	0.07299 (2)	0.13357 (4)	0.08651 (6)	0.16738 (6)	0.086397 (1)	0.09879 (4)
Best ECM	0.03184	0.068106	0.10608	0.051417	0.10125	0.11961	0.079717

(b) Results of Two-Year Forecast (RMSE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	0.035297 (1) A	0.07532 (1) A	0.13693 (1) A	0.07881 (3) C	0.11085 (1) A	0.16379 (4) B	0.10016 (1) A
ECM (JO II)	0.077039 (6) D	0.08661 (4) C	0.15596 (6) D	0.06073 (1) A	0.11840 (2) B	0.12749 (2) A	0.10437 (2) B
ECM (JO III)	0.070018 (4) C	0.081787 (2) B	0.15685 (4) B	0.06298 (2) B	0.12050 (3) C	0.16413 (5) C	0.10937 (3) C
ECM (PES)	0.05634 (3) B	0.11074 (5) D	0.16133 (5) C	0.13858 (7) E	0.15022 (4) D	0.23269 (7) E	0.14165 (6) D
OLS	0.10710 (7) E	0.30833 (7) E	0.32909 (7) E	0.11214 (5) D	0.16662 (5) E	0.18580 (6) D	0.20151 (7) E
NAÏVE	0.072097 (5)	0.12658 (6)	0.14185 (2)	0.12463 (6)	0.21573 (7)	0.13490 (3)	0.13598 (5)
ARIMA	0.053969 (2)	0.085805 (3)	0.15340 (3)	0.100409 (4)	0.20991 (6)	0.092804 (1)	0.11605 (4)
Best ECM	0.035297	0.07532	0.13693	0.06073	0.11085	0.12749	0.09110

(c) Results of Five-Year Forecast (RMSE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	0.03596 (1) A	0.07652 (1) A	0.12987 (1) A	0.08553 (3) C	0.10774 (1) A	0.17642 (4) B	0.10201 (1) A
ECM (JO II)	0.08087 (6) D	0.08433 (3) C	0.17428 (5) C	0.05976 (1) A	0.11917 (2) B	0.13621 (2) A	0.1091 (2) B
ECM (JO III)	0.07234 (5) C	0.07756 (2) B	0.18152 (6) D	0.06520 (2) B	0.12057 (3) C	0.17668 (5) C	0.11564 (3) C
ECM (PES)	0.06216 (3) B	0.13713 (5) D	0.17016 (4) B	0.12928 (6) D	0.17007 (5) E	0.20248 (6) D	0.14521 (6) D
OLS	0.14831 (7) E	0.60825 (7) E	0.36363 (7) E	0.3102 (7) E	0.16765 (4) D	0.23990 (7) E	0.30632 (7) E
NAÏVE	0.07217 (4)	0.13042 (6)	0.14942 (2)	0.09916 (4)	0.21335 (7)	0.13688 (3)	0.13357 (5)
ARIMA	0.057778 (2)	0.11423 (4)	0.16216 (3)	0.10858 (5)	0.19051 (6)	0.09086 (1)	0.12069 (4)
Best ECM	0.035966	0.07652	0.12987	0.05976	0.10774	0.13621	0.09101

(d) Results of Seven-Year Forecast (RMSE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	0.036959 (1) A	0.07794 (2) B	0.14295 (1) A	N.A	0.11860 (1) A	0.17713 (4) B	0.11071 (1) A
ECM (JO II)	0.085004 (6) D	0.08456 (3) C	0.18276 (5) C	N.A	0.12995 (2) B	0.13361 (2) A	0.12317 (2) B
ECM (JO III)	0.074997 (5) C	0.07703 (1) A	0.18584 (6) D	N.A	0.13178 (3) C	0.18508 (5) C	0.13094 (4) C
ECM (PES)	0.064509 (3) B	0.14725 (5) D	0.16379 (3) B	N.A	0.18476 (5) E	0.20593 (6) D	0.15324 (6) D
OLS	0.17178 (7) E	0.83752 (7) E	0.36797 (7) E	N.A	0.18226 (4) D	0.26379 (7) E	0.36466 (7) E
NAÏVE	0.073605 (4)	0.133855 (6)	0.15493 (2)	N.A	0.23051 (7)	0.14262 (3)	0.14710 (5)
ARIMA	0.060975 (2)	0.10168 (4)	0.18267 (4)	N.A	0.19837 (6)	0.09719 (1)	0.12818 (3)
Best ECM	0.036959	0.07703	0.14295	N.A.	0.11860	0.13360	0.10183

(e) Results of Ten-Year Forecast (RMSE)

Method	United States	United Kingdom	Germany	China	Japan	Taiwan	Average
ECM (E-G)	0.033278 (1) A	0.08219 (1) A	0.15185 (1) A	N.A	0.12061 (1) A	0.17143 (3) A	0.11187 (1) A
ECM (JO II)	0.10293 (6) D	0.09176 (3) B	0.15665 (2) B	N.A	0.12468 (2) B	0.20633 (5) C	0.13647 (3) B
ECM (JO III)	0.10261 (5) C	0.09288 (4) C	0.16902 (5) D	N.A	0.12725 (3) C	0.32814 (7) E	0.16398 (5) C
ECM (PES)	0.06686 (3) B	0.15698 (6) D	0.16512 (3) C	N.A	0.16557 (4) D	0.29636 (6) D	0.17017 (6) D
OLS	0.12615 (7) E	0.9764 (7) E	0.34574 (7) E	N.A	0.17275 (5) E	0.1983 (4) B	0.36387 (7) E
NAÏVE	0.080426 (4)	0.12847 (5)	0.18770 (6)	N.A	0.21265 (7)	0.14520 (2)	0.15089 (4)
ARIMA	0.06502 (2)	0.08779 (2)	0.16516 (4)	N.A	0.20312 (6)	0.10626 (1)	0.12547 (2)
Best ECM	0.033278	0.08219	0.15185	N.A.	0.12061	0.17143	0.11187

Notes 1.The Microfit output for the forecasting results of four dynamic ECM models and one static OLS model for the origin countries of Japan, Taiwan, China, United States, United Kingdom and Germany are available under request. Also, the SAS output for the selection of the order of the ARIMA model, the forecasting results of the ARIMA model, the EXCEL output for the calculation of forecasting errors for all seven forecasting models and all six origin countries are available under request

As shown in Tables 9.1A, 9.1B and 9.8, the Engle-Granger ECM is the best econometric model for forecasting tourism demand for the markets of the United States, the United Kingdom, Japan and Germany. The Johansen, Case 2, ECM is the best econometric model for forecasting tourism demand for the markets of China and Taiwan, in terms of its minimal forecast errors over all time horizons.

Overall, these alternative dynamic ECMs produce the most accurate forecasts in most of the origin countries, but the ranking results indicate that the ARIMA models produce more accurate forecasts than alternative ECMs for the Taiwan market.

9.3.1 Comparison of Forecasting Performance – Dynamic ECM and Static OLS Models

Tables 9.2A and 9.2B illustrate the results of the forecasting errors of the alternative classification of estimating models for all of the origin countries over all of the time horizons, based on the MAE and RMSE criteria, respectively. We use the case assessment method in conjunction with the absolute error method to evaluate the relative forecasting performance of the alternative models to avoid problems of estimation bias created by extreme value. We divided the four alternative ECM models into three categories: the ALL ECMs, the CORE ECMs and the BEST ECMs, in order to provide comprehensive evidence of the alternative ECMs. The definitions of the ALL ECMs and CORE ECMs are provided in the notes below Tables 9.2A and Table 9.2B. The results using the case method test indicate that the "ALL ECMs" outperform the OLS model in 91.07% of the cases, based on both the MAE and the RMSE criteria. In addition, the results for all of the origin countries estimated over all time horizons, based on the error magnitude test shown in Table 9.5, indicate that the "ALL ECMs" produce 82.30% (MAE) and 78.58% (RMSE) fewer errors than the OLS model. Moreover, if either of the forecasting errors of the "CORE ECMs" or the "BEST ECMs" is compared with the OLS model, the positive difference is even more substantial. These findings are in agreement with Kulendran and Witt (2001), who found that when more attention was paid to diagnostic checking, and if consideration was given to the recent developments in the cointegration approaches for modelling tourism demand, a substantial improvement was realised in forecasting accuracy.

Table 9.2A Results of Forecasting Accuracy (Alternative Categories of Models : Case Method and MAE) All Origin Countries and All Time Horizons

Model X	Y	No. of Cases Favour Model X	No. of Total Cases
ALL ECMs	NAÏVE	67	112
ALL ECMs	OLS	102	112
ALL ECMs	ARIMA	60	112
CORE ECM	OLS	55	56
CORE ECM	NAÏVE	38	56
CORE ECM	ARIMA	37	56
ECM (PES) all countries	ALL ECMs	18	84
ECM (PES), United States	ALL ECMs	10	15
OLS	NAÏVE	5	28
BEST ECMs	OLS	28	28
BEST ECMs	ARIMA	23	28
BEST ECMs	NAÏVE	26	28
ARIMA	OLS	26	28
ARIMA	NAIVE	21	28

Table 9.2B Results of Forecasting Accuracy (Alternative Categories of Models : Case Method and RMSE) All Origin Countries and All Time Horizons

Model X	Y	No. of Cases Favour Model X	No. of Total Cases
ALL ECMs	NAÏVE	69	112
ALL ECMs	OLS	102	112
ALL ECMs	ARIMA	54	112
CORE ECM	OLS	55	56
CORE ECM	NAÏVE	37	56
CORE ECM	ARIMA	35	56
ECM, (PES) ALL	ALL ECMs	17	84
ECM, (PES) United States	ALL ECMs	10	15
OLS	NAÏVE	6	28
BEST ECMs	OLS	28	28
BEST ECMs	ARIMA	23	28
BEST ECMs	NAÏVE	26	28
ARIMA	NAIVE	23	28
ARIMA	OLS	28	28

Notes:

1. ALL ECMs = Engle-Granger ECM, Johansen ECM (Case 2), Johansen, ECM (Case 3) and Pesaran ECM
2. CORE ECMs = Engle-Granger ECM and Johansen, ECM (Case 3)
3. ECM (PES), United States = ECM (Pesaran, the United States)
4. ECM (PES) = ALL ECM (Pesaran), including all origin countries.
5. OLS forecasts are compiled based on level form; ECM, NAÏVE forecasts are compiled based on first difference form.

9.3.2 Comparison of Forecasting Performance – Dynamic ECMs and NAÏVE Models

In Tables 9.2A and 9.2B, the empirical results based on the case method test indicate that the "ALL ECMs" produce better forecasts than the NAÏVE models in 59.82% (MAE) and 61.60% (RMSE) of the cases, out of a total of 112 cases. In addition, the empirical results based on the error magnitude test, as shown in Table 9.5, indicate that "ALL ECMs" generate 10.84% (RMSE) and 8.91% (MAE) fewer errors than the NAÏVE models. The empirical results, based on the case method, as shown in Table 9.2A, indicate that the "CORE ECMs" produce better forecasts than the NAÏVE models in 67.85% (MAE) and 66.07% (RMSE) of the 56 cases. In addition, when the "CORE ECMs" are compared with the NAÏVE model in terms of absolute errors, the "CORE ECMs" generate 15.71% (MAE) and 18.61% (RMSE) fewer errors than the NAÏVE method, as shown in Table 9.5. Overall, the results of both the case and the absolute error methods indicate that dynamic ECMs produce better tourism demand forecasts than the benchmark NAÏVE models. This finding agrees with the Kim and Song (1998) study, but disagrees with those of Kulendran and Witt (2001).

9.3.3 Comparison of Forecasting Performance – Dynamic ECMs and ARIMA Models

The empirical results based on the case method test indicate that the "ALL ECMs" produce better forecasts than the ARIMA in 53.5% of the 112 cases based on the MAE criterion. However, in terms of RMSE, the ARIMA produces better forecasts than "ALL ECMs" in 51.78% of the 112 cases. In addition, the empirical results shown in Table 9.5 indicate that the ARIMA produces 3.62% (MAE) and 3.64% (RMSE) fewer errors than the "All ECM" models, indicating a superiority of our selected ARIMA models. However, when we evaluate the relative forecasting performance based on the definitions of "CORE ECMs" (Engle and Granger and Johansen, Case 3) instead of the "ALL ECMs", the "CORE ECMs" outperform the ARIMA models in 66.07% (MAE) and 62.5% (RMSE) of the 56 cases. Likewise, the "CORE ECMs" generate 3.21%(MAE) and 4.18% (RMSE) fewer errors than the ARIMA models based on the error magnitude test.

In addition, the case method test results for the "BEST ECMs", as shown in Tables 9.2A and 9.2B, indicate that these ECMs with minimal forecasting errors for each market produce more accurate forecasts than the ARIMA models in 82.14% (MAE and RMSE) of the 28 cases. Moreover, the results from the method of forecasting error magnitude test, as shown in Table 9.5, indicate that the "BEST ECMs" produce 18.40% (MAE) and 21.35% (RMSE) fewer errors than did the ARIMA model.

In summary, our empirical results suggest that the "CORE ECMs" and "BEST ECMs" outperform the ARIMA model in terms of forecasting ability for tourism demand across all countries and time horizons. The finding agrees with Kim and Song (1998), but contradicts Kulendran and Witt (2001).

9.3.4 Comparison of Forecasting Performance – ARIMA, OLS and NAÏVE Models

Chu (1998) concluded that the ARIMA models produced relatively accurate forecasts. Although ARIMA model building approach can provide relatively accurate forecasts, it involves subjective judgements on the part on the researcher. Thus, it is essential to assess the overall forecasting performance of our selected ARIMA models. In Section 9.3.3, we compared the forecasting performances of the ARIMA and the ECMs, but the ARIMA models must also be compared with the static OLS and NAÏVE models in order to assess the overall forecasting ability of our selected benchmark ARIMA models in the context of tourism demand forecasting. The case method test results shown in Tables 9.2A and 9.2B indicate that the ARIMA models produce better forecasts than the OLS models in 100% (MAE and RMSE) of the 28 cases. In addition, the ARIMA models produce better forecasts than the NAÏVE models in 75% (MAE) and 82.14% (RMSE) of the 28 cases. Likewise, the results based on the error magnitude test, as shown in Table 9.5, indicate that our selected ARIMA models produce 12.52% (MAE) and 14.46% (RMSE) fewer errors than the NAÏVE models, and 75.20% (MAE) and 81.65% (RMSE) fewer errors than the OLS models.

In summary, the forecasting ability of our selected ARIMA models is better than the benchmark NAÏVE models. This finding agrees with Chu (1998), but contradicts Kulendran and Witt (2001). However, the ARIMA models produce more forecast errors when compared with the "CORE ECM" and the "BEST ECMs". Therefore, the findings of this study suggests that the ARIMA models are not the best forecasting models, as the "CORE ECM" and the "BEST ECMs" produce better overall forecasts performance. This finding agrees with Kim and Song (1988), but contradicts Gonzalez and Moral (1995).

9.3.5 Comparison of Forecasting Performance – BEST ECMs, OLS, NAÏVE and ARIMA Models

As shown in Tables 9.1A and Table 9.1B, overall, the Engle-Granger ECM is the "BEST ECM" (the ECM model with the fewest forecast errors) in all of the long-haul markets and Japan; while the Johansen, Case 2 ECM is selected as the "BEST ECM" in the Taiwan and China markets. The empirical results based on case method in Tables 9.2A and Table 9.2B indicate that the "BEST ECM" produces better forecasts than the ARIMA and OLS models in 82.14% and 100% (RMSE and MAE) of the 28 cases, respectively. In addition, the "BEST ECMs" outperform the NAÏVE models in 92.86% (MAE and RMSE) of the 28 cases. The results of the absolute error magnitude test indicate that the "BEST ECMs" produce fewer forecasts errors than the NAÏVE, ARIMA and OLS models in 30.75%, 18.40% and 99.80%, (MAE), respectively. When the RMSE is used as the criterion, the "BEST ECM" produces fewer forecast errors than the NAÏVE ARIMA and OLS models in 35.54%, 21.35% and 98.70%, (RMSE), respectively. In summary, the "BEST ECM" clearly outperformed the ARIMA, NAÏVE and OLS models in terms of forecasting ability, a finding that agrees with Kim and Song (1998), but contradicts Kulendran and Witt (2001) and Gonzalez and Moral (1995).

The results shown in Table 9.5 indicate that the "BEST ECM", CORE ECM" and ARIMA models produce better forecasts than the NAÏVE model. In particular, the empirical results indicate that the econometric models with the applications of new variables, new way of measuring of economic variables and estimation procedures based on the alternative cointegration approaches produce more accurate econometric forecasts than the benchmark NAÏVE and ARIMA models. Our empirical findings support the conclusions of Kim and Song (1998), but contradict Gonzalez and Moral (1995), Kulendran and King (1997), and Kulendran and Witt (2001). More importantly, this finding is based on Hong Kong's data as opposed to the common belief in the empirical literature that states that NAÏVE and ARIMA models always produce better forecasts than ECM models.

9.3.6 Further Analysis of Forecasting Performance – Pesaran ECMs

The tourism demand models based on the Pesaran and Shin (1998) approach were estimated separately in Chapter 7 because the results of the ADF unit root tests in Chapter 6 indicated that there is empirical uncertainties in establishing same order of integration for all underlying variables for the United States, Japan and China models. There is thus a strong need to ask whether or not the ECMs based on the more recent Pesaran and Shin (1998) approach could produce more accurate forecasts than other ECMs, based on traditional cointegration approaches. This is especially true for preferred ECMs that experience problems in identifying the same order of integration for all of the underlying variables. Besides, Kulendran and King (1997) suggested that there is growing consensus that suggests most popular unit root tests for the order of integration lack power. This clearly suggests that there is also a need to re-examine other ECMs that do not experience problems in determining the same levels of integration for all of their underlying variables. Our empirical results indicated that when the results of the Pesaran ECMs for all origin countries over all forecasting horizons are compared with those of alternative ECMs (Engle-Granger, Johansen, Case 2 and Johansen, Case 3 models), the Pesaran ECMs produce less accurate forecasts than the others, based on either the case or the absolute error methods.

As shown in Table 9.2A, the results of the case method test indicate that the Pesaran ECMs produce better forecasts for all of the countries in only 21.43% (MAE) and 20.24% (RMSE) of the 84 cases than the "ALL ECM". The results based on the absolute error magnitude test indicate that the Pesaran ECMs generate 19.00% (MAE) and 20.22% (RMSE) more average forecast errors than the "ALL ECM".

However, the forecasting performance of the Pesaran ECMs varied according to the tourist origin country. In particular, this ECM performed exceptionally well in forecasting tourism demand for the United States at 66.7% (MAE and RMSE) of all cases of alternative ECM. Likewise, the Pesaran ECMs for the United States generated 6.13% (MAE) and 4.50% (RMSE) fewer errors than the "ALL ECMs" (United States), based on the absolute error magnitude test, as shown in Table 9.8. The results of the individual rankings of selected origin countries, as shown in Table 9.8, indicate that the Pesaran ECMs rank as "B" (MAE and RMSE) for the United States model. This indicates that the ECMs based on the Pesaran and Shin (1998) approach could be recommended for use in developing an econometric model for predicting tourism demand. It is empirically important for the case in which there are doubts that the same level of differencing can be achieved to have stationarity for all of the model's underlying variables.

9.3.7 Further Analysis of Forecasting Performance – Time Horizon Analysis

In this section, the performance of the forecasting models is compared and examined with respect to forecasting time horizons. We have explored short-term (1 and 2 year), medium-term (5 year) and long-term (7 and 10 year) time frames for all origin countries for our time horizon analysis. This analysis will allow the forecasting performance of the alternative forecasting models to be compared with respect to the selected time horizon. In addition, the time horizon analysis is attempted to provide the objective evidence for suggestions about the best forecasting approach for a particular time horizon.

As shown in Tables 9.3A and 9.3B, the case method test results, based on the long-term horizon, indicate that the "CORE ECMs" produce better forecasts than the NAÏVE models in 70% (MAE) and 65% (RMSE) of the 20 cases. Likewise, the "CORE ECMs" produce better forecasts than the OLS models in 95% (MAE and RMSE) of the 20 cases, and the "CORE ECMs" produce better forecasts than the ARIMA models in 60% (MAE) and 55% (RMSE) of the 20 cases.

These findings indicate that the forecasting performance of the "CORE ECMs" is the best of the competing models on a long-term horizon. Likewise, the results of the absolute error magnitude test for the forecasts, shown in Table 9.7,confirm that the "CORE ECM" is a better model on the long-term horizon, because it generates 13.43% (MAE) fewer errors than the NAÏVE model and 99.52% (MAE) fewer errors than the OLS model. One exception to this trend is that the "CORE ECMs" produce 2.54% (MAE) and 1.98% (RMSE) more errors than the ARIMA model, indicating that the ARIMA model produces better forecasts on the long-term horizon, based on the absolute error method.

Likewise, the forecasting results of the error magnitude test on the short and medium-term horizons indicate that the "CORE ECMs" produce 7.84%, 17% and 83.90% (MAE) fewer forecasting errors than the ARIMA, NAÏVE, and OLS models, respectively. The results based on RMSE are similar to the above MAE results. The case method test results shown in Tables 9.3A and 9.3B indicate that the "CORE ECMs" produce better forecasts than those of the NAÏVE model in 66.66% (MAE and RMSE) of the 36 cases. In addition, the "CORE ECMs" produce better forecasts than the ARIMA and OLS models in 69.44% (MAE) and 66.66% (RMSE) and 100% (MAE and RMSE), of the 36 cases, respectively.

Overall, "CORE ECMs" perform better than the ARIMA, NAÏVE and OLS models over the short- and medium-term horizon and long-term horizon, respectively, based on the case and absolute error methods. One exception to this trend is that the ARIMA model produces better forecasts than "ALL ECMs" and "CORE ECMs" on the long-term horizon, based on the absolute error method. The results contradict the traditional view that ARIMA models tend to make much better forecasts than the ECMs on the short-term horizon.

As shown in Tables 9.6 and 9.7, the empirical results of seven alternative forecasting models indicate that the forecast errors increase with the length of the forecasting horizon, which is consistent with the findings of Kulendran and Witt (2001) and Kim and Song (1998).

9.3.8 Further Analysis of Forecasting Performance – Origin Country Analysis

Overall, the empirical results suggest that the overall average performance of the alterative categories of ECMs (ALL ECMs, CORE ECMs and BEST ECMs) is better than that of the ARIMA, NAÏVE and OLS models. However, the results shown in Table 9.8 vary with respect to the tourist arrivals from each individual origin country being forecast. With the MAE and RMSE criteria, the results based on the absolute error magnitude test indicate that the "BEST ECMs" is the most accurate specification for the United States, the United Kingdom, Japan, Germany and China. However, the "BEST ECMs" produce more forecasting errors than the NAÏVE and ARIMA models for tourist arrivals from Taiwan. This anomaly is partly caused by the difficulty in establishing the existence of a cointegration relationship in the Taiwan model, based on the Engle-Granger (1987) approach. In addition, the associated Engle-Granger ECM (Taiwan) suffered from the problem of normality. This finding is consistent with the conclusions of Kim and Song (1998), in that the forecasting performance of the ECM depends on the individual country being forecast.

Table 9.3A Results of Forecasting Accuracy – Alternative Categories of Models: Case Method and MAE)

All Countries and Short/Medium/Long Horizons

Model		Short-term		Medium		Long-term	
X	Y	Favour X	All Cases	Favour X	All Cases	Favour X	All Cases
ALL ECMs	NAÏVE	30	48	16	24	21	40
ALL ECMs	OLS	44	48	23	24	35	40
ALL ECMs	ARIMA	26	48	13	24	21	40
ECMs(PES)	ECM	5	36	4	18	9	30
OLS	NAÏVE	2	12	1	6	2	10
ARIMA	NAÏVE	9	12	4	6	8	10
BEST ECMs	ARIMA	10	12	5	6	8	10
CORE ECMs	NAÏVE	15	24	9	12	14	20
CORE ECMs	ARIMA	17	24	8	12	12	20
CORE ECMs	OLS	24	24	12	12	19	20
BEST ECMs	NAIVE	11	12	6	6	9	10

Table 9.3B Results of Forecasting Accuracy (Alternative Categories of Models, Case Method and RMSE)

All Countries and Short/Medium/Long Horizons

Model		Short-term		Medium		Long-term	
X	Y	Favour X	All Cases	Favour X	All Cases	Favour X	All Cases
ALL ECMs	NAÏVE	31	48	14	24	24	40
ALL ECMs	OLS	44	48	23	24	35	40
ALL ECMs	ARIMA	23	48	12	24	19	40
ECM(PES)	ECM	5	36	4	18	8	30
OLS	NAÏVE	3	12	1	6	2	10
ARIMA	NAÏVE	10	12	4	6	9	10
BEST ECMs	ARIMA	10	12	5	6	8	10
CORE ECMs	NAÏVE	16	24	8	12	13	20
CORE ECMs	ARIMA	16	24	8	12	11	20
CORE ECMs	OLS	24	24	12	12	19	20
BEST ECMs	NAIVE	11	12	6	6	9	10

Table 9.4A Results of Forecasting Accuracy – (Alternative Categories of Models, Case Method and MAE)

Each Origin Country and All Time Horizons

Model		United States		United Kingdom		Germany		Long-haul	
X	Y	Favour X	All Cases	Favour X	All Cases	Favour X	All Cases	Favour X	All Cases
ALL ECMs	NAÏVE	15	20	17	20	6	20	38	60
ALL ECMs	OLS	20	20	20	20	20	20	60	60
ALL ECMs	ARIMA	8	20	10	20	13	20	31	60
CORE ECMs	OLS	10	10	10	10	10	10	30	30
CORE ECMs	NAÏVE	9	10	10	10	7	10	26	30
CORE ECMs	ARIMA	5	10	8	10	8	10	21	30
ECMs (PES)	ECMs	10	15	0	15	4	15	14	45
OLS	NAÏVE	0	5	0	5	0	5	0	15
ARIMA	NAÏVE	5	5	5	5	1	5	11	15
BEST ECMs	NAÏVE	5	5	5	5	5	5	15	15
BEST ECMs	ARIMA	5	5	5	5	5	5	15	15

Table 9.4A (continued)

Model		Japan		Taiwan		China		Short-haul	
X	Y	Favour X	All Cases	Favour X	All Cases	Favour X	All Cases	Favour X	All Cases
ALL ECMs	NAÏVE	20	20	4	20	5	12	29	52
ALL ECMs	OLS	16	20	15	20	11	12	42	52
ALL ECMs	ARIMA	20	20	0	20	9	12	29	52
CORE ECMs	OLS	10	10	9	10	6	6	25	26
CORE ECMs	NAÏVE	10	10	0	10	2	6	12	26
CORE ECMs	ARIMA	10	10	0	10	6	6	16	26
ECMs (PES)	ECMs	0	15	4	15	0	9	4	39
OLS	NAÏVE	5	5	0	5	0	3	5	13
ARIMA	NAÏVE	5	5	5	5	0	3	10	13
BEST ECMs	NAÏVE	5	5	4	5	2	3	11	13
BEST ECMs	ARIMA	5	5	0	5	3	3	8	13

Table 9.4B Results of Forecasting Accuracy – (Alternative Categories of Models, Case Method and RMSE)

Each Origin Country and All Time Horizons

Model X	Model Y	United States Favour X	United States All Cases	United Kingdom Favour X	United Kingdom All Cases	Germany Favour X	Germany All Cases	Long-haul Favour X	Long-haul All Cases
ALL ECMs	NAÏVE	12	20	17	20	10	20	39	60
ALL ECMs	OLS	20	20	20	20	20	20	60	60
ALL ECMs	ARIMA	5	20	10	20	10	20	25	60
CORE ECMs	NAÏVE	6	10	10	10	7	10	23	30
CORE ECMs	OLS	10	10	10	10	10	10	30	30
CORE ECMs	ARIMA	5	10	8	10	6	10	19	30
ECMs(PES)	ECMs	10	15	0	15	6	15	16	45
BEST ECMs	ARIMA	5	5	5	5	5	5	15	15
ARIMA	NAÏVE	5	5	5	5	2	5	12	15
OLS	NAÏVE	0	5	0	5	0	5	0	15
BEST ECMs	NAÏVE	5	5	5	5	5	5	15	15

Table 9.4B (continued)

Model X	Model Y	Japan Favour X	Japan All Cases	Taiwan Favour X	Taiwan All Cases	China Favour X	China All Cases	Short-haul Favour X	Short-haul All Cases
ALL ECMs	NAÏVE	20	20	4	20	6	12	30	52
ALL ECMs	OLS	17	20	15	20	10	12	42	52
ALL ECMs	ARIMA	20	20	0	20	9	12	29	52
CORE ECMs	NAÏVE	10	10	0	10	4	6	14	26
CORE ECMs	OLS	10	10	9	10	6	6	25	26
CORE ECMs	ARIMA	10	10	0	10	6	6	16	26
ECMs(PES)	ECMs	0	15	1	12	0	9	1	33
ARIMA	NAÏVE	5	5	5	5	1	3	11	13
OLS	NAÏVE	5	5	0	5	1	3	6	13
BEST ECMs	NAÏVE	5	5	4	5	2	3	11	13
BEST ECMs	ARIMA	5	5	0	5	3	3	8	13

Table 9.5 Results of Forecasting Accuracy – (Alternative Forecasting Models, Absolute Error Method, and MAE/RMSE)

All Origin Countries and All Time Horizons

Method	Average Value/Rankings	
	MAE	*RMSE*
OLS	0.25406(11) E	0.28043(11) E
ECM [E&G]	0.09167(2) A	0.1023(2) A
ECM [JO, II]	0.097656(3) B	0.11311(4) B
ECM [JO III]	0.106138(7) C	0.12373(7) C
ECM [PES]	0.128146(9) D	0.14969(9) D
CORE ECM	0.098904(4)	0.11302(3)
ALL ECM	0.10590(6)	0.12220(6)
ALL CAUSAL	0.13554(10)	0.15385(10)
NAÏVE	0.11577(8)	0.13621(8)
ARIMA	0.10213(5)	0.11784(5)
BEST ECMs	**0.084915(1)**	**0.095105(1)**

Notes
1. Numbers in parenthesis, 1 to 11 indicate the individual rankings of each type of forecasting model over whole period of forecasting horizon for all origin countries.
2. Capital letters, A to E, indicate the individual rankings of the alternative econometric models.
3. ALL CAUSAL = E-G ECM, JO Case 2 ECM, JO Case 3 ECM, PES ECM and OLS.

Table 9.6 Results of Forecasting Accuracy – (Alternative ECMs, Absolute Error Method, and MAE/ RMSE)

All Origin Countries and Short/Medium/Long-term Horizons

Time Horizon	E-G ECM		JO, II ECM		JO, III ECM		PES ECM	
	MAE	RMSE	MAE	RMSE	MAE	RMSE	MAE	RMSE
1&2 Year (Short-term)	0.08987(1)	0.09338 (1)	0.09301(2)	0.09841(2)	0.09865(3)	0.10405(3)	0.13231(4)	0.13992(4)
5 Year (Medium-term)	0.08808(1)	0.10201(1)	0.09010(2)	0.1091(2)	0.09678(3)	0.11564(3)	0.11689(4)	0.14521(4)
7&10 Year (Long- term)	0.09526(1)	0.11129(1)	0.10608(2)	0.12982(2)	0.11829(3)	0.14746(3)	0.12962(4)	0.16171(4)

Table 9.7 Results of Forecasting Accuracy- (Alternative Categories of Models, Absolute Error Method, and MAE/ RMSE)

All Origin Countries and Short/Medium/Long-term Horizons

MAE

	Core ECM	ALL ECMs	OLS	NAÏVE	ARIMA
Short-term	0.09426(1)	0.10346(3)	0.17705(5)	0.11318(4)	0.10054(2)
Medium-term	0.09246(1)	0.09799(2)	0.27959(5)	0.10822(4)	0.10141(3)
Long-term	0.10677(2)	0.11231(3)	0.31829(5)	0.12215(4)	0.10409(1)

RMSE

	Core ECM	ALL ECMs	OLS	NAÏVE	ARIMA
Short-term	0.0987(1)	0.10894(3)	0.18367(5)	0.12472(4)	0.10742(2)
Medium-term	0.10882(1)	0.11798(2)	0.30632(5)	0.13357(4)	0.12069(3)
Long-term	0.12937(2)	0.13757(3)	0.36426(5)	0.14899(4)	0.12683(1)

Table 9.8 Results of Forecasting Accuracy – (Alternative Categories of Model , Absolute Error Magnitude and MAE/RMSE)

Individual Origin Countries and All Time Horizons

	United States		United Kingdom		Germany		Long-haul	
	MAE	RMSE	MAE	RMSE	MAE	RMSE	MAE	RMSE
OLS	0.11742 (10)(E)	0.12691 (10) (E)	0.25405 (11) (E)	0.61382 (11) (E)	0.3164 (10) (E)	0.33852 (10) (E)	0.22929 (11) (E)	0.35975 (11) (E)
E-G ECM	0.03020 (1)(A)	0.03466 (1) (A)	0.068164 (2) (A)	0.07602 (2) (A)	0.11482 (1) (A)	0.13369 (1) (A)	0.07106 (2) (A)	0.08145 (2) (A)
JO II ECM	0.07308 (9)(D)	0.08395 (9) (D)	0.07343 (5) (c)	0.08548 (5) (c)	0.13303 (5) (B)	0.15901 (5) (D)	0.09318 (7) (c)	0.10948 (7) (c)
JO III ECM	0.06604 (6) (c)	0.07797 (8) (c)	0.07076 (4) (B)	0.08131 (4) (B)	0.13594 (6) (c)	0.16414 (7) (B)	0.09091 (6) (B)	0.10781 (6) (B)
PES ECM	0.05205 (4)(B)	0.06174 (4) (B)	0.12832 (10) (D)	0.12796 (9) (D)	0.14163 (8) (D)	0.16584 (8) (c)	0.10733 (9) (D)	0.11851 (9) (D)
ALL ECMs	0.05534 (5)	0.06458 (5)	0.08517 (7)	0.09269 (7)	0.13135 (4)	0.15854 (4)	0.09062 (4)	0.10508 (5)
CORE ECM	0.048122 (2)	0.05631 (2)	0.06946 (3)	0.07867 (3)	0.12538 (2)	0.14892 (2)	0.08099 (3)	0.09463 (3)
ALL CAUSAL	0.067962 (8)	0.07725 (7)	0.11895 (9)	0.19691 (10)	0.16836 (9)	0.19454 (9)	0.11842 (10)	0.15623 (10)
NAÏVE	0.067872 (7)	0.07378 (6)	0.11446 (8)	0.12625 (8)	0.12564 (3)	0.15395 (3)	0.10265 (8)	0.11799 (8)
ARIMA	0.051167 (3)	0.05673 (3)	0.079527 (6)	0.09249 (6)	0.14123 (7)	0.15939 (6)	0.09064 (5)	0.10287 (4)
BEST ECM	0.03020 (1)	0.03466 (1)	0.066363 (1)	0.075833 (1)	0.11482 (1)	0.13369 (1)	0.07046 (1)	0.08139 (1)

Notes:

1. Numbers in parenthesis, 1 to 10 or 1 to 11, individual rankings of eleven alternative categories of forecasting models.
2. Capital letters in parenthesis, A to E, individual rankings of five alternative econometric models.
3. ALL CAUSAL = E-G ECM, JO2 ECM, JO3 ECM, PES ECM and OLS.

Table 9.8 Continued

	Japan		Taiwan		China		Short-haul	
	MAE	RMSE	MAE	RMSE	MAE	RMSE	MAE	RMSE
OLS	0.13322 (8) (D)	0.16682 (8) (E)	0.18753 (10) (D)	0.20913 (10) (D)	0.16090 (10) (E)	0.16954 (10) (E)	0.16055 (11)(E)	0.18183 (11) (E)
E&G ECM □	0.09804 (2) (A)	0.11181 (1) (A)	0.16172 (5) (B)	0.16766 (5) (B)	0.064947 (5) (C)	0.07569 (4) (C)	0.10823 (3) (B)	0.11838 (3) (B)
JO II ECM □	0.10154 (4) (B)	0.11928 (3) (B)	0.13210 (4) (A)	0.14465 (4) (A)	0.050536 (1) (A)	0.05730 (1) (A)	0.09472 (2) (A)	0.10707 (2) (A)
JO III ECM □	0.10337 (5)(C)	0.12103 (4) (C)	0.18001 (9) (C)	0.20198 (9) (C)	0.05483 (2) (B)	0.06164 (2) (B)	0.11273 (6) (C)	0.12821 (5) (C)
PES ECM □	0.14741 (9)(E)	0.16341 (7) (D)	0.19057 (11) (E)	0.23343 (11) (E)	0.12267 (9) (D)	0.13517 (9) (D)	0.15355 (10) (D)	0.17733 (10) (D)
ALL ECMs	0.11259 (6)	0.12888 (5)	0.1661 (6)	0.18693 (7)	0.07325 (6)	0.08245 (5)	0.11731 (7)	0.13275 (7)
CORE ECMs	0.10071 (3)	0.11642 (2)	0.17086 (8)	0.18482 (6)	0.05990 (3)	0.06866 (3)	0.11049 (4)	0.1233 (4)
ALL CAUSAL	0.11672 (7)	0.13687 (6)	0.17038 (7)	0.19137 (8)	0.09078 (7)	0.09986 (8)	0.12596 (9)	0.1427 (8)
NAÏVE	0.17541 (11)	0.212586 (10)	0.12551 (2)	0.13715 (2)	0.06151 (4)	0.08988 (6)	0.12081 (8)	0.14654 (9)
ARIMA	0.16290 (10)	0.19386 (9)	0.079463 (1)	0.09470 (1)	0.09484 (8)	0.09850 (7)	0.11240 (5)	0.12902 (6)
BEST ECMs	0.09784 (1)	0.11181 (1)	0.12824 (3)	0.13767 (3)	0.050536 (1)	0.05730 (1)	0.09279 (1)	0.10226 (1)

9.4 Scenario Forecasts of Tourism Demand – Selected Origin Countries

Our empirical literature survey on tourism demand in Chapter 4 indicated that most previous research suggested that well-fitted single equation tourism demand econometric models could be employed to produce ex-ante forecasts. Until recently, however, future tourism demand forecasts (ex- ante forecasts) based on econometric models were rarely provided. In this section, we have made projections for future changes in tourist arrivals to Hong Kong for each of the six origin countries over the five-year period 2000 - 2004. These forecasts are produced using our preferred econometric models, under assumptions of most likely and alternative optimistic and pessimistic scenarios.

The preferred econometric models we applied to produce future demand forecasts were selected based on the rankings of the five alternative econometric models. This was determined using the absolute forecast error method, as evaluated by the MAE and RMSE criteria. Where the ex-post forecasting method of related econometric models relates the forecast error to the choice of the modelling and forecasting techniques only, ex-ante forecasting incorporates modelling and forecasting techniques with the errors that arise from inaccurate forecasts of the explanatory variables. Since the forecasting errors of the explanatory variables increase with respect to the length of the forecasting horizon, we have set a five-year period as the maximum time possible to make tourism demand forecasts, based on empirical literature.

The procedures of the ex-ante forecasting imply that no advantage is taken of any information that would not have been available to a forecaster at the point in time when the forecast is generated. The estimating procedures of scenario forecasting are provided in Section 5.9.2.

9.4.1 Results of Scenario Forecasts of Tourism Demand (Japan)

As indicated from the results shown in Table 9.8, the Engle-Granger ECM (Japan) produces minimal average forecasting errors on the basis of the MAE and RMSE criteria. We have therefore selected it as the most preferred econometric model in forecasting the change in visitor flows to Hong Kong from Japan during the period 2000 -2004.

The forecasting equation (Japan), based on the Engle-Granger approach is presented in Equation 9-1.

$$\Delta InX_t = 0.029 + 2.26\Delta InYp_{85t} - 0.632\Delta InPo_{t-1} - 0.09\Delta InSP_t - 0.566(InX_{t-1}$$
$$-11.76 - 2.90InYp_{85t-1} + 0.214InSP_{t-1} + 0.782InPo_{t-1}) \dots\dots\dots\dots (9-1)$$

where

X_t = total tourist arrivals in year t, Japan

Yp_{85t} = permanent income index (0.85) in year t, Japan

Po_t = own price index at time t, Japan

SP_t = share price index at time t, Japan

D = first differences

As shown in Section 6.2, the diagnostic results of the Engle-Granger ECM in Equation 9-1 are satisfactory from a statistical point of view. However, it is necessarily to check the stability of the model in Equation 9-1 before applying the preferred model to produce scenario forecasts. The cumulative sum of recursive residuals (CUSUM) and the cumulative sum of squares of recursive residuals (CUSUMSQ) test for structural stability, as proposed by Brown et al. (1975), is applied to test for the stability of the model's parameter. The CUSUM test identifies any systematic changes (if there are any) in regression coefficients, while the CUSUMSQ test is useful in situations where the departure from the constancy of regression coefficients is haphazard and sudden.

In this study, we assume that the model is stable if the line of the CUSUM or the CUSUMSQ moves within the critical line of 5% error significance. If the CUSUM or the CUSUMSQ moves outside the critical lines of 5% error significance, however, the null hypothesis is rejected, thereby implying that the model is unstable. A detailed explanation of the CUSUM and CUSUMSQ tests is available in Harvey (1981). The results of these tests are shown in Figures D.1A and Figure D.1B of Appendix D. The results indicate that the preferred forecasting model for Japan appears to be stable over the estimation period. In addition, we plot the feasible recursive estimates of all the coefficients to test for their stability. If the coefficients display significant variation as more data are added to the forecasting equation, there appears a strong indication of stability. In the Japan model, the empirical results of the plot of feasible recursive estimates in Figures D.19A, B, C and D of Appendix D, show a strong indication of stability. We therefore assume that the structure of this model is also stable over the ex-ante forecast period. As a result, we are able to use Equation 9-1 to forecast tourist arrival changes over the five-year period from 2000 to 2004 under the assumptions of the most likely scenarios. The forecasts for the change in tourist arrivals using the assumptions of most likely scenarios are presented in Table 9.9, while the forecasts generated from alternative scenarios are presented in Table 9.10.

Overall, we predict that inbound tourist flows from Japan will grow at an overall average (a predicted average growth rate over the five-year forecasting period) of 11.87% over the period 2000-2004, a rebound from a negative growth rate of –6.9% over the period 1995-1999. However, the forecasts of the average growth rate of Japan visitor arrivals over the period from 2000 to 2004 vary largely with respect to the assumptions of the alternative scenarios, ranging from +14.13% (scenario with 1% higher in predicted income) to 9.61% (scenario with 1% lower in predicted income). According to the forecasts from the E-G ECM (Japan), tourist arrivals from Japan to Hong Kong are expected to increase from 1.01 million in 1999 to 1.77 million in 2004. However, it is still 12.2% lower than the peak of 2.01 million arrivals for Japan market in 1996.

Table 9.9 Projections of Changes in Tourist Arrivals from Japan, Taiwan and China

(Average Rate of Visitor Arrivals, 2000-2004)

Year (Average Annual Growth Rate in %)	Japan	Taiwan	China	Weighted Average (Short haul Markets)
Predicted Growth				
5 Year 2000-2004	(+) 11.87%	(+) 12.07%	(+) 24.4%	(+) 16.11%
Past Trend				
5 Year 1995-1999	(-) 6.9%	(+) 3.64%	(+) 11.49%	(+) 2.74%
5 Year 1990-1994	(+) 4.21%	(+) 7.81%	(+) 13.97%	(+) 8.66%
5 Year 1985-1989	(+) 14%	(+) 39.01%	(+) 23.14%	(+) 25.38%
5 Year 1980-1984	(+) 2.76%	(-) 4.94%	N.A	(-) 1.09%
10 Year 1990-1999	(+) 1.34%	(+) 5.73%	(+) 15.98%	(+) 7.68%
10 Year 1980-1989	(+) 8.38%	(+) 17.04%	N.A.	(+) 12.71%
10 Year 1970-1979	(+) 12.48%	(+) 24.69%	N.A	(+) 18.59%
10 Year 1960-1969	(+) 28.37%	N.A.	N.A	(+) 28.37%
15 Year 1985-1999	(+) 12.48%	(+) 16.82%	(+) 18.37%	(+) 15.89%
20Year 1980-1999	(+) 3.52%	(+) 17.04%	N.A.	(+) 10.28%
20 Year 1960-1979	(+) 20.43%	N.A.	N.A	(+) 20.43%
30Year 1970-1999	(+) 7.4%	(+) 15.81%	N.A	(+) 11.61%
40 Year 1960-1999	(+) 12.64%	N.A	N.A	(+) 12.64%

Notes The Microfit output for the results of scenario forecasting and the ARIMA forecasts of independent variables is available under request.

Table 9.10 Projections of Changes in Tourist Arrivals from Japan, Taiwan and China – Alternative Scenarios (2000-2004)

Scenario Year (Predicted Average Annual Growth Rate in % for Five Year Period, 2000-2004)	Japan	Taiwan	China
Predicted Trend			
Most Likely Scenario	11.87%	12.07%	24.4%
Alternative Optimistic Scenarios			
1% higher in income	14.13%	15.41%	26.58%
1% lower in own price	12.50%	13.08%	N.A.
1% higher in sub price	N.A.	12.25%	N.A.
1% lower in share price	11.96%	N.A.	N.A.
Alternative Pessimistic Scenarios			
1% lower in income	9.61%	8.73%	22.22%
1% higher in own price	11.24%	11.06%	N.A.
1% lower in sub price	N.A	11.89%	N.A.
1% higher in share price	11.78%	N.A.	N.A

Notes 1. 1% higher/lower assume the forecast rate is 1% higher/lower than the ARIMA baseline forecast for all economic variables in differenced form in the most preferred model.

9.4.2 Results of Scenario Forecasts of Tourism Demand (Taiwan)

We selected the Johansen, Case 2 ECM as the preferred forecasting model for producing scenario forecasts of the changes to future visitor arrivals from Taiwan. The forecasting equation, based on the Johansen, Case 2 approach, is defined in Equation 9-2.

$$\Delta InX_t = 0.089 + 3.34\Delta Yp_{40t} - 1.01\Delta InPo_{t-1} + 0.176\Delta InPc_{t-1} + 0.925Dummy88$$
$$-0.715(InX_{t-1} - 1.917 - 1.67InYp_{40t-1} + 0.897InPo_{t-1} - 1.64InPc_{t-1}) \ldots\ldots\ldots\ldots\ldots (9-2)$$

where

X_t = total tourist arrivals in year t, Taiwan

Yp_{40t} = index of permanent income with smoothing constant of 0.40 in year t, Taiwan

Po_t = own price index at time t, Taiwan

Pc_t = weighted substitute price index at time t, Taiwan

$Dummy88$ = country-specific Dummy variable for lifting of ban on travel to Hong Kong

Ln = logarithmic form

D = difference form

As indicated in Appendix D, Table D.1, the diagnostic test results of the Johansen, Case 2 ECM in Equation 9-2 are satisfactory from the statistical point of view. Before applying the equation to produce scenario forecasts, we need to check the stability of Equation 9-2. The empirical results of the CUSUM test and CUSUMSQ, as shown in Figures D.14A and Figure D.14C of Appendix D, indicate that there is an upward trend over the period from 1989 to 1994. However, our estimated tourism demand model is relatively stable over the entire estimation period. In addition, the empirical results of the plot of recursive estimates in Figures D20A – D20H in Appendix D show an indication of stability. We therefore believe that the structure of Equation 9-2 will remain unchanged over the ex-ante forecast period. The forecasts of the changes in tourist arrivals from Taiwan over the period from 2000 to 2004, with the assumptions of the most likely scenarios, are presented in Table 9.9. Overall, we predict that the inbound tourist flows from Taiwan will grow at an average rate of 12.07% per annum over the period 2000-2004, a rebound forecast from the average rate growth of 3.64% over the period 1995-1999. However, the average growth rate over the period from 2000 to 2004 will vary quite substantially with respect to the assumption of the scenarios, lying within the range from + 15.41% (scenario with 1% higher in income) to + 8.73% (scenario with1% lower in income). Finally, according to the average forecasts from the Johansen ECM (Case 2), tourist arrivals from Taiwan to Hong Kong are expected to increase from 1.98 million in 1999 to 3.5 million in 2004.

9.4.3 Results of Scenario Forecasts of Tourism Demand (China)

As indicated in Appendix D. Table D.1, the ECM based on Johansen, Case 2 approach produced the smallest forecasting errors, judging from the MAE and RMSE criteria. We therefore choose it as the preferred forecasting model for predicting future inbound visitor arrivals from China. We thus apply the following forecasting model, as shown in Equation 9-3, to produce estimates of the changes in tourist flows from China over the period from 2000 to 2004 with the three scenarios.

The China model is defined in the following forecasting equation:

$$\Delta InX_t = 0.029 + 2.19\Delta InYp_{100t} - 0.849(InX_{t-1} + 2.01 - 1.59InYp_{100t-1} - 0.53InTV_{t-1}) \quad (9-3)$$

where

X_t = total tourist arrivals at time t, China

Yp_{100t} = index of permanent income with smoothing constant of 1.00 at year t, China

TV_t = index of trade volume at time t, measured by total re-exports, imports and exports, Hong Kong and China

Ln = logarithmic form

D = difference form.

As shown in Appendix D, Table D.1, the diagnostic results of the Johansen, Case 2 ECM in Equation 9-3 are satisfactory from a statistical point of view. The results of the CUSUM and CUSUMSQ tests as shown in Figures D.15A and Figure D.15B of Appendix D, indicate that an upward trend existed since 1992. However, our estimated tourism demand model appears to be quite stable within the 95% critical line for the estimation period. In particular, the degree of stability increases toward the late 1990s, supporting our confidence in using it to generate scenario forecasts. Moreover, the empirical results of the plot of recursive estimates in Figures D.21A and Figure D.21B provide an indication of stability. We therefore assumed that the model is stable.

The forecasts of changes in inbound tourist arrivals from China over the period from 2000 to 2004, with the most likely scenario and other alternative scenarios, are presented in Table 9.9 and 9.10, respectively. Overall, the average growth rate of visitor arrivals from China over the five-year period is

24.4% per annum, a rebound forecast as compared with growth rate of 11.49% over the period 1995-1999. However, the growth rate varies significantly with respect to the assumptions of the three scenarios, lying within a range from 26.58% (scenario with 1% higher in predicted income) to 22.22% (scenario with 1% lower in predicted income). According to the weighted average forecasts from Johansen ECM (Case 2), tourist arrivals from China to Hong Kong are expected to increase from 3.08 million to 9.17 million in 2004, lying with a range from 10.07 million (scenario with 1% higher in income) to 8.4 million (scenario with 1% lower in income). The forecast suggests that China is expected to continue to be the largest tourist generating countries for Hong Kong tourism.

9.4.4 Results of Scenario Forecasts of Tourism Demand (United States)

The Engle-Granger ECM is the preferred forecasting model for the origin country of the United States because it produced the fewest forecasting errors.

The United States forecasting equation is defined in the following form over the period from 2000 to 2004:

$$\begin{aligned}
&\Delta InX_t = 0.028 + 0.852\Delta InYp_{80t-1} - 0.629\Delta InPo_t + 0.409\Delta InTV_t \\
&- 0.158Dummy89 - 0.732(InX_{t-1} - 16.84 - 1.45InYp_{80t-1} + 0.843InPo_{t-1} \\
&- 0.454InTV_{t-1} + 0.237Dummy89) \dots\dots (9-4)
\end{aligned}$$

where

X_t = total tourist arrivals in year t, U.S.A.

Yp_{80t} = index of permanent income with smoothing constant of 0.80 at time t, U.S.A.

Po_t = own price index at time t, U.S.A.

TV_t = real trade volume index, measured by total re-exports, imports and exports between Hong Kong and United States at time t

$Dummy89$ = dummy variable for Beijing (China) incident in 1989

Ln = logarithmic form

D = difference form

As shown in Section 6.5, the diagnostic results of the Engle-Granger ECM shown in Equation 9-4 are satisfactory. To reconfirm this, we apply the CUSUM and CUSUMSQ tests to check for the stability of the model parameter.

As shown in Figures D.7A and Figure D.7C of Appendix D, both the CUSUM and CUSUMSQ tests indicated that the estimated United States tourism demand equation is relatively stable over the whole estimation period. In addition, the empirical results of the plot of recursive estimates in Figures D.22A – Figure D.22H of Appendix D provide further indication of stability. The forecasts of changes in inbound tourist flows from the United States over the period from 2000 to 2004, with the most likely and alternative scenario, are presented in Table 9.11 and 9.12.

Overall, we predict that the inbound tourist flows from the United States will grow at an overall average rate of 8.50% per annum over the five-year period 2000-2004, a rebound forecast, as compared with a growth rate of 0.76% over the five-year period 1995-1999. However, the growth rate forecasts vary significantly with respect to the alternative scenarios, lying in a range from 9.35% (scenario with 1% higher in income) to 7.65% (scenario with 1% lower in income). The E-G ECM predicted that tourist arrivals from U.S to Hong Kong increase from 0.78 million (1999) to 1.17 million (2004) based on the most likely average forecasts, lying in a range from 1.22 million (scenario with 1% higher in income) to 1.13 million (scenario with 1% lower in income). The forecast suggests that United States is expected to be the largest long-haul market for Hong Kong tourism.

Table 9.11 Projections of Changes in Tourist Arrivals from United States, United Kingdom and Germany-Average Rate of Visitor Arrivals (2000-2004)

Year (Average Annual Growth Rate in %)	United States	United Kingdom	Germany	Weighted Average (Long Haul Markets)
Predicted Growth				
5 Year (2000-2004)	(+) 8.50%	(+) 7.58%	(+) 8.07%	(+) 8.05 %
Past Trend				
5 Year 1995-1999	(+) 0.76%	(+) 2.56%	(-) 3.86%	(-) 0.18%
5 Year 1990-1994	(+) 4.61%	(+) 6.84%	(+) 13.34%	(+) 8.26%
5 Year 1985-1989	(+) 1.34%	(+) 9.07%	(+) 9.76%	(+) 6.72%
5 Year 1980-1984	(+) 11.45%	(+) 11.72%	(+) 4.03%	(+) 9.07%
10 Year 1990-1999	(+) 2.68%	(+) 4.7%	(+) 4.74%	(+) 4.04%
10 Year 1980-1989	(+) 6.39%	(+) 10.4%	(+) 6.9%	(+) 7.90%
10 Year 1970-1979	(+) 3.77%	(+) 14.22%	(+) 13.83%	(+) 10.61%
10 Year 1960-1969	(+) 14.33%	N.A.	(+) 21.74%	(+) 12.03%
15 Year 1985-1999	(+) 2.24%	(+) 6.16%	(+) 6.41%	(+) 15.89%
20Year 1980-1999	(+) 4.54%	(+) 7.55%	(+) 4.65%	(+) 5.58%
20 Year 1960-1979	(+) 9.05%	N.A.	(+) 17.78%	(+) 13.41%
30Year 1970-1999	(+) 4.28%	(+) 9.77%	(+) 8.49%	(+) 7.52%
40 Year 1960-1999	(+) 6.80%	N.A	(+) 11.80%	(+) 9.3%

Notes The Microfit output for the results of scenario forecasting and the ARIMA forecasts of independent variables is available under request.

Table 9.12 Projections of Changes in Tourist Arrivals from United States, United Kingdom and Germany– Alternative Scenarios (2000-2004)

Scenario (Predicted Average Annual Growth Rate in % for Five Year Period, 2000-2004)	United States	United Kingdom	Germany
Predicted Trend			
Most Likely Scenario	8.50%	7.58%	8.07%
Alternative Optimistic Scenarios			
1% higher in Income	9.35%	8.62%	9.71%
1% lower in Own Price	9.13%	8.19%	8.31%
1% higher in Sub Price	N.A.	8.16%	N.A.
1% higher in Share Price	N.A	N.A.	8.12%
1% higher in Trade Volume	8.91%	N.A.	N.A
Alternative Pessimistic Scenarios			
1% lower in Income	7.65%	6.54%	6.44%
1% higher in Own Price	7.87%	6.97%	7.83%
1% lower in Sub Price	N.A	7.00%	N.A.
1% lower in Share Price	N.A	N.A.	8.02%
1% lower in Trade Volume	8.09%	N.A.	N.A.

Notes 1. 1% higher/lower assume the forecast rate is 1% higher/lower than the ARIMA baseline forecast for all economic variables in differenced form in the most preferred model.

9.4.5 Results of Scenario Forecasts of Tourism Demand (United Kingdom)

The results in Table 9.8 indicated that the United Kingdom ECM, based on the Engle-Granger approach, produced the fewest forecasting errors. We therefore decided to apply this model to produce the scenario forecasts for the United Kingdom.

The United Kingdom forecasting equation is defined in the following Equation 9-5:

$$\Delta InX_t = 0.077 + 1.04\Delta InYp_{30t} - 0.613\Delta InPo_t + 0.581\Delta InPc_t - 0.304(InX_{t-1}$$
$$-14.34 - 4.72InYp_{30t-1} + 1.10InPo_{t-1} + 0.606InPc_{t-1}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9-5)$$

where

X_t = total tourist arrivals at time t, United Kingdom

Yp_{30t} = index of permanent income with smoothing constant of 0.30 at time t, United Kingdom

Po_t = own price index at time t, United Kingdom

Pc_t = weighted substitute price at time t, United Kingdom

$Dummy89$ = dummy variable for Beijing (China) incident in 1989

Ln = logarithmic form.

D = differenced form

As shown in Section 6.6, the results of the Engle-Granger ECM, as shown in Equation 9-5, are satisfactory from the statistical point of view. The results of the United Kingdom CUSUM and CUSUMSQ tests, as shown in Figures D.9A and Figure D.9B of Appendix D, also indicate that the model is very stable over the whole estimation period. In addition, the empirical results of the plot of recursive estimates of coefficients, as shown in Figures D23A- D23D also provide an indication of stability. We therefore believe that the structure of the United Kingdom tourism demand equation will remain unchanged over the ex-ante forecast period.

We applied Equation 9-5 to forecast the changes in tourist arrivals from the United Kingdom over the period from 2000 to 2004 with the assumption of most-likely and other alternative scenarios. The results of this forecast are presented in Table 9.11 and Table 9.12. Overall, we predict that inbound tourist flows from U.K. will grow at a weighted average of 7.59%, a rebound forecast, as compared with average growth rate of 2.56% over the period 1995-1999. In addition, the forecasts vary with the range from 8.62% (scenario with 1% higher in income) to 6.54% (scenario with 1% lower in income). The results of weighted average forecasts based on the E-G ECM indicated that tourist arrivals from

U.K. to Hong Kong increase from 0.33 million in 1999 to 0.475 million in 2004, ranging from 0.499 million (scenario with1% higher in income) to 0.453 million (scenario with 1% lower in income). This result suggests that the growth rate of tourist arrivals from the United Kingdom will be the slowest among the origin countries.

9.4.6 Results of Scenario Forecasts of Tourism Demand (Germany)

As shown in Table 9.8, the ECM based on the Engle-Granger approach produces the fewest forecasting errors for tourist arrivals from Germany. We therefore applied this forecasting model to produce ex-ante forecasts over the period from 2000 to 2004 for Germany.

The preferred German forecasting model is defined in Equation 9-6:

$$\begin{aligned}
&\Delta InX_t = 0.031 + 0.31\Delta InX_{t-1} + 1.64\Delta InY_{p30} - 0.242\Delta InPo_t \\
&+ 0.051\Delta InSP_{t-1} - 0.567(InX_{t-1} + 12.56 - 3.59InY_{p30t-1} + 0.609InP_{t-1} \\
&- 0.188InSP_{t-1} - 0.424Dummy91) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9-6)
\end{aligned}$$

where

X_t = total tourist arrivals at time t, Germany

Y_{p30t} = index of permanent income with smoothing constant of 0.30 at time t, Germany

Po_t = own price index at time t, Germany

SP_t = share price index of Germany at time t, Germany

$Dummy91$ = dummy variable for reunification of West and East Germany

Ln = logarithm form

D = differenced form

As shown in Section 6.7, the results of the Engle-Granger ECM in Equation 9-6 are acceptable from a statistical point of view. Before applying Equation 9.6 to generate scenario forecasts, we use the CUSUM and CUSUMSQ tests to check the stability of the model. The results of this test, as shown in Figures D.11B and Figure D.11D of Appendix D, indicate that a structural break appears to have occurred in 1991, when the reunification of Germany began to take place. In general, however, our estimated model appears to be relatively stable within the 95% critical line over the entire estimation period. In addition, the empirical results of the plot of recursive estimates in Figures D24A – D24E in Appendix D shown an indication of stability. The results of the forecasts of changes in tourist arrivals from Germany with the assumptions of most-likely scenario over the period from 2000 to 2004 are presented in Table 9.11, while the forecasts with the assumptions of other alternative scenarios are presented in Table 9.12. In addition, we predict that inbound tourist flows from Germany will grow at a overall average of 8.07 % over the period from 2000 to 2004, a large rebound from the negative growth rate of –3.86% over the last five-year period of 1995-1999. However, the average growth rates of visitor arrivals vary with respect to the alternative scenarios, ranging from +9.71% (scenario with 1% higher in income) to 6.44% (scenario with 1% lower in income). According the weighted average forecasts of E-G ECM, the tourist arrivals from Germany to Hong Kong increase from 0.197 million in 1999 to 0.298 million in 2004, lying in the range from 0.313 million (scenario with 1% higher in income) to 0.269 million (scenario with 1% lower in income).

9.4.7 Scenario Forecasting Results and Policy Implications

The results of the scenario forecasts suggested that all the short and long-haul markets have shown an upward trend in tourist arrivals. Moreover, the overall predicted average annual growth rate for all markets is 12.08% over the forecasting period from 1999-2004, a rebound forecast of 1.27% over the period 1995-1999. While all the short-haul markets have weighted average growth rate of 16.11% over the forecasting period from 1999 to 2004, all the long-haul markets have a growth rate of 8.05% over the same period. The forecasting results suggests that China is expected to continue to be the largest tourist generating countries by the end of ex-ante forecasting period and it shows that tourist arrivals will be reached in 9.17 million by 2004, while the United states is expected to continue to be biggest long-haul market with a forecast arrivals of 1.17 million by 2004. While the growth rate of tourist arrivals for China is predicted to be the highest, the growth rate from the U.K. will be the slowest among the six origin countries. The forecasting results should provide a policy guideline for government and tourist industry so that the facilities relating to tourism should be adjusted. For example, our scenario forecasts of medium-term tourism demand indicate an increasing trend of demand, suggesting a strong need for building of tourism hardware and other tourism infrastructures, such as a tourist helicopter terminal. In addition, our scenario results indicate that Hong Kong continues to gain market shares from short-haul markets, implying that the tourist industry should concentrate its tourism resources on the short-haul markets that represents more potential for increasing tourism receipts. One important point must be mentioned that, due to the terrorists attack on the USA on 11, Sept, 2001 and the SARS epidemic outbreak in March, 2003 in Hong Kong, the demand for Hong Kong tourism is likely to be affected in the short-run. However, the long-term upward trend in the demand for Hong Kong tourism in this study is unlikely to be affected significantly over the forecasting period.

9.5 Chapter Summary

The empirical literature of tourism demand forecasting we reviewed indicated that most tourism demand studies had placed emphasis on the evaluation of the forecasting performance among the alternative time- series forecasting models. This chapter extends this investigation by not only evaluating the relative forecasting performance between the time-series models and the NAÏVE models, but also by comparing among the alternative dynamic ECM models based on an alternative cointegration approach, the time series and the benchmark NAÏVE models.

Our empirical results indicate that the dynamic ECM models based on the Engle-Granger approach produced the most reliable average forecasts for all of the long-haul markets and Japan, while the models based on the Johansen, Case 2 approach produced the most accurate econometric forecasts for the short-haul markets of China and Taiwan. In addition, we compared the relative forecasting performance of the "BEST ECMs" with the OLS, ARIMA, and benchmark NAÏVE models. Our empirical results indicated that the "BEST ECMs" produced more accurate forecasts than the OLS, ARIMA and NAÏVE models in all markets except Taiwan. The empirical results also indicated that if the models were used for predicting visitor arrivals, then the forecast of Taiwanese visitors would be the least precise.

More importantly, we also applied forecasting models based on the Pesaran and Shin (1998) approach to produce tourism demand forecasts for the models that did and did not experience problems in establishing the same orders of integration. Our empirical results for these tests indicated that we could recommend models based on the Pesaran and Shin approach as an alternative to models based on traditional cointegration approaches to produce accurate tourism demand forecasts. This recommendation is particularly useful for cases that experience doubts on their levels of differencing, to achieve stationarity.

Our empirical results of time horizon analysis show that the forecasting error is highly dependent on the length of the forecasting horizon. This agrees with the findings of Kulendran and Witt (2001) who said that the forecasting error should correlate positively with the length of the forecasting horizon.

One important finding must be mentioned: Our empirical results suggests that the " CORE ECMs" produced better forecasts than the ARIMA models on both the short- and medium-term horizons but ARIMA models produce relatively accurate forecasts in a longer-term horizon, a finding contrary to the traditional view that ARIMA models tend to produce better forecasts than ECMs on the short-term lead horizon and the finding of Kulendran and King (1997) who found that the ARIMA models show a clear tendency to be relatively less accurate than other procedures as the lead time increases.

Overall, the forecasting performance of the "BEST ECMs" ranked first among the forecasting models. However, the rankings of individual source markets indicated that the "BEST ECMs" and the "CORE ECM" did not produce average forecasts as accurate as the ARIMA and NAIVE models for the Taiwan market. We believe that the poor results of the "CORE ECMs" for Taiwan, based on the Engle-Granger (1987) approach, were probably caused by a problem in establishing the existence of a cointegration relationship at the 95% level, and as the associated Engle-Granger ECM suffered from the diagnostic problem of normality.

The empirical literature reviewed showed that most studies placed emphasis on the evaluation of ex-post forecasting performance. This chapter produced ex-ante forecasts of tourism demand with the assumptions of most likely and other alternative scenarios. The results of the forecasts under the assumptions of most likely scenario suggested that all the long and short-haul markets should have positive overall weighted average growth rate in visitor arrivals in Hong Kong over the forecasting period from 2000 to 2004.

Chapter 10 Summary and Conclusions, Contribution of Research, Policy Implications and Recommendations

10.1 Summary of Major Research Findings

This chapter concludes and summarises the major research findings, research objectives results discussions and conclusions, contribution of the research, policy implications and recommendations, limitations of the research, and implications for further research.

In this study, we developed econometric models for estimating tourism demand using the cointegration and error correction approaches, and attempted to explain the effects of selected economic determinants on inbound international tourist flows to Hong Kong from six major tourist origin countries. In particular, our aim was to investigate whether our new estimation procedures based on the application of permanent-income-life cycle hypothesis in modelling income, the rival search process in modelling substitute price and the application of alternative cointegration and error correction approaches would improve the reliability of parameter estimates and the forecasting performance of tourism demand models. We tested the forecasting ability of the associated dynamic ECMs, based on alternative cointegration and error correction approaches, evaluating them, using benchmark OLS, ARIMA and NAÏVE models, with the MAE and RMSE criteria. Finally, we applied our preferred ECMs, those that had the fewest forecasting errors, to produce scenario forecasts of Hong Kong's inbound tourist arrivals.

We summarise the major findings as follows:

1. Over the past four decades, Hong Kong's international tourism demand had grown at a rate faster than Worldwide and in the East Asia and the Pacific region. In 2001, Hong Kong tourism was ranked second in the EAP region, and within the top twenty tourist destinations in the world, in terms of international tourist arrivals and tourism receipts. In addition, Hong Kong tourism receipts accounted for approximately 6.75% and 5.8% of GDP over the 1960s and 1990s, respectively. These statistics have kept Hong Kong on the World Tourist Organisation's 'tourist country' list since the 1960s.

2. In our research, both descriptive and quantitative evidence suggested that Singapore, Thailand, Australia and Japan are tourists' major substitute destinations for Hong Kong within the EAP region. Facing the challenge of its major rivals in the region, our tourism demand analysis indicated that Hong Kong has maintained its dominance in the regional tourism market over the past decades.

3. Both descriptive and quantitative approaches were used in this study to analyse the trends and the economic determinants of Hong Kong's tourism demand. Our descriptive analysis of international

tourism demand for Hong Kong in Chapter 3 indicated that there was an upward trend of tourism demand over the period from 1959 to 2001.

Over the period from 1959 to 1979, Hong Kong achieved remarkable growth in terms of tourism demand, with the exception of the first oil crisis in the 1970s. During this period, long-haul source markets dominated inbound tourist flows. Much of the growth can be attributed to increased tourist flows from the United States and Western Europe. However, during the 1980s, the changes in international tourist flows to Hong Kong followed a worldwide trend that saw more intra-regional tourists arriving in Hong Kong. In 1985, both short-haul and long-haul markets accounted for a equal share of visitors to Hong Kong of about 50%. While the short-haul market share gradually increased, reaching 75% in 1999, the share of long-haul markets declined from 50% of total visitor arrivals to Hong Kong in 1985 to 25% in 1999.

4. For the first time, in 1994, China replaced Taiwan as the biggest tourist market. It has since continued to provide the largest number of inbound tourists to Hong Kong. The majority of the visitors arriving in Hong Kong remain pleasure tourists, although the proportion of business tourists is on the rise. In 2000, pleasure tourists accounted for 55% of overall visitor arrivals, followed by business tourists (30%), those visiting friends and relatives (8%), and those en-route to other destinations (6%). An increasing dominance of business-related tourists reflects a changing role of Hong Kong tourism in the late 1980s, reflecting a structural change of the Hong Kong economy.

5. April and October were the peak months for arrivals, based on average arrivals per month over the period from 1980 to 2000. In contrast, January and February were the least popular months, which reflect the effect of the Chinese Lunar New Year on arrivals.

6. Our descriptive analysis of tourism demand in Chapters 2 and 3 suggested that the study's econometric models of tourism demand should use six cross-country dummy variables and five country-specific dummy variables to reflect the effect of global economic crisis, social policy changes, political unrest, and other special events in Hong Kong and the study's origin countries over the estimation period from 1959 to 1999.

7. One objective of this study is to re-develop econometric models of tourism demand for Hong Kong. In the process of our re-examination, we reviewed past relevant studies of econometric models of tourism demand in Chapter 4 to provide a rough guide for selecting our research methods and procedures. We critically evaluated almost all major existing econometric models of tourism demand based on alternative cointegration and error correction approaches and other relevant single-equation tourism demand models. Our critical appraisal of these previous econometric models strongly

suggested opportunities for improvement in modelling income and price effect in the tourism demand model. This motivated us to develop our research framework that underlies our econometric models of tourism demand to allow us to produce more accurate and reliable forecasts of tourism demand for Hong Kong.

8. Our framework for modelling and forecasting tourism demand was introduced in Chapter 5. We specified the tourism demand models for each of Hong Kong's six main tourist origin countries. We select our permanent income and asset wealth variables by examining the merits of permanent income-life cycle hypothesis, which we clearly justified as an alternative for current income hypothesis. In addition, we selected our econometric approaches by examining the merits of the cointegration and error correction approaches, which we clearly explained and justified as appropriate for tackling the problem of spurious regression. However, our review of the empirical literature of tourism demand estimation based on cointegration and error correction approach indicated that some uncertainties exist in some of the previous econometric models of tourism demand in identifying the same order of integration for all of the underlying variables. We therefore argued that the Pesaran approach may be employed as a supplement to the traditional Engle-Granger and Johansen approaches. In the discussion, we critically evaluated the underlying strength of the Pesaran approach against other popular cointegration approaches.

9. We considered not only the findings of descriptive analysis of tourism demand in Chapter 3 and the review of empirical literature in Chapter 4, but also the economic rationale and statistical justification, when we selected the appropriate proxy variables for the economic determinants in our tourism demand model. Unlike most previous models, in which the popular proxies and functional form were generally selected based on a survey of past empirical literature of tourism demand, the selection of the preferred permanent income index, the selection of destinations for the construction of weighted substitute price indices, and the functional forms used in our study were determined by statistical evidence in conjunction with economic theory. We clearly explained the merits of the application of a grid search process for selecting the proxy variable of the preferred permanent income index to measure the effects of income in the tourism demand equations. In another process of the proxy variable search, we applied a rival search process to aid us in selecting substitute destinations for Hong Kong in the construction of the weighted substitute price indices. In addition, our study is the first of its kind to employ the share price index as a proxy variable to measure the effects of asset wealth in a tourism demand equation based on the theoretical rationale of permanent income-life cycle hypothesis.

Finally, we explained in detail the estimation procedures of cointegration relationships and their associated dynamic ECMs based on the Engle-Granger, Johansen and Pesaran approaches. We evaluated the procedures for measuring forecasting performance of error correction models that are based on alternative cointegration approaches, OLS, ARIMA and the benchmark NAÏVE models. We further discussed the merits of producing scenario forecasts by using applications of the most accurate econometric models of tourism demand.

10. The empirical results and findings of this study were all presented with analysis in Chapters 6 to 9. The empirical results of the cointegrating regressions and their associated ECMs, based on the Engle-Granger and Johansen, Case 3 approaches, were presented with economic interpretations in Chapter 6. For all of the underlying variables in the United States, Japan and China models, the results of ADF unit root tests indicated that uncertainty existed in identifying the same number of unit roots for each model. As a result of this empirical uncertainty, we developed econometric models to estimate tourism demand based on the Pesaran and Shin (1998) approach. This helped us to ensure the reliability of our results, because in using this approach, we were able to estimate the state of long- run relationships among the underlying variables, irrespective of the order of integration for all the underlying variables in the estimated equations.

11. In our cointegration results based on the Johansen Case 3 models in Chapter 6, the empirical results suggested that there existed at least one long-run relationship among underlying variables for all of the models. However, the empirical results of the cointegrating regressions based on the Engle-Granger (1987) procedures did not indicate long-run relationships for China and the United Kingdom models and these findings showed mixed results for the two models. Moreover, we examined the associated ECMs, based on the Engle-Granger and Johansen, Case 3 approaches by empirical investigation using Hendry-type testing down procedures. The empirical results indicated that our most preferred ECMs were able to pass all of the statistical tests used for diagnostic checking, with the exception of the preferred Taiwan model, based on the Engle-Granger approach.

12. The overall results of the cointegrating regression and its associated ECMs suggested that the factors of permanent income and own price index were the most important long- and short-run factors that affected tourism demand for all origin countries. The results of a grid search process of the permanent income index further suggested that a stronger positive correlation between the permanent income indices (with a smaller selected weighting factor) and tourist flows to Hong Kong was found to exist in the long-haul market. This suggests that long-haul tourists are more responsive to the effect of

their permanent income than are short-haul tourists. More importantly, these findings suggest the merits of application of income variable based on the PI-LCH in the tourism demand equation.

13. The empirical results of a rival search process for the selection of substitute destinations suggested that Australia, Singapore, Thailand and Japan are the most competitive substitute destinations for Hong Kong. This was true for both descriptive analysis and quantitative analysis. More importantly, the weighted substitute price variable was found to be statistically significant for Taiwan and the United Kingdom.

14. Our study also found that a new variable, the share price variable, was statistically significant for Japan and Germany model. We were not surprised by this discovery, as a relatively high proportion of tourists from these two countries are leisure travellers. On the whole, we found that leisure tourists are more sensitive to changes in the level of asset wealth. Finally, we found that the trade volume variable was an important determinant for China and the United States.

15. The results of the Pesaran approach in Chapter 7 indicated that all models, with the exception of those of the United Kingdom and China, showed the existence of a long-run cointegration relationship. These results agreed with those of the Engle-Granger approach that indicated a cointegration relationship did not exist among the underlying variables in the United Kingdom and China models. The problem of the United Kingdom model could be attributed to Hong Kong's positions as a British colony over the period from 1842 to 1997. During that time, the social - political and cultural relationships between the United Kingdom and Hong Kong might have had some significant impacts on U.K. residents travelling to Hong Kong. It is not surprising that in the U.K. model, economic factors played a lesser role in determining tourist flows to Hong Kong. Overall, we found that the results of the United Kingdom and China model based on the Pesaran approach are in agreement with those based on the Engle-Granger approach.

16. The results of the derived elasticity estimates of the economic variables, as presented in Chapter 8, indicated that international tourist flows to Hong Kong are highly sensitive with regard to economic factors. The overall (the weighted average of six origin countries) average long-run and short-run permanent income elasticity is 2.7 and 2.0, respectively. The estimated average (the weighted average of the four alternative models) permanent income elasticity ranged from 1.1 (United States) to 5.3 (United Kingdom) in the long-run models, implying that Hong Kong tourism is considered a luxury product for tourists coming from the six tourist-generating countries.

17. The estimated average own price elasticity was either elastic or inelastic, depending on the tourist origin countries. We found that the overall long-run own price elasticity is averaged at -1.02, while for the short-run it is averaged at -0.5.

18. The weighted substitute price variable was significant in the models for the United Kingdom and Taiwan, and the estimated long-run elasticity fell to a range from 1.1 (U.K.) to 1.7(Taiwan). We found that the overall long-run average weighted substitute price elasticity is 1.4, while the overall short-run elasticity is 0.7.

19. The share price variable was statistically significant in the Japan and Germany models. The signs of the estimated long-run elasticity depend on the tourist origin country, ranging from -0.2 (Japan) to +0.3 (Germany). We found that the overall average long-run share price elasticity is 0.3 (in absolute value), while the overall short-run share price elasticity is 0.1 (in absolute value). This suggests that asset wealth play a role in the tourism demand model.

20. Conversely, the trade volume variable was statistically significant, with the expected sign, in the United States and China models. This suggests that the openness of the Hong Kong Economy and the business link with the U.S and China tend to have important impacts on the Hong Kong tourism. We found that the overall long-run trade elasticity of demand is 0.5, while the overall short-run trade elasticity is 0.3.

21. The results indicated that amongst the selected six cross-country dummy variables, DUMMY89 variable was statistically significant for the United States and United Kingdom models only. This finding suggested that tourists from the United States and the United Kingdom were politically sensitive to the 1989 incident in Beijing. However, it is important to note that as we could not establish the state of cointegration for the United Kingdom and China model, based on Engle-Granger and Pesaran approaches, the estimated elasticity for these models must be interpreted with caution. Regarding the five country-specific variables, DUMMY88TAI and DUMMY91GER variables were found to be important variables in Taiwan and Germany.

22. The results of this study showed that the significance of economic determinants of tourism demand vary by origin country, suggesting that using aggregate data across countries needs to be treated with caution.

23. The results of the seven forecasting models demonstrated that the dynamic ECMs based on the Engle-Granger and Johansen approaches had produced better average forecasts than the OLS, NAÏVE and ARIMA models in the long and short-haul market (with the exception of Taiwan). Contrary to the findings of Kulendran and Witt (2001) and Song et al. (2003), the findings of this study

suggested that the dynamic ECM model is the best among the competing forecasting models and support the merits of application of ECM in tourism demand forecasting.

24. We also compared the ECM models based on the Pesaran approach with alternative ECMs for the United States and United Kingdom. The results indicated that we could recommend the Pesaran approach as an alternative to other popular cointegration approaches to produce tourism demand forecasts, particularly for those models in which there exist problems in identifying the same order of integration for all of the underlying variables.

25. The results of the most-likely scenario forecasts suggested that all the short-haul and all the long-haul markets have the positive average growth rate in visitor arrivals over the forecasting period from 1999 to 2004. While all the short-haul markets have the weighted average growth rate of 16.11%, all the long-haul markets have a slower 8.05% average growth rate over the period of 2000-2004.

26. Finally, the results suggest that China is expected to continue to be the largest tourist generating country by the end of 2004. The average forecast under the assumption of most-likely scenario predicted that tourist arrivals from China increase from 3.08 million in 1999 to 9.17 million in 2004.

10.2 Research Objectives Results, Discussions and Conclusions

In this section, we will draw conclusions based on the research findings from this study. Our conclusions are related to the research objectives, as listed in Chapter 1. We will also discuss findings and conclusions that relate to the specific results of our explorations as obtained by the tourism demand models, based on the alternative cointegration and error-correction approaches mentioned in the corresponding chapters.

1. Overall, our econometric models of tourism demand, based on the alternative cointegration approach, are well specified for Hong Kong's six major tourist origin countries. The ADF unit root tests indicated that the majority of the underlying variables are I(1) variables, which confirms the application of cointegration and error correction approaches instead of ordinary least square estimation. This is consistent with the findings of Wong (1997) that previous studies which conveniently draw standard inferences from ordinary least squares estimated tourism models based on the levels of international tourist arrivals can be very misleading since non-stationarity in the data will produce inconsistent parameter estimators and unreliable test statistics. In addition, the cointegration results based on the Johansen approach suggested the long-run relationship between the underlying variables in the tourism demand equations for all models. We found that all of the selected economic variables were important determinants in the error correction models, with the estimated elasticity correctly signed, as expected by economic theory. Overall, the ECMs based on the alternative cointegration approaches

produced better forecasts than the ARIMA, OLS and NAÏVE models. In addition, we selected the best econometric models (those with the least errors) to produce scenario forecasts for changes to the international tourist flows to Hong Kong for each of the six origin countries. As a result, not only does this study contribute to the empirical academic dimension, it also provides opportunities for policy makers to identify variables (factors) that are relevant for the tourist industry and the government in making economic decisions.

2. The empirical results of this study indicated that the new variables (the share price variable, the grid search version of the permanent income variable, and the rivals search version of the weighted substitute price variable) performed very well in our tourism demand models. This suggests that the applications of our estimation procedures clearly improve the reliability of parameter estimates. The empirical results indicated that the share price variable (a proxy for the asset wealth) is statistically significant in the Japan and Germany models. The sign was positive for Germany and negative for Japan. More importantly, the empirical results of the grid search process for permanent income variable indicated that the selected weighting factor of the preferred permanent income index varied with respect to each tourist origin country. Overall, the long-haul models generally selected the permanent income index with lower average value of weighting factors than did the short-haul models, indicating that the permanent income variables are more significant than the current income variables in estimating tourism demand for the long-haul models. Further, these findings suggested in those previous empirical studies which have assumed tourism demand to depend solely on current income, the relationship between tourism demand and its determinants was potentially misleading and the calculated elasticities is inaccurate.

3. The results of the ADF unit root tests indicated that there is difficulty in identifying the same levels of integration for all the underlying variables in the United States, Japan and China models. To ensure the reliability of our results and findings, the Pesaran approach-based ECM models were introduced. We used the Pesaran approach because it can indicate the state of long-run relationship among the underlying variables in the model, irrespective of the order of the integration of the underlying variables. The empirical results of the models based on the Pesaran approach indicated that for each tourist origin country, with the exception of the United Kingdom and China, there existed a long-run relationship. This is consistent with the findings of Engle- Granger (1987) approach.

4. We evaluated the forecasting performance of the five alternative econometric models (four ECM and one OLS) by comparing with the benchmark ARIMA and NAÏVE models, using the MAE and RMSE criteria, over five different forecasting horizons. The results indicated that the models based on

the Engle-Granger approach produced the most accurate forecasts in all the long-haul markets and Japan, while Johansen Case 2 models produced most accurate forecasts for Taiwan and China. Overall, the "BEST ECMs" produced the most accurate average ex-post forecasts among the seven forecasting models, which indicate that the model based on cointegration methodology has superiority in terms of forecasting ability. However, recent empirical economic literature has indicated that the popular unit root tests lack power. Kulendran and King (1997) indicated that the poor performance of some ECM models based on the traditional cointegration approaches might be due to lack of power of unit root testing. We therefore recommended that the Pesaran approach should also be considered as an alternative estimation approach when developing econometric models for estimating and forecasting tourism demand. The results indicated that the forecasting performance of the Pesaran ECMs produced relatively accurate forecasts for the market of the United States, and the United States model has experienced problems in maintaining the same order of integration.

5. The preferred ECMs were applied to produce scenario forecasts for the period from 2000 to 2004. Since forecasting errors rise at an increasing rate with respect to the length of forecasting horizon, we selected the five-year ex-ante forecasting period instead of the 10-year ex-ante forecasting period. Overall, all the long and short-haul markets have positive growth rate in visitor arrivals over the period from 2000 to 2004. We predict that the average inbound tourist flows from six origin countries under the assumption of most- likely scenario will grow at an average growth rate of 11.87%(Japan), 12.07% (Taiwan), 24.4% (China), 8.50% (U.S.), 7.58% (U.K.), and 8.07% (Germany), respectively over the forecasting period. According to the results of weighted average forecasts, tourist arrivals from China to Hong Kong continue to be the largest among various origin countries.

6. Although the empirical literature indicates that ARIMA models are capable to produce relatively accurate forecasts of tourism demand, it is not an appropriate method to analyze the cause-effect relationship between the tourism demand variable and the economic variables in the tourism demand model. In particular, where tourism planners may normally be concerned about the relative importance of income, own price, substitute price variables in the tourism demand models differ from country to country. Hence, in contrast to ARIMA models, the error correction models is a more powerful tool for the policy-makers in formulating tourism related polices in the medium term, including (a) destination supply, (b) pricing, (c) competition (d) taxation and (e) marketing.

a. Income elasticity and destination supply policy: The empirical results indicate that the coefficients of the income variable were significant for all origin countries. The long run permanent income elasticities with positive signs range from 1.1 (U.S) to 5.3 (U.K.), which indicate that Hong Kong tourism is considered a luxury good for her customers. The high income elasticity indicate that, with high economic growth predicted in the origin countries such as China and United States, the demand for Hong Kong tourism should continue to expand substantially. We therefore recommend the tourist industry should adjust supply variables such as airline seats and hotel room capacity to meet an increasing market demand.

b. Price elasticity and pricing policy: The coefficients of the own price variable have the expected negative signs for all countries and are significant for all origin countries (with the exception of China). The long-run own price elasticity with negative signs ranged from -1.3 (Ger) to -0.8 (Jap). The empirical results indicate that the most price-sensitive markets are the United Kingdom, Germany and the Taiwan. It implies that Hong Kong's tourism price must remain competitive to attract more tourists from those countries. The least price-sensitive markets are the United States, Japan and China (insignificant own price variable). This suggests that an aggressive pricing policy may not be useful in attracting tourists from those countries. Instead, Non-price competition, such as improvements to service quality and creating unique promotional strategy are policies that will attract more tourists from those countries.

c. Substitute price elasticity and competition policy- The empirical results indicate that the weighted substitute price variables are statistically significant in the models for Taiwan and United Kingdom. Tourist originating in these source markets, with weighted substitute price elasticities of 1.7 (Taiwan) and 1.1 (United Kingdom), appeared to be more sensitive to the prices of substitute destinations within the East Asia and Pacific (EAP) region, when compared with tourists from other origin countries. For the United Kingdom and Taiwan models, the substitute price variables appear to exert strong influence on tourist arrivals in Hong Kong. We recommend that Hong Kong's tourism pricing needs to remain competitive with the tourist destinations identified here as substitutes within the EAP region for these markets. Conversely, the substitute price variables are not significant in the model for Germany, Japan and the United States. This indicates that the degree that other EAP destinations could be substituted for Hong Kong is limited for those origin countries.

d. Price elasticity and taxation policy: Taxes on tourism have the effect of increasing the prices of tourism but do not imply an increase in total tax revenue for the government. The amount of extra tax revenue from the increase of an existing tax or the introduction of a new tax depends on the price elasticity of demand, which is important to assess for the purposes of policy. The empirical results indicate that the price elasticity of demand is greater than one (average of six origin countries). The relatively high elasticity suggests that tourism services in Hong Kong are sensitive activities with respect to change in the related taxes. This implies that an increase in tax on tourism activities in Hong Kong will lead to a significant loss in term of tourism tax revenue. We therefore recommend the tax rates levied on Hong Kong tourism services, such as hotel tax and tourist entry tax, remain competitive if Hong Kong aims to exploit fully its tourism potential.

e. Demand elasticites and marketing strategy: (i) Tourists from the United States are less sensitive to changes in income (income elasticity =1.1) and they are not sensitive to the tourism price in Hong Kong (price elasticity = -0.9). The lower income and price elasticity may be due to the relatively large proportion of business tourists coming from the United States. Consequently, Hong Kong's tourism policies for attracting American tourists should be thematically appropriate, as opposed to price competitive, to be effective. **(ii)** Price strategies are not effective for attracting Japanese tourists to Hong Kong because the Japanese are not price sensitive (price elasticity = -0.9). Accordingly, marketing efforts would be a more effective strategy than keeping pricing competitive when promoting Hong Kong to the Japanese market. **(iii)** People coming from China to Hong Kong are more sensitive to change in income (income elasticity = 1.7), but they are not responsive to changes in tourism prices (China's own price variable is insignificant). To attract more tourists from China, Hong Kong tourism should target the high-income segment employing a product differentiation strategy, which would be more effective than an aggressive pricing strategy. **(iv)** For the markets of Germany, Taiwan and United Kingdom, we recommended the tourist industry should target the high-income segments of each country [income elasticites = 3.4 (Germany), 1.9 (Taiwan) and 5.3 (United Kingdom)] with messages that are price conscious [own price elasticites = -1.3 (Germany), -1.02 (Taiwan) and -1.1 (United Kingdom)]

7. Past empirical literature of tourism demand focused on Europe and North America. Our study provides additional evidence of tourism demand estimation and forecasting for the East Asia and Pacific region. The results and findings of this study confirmed the contribution of this research is three-fold. Firstly, the superiority of the permanent income and share price variables supports the merits of applications of permanent income-life cycle hypothesis in estimating tourism demand. Secondly, the superior results of cointegration analysis and ECM forecasting within this study supports the merits of application of cointegration analysis, its relationship to ECMs and its use in conjunction with Hendry-testing down procedures for estimating and forecasting tourism demand. Thirdly, both the descriptive analysis and quantitative findings of international tourism demand in this research provides decision makers with concrete information in analysing tourism policy options. Finally, we confirmed

that our econometric study of international tourism demand for Hong Kong provides solid evidence to improve the application results of econometric models (based on the theories of permanent income-life cycle hypothesis and the cointegration and error correction approaches) for the estimation of the economic determinants of tourism demand and for the forecasting of tourism demand.

10.3 Contribution of Research

In summary, the single equation econometric models of tourism demand used in this study contribute to the cointegration literature of modelling and forecasting tourism demand. Although Divisereka (1995), Kulendran (1996), Lathiras and Siriopoulos (1998), Kim and Song (1998), and Dritsakis (2004) all employed various models based on the alternative cointegration and error correction approaches to estimate and forecast tourism demand, our research differed in the following aspects: 1.statistical search methods to select appropriate proxies for economic variables and functional form; 2.a new share price variable introduced to the tourism demand equation; 3.new cointegration approach; and 4. applications of scenario forecasting in tourism demand. The following section shows some major advance from previous studies.

The new procedures and variables in our tourism demand models are an extension of previous studies by further exploring the effects of permanent income, and substitute prices, and being the first to explore the effects of asset wealth on tourism demand. In this research, we applied the grid search version of the permanent income indices, the weighted substitute price indices based on the rival search selection procedures of the most competitive rivals, and the new share price variable to construct our models of tourism demand. Particularly, the effect of asset wealth as a source of consumption has been thought to be more important over the past few decades, however, no study attempted to model these effects. This research can therefore be considered the pioneer study to explore these effects. The empirical findings indicated to us that the position of tourist asset wealth and the role of permanent income played a significant role in our tourism demand equation.

Although previous models based on the cointegration and error correction approaches, including Kulendran (1996) and Kim and Song (1998) were widely applied in the tourism demand literature as a remedy to the problem of spurious regression, our review of empirical literature indicated that the most popular unit root tests, such as the one used in the Engle-Granger and Johansen maximum likelihood approaches, generally lack power. This shortcoming affects the reliability of the parameter estimates and the forecasting performance of the ECMs, based on the traditional cointegration approaches.

We extended the research found in the previous studies of Divisereka (1995), Kulendran (1996), Lathrious and Syripouopolis (1998), Kim and Song (1998), and Dritsakis (2004) by using the applications of the Pesaran approach as a supplement to the traditional cointegration approaches used to model and forecast tourism demand, to improve the reliability of estimates of elasticity and the forecasting performance of error correction models. The Pesaran approach is particularly important to this study because we experienced difficulty with the U.S., Japan and China models in identifying the same order of integration for all of the underlying variables.

While previous estimates of income and price elasticities used in tourism-related policy applications have normally been derived from either the Engle-Granger or Johansen approaches. [(Engle and Granger approach used in Vogt and Wittayakorn (1998) and the Johansen approaches used in Diviserka (1995) and Dritsakis (2004)], we derived the estimates of income, price and substitute price elasticities using the weighted average of the estimate value of four alternative error correction models that appear to be a meaningful measure by smoothing out any extreme value derived from a single model. Moreover, we decide to use the weighted average approach (based on three alternative cointegration approaches) to account for the possibilities of multiple long-run relationships and deal with the small sample problems.

When evaluating the forecasting performance of the alternative econometric models, we attempted to extend the evaluation procedures from previous relevant studies, including Kim and Song (1998) and Kulendran and Witt (2001), by comparing the relative forecasting performance of the seven alternative forecasting models over a period of one- to ten- year ex-post forecasting horizons with the application of model re-estimation procedures. In addition, since the forecasts of expected future demand have rarely been discussed in the existing literature, we produced weighted average scenario ex-ante forecasts for a five-year period from 2000 to 2004, using the ECMs of the fewest forecasting errors.

One of the objectives of this study was to improve the reliability of estimates of demand elasticity and to produce more accurate econometric forecasts. The following findings demonstrate that this research makes a significant contribution to the empirical work of tourism demand estimation and forecasting.

First, most of our preferred permanent income indices selected smaller values of the weighting factors, particularly for the long-haul markets. This finding supports our proposed hypothesis that the grid search version of the permanent income index is theoretically superior to the popular form of current income variable when estimating income effects in the tourism demand model.

With regard to modelling price type factors, previous studies have either ignored the fact that tourists choose between a range of tourism products and destinations, or included prices for a range of alternative destinations, but have not included a well-argued rationale for their selected ranges. For our rival search process, we selected our set of substitute destinations objectively by using statistical evidence, rather than personal judgement. In addition, our construction methodology for our weighted substitute price index followed closely the construction method of the real effective exchange rate index commonly used in the field of international economics. Our findings indicated that the weighted substitute price variable is also an important variable in the tourism demand equations.

Our empirical results also indicated that the share price variable is a major economic determinant of the tourism demand model, and must be considered in further investigations of estimating tourism demand, particularly in those source markets that are dominated by holiday travellers. Our results indicated that the effect of their asset wealth within the tourism demand model is relevant and important to tourism demand equations.

Although Kulendran and Witt (2001) and Song, Witt and Jensen (2003) used alternative econometrics approaches to forecast tourism demand (details had been reviewed in Chapter 9), we have extended the research from Kulendran and Witt (2001), Kim and Song (1998) and Song Witt and Jensen (2003) in several aspects. First, we extended the Kulendran and Witt (2001) and Song, Witt and Jensen (2003) ex-post forecasting timeframe to include horizons from one to ten years forecasting horizon, and applied the procedures of model re-estimation to the maximum of the tenth round for improving the reliability of the results. Second, we used our preferred ECMs to generate scenario demand forecasts over the forecasting period from 2000 to 2004, following our review of empirical literature, which indicated that a five-year-ahead demand forecast is considered a long forecasting horizon. Third, we improved the quality of our forecasts over other major studies, because the forms of our economic proxies were determined by using various proxy variable search procedures instead of subjective judgement and which had shown statistical significance.

Kulendran and Witt (2001) suggested that because of the mixed nature of the forecasting results using alternative econometric models, it is important to indicate the results of the relative forecasting performance of ECMs in the context of tourism demand forecasting. The forecasting results of our dynamic ECMs strongly indicated that modern econometric models that apply the cointegration and error correction approach are superior to OLS, ARIMA and NAÏVE models. This finding agrees with that of Kim and Song (1998), but is contradictory to that of Kulendran and Witt (2001). When we compared our findings with the future demand forecasts of Kulendran (1996), the average value of our alternative scenario forecasts has incorporated the adjustments of changes in the economic circumstances of the various countries concerned.

10.4 Policy Implications and Recommendations

We contend that the results and findings of this study not only contribute to the empirical dimension of tourism demand but also provide policy implications for Hong Kong's tourist-related industry and the Government bodies. This section of the study could also be considered as a source of information for both the tourist-related industry in Hong Kong and the Hong Kong Tourism Board.

The descriptive and quantitative analysis of international tourism demand in this research provides decision makers with a sound and effective decision process in making tourism policy. Tourism can be an effective generator of foreign exchange and employment, and a means of reducing the balance of payments deficits, as well as diversifying the structure of the Hong Kong economy. However, these objectives cannot be fully achieved without a thorough understanding of the factors affecting tourism demand in Hong Kong. The empirical results and the economic interpretation of our study have enhanced our understanding the tourist behaviour in Hong Kong from our major origin countries. We summarise the policy implications and recommendation of this study as follows:

1. Our findings suggest that there is a considerable variation of tourism market trends and elasticity of tourism demand for Hong Kong among the source markets. Given that tourism demand elasticities for Hong Kong vary by source markets, country–specific policies must be formulated because no uniform policies can be implemented for all countries.

2. Our analysis of the trend of tourism demand and of the changes in the structure of Hong Kong's economy in the mid-eighties indicated that the role of tourism has changed with respect to the economic development of Hong Kong. With regard to this changing role, we conclude that Hong Kong should continue to develop its tourism market to better attract a balanced portfolio of business and leisure travellers to reflect not only Hong Kong's position as a paradise for leisure tourists but as a regional business hub as well.

3. The study found that Hong Kong has gained significant market shares from one of the world's fastest growing tourist generating country of China, implying that the government should concentrate its tourism resources on the China market that represents the greatest potential for increasing tourist receipts.

4. Our market share analysis shows that Hong Kong has gained only a small market share from the world's largest tourist origin countries (such as U.S., U.K., Germany) and fast growing market of India and Middle East Countries. Apart from the 'distance' factor, the lack of sufficient knowledge about Hong Kong as a travel destination is quite significant. The Hong Kong Tourism Board (HKTB) should

work towards promoting Hong Kong's attraction by implementing more innovative promotional strategies to target these markets.

5. Tourist arrivals in Hong Kong fluctuate widely in accordance with the months and the dates of major holidays in its biggest source markets. The study found that the smaller seasonal fluctuations of tourism demand in the 1990's could be attributable to the Hong Kong policy that aims to develop new tourist markets and products, and the price-discriminating measures during off-peak seasons by the hotel and airline sectors. We believed that HKTB and the tourism enterprises should develop Hong Kong further as a popular international travel destination using a variety of promotional campaigns. This should be another contributing factor in reducing the impact of seasonal factors on international tourist arrivals.

6. The study found that per capita income is one of the major variables affecting the demand for international tourism to Hong Kong. The results of the permanent income elasticity tests indicate that Hong Kong tourism is a luxury for both long-haul and short-haul tourists. The tourist-related business should increase the capacity of tourist-related services in times of economic boom, and decrease production in economic recession in the major tourist origin countries (Destination Supply Policy).

7. Another major factor influencing tourism demand in Hong Kong is the own tourism price. The findings show that the long and short-run estimated own price elasticity is relatively low for all origin countries (with the exception of long-run elasticity of Germany, United Kingdom and Taiwan), implying that Hong Kong tourism has certain market power over domestic tourism in those origin countries. Moreover, the estimated own price elasticity indicates that it is elastic in the long-run but inelastic in short-run for the market of United Kingdom, Germany and Taiwan, implying that the total revenue of tourist-related business might be improved in the short-run after tourist service prices increase, but will fall over the long run. Thus, Hong Kong's hotels and airlines should consider both the long-and short-run impact of making price decisions for the United Kingdom, German and Taiwan tourists (Pricing Policy).

8. The weighted substitute price variables are statistically significant and produce positive and elastic cross-elasticity of demand for the U.K. and Taiwan, implying that the prices of tourism services need to remain competitive with respect to the substitute destinations in the region to exploit tourist potential effectively. However, the empirical results indicate that the weighted substitute price variables are statistically insignificant in the models for Germany, the United States and Japan, suggesting that Hong Kong's tourism services and those of the regional competitors are characterised by different attributes for German, the United States and Japanese tourists (Pricing Policy).

9. The study found that the real trade volume variables are statistically significant for the United States and China, because a relatively large proportion of tourists coming from the United States and China are business tourists. It implies that tourist-related business should focus setting unique policies for the United States and China markets with respect to the purpose of their visits (Marketing Policy).

10. The study found that the share price variables are statistically significant for the Germany and Japan models. While Germany's market has a positive sign for its share price variable, Japan has a negative sign. This implies that the tourist-related business should increase tourist services capacities for Germany, but decrease tourist services capacities for Japan, with respect to the increase in the share price index (Destination Supply Policy).

11. It is possible that investors in the tourist industry could use the forecasting results of this study to better allocate their economic resources. Accurate econometric forecasts and reliable elasticity estimates of tourism demand in this study are not only useful to policy making for tourism enterprises but also important to government and tourist associations, to allow them to better formulate tourism-related policies. In addition, the tourist-related industry should formulate its resource planning more efficiently on the basis of forecasting results. The results of the scenario forecasts demonstrated that there is an increase of expected future tourism demand over the 5-year forecasting period for all origin countries. This implied that there should be greater demand for tourist-related facilities. The tourist-related business should increase the number of hotel rooms, shopping and catering facilities, conference and exhibition facilities, tours and entertainment services, and airline capacity.

12. Since past studies focused on shorter-term forecasting, the results of our medium- to long-term scenario forecasts can be extremely useful in making capital investment decisions, such as the purchasing of extra aircraft, the building of new exhibition centres, the building of hotels, and planning within the entertainment business. As Witt and Witt (1992) noted, "If the longer term demand for tourism were not predicted accurately for the supply side, disbenefits might take the form of shortages of hotel accommodation, passenger transportation capacity, professional staff ". The results of our scenario forecasts of increasing tourism demand in the medium- to long-term are a major research input for making capital investment decisions such as the building of the Hong Kong Disney theme park, new exhibition centre, and helicopter terminal.

Based on the results and findings of the study, the following recommendations are focused on the better development of an econometric model of tourism demand with a high degree of validity and reliability. This section could be considered as a source of information for researchers and practitioners concerned with modelling and forecasting tourism demand.

13. Our empirical results indicated that most of the economic variables in the tourism demand models are I(1) variables, and researchers in the field should apply the cointegration and error correction approach for modelling tourism demand in Hong Kong.

14. Our results indicated that there is some superiority of the permanent income variable and weighted substitute price variable in terms of statistical significance. Researchers in the field should apply the method of grid search process to improve the selection of an appropriate income variable and the rival search procedures for the construction of a weighted substitute price index in the process of developing a tourism demand model.

15. The study found that the share price variable is a major economic determinant of the tourism demand model, and must be considered in further investigations of estimating the effect of asset wealth in tourism demand model, particularly in the source markets that are dominated by holiday travellers.

16. Since the study found that ECM models produced more accurate forecasts than the OLS, ARIMA and NAÏVE models, we recommended researchers should apply the cointegration and error correction methodology for modelling and forecasting tourism demand.

17. It is clear that accurate forecasts of tourism demand are essential for efficient planning by tourist-related business, particularly given the perishability of the tourism product (Song and Witt, 2000). Researchers should continue to produce more accurate expected future demand forecasts (ex-ante forecasts) to facilitate the planning activities of tourism-related business and the government.

18. While we assumed that tourism data published by the government has been collected and is recorded properly, we find that there is no uniformity in international tourism information (such as number of tourist arrivals, tourist expenditures) collected by some government bodies, local tourist associations and international tourist associations. We recommend that the local, national and international organisations coordinate for the development of a more reliable, valid and more comparable international tourism data series.

19. The study finds that the Pesaran ECMs produce relatively accurate forecasts than do alternative ECMs for the U.S. model. We should recommend researchers to apply the Pesaran ECMs in developing an econometric model of tourist demand. In particular, we strongly recommend the researchers to apply the Pesaran approach when there are doubts on the same level of integration for all of the models.

10.5 Limitations of Study

The limitations of the study include the following:

1. The purpose of this research is to build an econometric model to examine the tourism demand in Hong Kong. Thus, the model does not consider supply behaviour, political, social-psychological nor demographic factors within the tourism industry, and the study is limited to the economic determinants of tourism demand. In particular, the econometric model of tourism demand from the United Kingdom does not consider the inbound tourist flows as a result of the British administration in Hong Kong over the period from 1842 to 1997.

2. This study relies on secondary time-series data, thus it does not combine cross-sectional and time-series data. There have been severe constraints on the availability of adequate and reliable statistical data, particularly for the series of marketing expenditures and the costs of transportation. Furthermore, the application with other time-series data is imperfect because there exists the possibility that errors might have occurred during the collection, sampling, aggregation and measurement of such data. While it is assumed that data published by the government have been collected and are recorded properly, it is difficult to check the process of collection of such data. In addition, we find that there is no uniformity in international tourism information (such as tourist arrivals, tourist expenditures) collected by government bodies or international organisations, and it is thus difficult to confirm the reliability of the data.

3. We have restricted the use of tourism demand models to countries with a larger market share of tourism demand and to those that have data readily available. For this research, only the three most significant long-haul tourism markets and the three most significant short-haul markets have been selected for analysis. These markets account for nearly 72% of total tourist arrivals in Hong Kong over the whole period of study.

4. This research employs annual data that do not take into account the effect of seasonal fluctuations of tourism demand in Hong Kong. The effect of seasonality is therefore excluded from this investigation.

5. While future tourism demand forecasts (ex-ante forecasts) using ARIMA models are not influenced by examining the past trends of forecast variable itself, ex-ante tourism demand forecasts generated using error correction models are influenced by examining the past trend of the demand variable itself and by forecasting future trends of the explanatory variables. In this research, the period of the forecasts of the error correction models form 2000 to 2004 are defined as the period of ex-ante

forecasts. In contrast to the ex-post forecasts, the values of the explanatory variables are unknown and must be forecasted over the period from 2000 to 2004 to supply ex-ante forecasts for the tourism demand variables. However, we must emphasize that the forecast value of explanatory variables in the error correction models are subject to the risk of forecasting errors of the selected ARIMA models.

6. The majority of empirical literature in the context of permanent income-life cycle model reports a significant wealth effect. However, the composition and measure of wealth varies from one study to another. Wealth has been defined as the stock of liquid assets, financial and non-financial assets, real assets and the share price index. In most cases, the selection of proxies for the wealth variable is subject to the reliability and availability of data. In this study, the share price index was used as a proxy for asset wealth in analysing tourism demand because reliable data on property value for most origin countries are not available. Although the share price proxy is arguably better than most alternatives used in the literature, it is subject to the risk of measurement and specification errors of unknown magnitudes. Hence, despite the theoretical consistency and good statistical fit, the results of the share price variable must be analysed with considerable care.

7. It is important to note that our error correction models were unable to explain certain variations of tourism demand from United Kingdom particular well. However, we must indicate that since Hong Kong was a British colony for the period from 1842-1997, it is more likely that economic variables alone will not fully explain the variations of United Kingdom tourism demand in Hong Kong. We believe that the link factors such as social-political and cultural relationship between United Kingdom and Hong Kong may have strong impacts on visitors travelling to Hong Kong from the United Kingdom, but the cultural and social-political aspects are beyond the scope of this research.

8. The empirical results indicate that our econometric model did not explain the variation of tourism demand from China particularly well. However, it is important to emphasize that the results of the China model must be interpreted with considerable care. At the time of the study, the available data was severely limited with only thirteen degrees of freedom in the China market. This significantly affected the development of the econometric model for testing and estimating tourism demand from China based on alternative cointegration approaches.

10.6 Indications for Future Research

In this study, both cointegrating regressions and the associated error correction models have made important contributions to the empirical literature of tourism demand; however, there remains room for further advances. Further research should be considered in such areas as follows:

1. The grid search version of the permanent income variable, the rival search version of the weighted substitute price variable and the share price variable were used as the most appropriate proxies for income, substitute price and asset wealth variables in modelling tourism demand. Although we provided economic or statistical rationale for the proxies developed and the approximations made in this study, they are still subject to measurement errors of unknown magnitudes. There is still a need for improvement, in that further research in this respect is necessary.

2. Although the Pesaran approach has been applied to tackle the empirical problems in some of the models as to whether or not all of their underlying variables had the same level of integration, further research could examine other powerful unit root tests or alternative cointegration approaches to address this issue.

3. Although the quality of the forecasting accuracy is important for tourism resources allocation, for certain strategic business conditions, it may be more important to forecast correctly the direction of change in tourism demand.

4. The results of this study indicated that the estimated elasticity, such as that of the permanent income indices, differed considerably with respect to individual origin country, the distance of travel, and the purpose of the tourist's visit. We therefore suggest that there should be strong need for further research on disaggregate data, such as business travel, and the variations of tourist behaviour between the long- and short-haul tourist markets.

5. Apart from the problem of the non-stationarity properties of the time-series data and the possibility of unstable model structure for some of the tourism demand models, the issue of seasonality has not been investigated within the empirical literature of tourism demand in Hong Kong. Our descriptive analysis indicated that one of the main characteristics of the tourist industry in Hong Kong is its seasonality. Further development of a seasonal econometric model of tourism demand in the Hong Kong tourism market should therefore be studied.

6. The model that estimated arrivals from the United Kingdom suggested that our econometric model was not able to explain certain variations of tourism demand from that country particularly well. As Hong Kong and the United Kingdom maintained a unique colonial relationship over the period between 1842 and 1997, we suggest that further research should focus more on the study of the ties element include factors that represent social, cultural and political links between Hong Kong and United Kingdom.

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Appendix. A Review of Selected Earlier Tourism Demand Studies (1966-1989)

Table A.1 provides a survey of the selected earlier studies of tourism demand and focuses on the selection of dependent and independent variables within the tourism demand model

Table A.1 Summary of Variables Considered in Major Previous Studies of Tourism Demand

Year	Author	Dependent Variables	Independent Variables
1966	Gray	Actual imports on travel accounts Potential imports on travel account	Real disposable income per capita Exchange rate Transportation cost
1970	Artus	Index of real spending	Index of real disposable income Weighted relative price index Market index for foreign travel services
1972	Blackwell	Actual number of tourist arrivals (per 1,000 population of Great Britain and U.S.A, respectively)	Disposable per capita income Relative price index Dummy variable (Car Ferry)
1972	Barry and Hagan	Real annual expenditure Number of tourist arrivals	Per capita disposable personal income Time Trend Per capita foreign tourism expenditure Real advertising expenditure Weighted price index Dummy variables (i) Travel credit restriction (ii) Weather index (iii) Introduction of car ferry
1972	Artus	Per capita real spending	Per capita disposable personal income Relative local currency price Relative exchange rate Weighted average of foreign travel expenditure
1972	Kwack	Real expenditure	Real disposable income Transportation cost Relative price Dummy variable (EXPO 67) in Montreal.
1973	Bechdolt	Number of tourist arrivals	Income (aggregate) Transportation cost Per capita personal income
1974	Jud and Joseph	Real tourism expenditure, number of departures	Real GNP per capita Disposable income per capita Relative Price Index Transportation cost

1979	Bond	Demand for travel Demand for transportation	Permanent Income Index Transportation Cost Double Weighted Index for the relative effective price competitiveness Foreign Market Share Variable
1980	Fuji and Mak	Real tourism imports	Real per capita personal disposable income Real transportation cost Lag value of the dependent variable
1980	Little	Real expenditure	Real per capita personal disposable income Consumer price index Exchange rate index Transportation cost index Dummy variable (political)
1980	Witt	Per capita vacation trips	Real personal disposable income per capita Real cost of travel Travel time Relative cost of tourism Dummy variables (i) cost restriction (ii) type of holiday (iii) mode of travel (iv) characteristics of destination
1981	Kilman	Number of tourist arrivals	Relative inflation Relative exchange rate Transportation cost Disposable income Combined Population (Canada and each origin contries) Measure of ethnic attraction
1982	Loeb	Real expenditure per capita	Real per capita income Exchange rate Relative price Dummy variable (special events)
1984	Anastasopoulous	Number of tourist arrivals	Per capita real disposable income Per capita real national income Relative price Dummy variables (unusual events and time trend)
1984	Uysal and Crompton	Number of tourist arrivals Tourist expenditures	Per capita real income Relative price Exchange rate Promotional expenditure Dummy variable (i) economic instability (ii) social instability
1984	O'Hagan and Harrison	Per capita expenditure	Per capita income Relative price Dummy variable (i) trends (ii) political factors

Year	Author	Dependent Variables	Independent Variables
1985	Witt and Martin	Per capita visitor arrivals	Real per capita disposable income Relative price Real transportation cost Exchange rate Lagged dependent variable
1986	Gundahai and Boey	Number of tourist arrivals	Real national income per capita Index of shopping price (Singapore currency) Index of hotel prices (Singapore currency) Index of exchange rate
1988	Witt and Martin	Visitor arrivals divided by population	Real personal disposable income per capita Cost of living for tourist in destination Weighted average of cost of tourism in substitute destination Exchange rate Weighted average of cost of air travel Weighted average of transportation cost by surface Trend term Dummy variables
1988	Summary	Number of holiday tourists	Real disposable income per capita Real air fare Exchange Rate Relative price Dummy variable (conflict with Tanzania)
1988	Martin and Witt	Per capita visitor arrivals	Real personal disposable income per capita Cost of living for tourists in destination Weighted average of cost of tourism in substitute destinations Exchange rate Weighted average of cost of travel by surface to substitute destinations Lagged dependent variable Dummy variables

The survey covers the period between 1966 and 1989. Reviews of earlier tourism demand studies are also presented by Sheldon and Var (1985), and Crouch (1994a and 1994b)

Appendix B Results of Long-run General Models and Short-run General ECMs

In Tables B.1 to B.18, we present the empirical results of our long-run general models and short-run general error correction models based on the Engle-Granger and Johansen approaches (Case 3 model) for each of the six origin countries. The Microfit output of Tables B.1 to B.18 is available under request.

Table B.1 Results of Long-run General Model (Japan) – Dependent Variable LnTANAT (1959-1999)

Economic Series	Coefficient	t-ratio
CST	11.9369	9.0934
LnRGDPPC	2.8432	11.1144
LnSHARE	-0.30644	-2.9624
LnPPP	-0.79837	-2.1780
LnRTRAD	0.034953	0.34319
LnSUB	0.030182	0.070740
DUMMY74	0.12050	0.96124
DUMMY80	0.15721	0.93679
DUMMY89	0.086242	0.64251
DUMMY91	-0.060891	-0.36550
DUMMY97	0.0053028	0.029219
DUMMY98	-0.19330	-0.93682
DUMMY87JAP	0.13985	1.0027

Notes: 1.LnTANAT = total visitor arrivals from Japan
2.LnRGDPPC = real GDP per capita
3.LnPPP = own tourism price
4.LnSUB = weighted substitute price index
5.LnRTRAD = trade volume in real terms
6.LnSHARE = Share Price Index
7.DUMMY74 = dummy variable for first oil crisis
8.DUMMY80 = dummy variable for second oil crisis
9.DUMMY89 = dummy variable for June 4th, 1989 incident in Beijing
10.DUMMY91 = dummy variable for Gulf War crisis
11.DUMMY97 = dummy variable for 1997 Hong Kong handover
12.DUMMY98 = dummy variable for Asian financial crisis
13.DUMMY87JAP= country-specific dummy variable for a social policy in Japan that encouraged outbound travel
14.R^2 = coefficient of determination
15.DW = Durbin Watson statistics
16.Ln= logarithmic form

R^2 = 0.99237 DW = 0.98910

Table B.2 Results of Short-run General Model (Japan) – Engle-Granger Approach, Dependent Variable DLnTANAT (1961-1999)

Economic Series	Coefficient	t-ratio
CST	0.041426	1.6084
DLnP85	2.1976	3.9637**
DLnP85(1)	-1.2255	-1.7793*
DLnP85(2)	-0.26661	-0.36567
DLnPPP	-0.22825	-1.1312
DLnPPP(1)	-0.32481	-1.1214
DLnPPP(2)	-0.0052952	-0.019333
DLnSHARE	-0.12456	-1.8327*
DLnSHARE(1)	-0.014757	-0.20435
DLnSHARE(2)	-0.050103	-0.74924
RESEGJAP(1)	-0.77575	-3.6101**
DLnTANAT(1)	0.35924	2.0847**
DLnTANAT(2)	0.096604	0.54080

Notes 1.D = first differences
2.Figures in the parentheses, number of lags
3. RESEGJAP(1) one-lagged error correction term determined from corresponding cointegrating regression derived from Engle-Granger procedure
4.DLnP85 , permanent variable with weighting factor of 0.85
5.For definition of other underlying variables, refer to notes of Table B.1.
6.*/** denotes significance at the 10%/ 5% level
7. In order to conserve the degree of freedom, each dummy variable is regressed separately with all selected economic variables and the dummy87 variable in the short-run general models. Only the statistically significant dummy variables are reported in the Table B.2. The results of ECM models with alternative dummy variables and other potential economic variables with appropriate lags are available under request.

R^2 = 0.79687 $\overline{R}^2$ = 0.69937
SER = 0.10086 RSS = 0.25431

Diagnostic Test

LM = 0.14171 RESET = 3.9343
NORM = 1.9357 HETRO=0.40740

Table B.3 Results of Short-run General Model (Japan) – Johansen, Case 3 Model, Dependent Variable DLnTANAT (1961-1999)

Economic Series	Coefficient	t-ratio
CST	11.8013	3.3541**
DLnP85	1.7942	3.2440**
DLnP85(1)	-1.1431	-1.6276
DLnP85(2)	0.25368	0.37414
DLnPPP	-0.16808	-0.81786
DLnPPP(1)	0.090348	0.22602
DLnPPP(2)	0.45711	1.4001
DLnSHARE	-0.17188	-2.4861**
DLnSHARE(1)	0.095004	1.0363
DLnSHARE(2)	-0.016800	-0.23163
ECMJOJAP(1)	-0.74407	-3.3462**
DLnTANAT(1)	0.38217	2.1089**
DLnTANAT(2)	-0.11892	-0.77190

Notes 1.ECMJOJAP1, one-lagged error correction term determined from corresponding cointegrating vector, derived from Johansen, Case 3 model

2.For other descriptions, refer to notes of Tables B.2 and Table B.1.

3. */** denotes the significance at 10%/5% level.

4. In order to conserve the degree of freedom, each dummy variable is regressed separately with all selected economic variables and the dummy87 variable in the short-run general models. Only the statistically significant dummy variables and economic variables with appropriate lags are reported in the Table B.3. The estimated results of preliminary general ECM models with alternative dummy variables are available under request.

R^2 = 0.78656 $\overline{R}^2$ = 0.68411

SER = 0.10338 RSS = 0.26721

Diagnostic Test

LM = 0.19803 RESET = 2.2001

NORM = 1.9372 HETRO = 0.72799

Table B.4 Results of Long-run General Model (Taiwan) – Dependent Variable DLnTANAT (1968-1999)

Economic Series	Coefficient	t-ratio
CST	1.3561	0.83199
LnRGDPPC	2.2891	4.4396
LnSHARE	-0.17460	-1.3108
LnPPP	-1.3180	-4.0565
LnSUB	1.9508	4.3210
LnRTRAD	0.0008033	0.0036034
DUMMY74	0.36424	2.9788
DUMMY80	0.23360	1.8994
DUMMY88TAI	1.1724	7.0261
DUMMY89	0.17575	1.0870
DUMMY91	0.059875	0.34588
DUMMY97	0.051114	0.27726
DUMMY98	0.35226	1.5652

Notes 1.DUMMY88TAI, dummy variable for abolishment of travel in Taiwan in 1998
2.For the description of other variables, refer to notes of Table B.1

R^2 = 0.99492 $\overline{R}^2$ = 0.99171

SER = 0.15192 RSS = 0.43854

Table B.5 Results of Short-run General Model (Taiwan) – Engle-Granger Approach, Dependent Variable DLnTANAT (1971-1999)

Economic Series	Coefficient	t-ratio
CST	-0.31824	-1.6112
DLnTANAT(1)	-0.15758	-0.73660
DLnTANAT(2)	-0.18332	-1.2650
DLnP40	3.3262	1.3059
DLnP40(1)	4.8058	1.7731*
DLnP40(2)	-0.95533	-0.40362
DLnPPPTAI	-0.94205	-1.6388*
DLnPPPTA(1)	-1.8398	-3.1748**
DLnPPPTA(2)	-1.5051	-2.2349**
DLnSUB	0.93452	1.9292*
DLnSUB(1)	0.053524	0.085924
DLnSUB(2)	1.0721	1.7569*
DUMMY88TAI	0.27141	2.5748**
RESEGTAI(1)	-0.74648	-2.3130**

Note 1.RESEGTAI(1) is one-lagged error correction term, complied from corresponding cointegrating regression, derived from Engle-Granger procedure
2.DLnP40, permanent income variable with weighting factor 0.40 in first differenced form
3.For other data descriptions, refer to notes of Tables B.4 and B.2
4. */** denotes the significance at 10%/5% level.
5. In order to conserve the degree of freedom, each dummy variable is regressed separately with all selected economic variables and the dummy88TAI variable in the short-run general models. Only the statistically significant dummy variables are reported in the short-run models. The results of preliminary general ECM models with alternative dummy variables and other economic variables with 2 lags are available under requests.

R^2 = 0.79152 $\bar{R}^2$ = 0.61084
SER = 0.17059 RSS = 0.43650
Diagnostic Test
LM = 0.0064999 RESET = 6.7576**
NORM = 0.22334 HETRO = 0.23370

Table B.6 Results of Short-run General Model (Taiwan) – Johansen, Case 3 Model, Dependent Variable DLnTANAT (1971-1999)

Economic Series	Coefficient	t-ratio
CST	1.2151	2.6006**
DLnTANAT(1)	-0.11223	-0.059945
DLnTANAT(2)	-0.073356	-0.57750
DLnP40	2.6219	1.2294
DLnP40(1)	1.5049	0.62055
DLnP40(2)	-1.1376	-0.57748
DLnPPP	-0.62475	-1.3302
DLnPPP(1)	-0.89445	-1.5326
DLnPPP(2)	0.12321	0.18567
DLnSUB	0.66902	1.7624*
DLnSUB(1)	-0.029092	-0.057613
DLnSUB(2)	-0.060875	-0.10495
DUMMY88TAI	0.90713	4.9702**
RESJOTAI(1)	-0.73993	-3.7796**

Notes 1.RESJOTAI(1), one-lagged error correction term, complied from corresponding cointegrating vector, derived from Johansen, Case 3 model

2.For other descriptions, refer to notes of Table B.5

3. */** indicates 10%/5% level.

4. In order to conserve the degree of freedom, each dummy variable is regressed separately with all selected economic variables and the dummy88TAI variable in the short-run general models. Only the statistically significant dummy variables are reported in the short-run models. The results of preliminary general ECM models with alternative dummy variables and other economic variables are available under requests.

R^2 = 0.85513 $\overline{R}^2$ = 0.72958

SER = 0.14220 RSS = 0.30332

Diagnostic Test

LM(1) = 0.019721 RESET = 1.0519

NORM = 0.16090 HETRO = 0.31441

Table B.7 Results of Long-run General Model (China) – Engle-Granger Approach, Dependent Variable is LnTANAT (1984-1999)

Economic Series	Coefficient	t-ratio
CST	-3.8414	-3.3704**
LnRGDPPC	1.9786	19.9453**
LnPPP	-0.29102	-2.0287**
LnRTRADE	0.62405	4.4022**
DUMMY89	0.070125	1.7767*
DUMMY91	-0.022691	-0.43199
DUMMY97	-0.13735	-2.8722**
DUMMY98	-0.073018	-1.4286
DUMMY87CHI	-0.10858	-1.3879
DUMMY93CHI	0.13666	3.5602**

Notes 1.DUMMY87CHI , Dummy variable for introduction travel package in China

2.DUMMY93CHI , Dummy variable for relaxation of visa requirements in China.

3. For other data descriptions, refer to the notes of Table B.1.

4. */** denotes the significance at 10%/5% level

Diagnostic Tests

R^2=0.99911 DW=1.7555

Table B.8 Results of Short-run General Model (China) – Engle-Granger Approach, Dependent Variable DLnTANAT (1986-1999)

Economic Series	Coefficient	t-ratio
CST	-0.028563	-0.55119
DLnRGDPPC	2.3621	4.0396**
DLnRTRADE	0.24573	1.3110
RESEGCHI(1)	-0.87585	-3.2322**

Note 1.DLnRGDPPC, permanent variable with weighting factor 1.00

2..RESEGCHI(1) , one-lagged error correction term determined from corresponding cointegrating regression, derived using Engle-Granger approach

3.For other data descriptions, refer to the notes of Table B.2

4.*/** denotes significance at 10%/5% level.

5. Due to small sample size, the General ECM models cannot include all the dummy variables and all the economic variables in one single ECM model. We estimated the significance of each Dummy Variable and potential economic variables with lags in separate ECM model and the results indicated that all the dummy variables are not relevant for the Preferred ECM model. The results of Preliminary general ECM models with alternative dummy variables are available under requests.

R^2 = 0.78061 R^2 (adjusted) = 0.72077
SER = 0.067494 RSS = 0.050109
Diagnostic tests
LM(1) = 1.3580 RESET = 1.3566
NORM(1) = 0.60970 HETRO = 0.49641

Table B.9 Results of Short-run General Model (China) – Johansen, Case 3 Model, Dependent Variable DLnTANAT (1986-1999)

Economic Series	Coefficient	t-ratio
CST	-1.7962	-4.1793**
DLnRGDPPC	2.1243	4.0146**
DLnRTRADE	-0.19525	-0.92229
RESJOCHI(1)	-0.91304	-4.0485**

Notes
1. RESJOCHI(1), one-lagged error correction term determined from corresponding cointegrating regression, derived from Johansen, Case 3 approach
2. For other data descriptions, see Table B.2
3. */** denotes the significance at 10%/5% level
4. Due to small sample size, the General ECM models cannot include all the dummy variables in one single model. We estimated the significance of each Dummy Variable with separate General ECM model and the results indicated that all the dummy variables are not relevant for the Preferred ECM model. The results of Preliminary general ECM models with alternative dummy variables are available under requests.

R^2 = 0.82821 $\overline{R}^2$ = 0.78136
SER = 0.059724 RSS = 0.039236
Diagnostic Test
LM(1) = 0.55079 RESET(1) = 0.072897
NORM(2) = 0.26260 HETRO (1) = 0.005896

Table B.10 Results of Long-Run General Model (United States) – Dependent Variable is LnTARNA (1959-1999)

Series	Coefficient	t-ratio
CST	14.6556	7.0218
LnRGDPPC	1.2071	3.9598
LnPPP	-0.76599	-4.5335
LnSHARE	0.030297	0.45122
LnSUB	0.17219	0.93889
LnRTRAD	0.46398	6.5571
DUMMY74	0.071531	0.94593
DUMMY80	0.0064892	0.089585
DUMMY89	-0.24528	-3.6060
DUMMY91	-0.17870	-1.9391
DUMMY97	0.035554	0.35900

Note: 1. For data descriptions, refer to the notes of Table B.1.

R^2 = 0.99083 DW=1.6363

Table B.11 Results of Short-run General Model (United States) – Engle-Granger Approach, Dependent Variable DLNTARNA (1962-1999)

Economic Series	Coefficient	t-ratio
CST	0.049374	1.4012
DLnTARNA(1)	0.14021	0.68675
DLnTARNA(2)	-0.067015	-0.45413
DLnP80	-0.040754	-0.049432
DLnP80(1)	1.2008	1.2135
DLnP80(2)	-0.31243	-0.35426
DLnREXC	-0.50270	-1.6143
DLnREXC(1)	0.0030105	0.0085381
DLnREXC(2)	-0.39403	-1.2547
DLnRTRAD	0.37426	2.3770**
DLnTRAD(1)	-0.20512	-1.0438
DLnRTRAD(2)	-0.022530	-0.11985
DUMMY89	-0.12216	-1.6939*
RESEGUS(1)	-0.69458	-2.7503**

Notes: 1. DLNP80 is the permanent income variable in differenced form with weighting factor of 0.80.
2. RESEGUS(1) , one-lagged error correction term determined from corresponding cointegrating regression, derived from Engle-Granger approach
3. For other descriptions, refer to the notes of Table B.2
4. */** indicates significance level at 10%/5% level
5. In order to conserve the degree of freedom, each dummy variable is regressed separately with all selected economic variables and the dummy89 variable in the short-run general models. Only the statistically significant dummy variables and economic variables are reported in the short-run models. The results of preliminary general ECM models with alternative dummy variables and other economic variables are available under requests.

R^2 = 0.68618 $\bar{R}^2$ = 0.51619
SER = 0.074529 RSS = 0.13331
Diagnostic Test
LM = 1.2445 RESET = 0.19493
NORM = 0.10923 HETRO = 0.11136

Table B.12 Results of Short-run General Model (United States) – Johansen, Case 3 Model, Dependent Variable DLnTARNA (1962-1999)

Economic Series	Coefficient	t-ratio
CST	10.3203	2.8298**
DLnTARNA1	0.18783	0.88726
DLnTARNA2	0.0094339	0.059751
DLnP80	0.69685	0.74283
DLnP801	1.3814	1.4209
DLnP802	-0.48938	-0.57019
DLnPPP	-0.59184	-1.8717*
DLnPPP1	0.18589	0.51577
DLnPPP2	-0.29182	-0.92157
DLnRTRAD	0.26091	1.5057
DLnRTRAD1	-0.28809	-1.3686
DLnRTRAD2	-0.10989	-0.54455
DUMMY89	-0.18449	-2.7718**
RESJOUS1	-0.73258	-2.8220**

Notes: 1. RESJOUS1, one-lagged error correction term determined from corresponding cointegrating vector using Johansen, Case 3 model.

2. */** indicates significance at 5%/10% level.

3. In order to conserve the degree of freedom, each dummy variable is regressed separately with all selected economic variables and the dummy89 variable in the short-run general models. Only the statistically significant dummy variables are reported in the short-run models. The results of preliminary general ECM models with alternative dummy variables and other economic variables are available under requests.

R^2 = 0.69010 $\bar{R}^2$ = 0.52224

SER = 0.074062 RSS = 0.13164

Diagnostic Test

LM(1) = 0.97850 RESET(1) = 5.4883**

NORM(2) = 0.06836 HETRO(1) = 0.39496

Table B.13 Results of Long-run General Model (United Kingdom) – Dependent Variable LnTARES (1965-1999)

Economic Series	Coefficient	t-ratio
CST	6.5011	1.8054
LnRGDPPC	2.5987	3.1466
LnPPP	-0.78968	-2.3435
LnSUB	1.4205	3.7522
LnSHARE	0.64453	2.8661
LnRTRADE	-0.19175	-0.59243
DUMMY74	0.23320	1.0614
DUMMY80	0.28841	1.3565
DUMMY89	-0.15594	- 0.80866
DUMMY91	-0.039545	-0.15763
DUMMY97	0.025435	0.099294

Note: 1.For data descriptions, refer to the notes of Table B.2,
2.LnTARES, visitor arrivals based on country of residence.

R^2 = 0.96784 DW= 0.93173

Table B.14 Results of Short-run General Model (United Kingdom) – Engle-Granger Approach, Dependent Variable DLnTARES (1968-1999)

Economic Series	Coefficient	t-ratio
CST	0.13604	2.3797**
DLnTARES1	-0.11103	-0.51521
DLnTARES2	-0.058863	-0.27076
DLnP30	2.0427	0.63943
DLnP301	-2.5887	-0.63595
DLnP302	0.23583	0.11127
DLnPPP	-0.52599	-1.7467*
DLnPPP1	-0.31609	-0.89165
DLnPPP2	-0.39526	- 1.0366
DLnSUB	0.48222	1.7379*
DLnSUB1	0.26353	0.77486
DLnSUB2	0.21788	0.58942
DUMMY89	-0.072807	-0.90996
RESEGUK1	-0.35868	-2.5172**

Note: 1.RESEGUK1, lagged error correction term determined by corresponding cointegrating vector, complied from Engle-Granger approach.
2.For other definition of variables, see Table B.2.

3. */** denotes the significance at 10%/5% level.

4. In order to conserve the degree of freedom, each dummy variable is regressed separately with all selected economic variables and the dummy89 variable in the short-run general models. Only the statistically significant dummy variables are reported in the short-run models. The results of preliminary general ECM models with alternative dummy variables and other economic variables are available under requests.

R^2 = 0.58766 $\overline{R}^2$ = 0.28986

SER = 0.092423 RSS = 0.15376

Diagnostic Test

LM (1) = 0.55074 RESET(1) = 2.2468

NORM (2) = 0.59617 HETRO(1) = 0.00126

Table B.15 Results of Short-run General Model (United Kingdom) – Johansen, Case 3 Model, Dependent Variable DLnTARES (1968-1999)

Economic Series	Coefficient	t-ratio
CST	4.0353	1.9981*
DLnTARES1	-0.073256	-0.31330
DLnTARES2	0.084768	0.34844
DLnP30	3.1076	0.88909
DLnP301	-2.0990	-0.48797
DLnP302	2.8939	1.2023
DLnPPP	-0.52524	-1.6464
DLnPPP1	-0.41785	-1.1354
DLnPPP2	-0.43865	-1.0880
DLnSUB	0.73418	2.4744**
DLnSUB1	0.29572	0.82180
DLnSUB2	0.21165	0.54095
DUMMY89	-0.21280	-1.9142*
ECMJOUK1	-0.38577	-1.9298

Notes 1. ECMJOUK1 = lagged error correction term determined by corresponding cointegrating vector, derived from Johansen approach.

2. For other definition of variables, refer to the notes of table B.2.

3. */** denotes the significance at 10%/5% level.

4. In order to conserve the degree of freedom, each dummy variable and other potential economic variables is regressed separately with all selected economic variables and the dummy89 variable in the short-run general models. Only the statistically significant dummy variables are reported in the short-run models. The results of Preliminary general ECM models with alternative dummy variables and economic variables are available under requests.

R^2 = 0.53808 $\overline{R}^2$ = 0.20447

SER = 0.097822 RSS = 0.17225

Diagnostic Test

LM (1) = 0.17572 RESET(1) = 0.57551

NORM(2) = 0.16906 HETRO (1) = 3.1370

Table B.16 Results of Long-run General Model (Germany) – Dependent Variable LnTANAT (1959-1999)

Economic Series	Coefficient	t-ratio
CST	-9.2264	-2.7794
LnRGDPPC	1.6946	2.5860
LnSHARE	0.086321	0.81645
LnPPPGER	0.15004	0.67042
LnSUB	0.31290	1.5570
LnRTRADE	0.67282	3.3643
DUMMY74	-0.050158	-0.55130
DUMMY80	-0.021082	-0.20826
DUMMY89	0.38396	2.1812
DUMMY91	-0.47462	-3.5914
DUMMY97	0.012226	0.093100
DUMMY91GER	0.67476	5.9680

Notes: 1. For the description of variables, refer to Table B.1.

R^2 = 0.99497 DW= 1.3544

Table B.17 Results of Short-run General Model (Germany) – Engle-Granger Approach, Dependent Variable is DLnTANAT (1962-1999)

Economic Series	Coefficient	t-ratio
CST	0.013269	0.39002
DLnTANAT1	0.66665	3.9186**
DLnTANAT2	0.25874	1.1350
DLnP30	3.5118	3.5862**
DLnP301	-3.9009	-2.8209**
DLnP302	-0.026876	-0.029283
DLnPPPGER	-0.060844	-0.29603
DLnPPGER1	-0.31074	-1.7276*
DLnPPGER2	0.38783	1.7821*
DLnSHARE	0.34416	2.8427**
DLnSHARE1	-0.21731	-1.8100*
DLnSHARE2	0.062738	0.64724
DUMMY91GER	0.011174	0.27661
RESEGGER1	-0.95922	-4.4822**

Notes: 1. RESEGGER1= lagged error correction term determined by corresponding vector, derived from Engle-Granger approach.

2. For other definitions of variables, see Table B.2
3. */** denotes significance at 5%/10% level.
4. In order to conserve the degree of freedom, each dummy variable and other potential economic variables with 2 lags are regressed with all selected economic variables and the Dummy91GER variable in the short-run general models. Only the statistically significant dummy variables are reported in the short-run models. The results of preliminary general ECM models with alternative dummy variables are available under request.

$R^2 = 0.75653$ $\overline{R}^2 = 0.62465$

SER = 0.074853 RSS = 0.13447

Diagnostic Test

LM(1) = 2.3133 RESET = 2.0119

NORM(1) = 0.48533 HETRO = 0.33279

Table B.18 Results of Short-run General Model (Germany) – Johansen, Model, Dependent Variable, DLnTANAT (1962-1999)

Regressor	Coefficient	t-ratio
CST	-2.3810	-2.7615**
DLnTANAT1	0.31842	1.8482*
DLnTANAT2	-0.30148	-1.4764
DLnP30	2.9814	2.6406**
DLnP301	0.079602	0.059714
DLnP302	1.9125	1.6118
DLnPPPGER	-0.35456	-1.5648
DLnPPGER1	0.13982	0.052857
DLnPPGER2	0.46865	1.7454*
DLnSHARE	0.39022	2.4518**
DLnSHARE1	-0.14203	-0.95440
DLNSHARE2	0.94578	0.8062**
DUMMY91GER	0.18485	2.3798**
ECMJOGER1	-0.36533	-2.8459**

Notes 1. ECMJOGER1 = One-lagged error correction term from corresponding cointeegrating vector using Johansen, Case 3 model.

2. */** denotes significance at 10%/5% level.

3. In order to conserve the degree of freedom, each dummy variable and other potential economic variables with 2 lags are regressed with all selected economic variables and the Dummy91GER variable in the short-run general models. Only the statistically significant dummy variables are reported in the short-run models. The results of preliminary general ECM models with alternative dummy variables are available under request.

$R^2 = 0.66558$ $\overline{R}^2 = 0.48444$

SER = 0.087727 RSS = 0.18470

Diagnostic Test

LM(1) = 3.5462 RESET = 11.5158**

NORM(1) = 1.9985 HETRO = 0.006009

Appendix C Results of Non-nested Test Statistics and Choice Criteria – Testing Linear Versus Log-linear Tourism Demand Models

This appendix provides the empirical results of the S-test, the PE-test, the BM test, the DL test, and Sargan's and Vuong's likelihood criterion, to select the most appropriate functional form.

Table C.1 Results of Testing Linear Versus Log-Linear Tourism Demand Model – Non-Nested Test Statistics and Choice Criteria

Functional Form	Origin					
	U.S.	U.K.	Germany	Japan	Taiwan	China
S-Test(100)	-1.8502	-0.64668	0.56251	1.1041	-2.3182**	0.75598
PE-Test	-0.87230	1.3457	4.8612**	-2.0245**	1.1133	1.6045
BM-Test	-1.0981	1.0435	-1.1251	-2.4103**	1.1299	1.7283
D-L Test	1.6725	1.5807	1.3251	2.2818**	1.6994	1.4074
Sargan's Likelihood Criterion	-11.5141 (favours M2)	-19.933 (favours M2)	-47.8730 (favours M2)	-53.8920 (favours M2)	-21.4473 (favours M2)	-7.3535 (favours M2)
Vuong's Likelihood Criterion	-19.6676 (favours M2)	-21.0849 (favours M2)	-35.6821 (favours M2)	-41.6808 (favours M2)	-14.2109 (favours M2)	-12.3674 (favours M2)

Notes:

1. S-Test – simple version of the simulated Cox-test statistics from Pesaran and Pesaran (1995)
2. BM Test – taken from Bera and McAleer (1989)
3. DL Test – double-length regression test statistics taken from Davidson and Mackinnon (1981)
4. PE Test – double-length regression test statistic taken from Mackinnon, White and Davidson (1983)
5. Sargan's (1964) likelihood function criterion helps choice between linear and log-linear models
6. Vuong's(1989) likelihood function criterion helps choice between linear and log-linear models
7. M1, linear specifications; M2, log-linear specifications
8. ** indicates rejection of use of log-linear specifications at 95% significance level
9. The Microfit output of Table C.1 is available under requests.

As shown in Table C.1, a number of different functional form tests are used to test log-linear models against linear models. These are carried out to examine whether the traditional log-linear form or the linear form applied in tourism demand equations is the most appropriate form. We applied four non-nested tests and two choice criteria to determine the most preferred functional form for this study. The empirical results of various non-nested test statistics reported in Table C.1 are based on the testing hypothesis of the log-linear model against the linear model.

The empirical results indicate that all of the non-nested tests statistics cannot reject the log-linear model against the linear model at the 5% error level in the United States, United Kingdom, and China models. Moreover, the two choice criteria also suggest the log-linear specification over the linear form for the above three models. Overall, we prefer to select the log-linear specification for those origin countries.

Although the empirical results of the BM, PE and DL tests suggest the rejection of the log-linear model at the 5 % level for the Japan model, the S- test and the two choice criteria select the log-linear specification. Since we do not have enough evidence to reject the log-linear form, we decided to select the log-linear form for the Japan model.

Moreover, the results of the PE, BM and DL tests and the two choice criteria, with the exception of the S-tests, suggest the log-linear specification over the linear form for the Taiwan model. We also decided to use the log-linear specification instead of linear form to model and forecast tourism demand model for the Taiwan model. Finally, the results of the BM S-test, DL tests and the two choice criteria, with the exception of the PE test, suggest the log-linear specification over the linear form for the Germany model. Overall, we decided that it was preferable to use the log-linear form for all country-pairs models in this study.

Appendix D Summary of the Results of Diagnostic Tests -- Alternative ECMs

As shown in Appendix D. Table D.1, we have carried out a number of standard diagnostic tests to examine whether or not the four ECM models based on the alternative approaches have any serial correlation problems, heteroscedasticity, non-normal errors, mis-specifications of the functional form and parameter instabilities. We have used various diagnostic tests to check for model misspecifications; the Godfrey (1998) Lagrange multiplier test to find serial correlations; the Ramsey (1969) RESET test to test for the functional form; the Jarque-Bera (1981) test for normality; the white (1980) heteroscedasticity test to detect non-constant variances in the residuals; and the CUSUM and CUSUMSQ stability tests for parameter constancy. We have reported results from CUSUM and CUSUMSQ tests to indicate the overall stability of each model. In addition, we plotted the feasible recursive estimates of all of the coefficients to test for their stability using the preferred error correction models. If the coefficients displayed significant variations as more data is added to the estimating equation, it is a strong indication of instability.

Although traditionally the Chow (1960) test has been used to test for model stability, as argued by Melnick et al. (1995) this procedure is inapplicable in the cointegration context because, under the null hypothesis of stability, the estimated coefficient in the two sub-samples will be more biased than the full sample estimates. Under such a circumstance, the null hypothesis can easily be rejected, even though the opposite is correct. To resolve this problem, we attempt to plot the feasible recursive estimates of all of the coefficients and apply the CUSUM and CUSUMSQ tests within the "BEST ECM" models for each origin country.

Appendix D. Table D.1 summarises the empirical results of the goodness of fit and the diagnostic test statistics of the short-run tourism demand models based on the four alternative cointegration approaches for each of the six origin countries. Overall, the empirical results indicated that the models are well specified since they pass all of the rigorous statistical tests. As such, this confirms the statistical acceptability for policy evaluation and forecasting purposes. In addition, both the CUSUM and CUSUMSQ tests and the plot of the recursive estimates indicate that the ECMs are stable. However, the diagnostic results also indicated that the Taiwan ECM (Engle-Granger approach) does not pass the normality test.

Table D.1: Diagnostics Statistics of Short-run Dynamic Model (All Markets)

	United States				Germany				United Kingdom			
	E-G	JO, 3	JO, 2	PES	E-G	JO, 3	JO, 2	PES	E-G	JO, 3	JO, 2	PES
LM(1)	1.628	0.2371	0.10534	1.0163	0.02133	0.58424	1.2230	0.46686	0.22358	0.43439	0.038193	0.40148
RESET(1)	1.6419	0.4162	0.6606	0.09202	0.22735	2.2167	1.0849	0.84426	0.040721	2.9109	3.8264	0.005056
NORM(2)	0.85412	1.9064	3.9786	1.3465	1.2787	1.3066	4.5245	1.6623	0.24560	0.40184	0.16075	0.51466
HETRO(1)	0.34381	0.1051	0.06266	0.7579	1.5035	0.97887	0.77934	2.3282	3.1249	2.2548	3.3032	0.18549
$\overline{R}^2$	0.56506	0.59519	0.49167	0.63600	0.53254	0.37152	0.35737	0.59403	0.39808	0.27380	0.17321	0.43948
SER	0.072677	0.07014	0.07857	0.06648	0.087937	0.10196	0.10311	0.08195	0.082715	0.092087	0.096942	0.082112
RSS	0.17430	0.16223	0.2037	0.14145	0.25519	0.34309	0.35082	0.21491	0.19157	0.22896	0.086639	0.17530
DW	1.6548	2.0816	2.0107	2.2063	1.9604	1.7515	1.6478	2.1140	2.0091	2.0807	1.9441	2.1757
CUSUM	Fig D.7A&D.7B	Fig D.8A & D.8B	Fig D.16A	N.A	FigD.11A& D.11B	FigD.12A& D.12B	Fig D.18A	N.A	Fig D.9A	Fig D.10A& D.10B	Fig D.17A	N.A.
CUSUMQ	Fig D.7C&D.7D	FigD.8C & D.8D	FigD.16B	N.A.	Fig D.11C & D.11D	Fig D.12C& D.12D	Fig D.18B	N.A	Fig D.9B	Fig.D.10C& D.10D	Fig. D.17B	N.A
Recursive Estimate	Fig D.22- Fig D.22H	N.A.	N.A.	N.A	Fig D.24A - D.24E	N.A.	N.A	N.A	Fig D. 23A- D.23D		N.A.	N.A.

Table D.1: Diagnostics Statistics of Short-run Dynamic Model (All Markets) (cont'd)

	Japan				Taiwan				China			
	E-G	JO, 3	JO, 2	PES	E-G	JO, 3	JO, 2	PES	E-G	JO, 3	JO, 2	PES
LM	2.9818	2.0174	2.0834	2.0010	0.28991	0.083393	0.12908	0.092352	0.004493	0.43537	0.23384	0.051760
RESET	2.0884	2.8812	2.8337	0.089443	0.022361	0.29110	0.0068862	2.0006	0.073338	0.043830	0.034326	3.1324
NORM	0.44360	0.28829	0.28560	2.4650	42.9104**	2.3028	0.56164	1.0443	0.57226	0.31197	0.11485	1.3017
HETRO	0.047686	0.18816	0.19071	0.22127	2.1653	0.32955	0.12903	0.13530	0.086662	0.055487	0.12643	0.18690
$\overline{R^2}$	0.69872	0.71363	0.71514	0.75826	0.36437	0.75374	0.77640	0.78147	0.76772	0.78408	0.79565	0.63209
SER	0.10355	0.10095	0.10069	0.092753	0.21423	0.13335	0.12706	0.12561	0.061559	0.059351	0.057739	0.077474
RSS	0.36455	0.35670	0.35481	0.25810	1.1474	0.44453	0.38748	0.31558	0.041685	0.042271	0.040005	0.066024
DW	1.6682	1.6884	1.6841	2.2477	1.8240	1.7860	1.8545	2.0783	1.9271	2.0226	2.0044	2.0097
CUSUM	Fig D.1A	Fig D.2A	Fig D.13A	N.A	Fig D.3A&D.3B	Fig D.4A and 4B	Fig D.14A and D.14B	N.A.	Fig D.5A	Fig D.6A	Fig D.15A	N.A.
CUSUMSQ	Fig D.1B	Fig D.2B	Fig D.13B	N.A	Fig D.3C & D.3D	Fig D.4C and 4D	Fig D.14C and 14D	N.A	Fig D. 5B	Fig D.6B	Fig D.15B	N.A
RECUR	Fig D. 19A-19D	N.A.	N.A.	N.A.	N.A.		Fig D.20A-D.20H	N.A.			Fig D.21A-21B	N.A

Notes 1. LM = Lagrange multiplier test for serial correlation

2. RESET = Ramsey RESET test for model mis-specification

3. NORM = Jarque-Bera [1980] test for normality of the residuals

4. HETRO = White (1980) heterosedasticity test for the detection of non-constant variance

5. $\overline{R^2}$ = adjusted coefficent of determination

6. SER = sum of error residual

7. RSS = regression sum of square

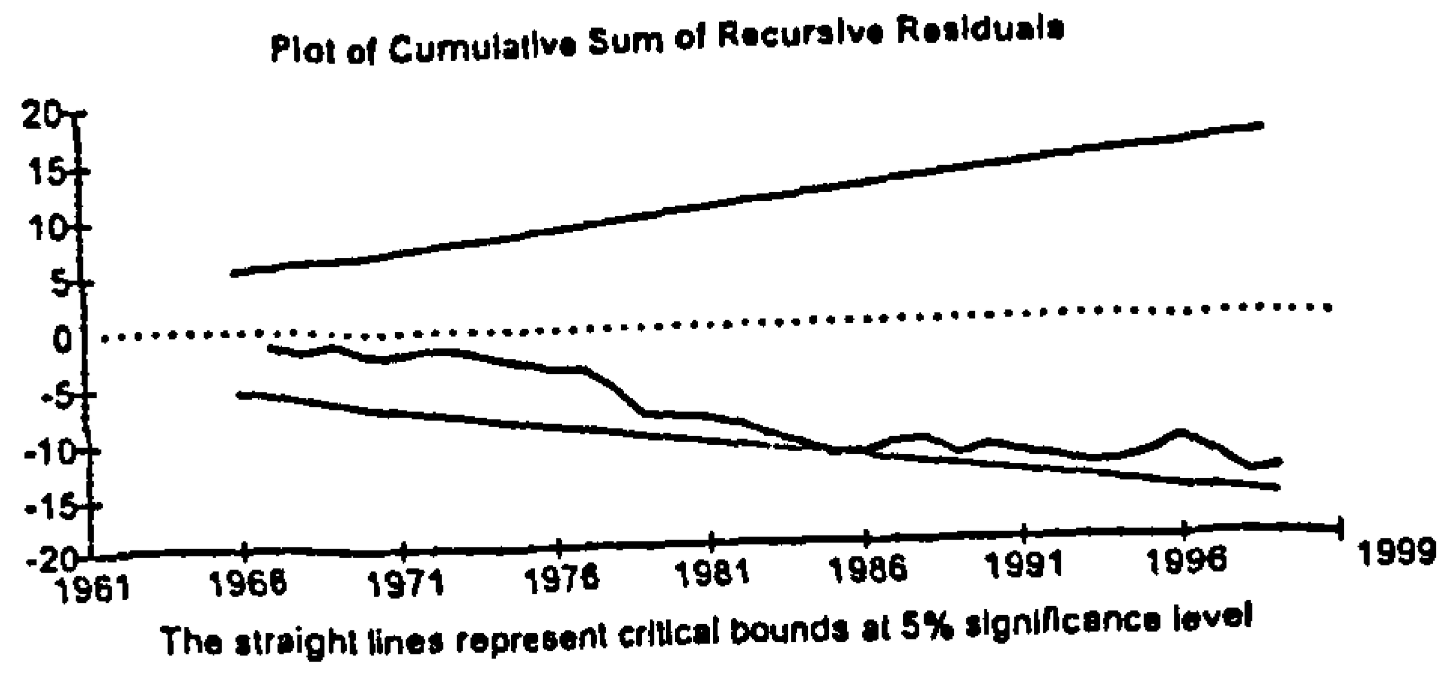
8. DW = Durbin Watson statistics

9..Graphics of the CUSUM and CUSUMSQ tests (Preferred ECMs) are shown in Appendix D and the graphics of other CUSUM and CUSUMSQ are available under request

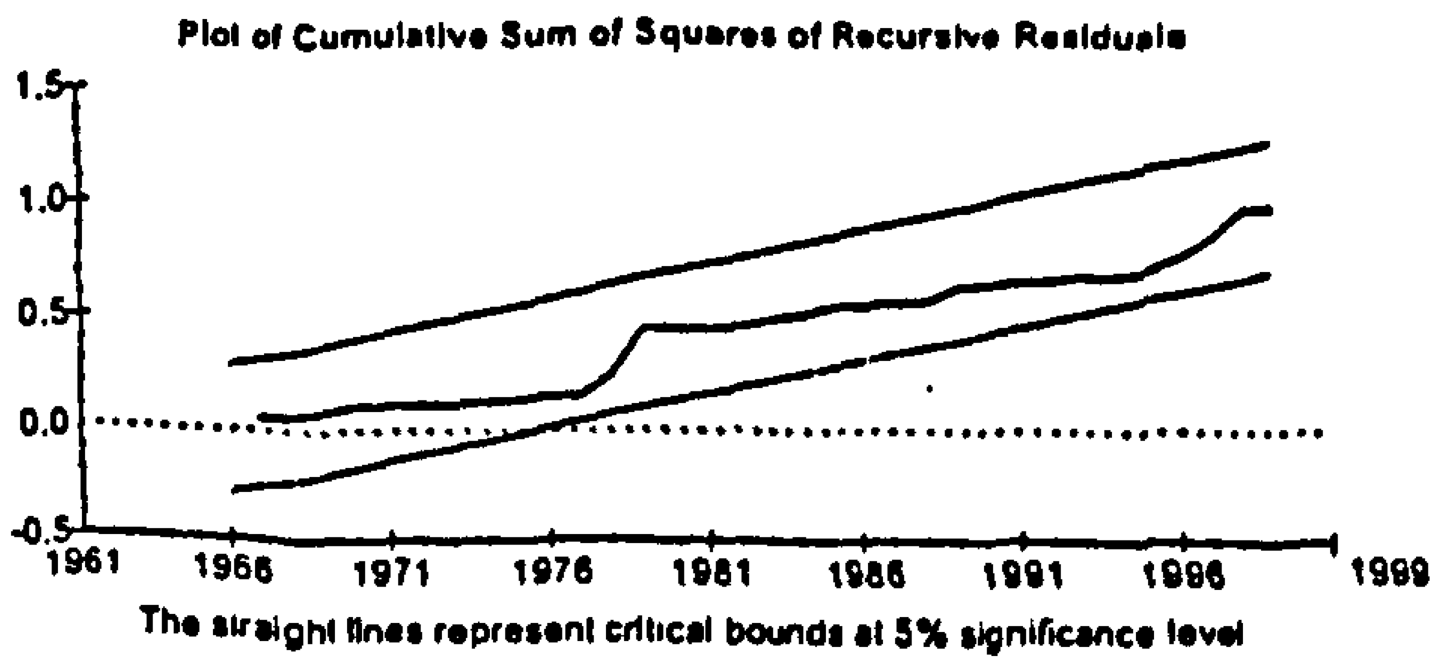
10..RECUR is the recursive estimates of coefficients tests . Graphics of RECUR (Preferred ECMs) are shown in Appendix D

Appendix D Graphical Presentation of CUSUM, CUSUMQ, and the Recursive Estimates of Coefficients for Each of Six Major Origin Countries over the period 1959-1999

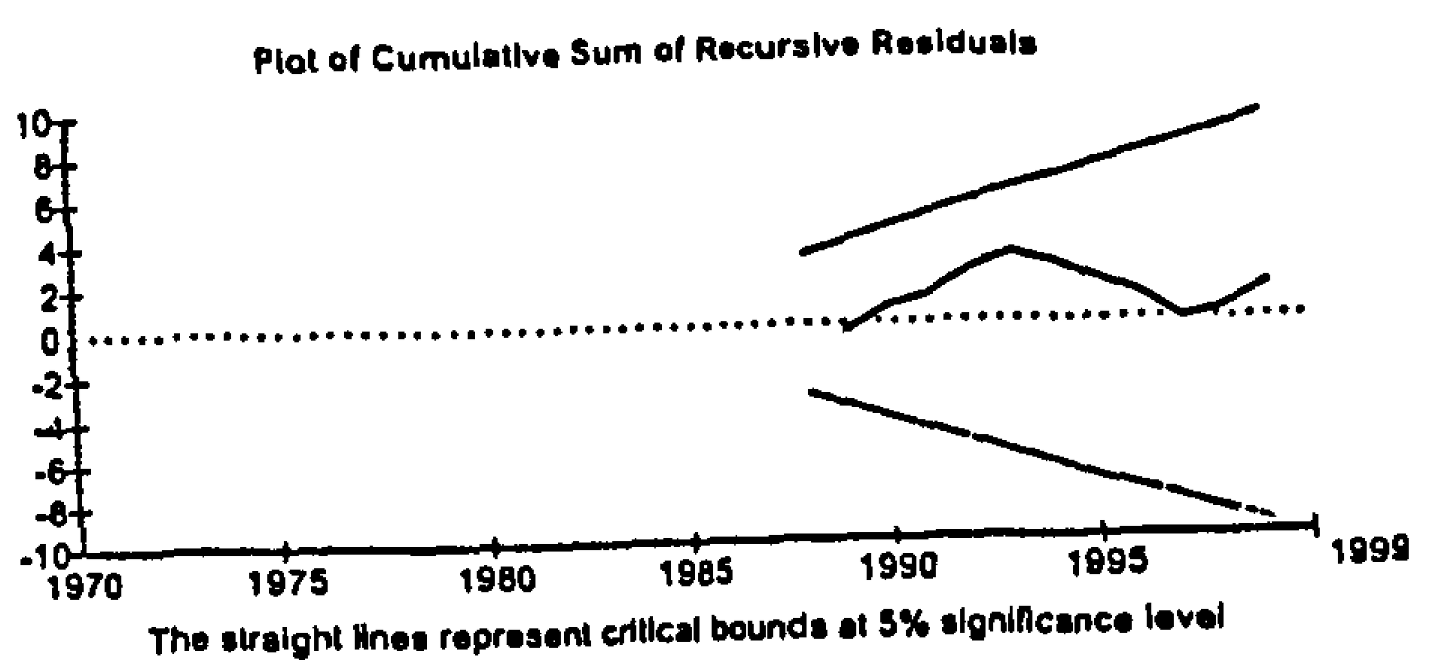
Appendix Figure D.1A CUSUM test Japan Case 1



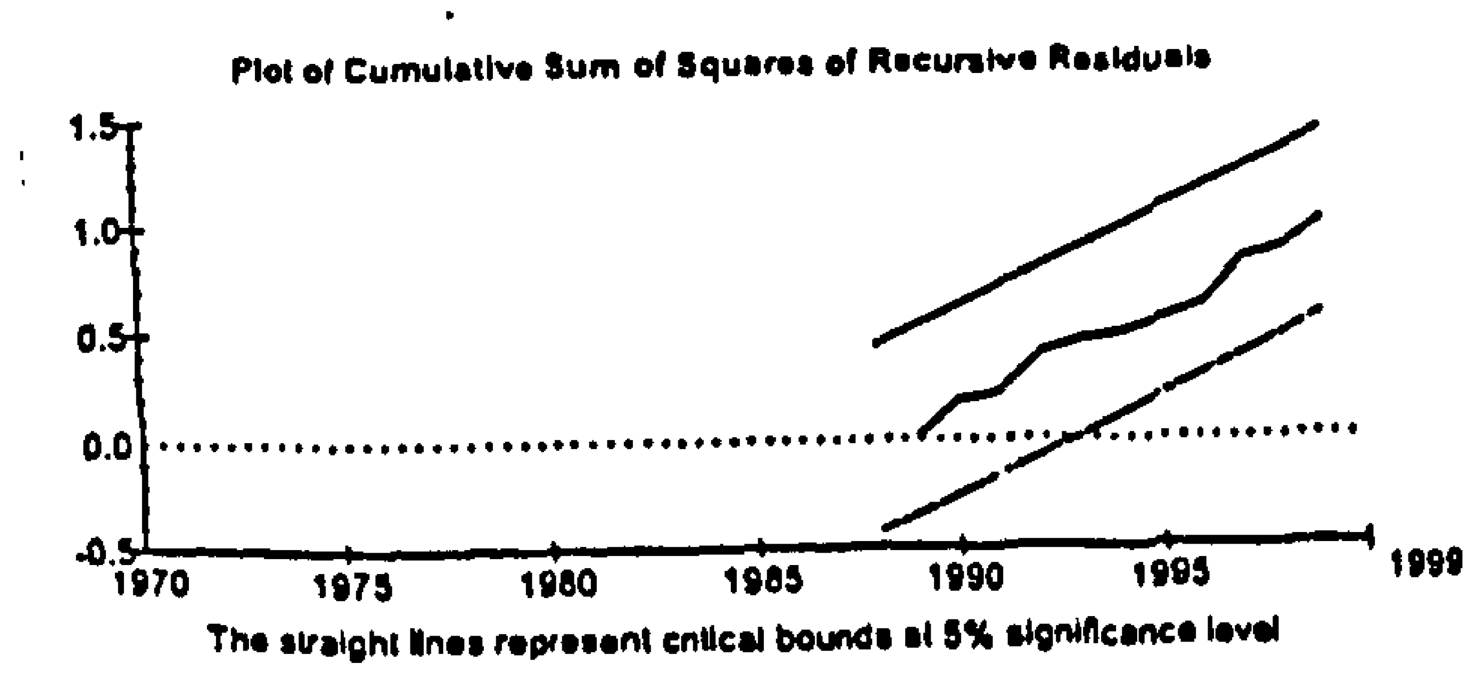
Appendix D Figure D.1B CUSUMSQ test Japan Case 1



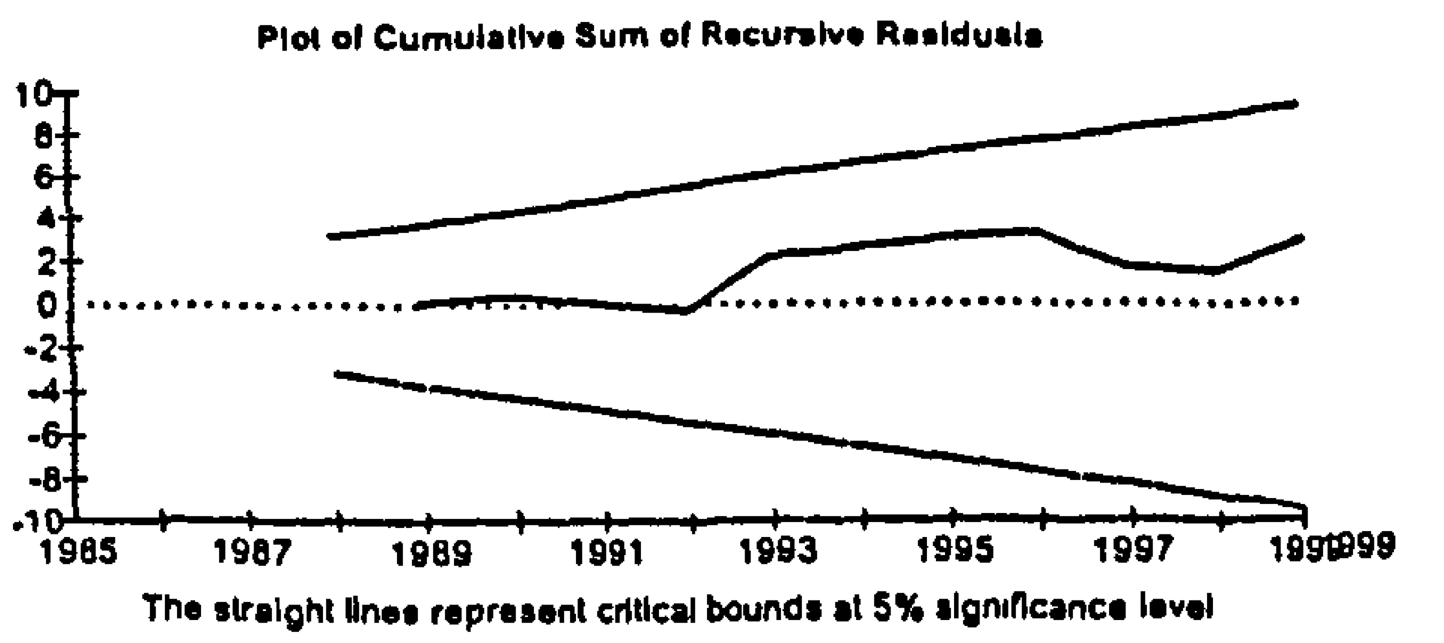
Appendix D Figure D.14A CUSUM test Taiwan. (Dummy), CASE 2



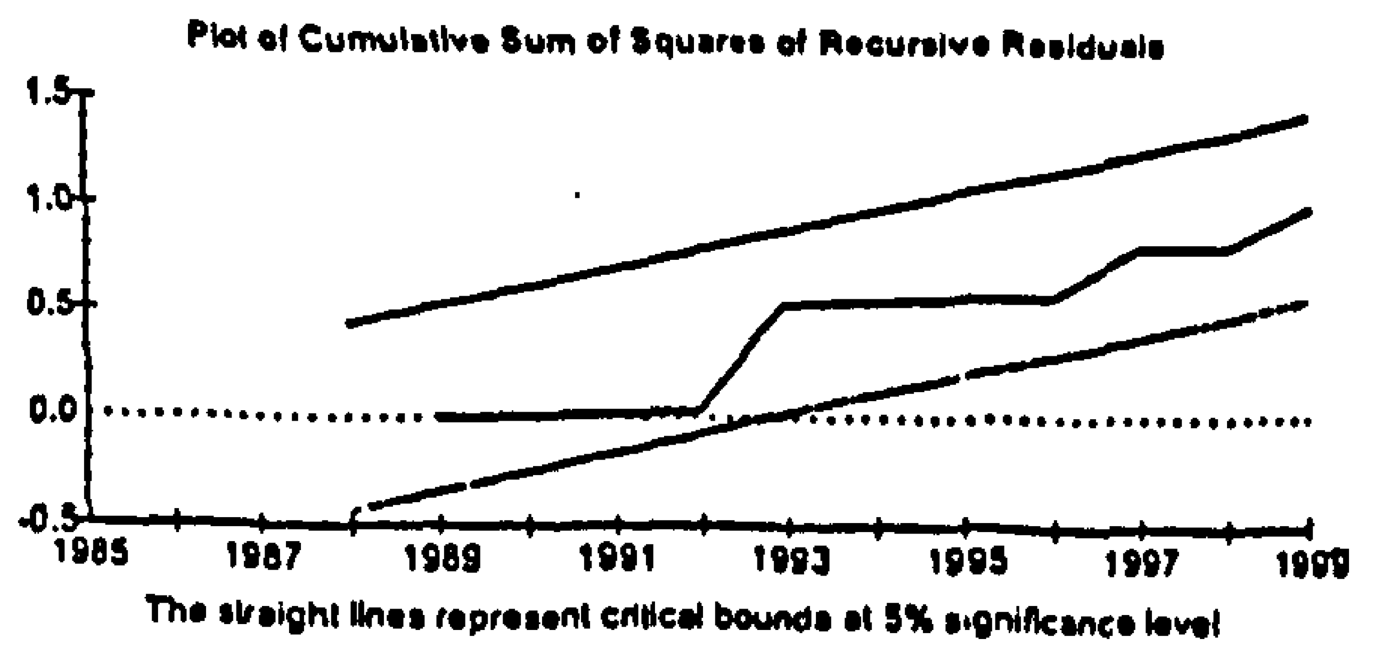
Appendix D Figure D.14C CUSUMQ test Taiwan (Dummy)



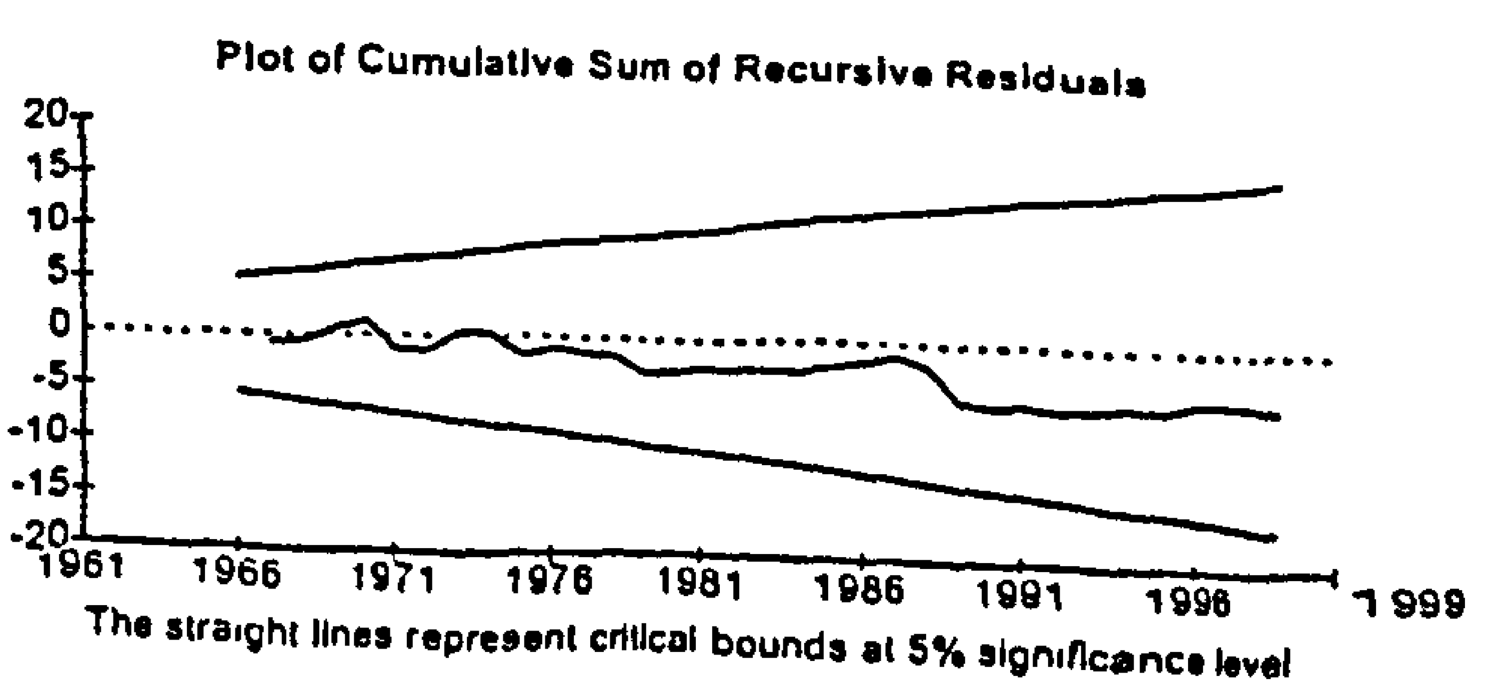
Appendix D Figure D.15A CUSUM test China Case 2



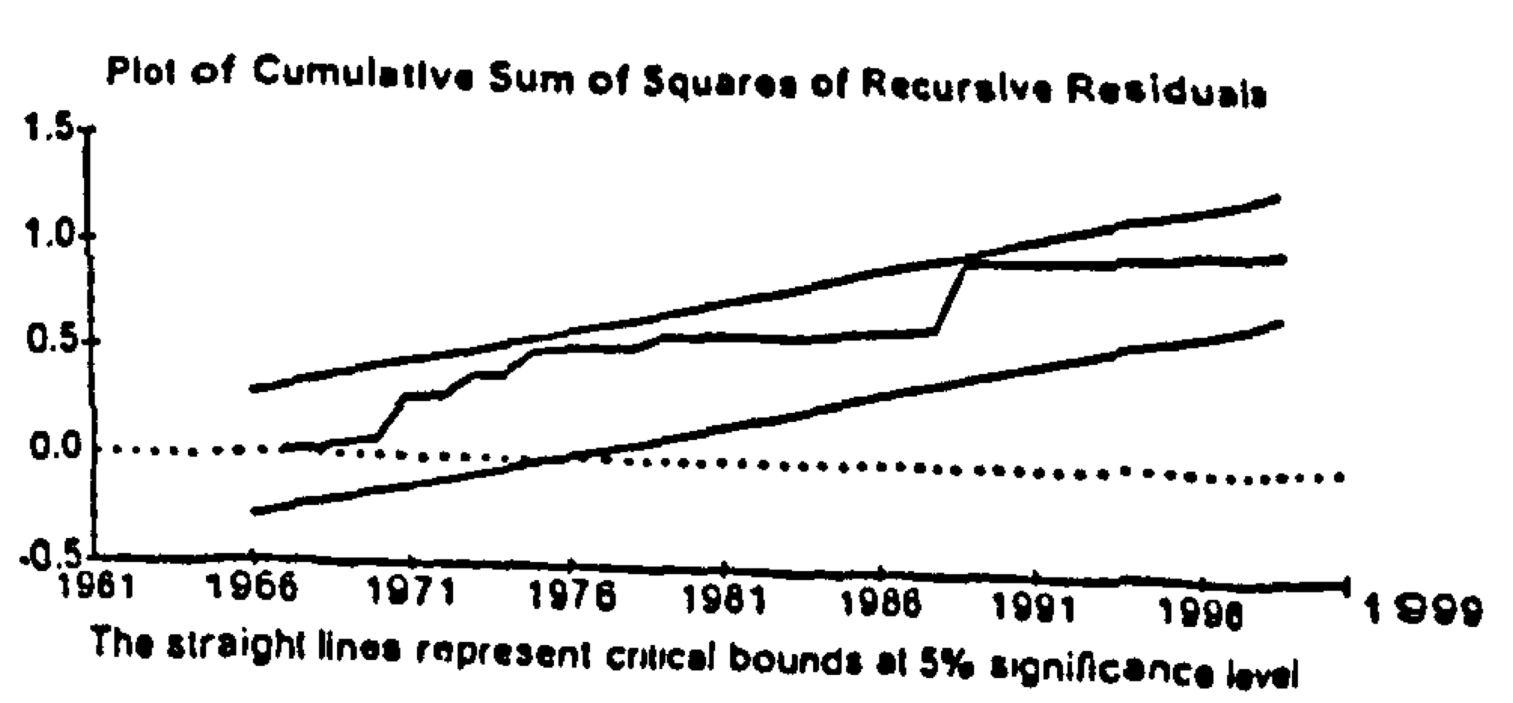
Appendix D Figure D.15B CUSUMSQ test China. Case 2



Appendix D Figure D.7A CUSUM test U.S.A. Case 1

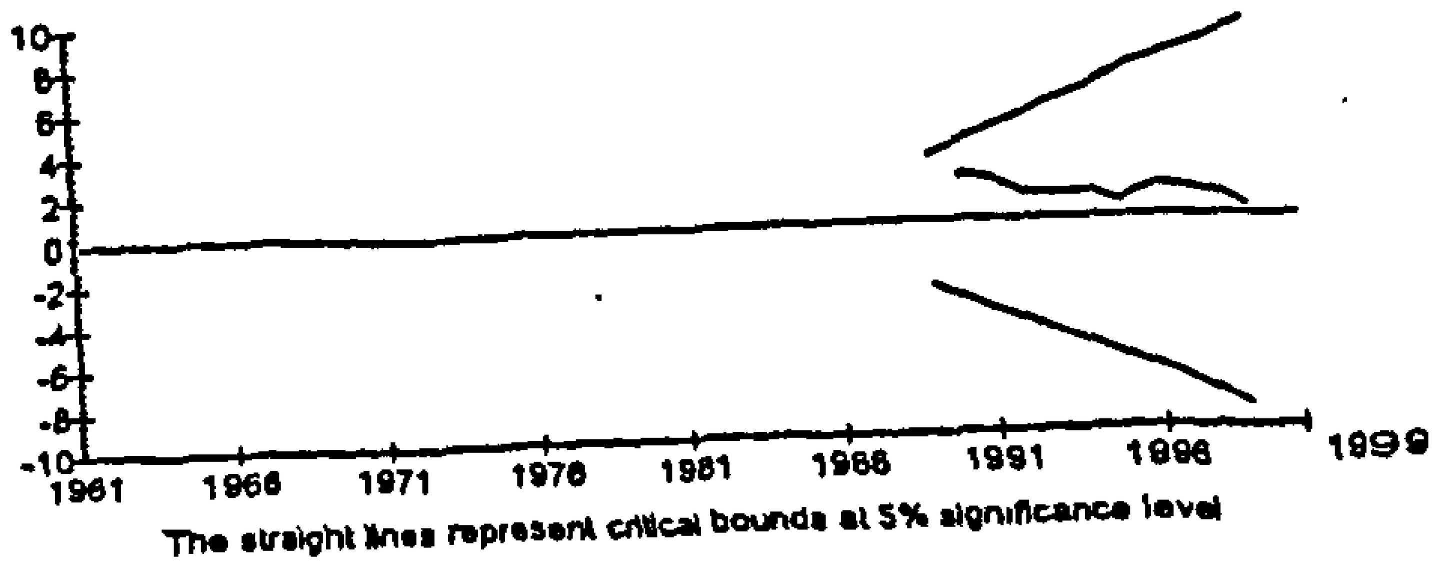


Appendix D Figure D.7C CUSUMQ test U.S.A. Case 1



Appendix D Figure D.7B CUSUM test U.S.A. Case 1
(Dummy)

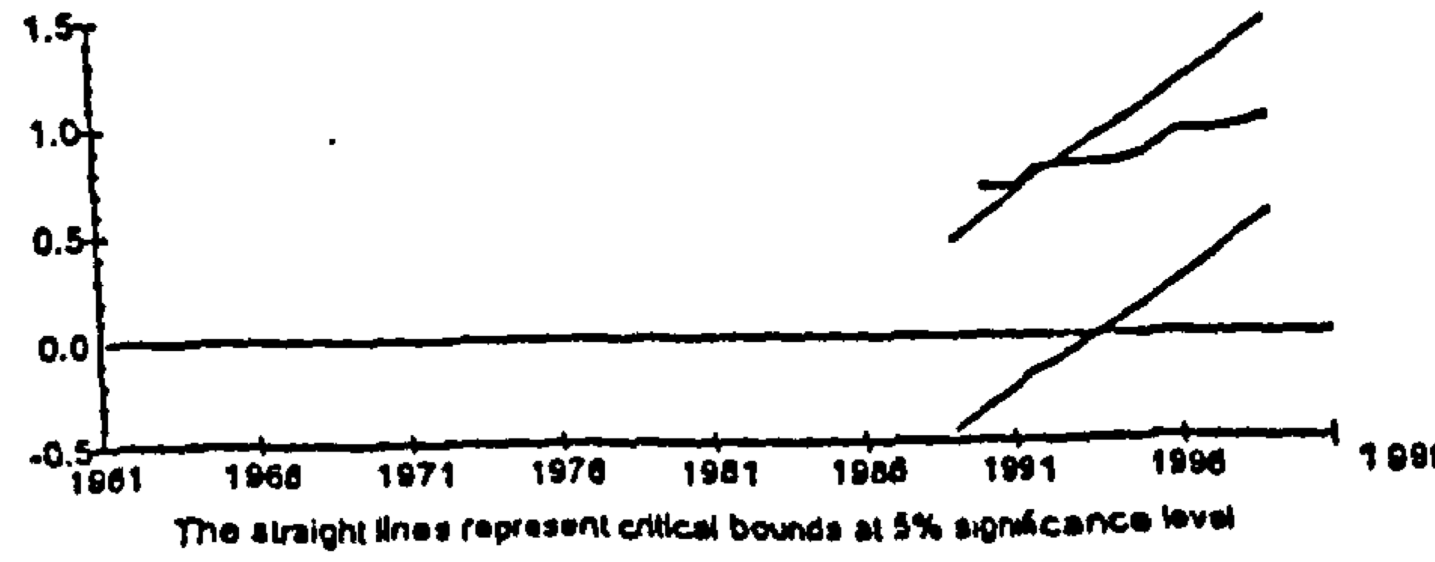
Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Appendix D Figure D.7D CUSUMQ test U.S.A. Case 1
(Dummy)

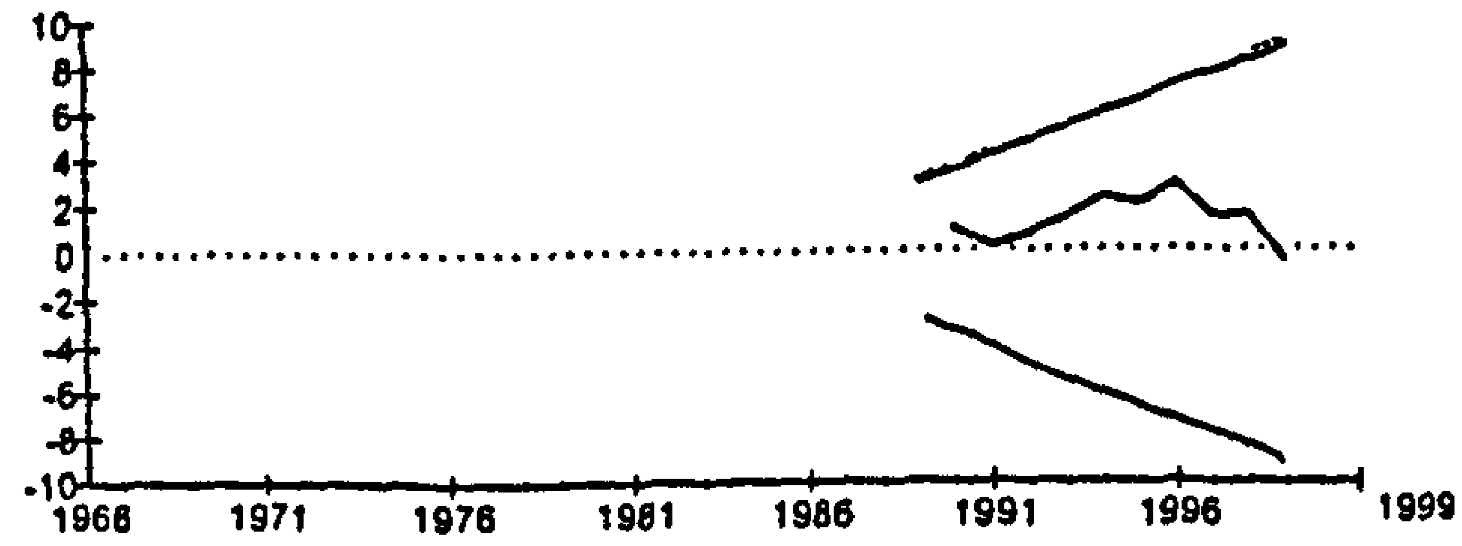
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Appendix D Figure D.9A CUSUM test U.K. Case 1

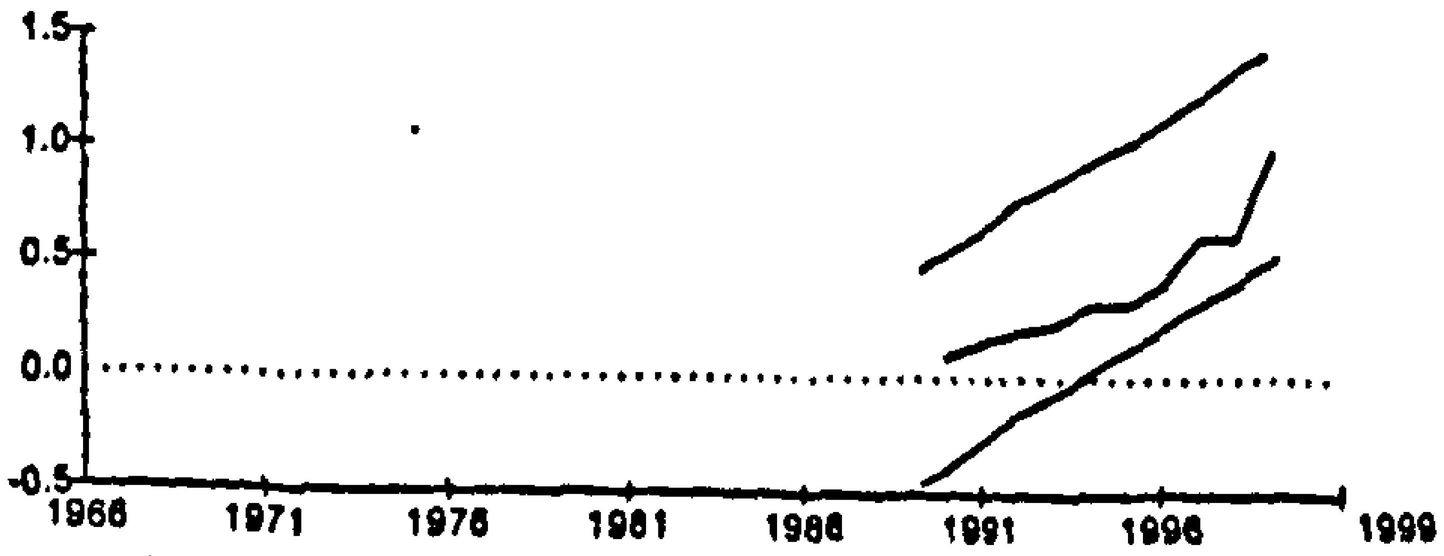
Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Appendix D Figure D.9B CUSUMSQ test U.K.

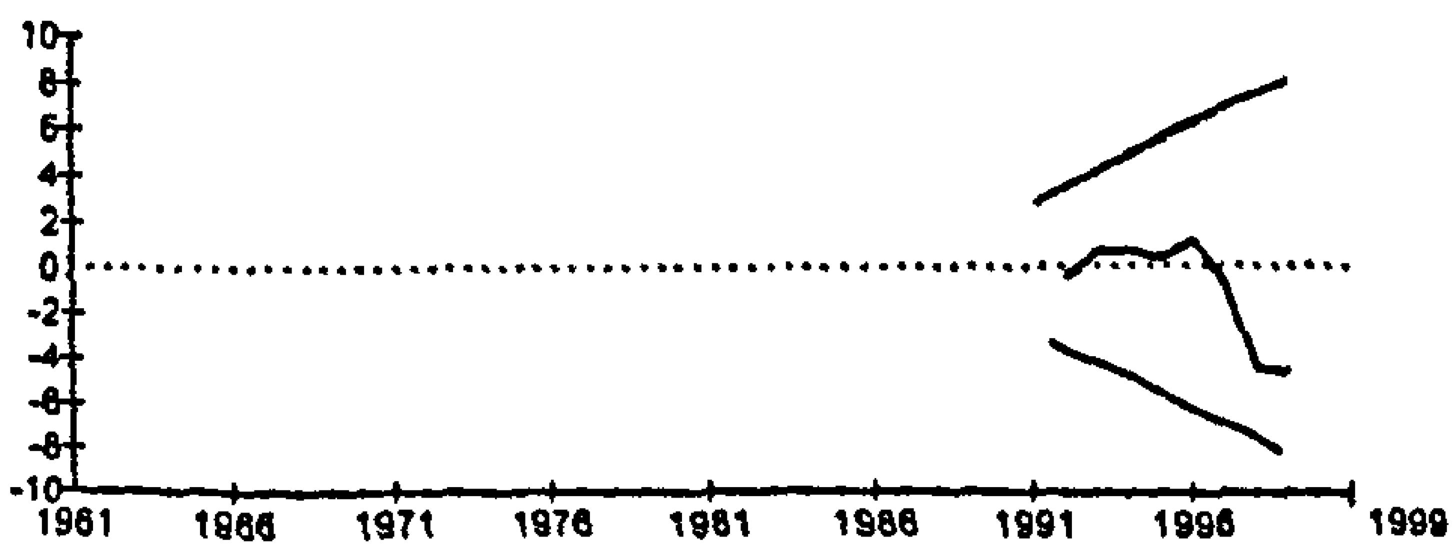
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Appendix D Figure D.11B CUSUM test Germany Case 1
(Dummy)

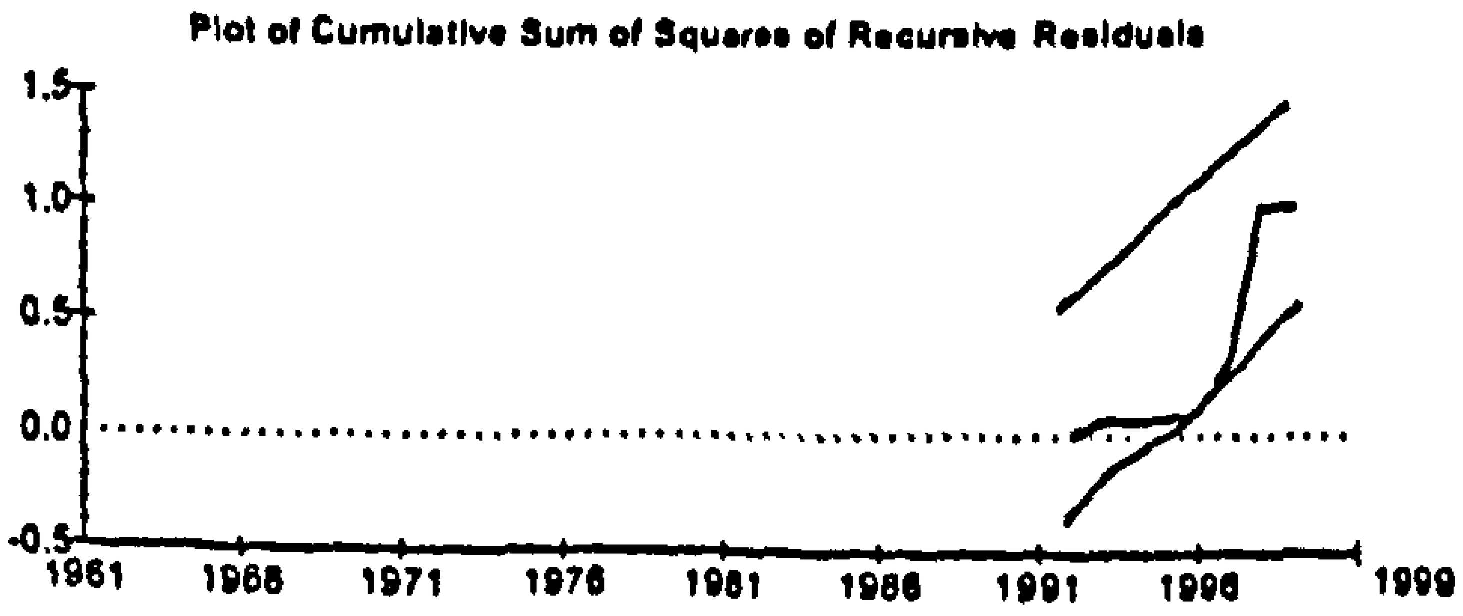
Plot of Cumulative Sum of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

Appendix D Figure 11D CUSUMQ test Germany
Case 1

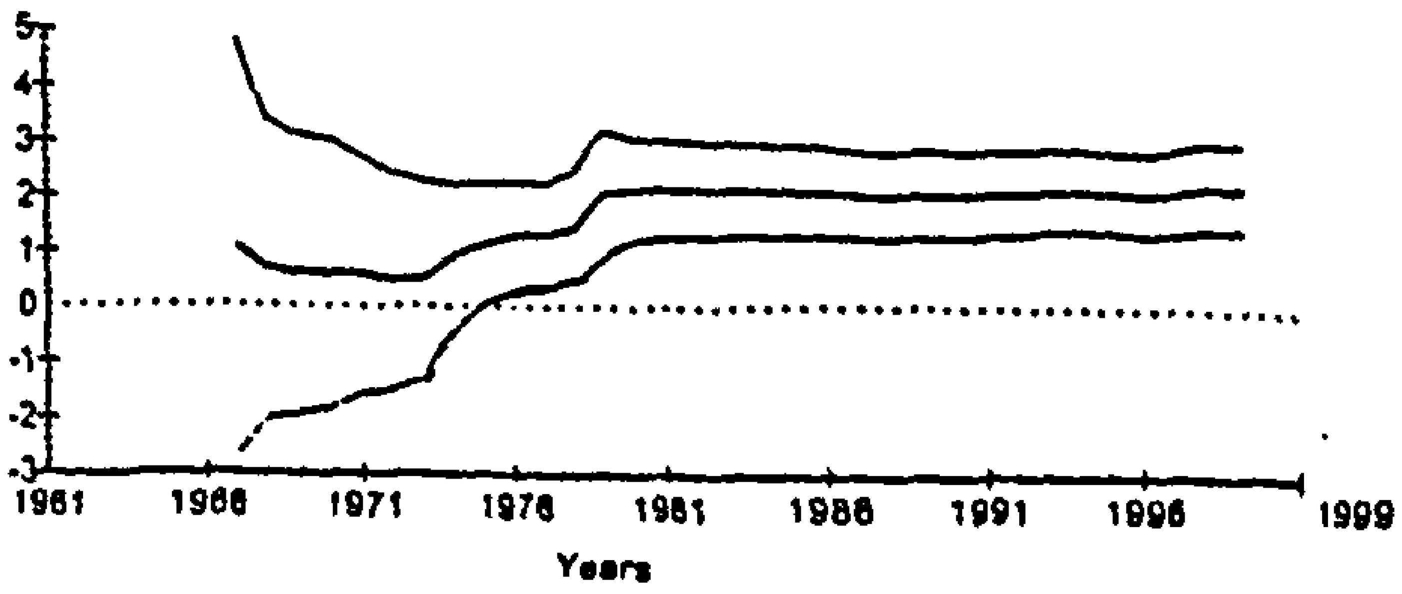
Plot of Cumulative Sum of Squares of Recursive Residuals



The straight lines represent critical bounds at 5% significance level

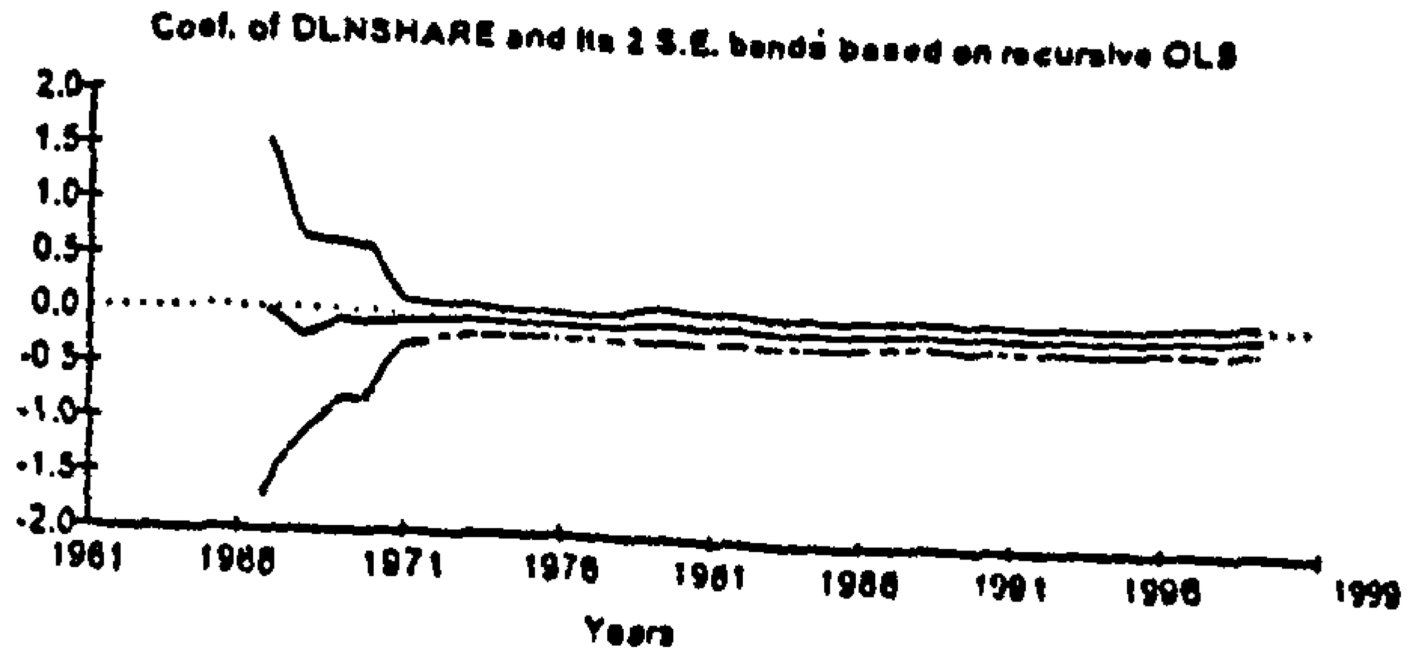
Appendix D Figure D.19A

Coef. of DLNP85 and its 2 S.E. bands based on recursive OLS

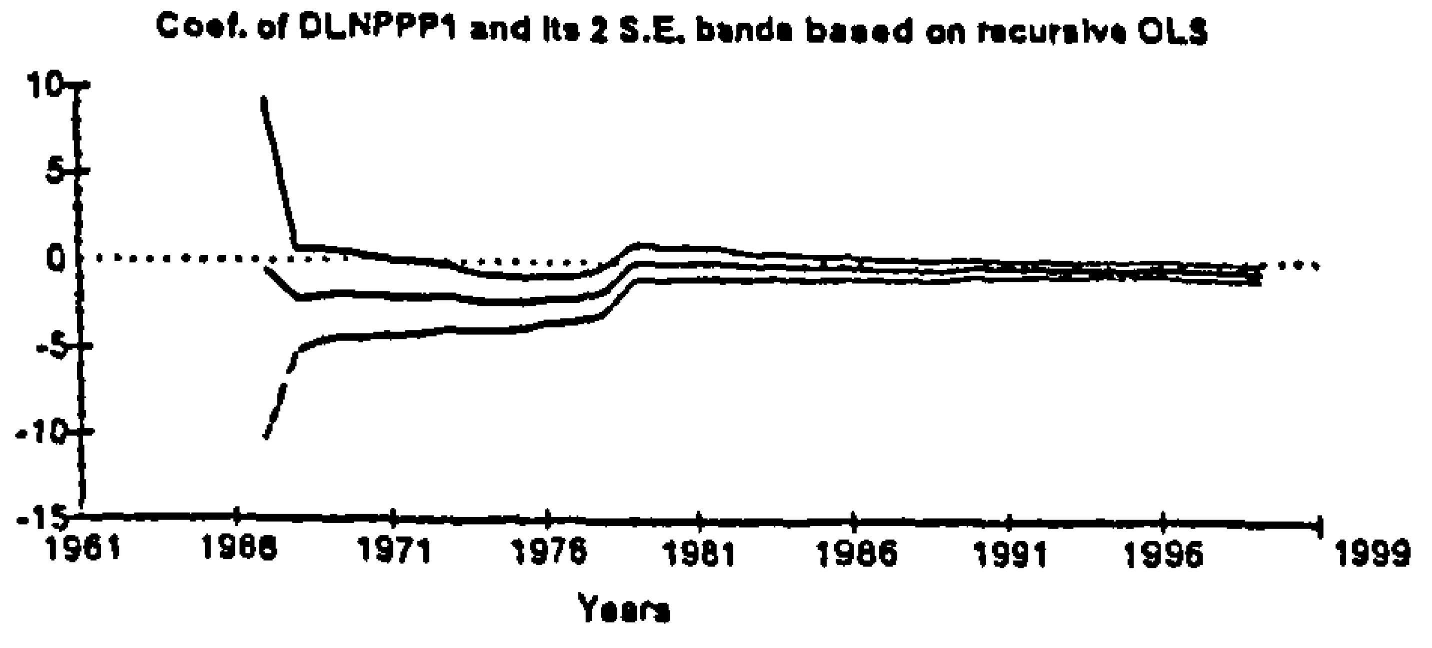


Appendix D Figure D.19B

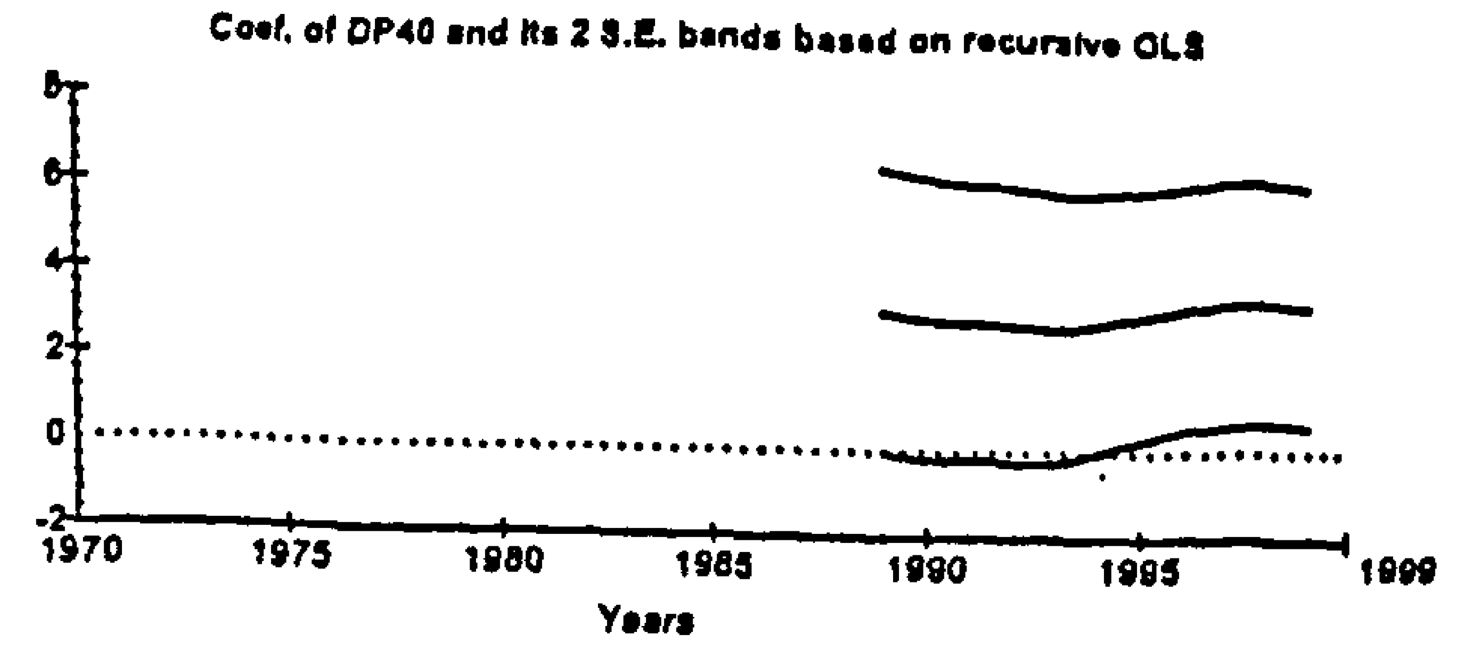
Coef. of DLNSHARE and its 2 S.E. bands based on recursive OLS



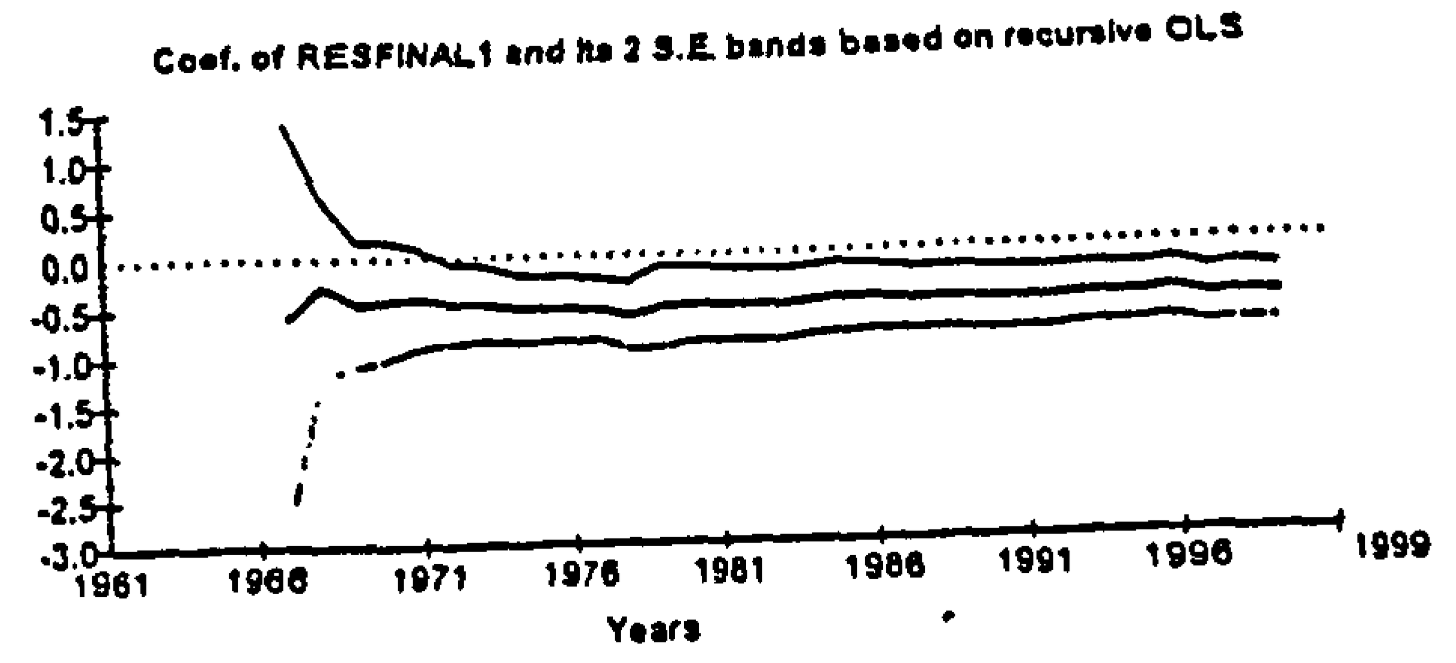
Appendix D Figure D.19C



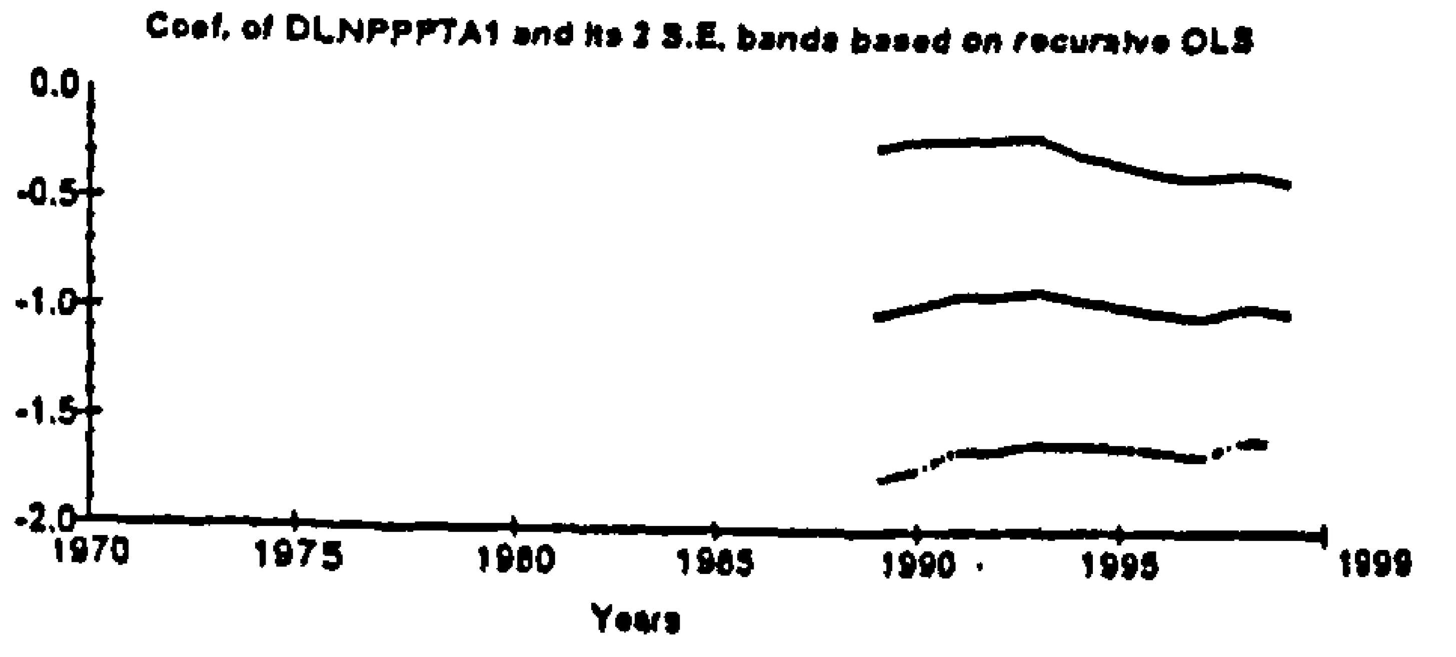
Appendix D Figure D.20A



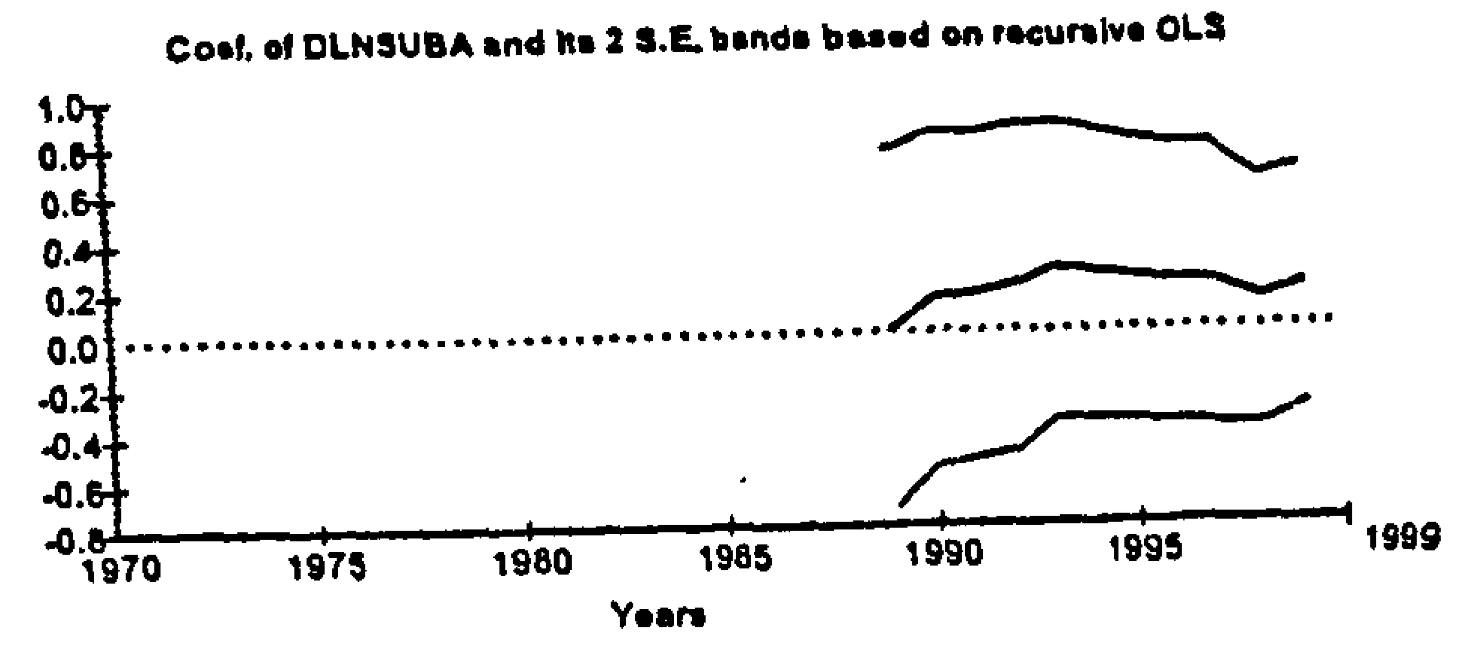
Appendix D Figure D.19D



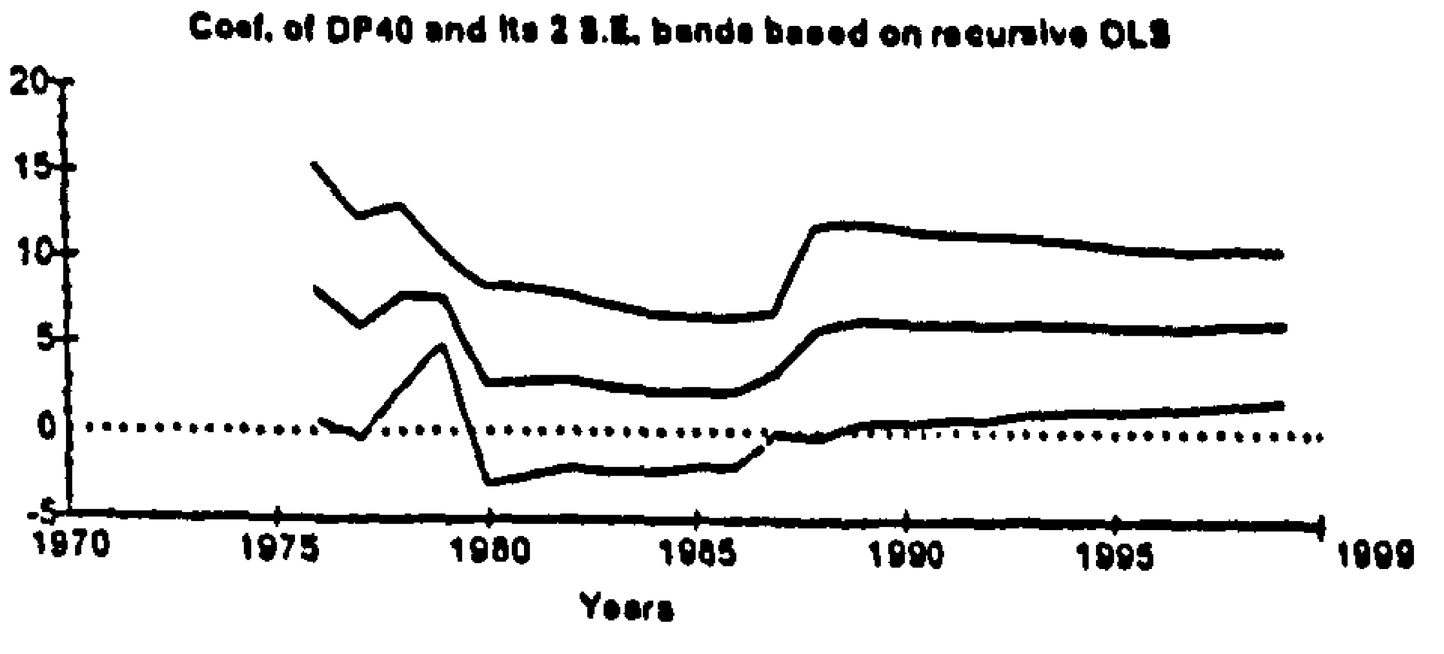
Appendix D Figure D.20B



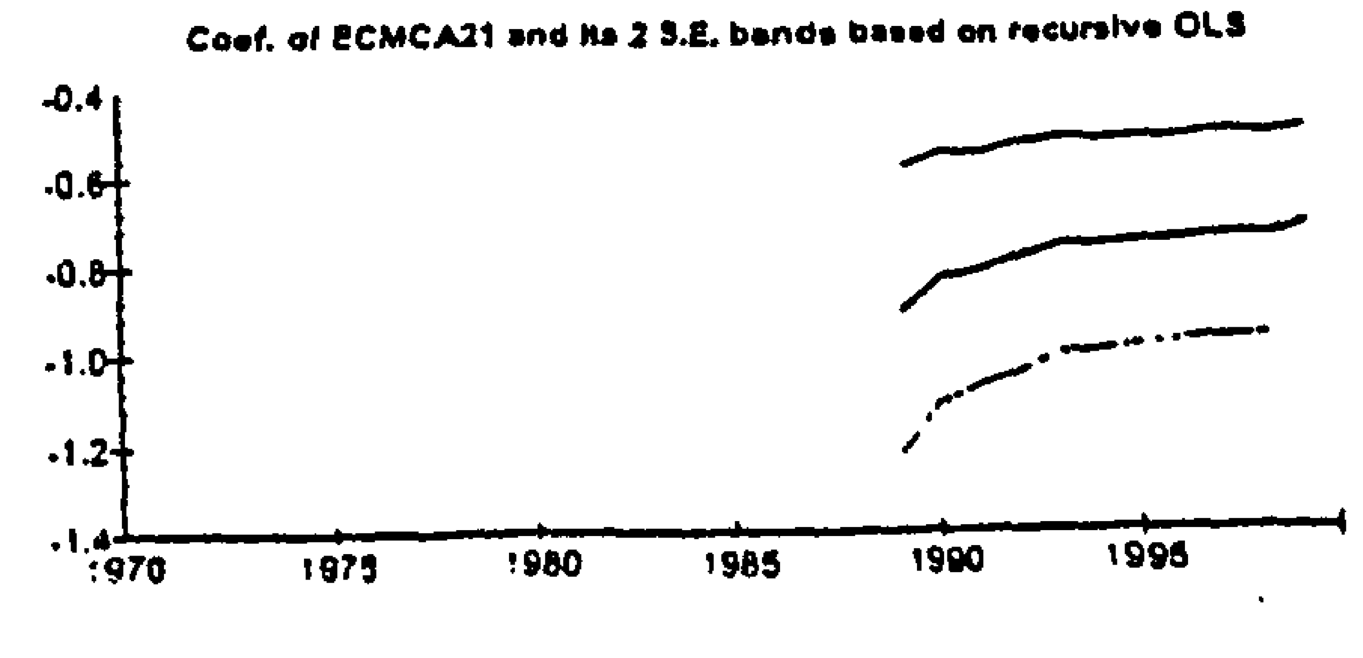
Appendix D Figure D.20C



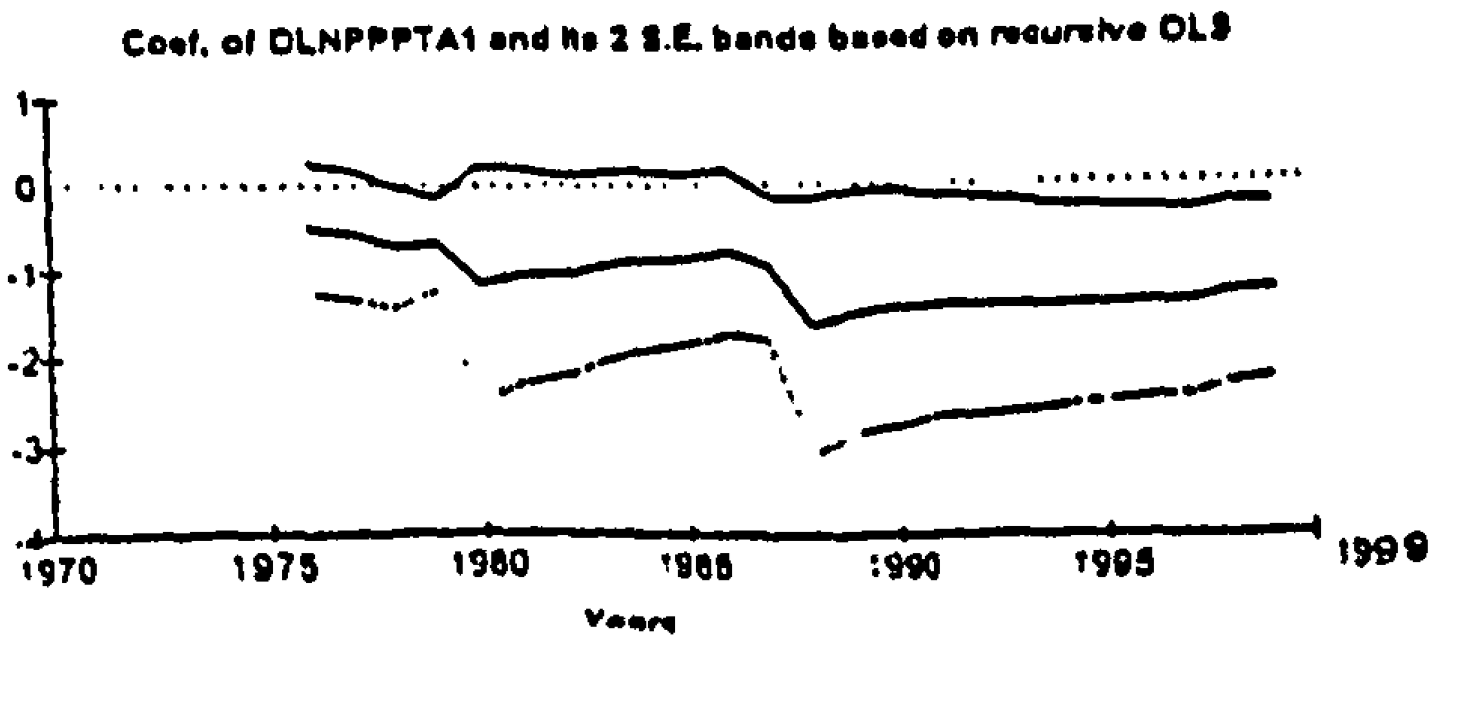
Appendix D Figure D.20E



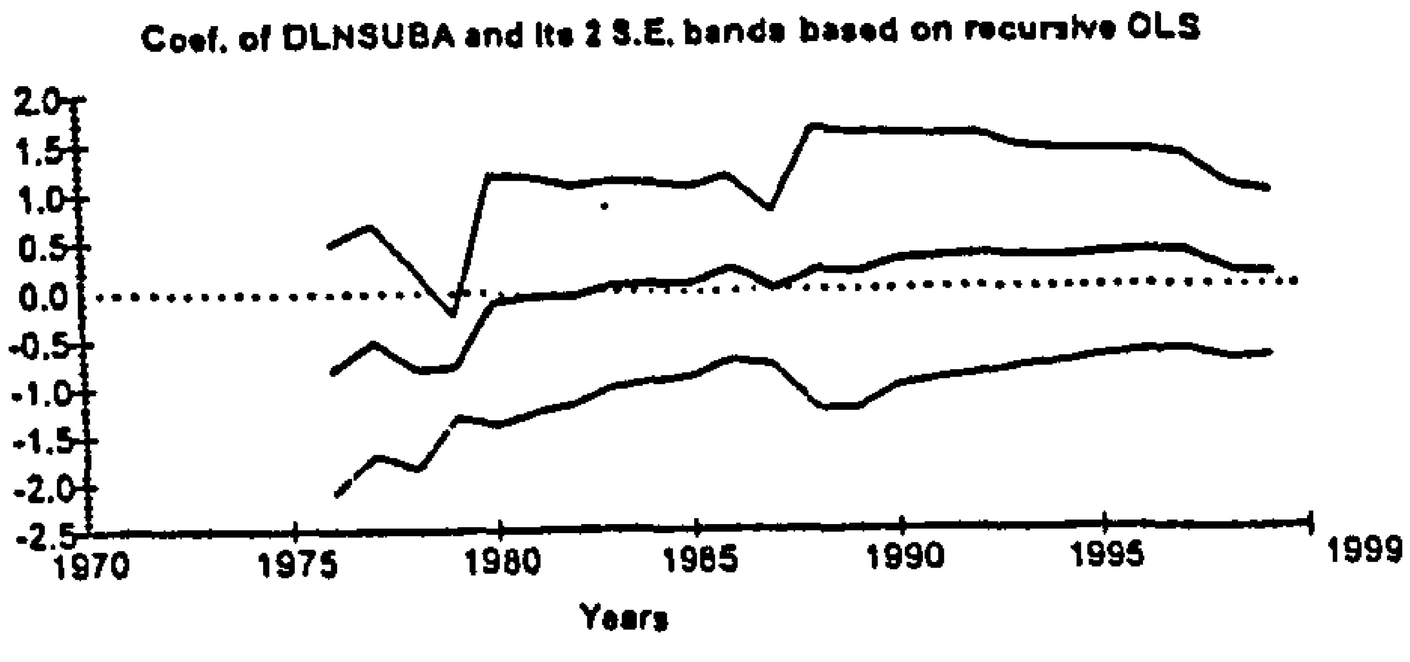
Appendix D Figure D.20D



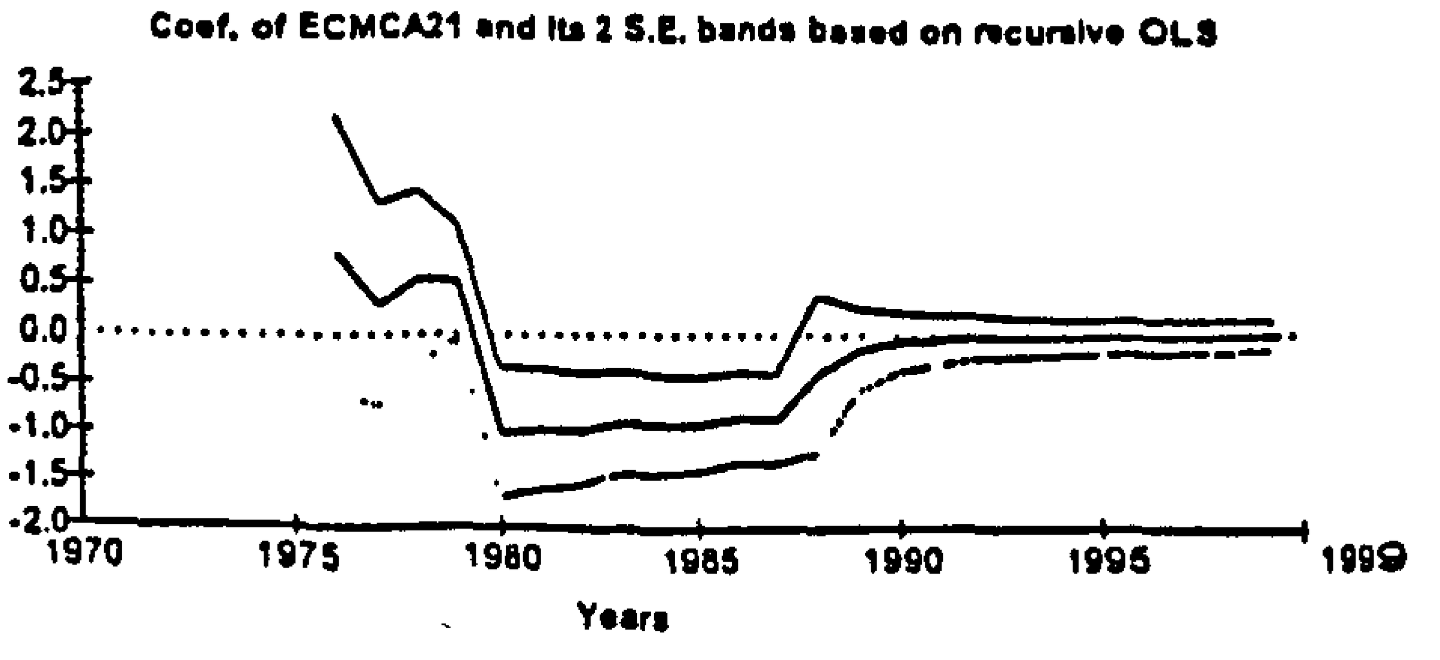
Appendix D Figure D.20F



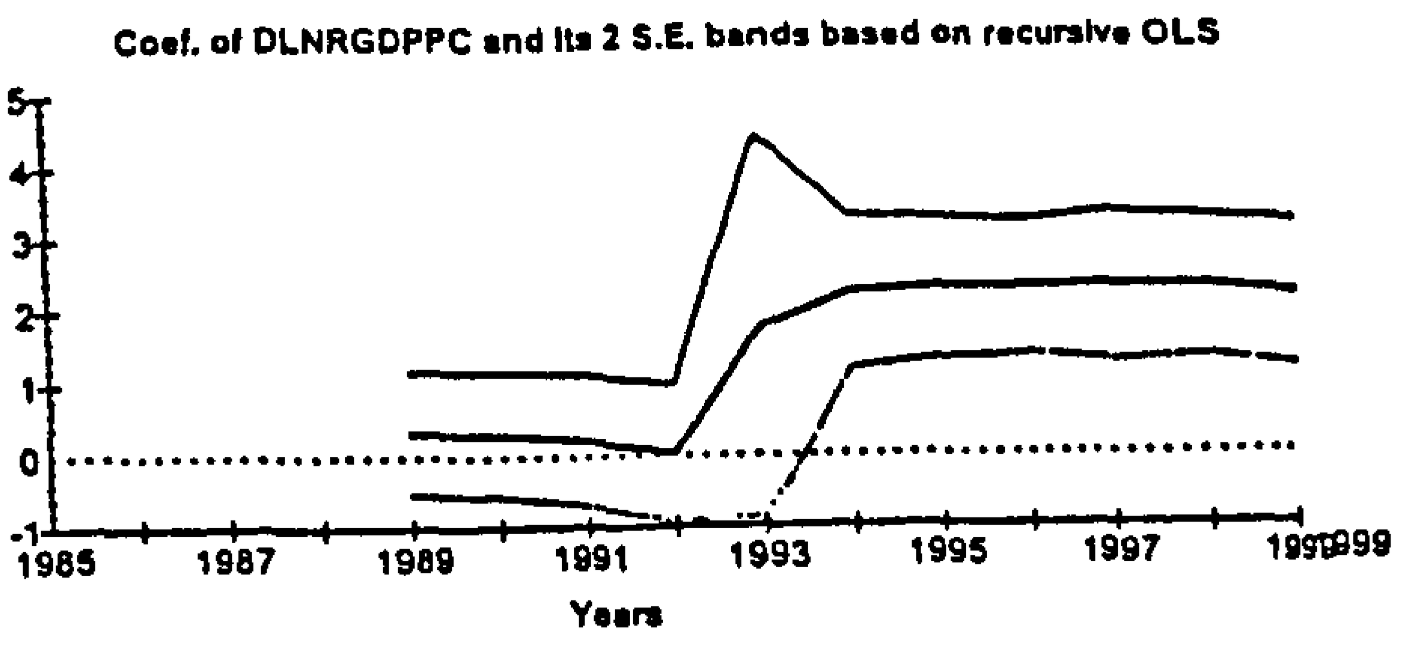
Appendix D Figure D.20G



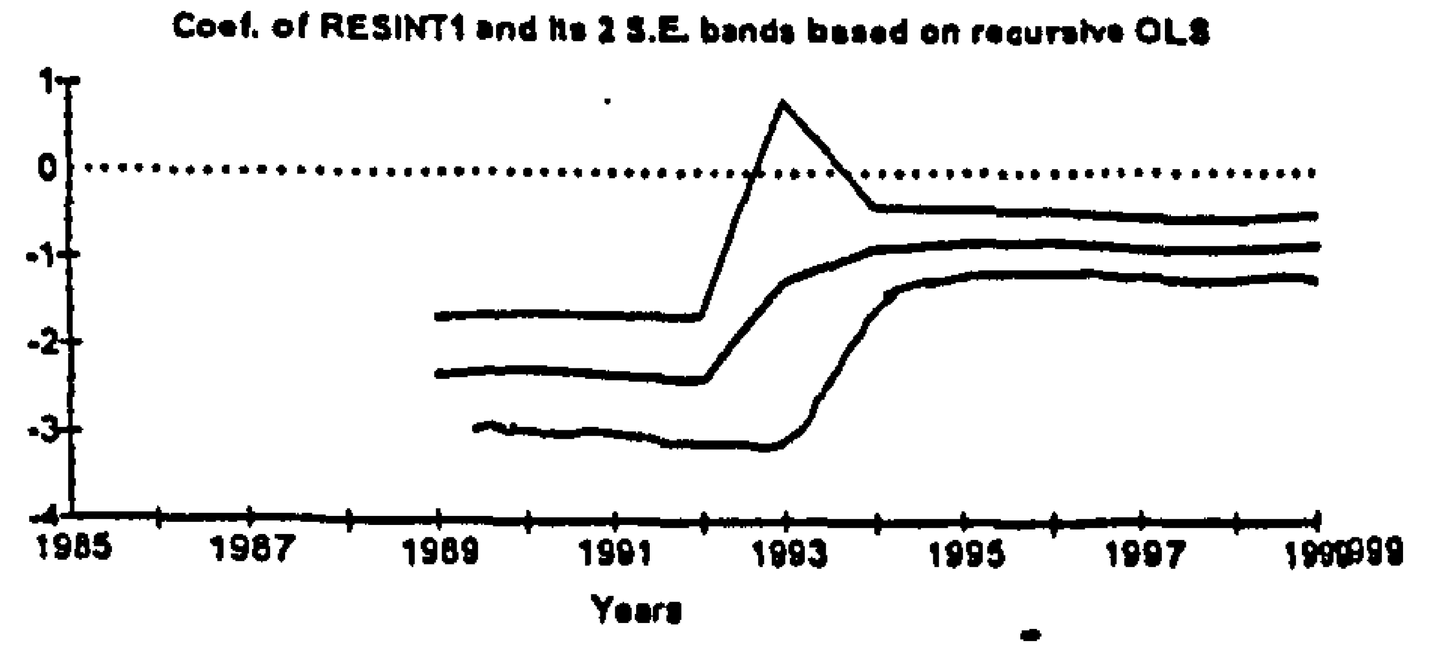
Appendix D Figure D.20H



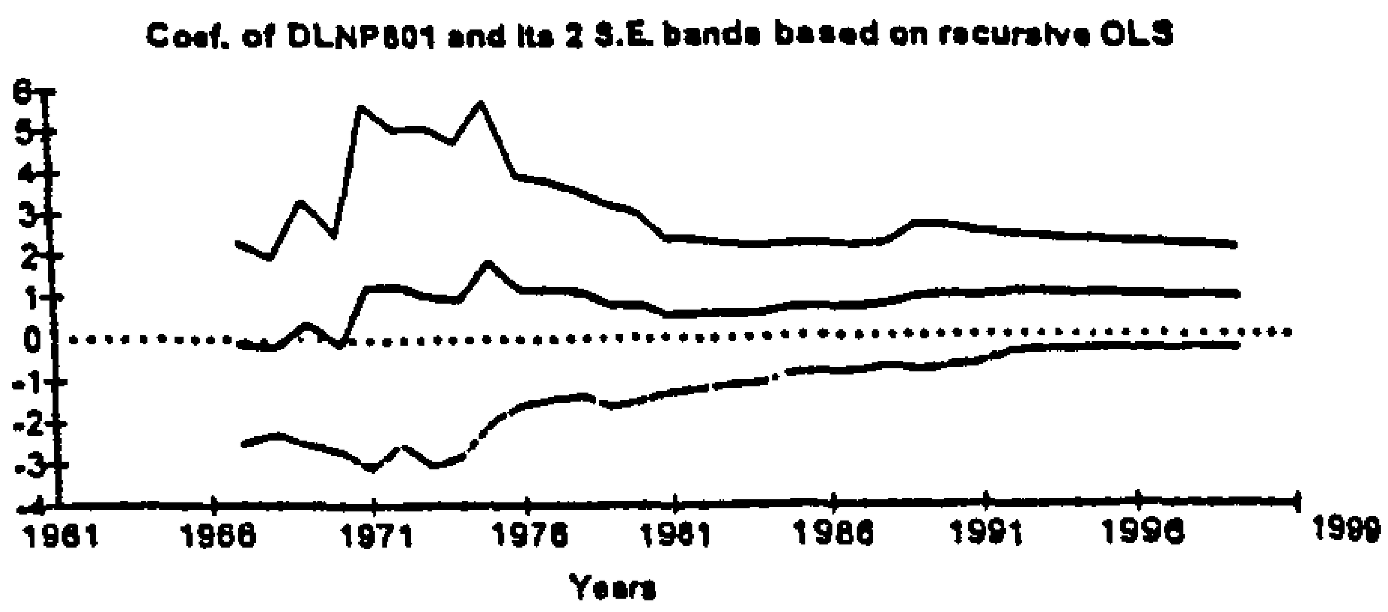
Appendix D Figure D.21A



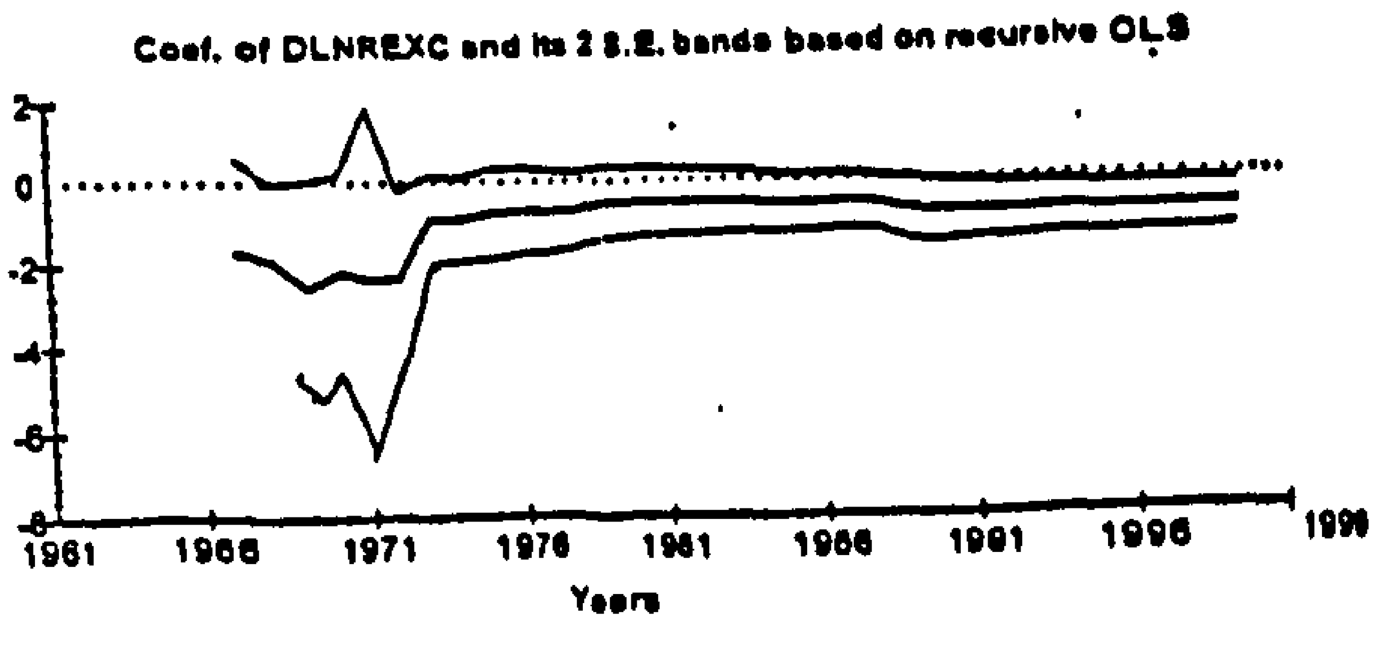
Appendix D Figure D.21B



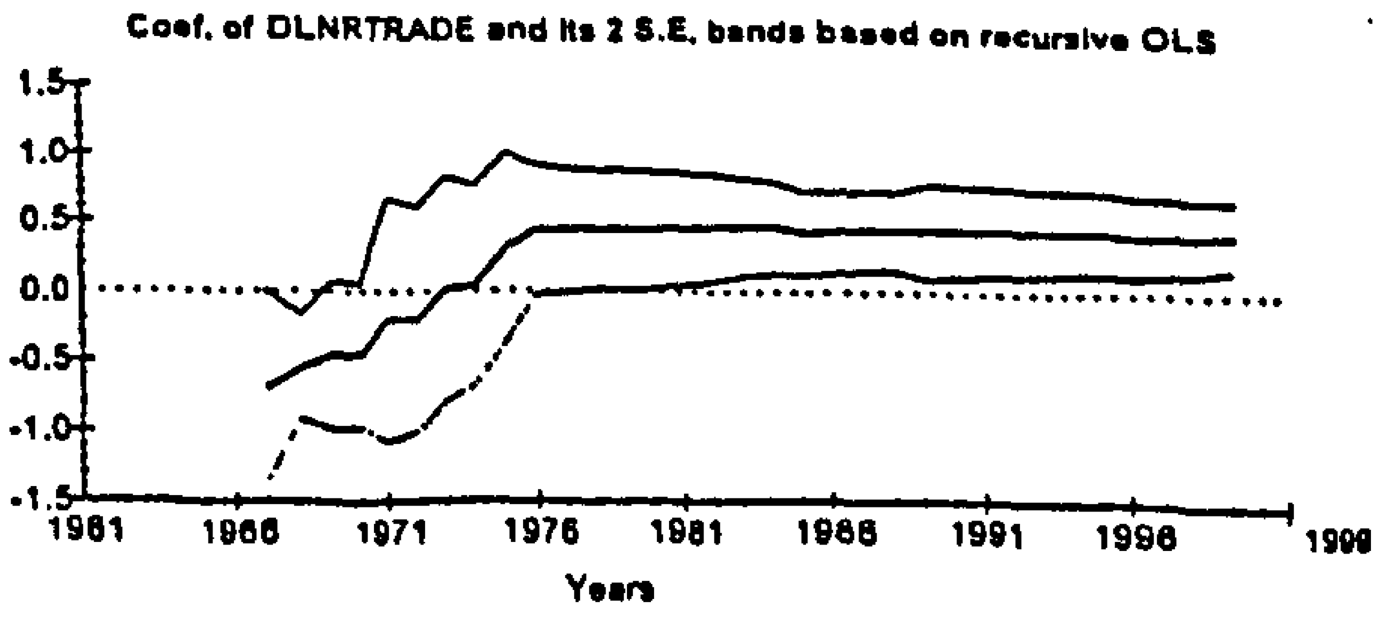
Appendix D Figure D.22A



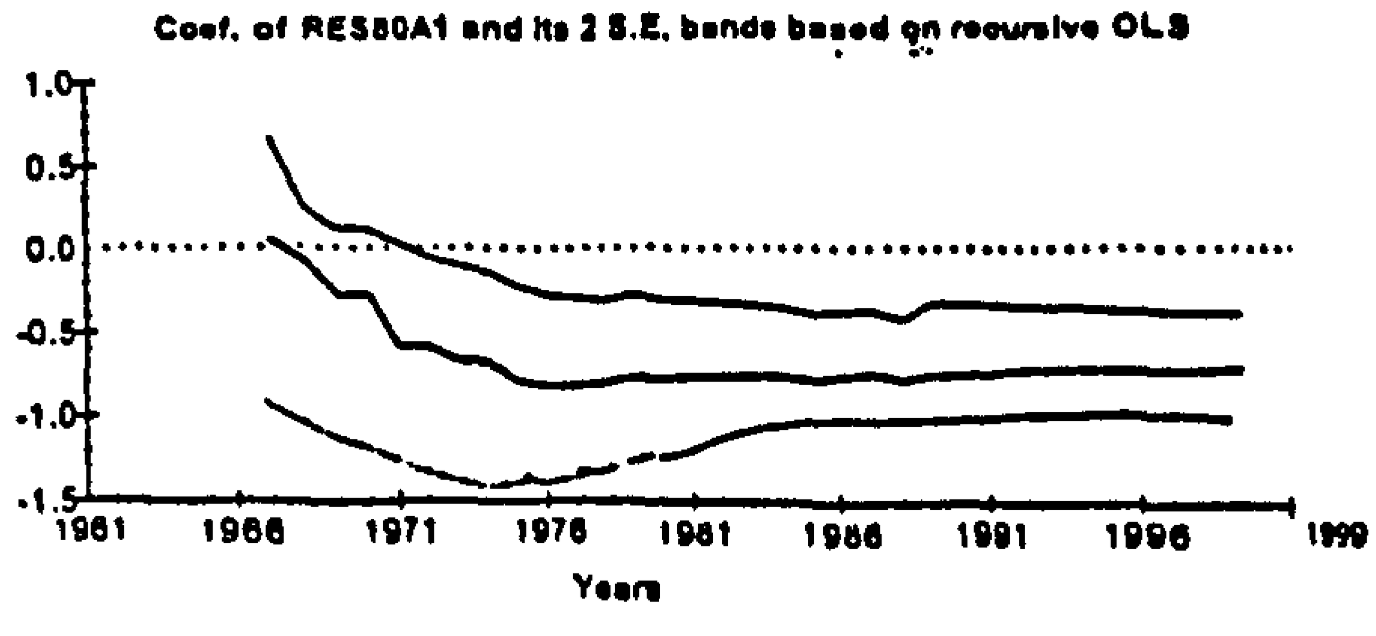
Appendix D Figure D.22B



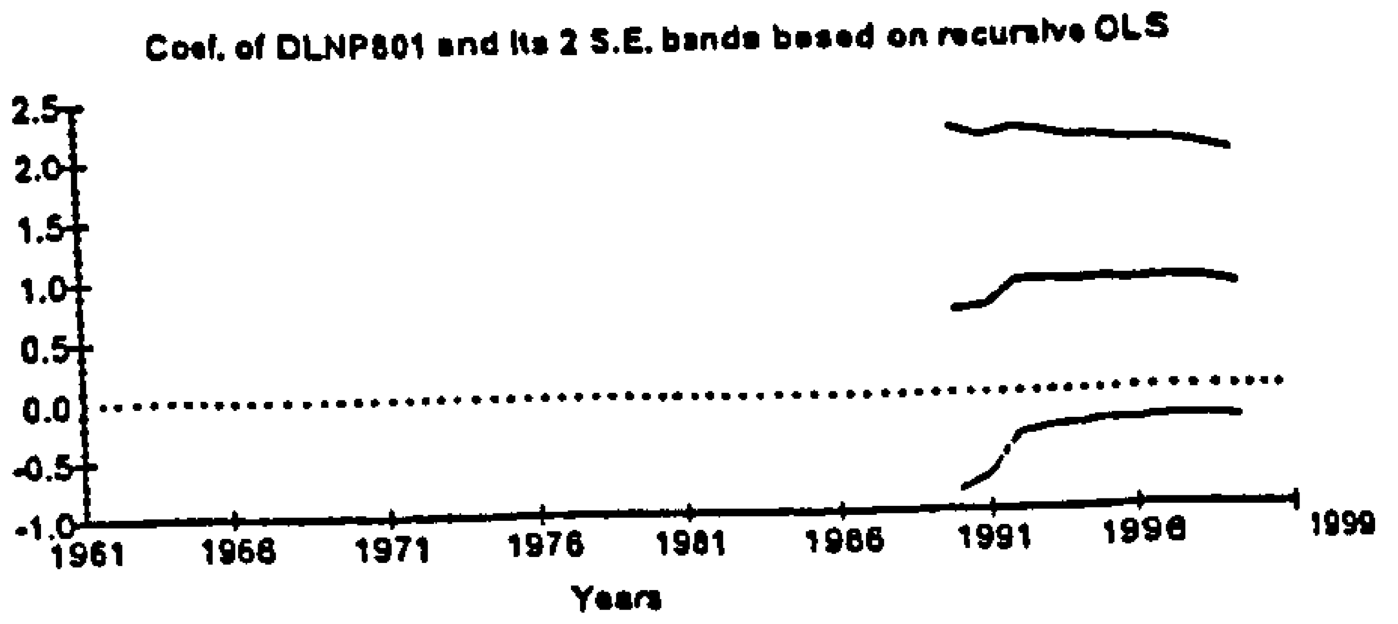
Appendix D Figure D.22C



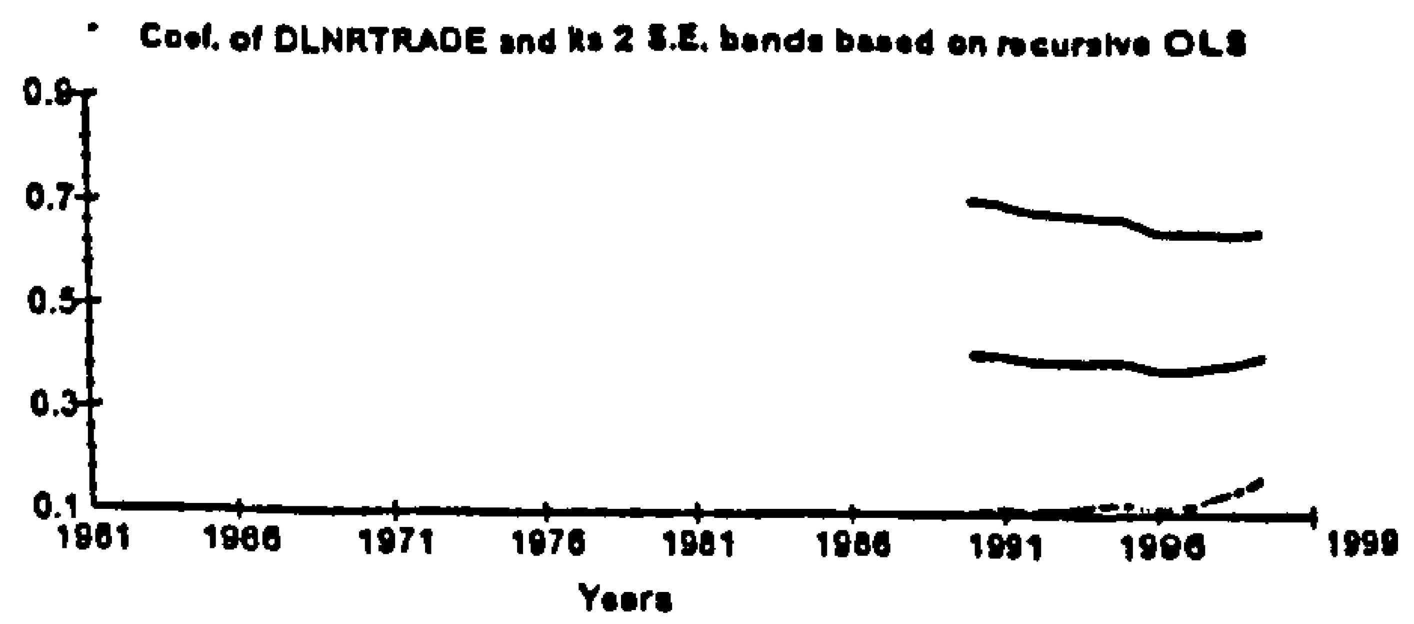
Appendix D Figure D.22D



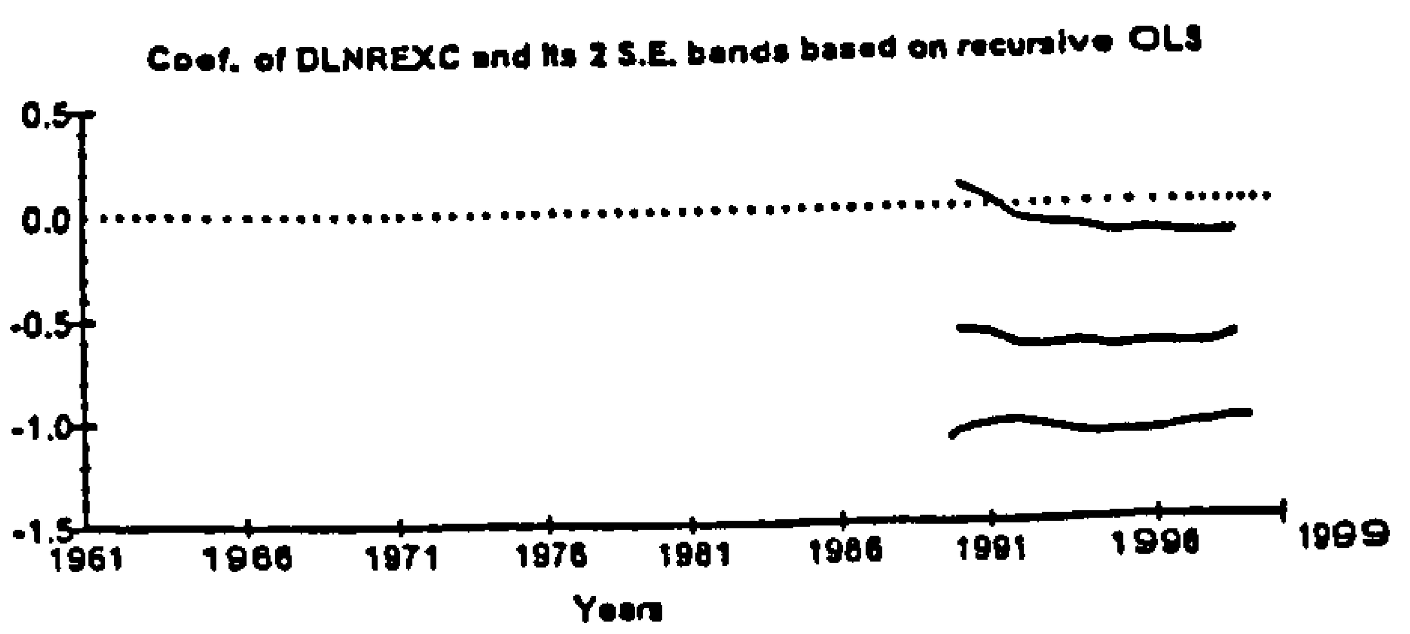
Appendix D Figure D.22E



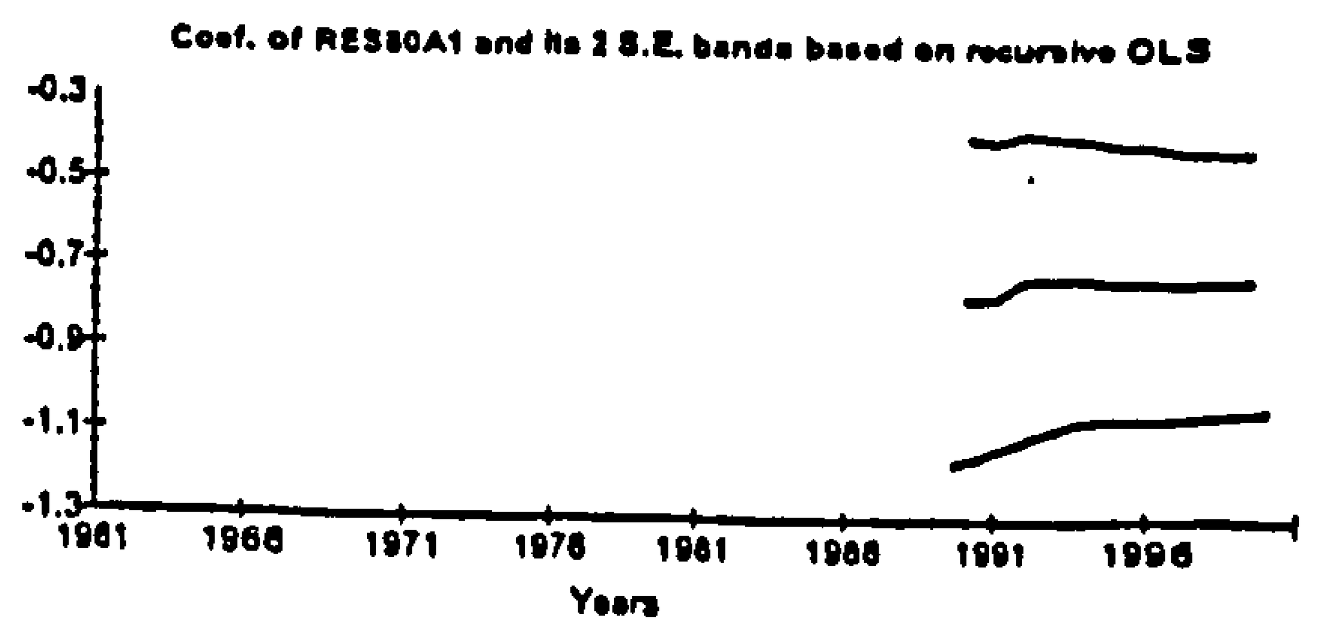
Appendix D Figure D.22G



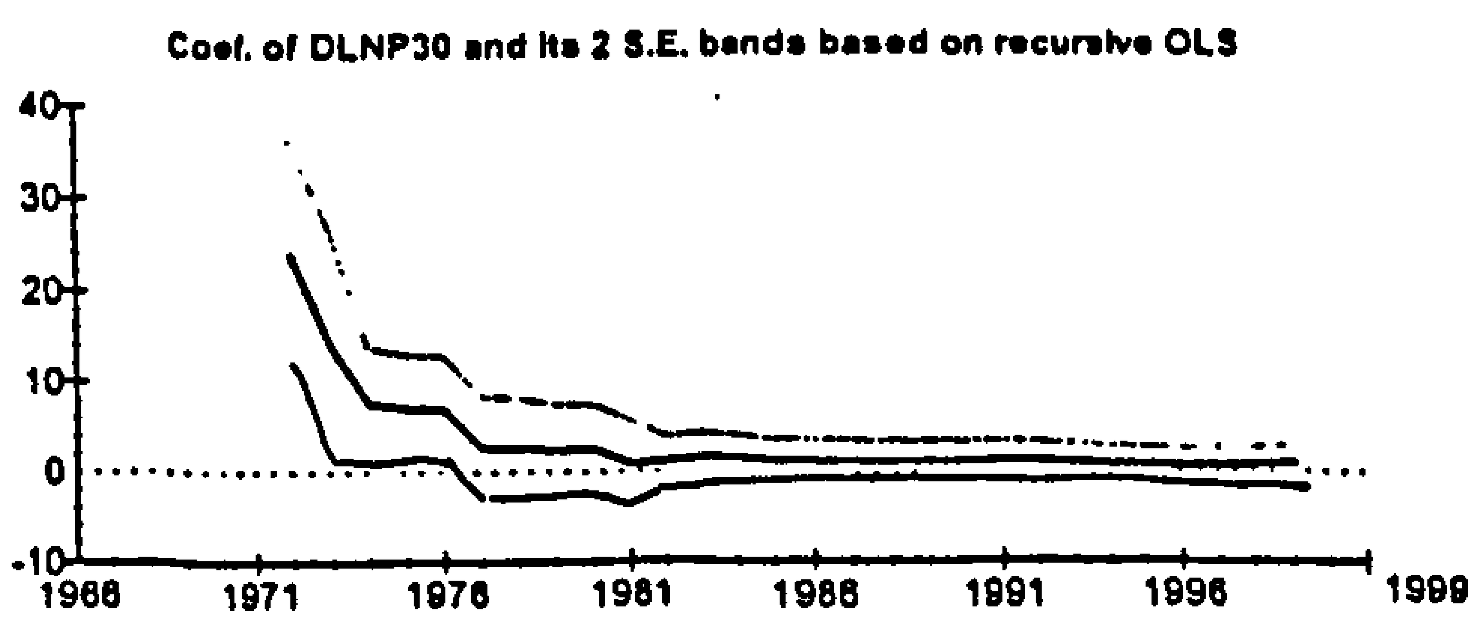
Appendix D Figure D.22F



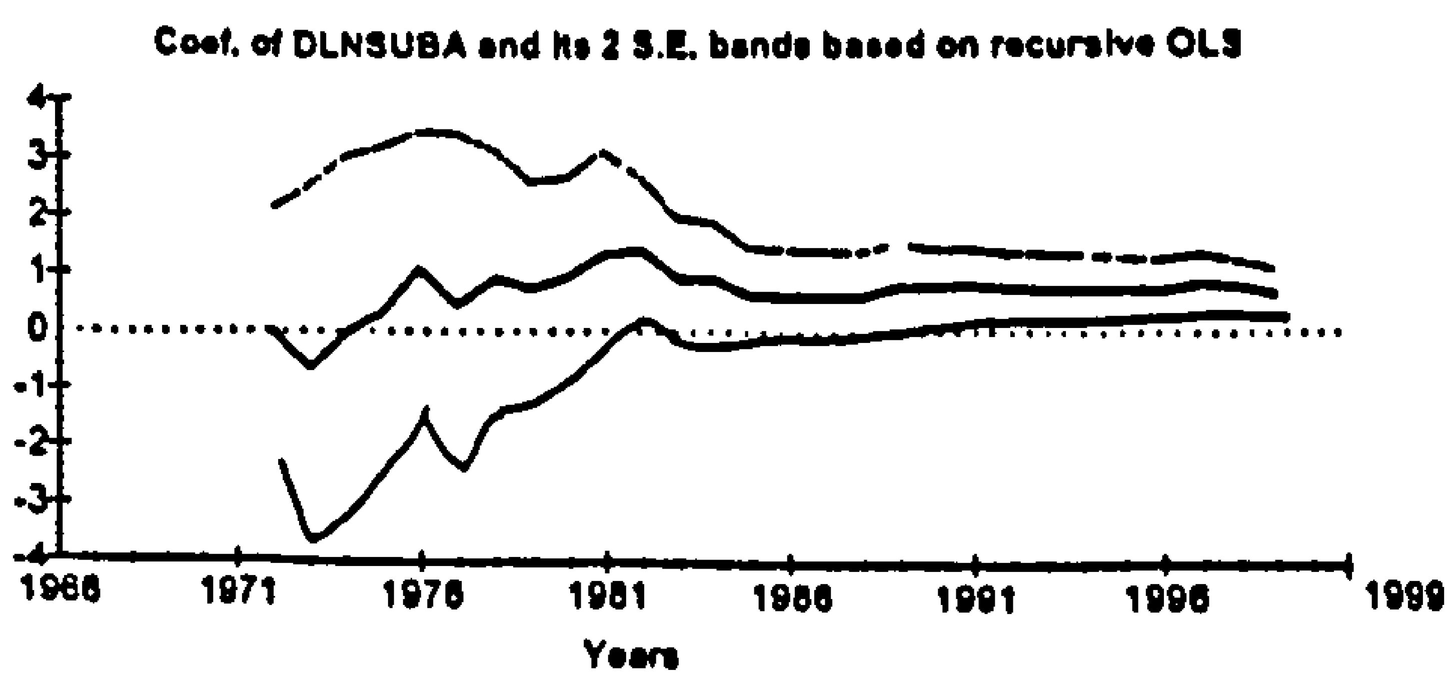
Appendix D Figure D.22H



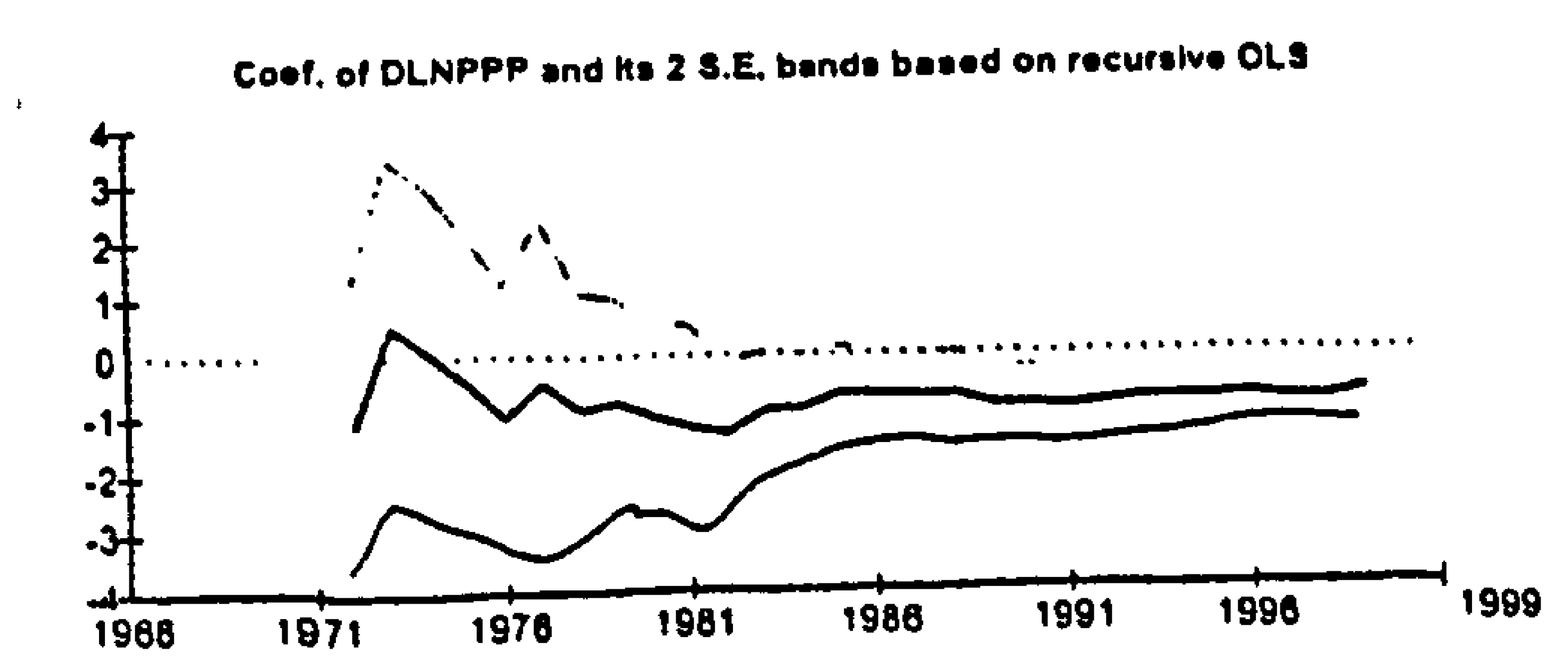
Appendix D Figure D.23A



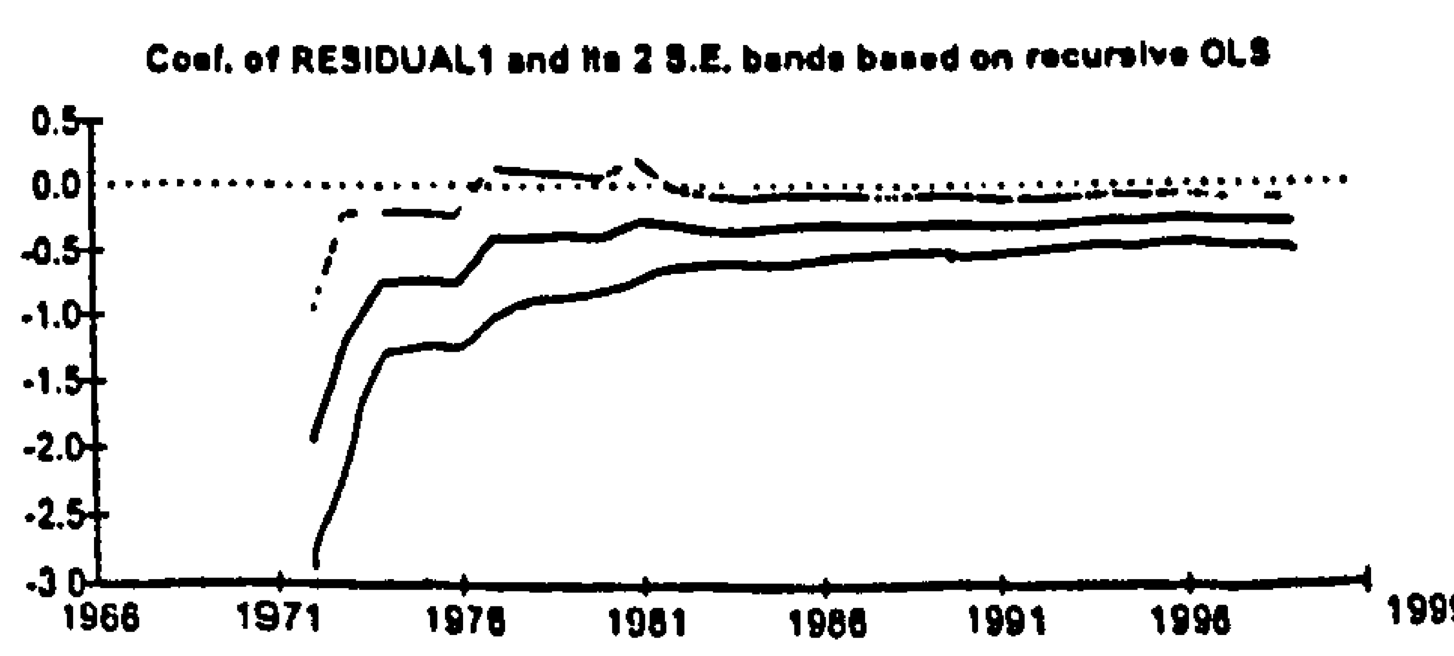
Appendix D Figure D.23C



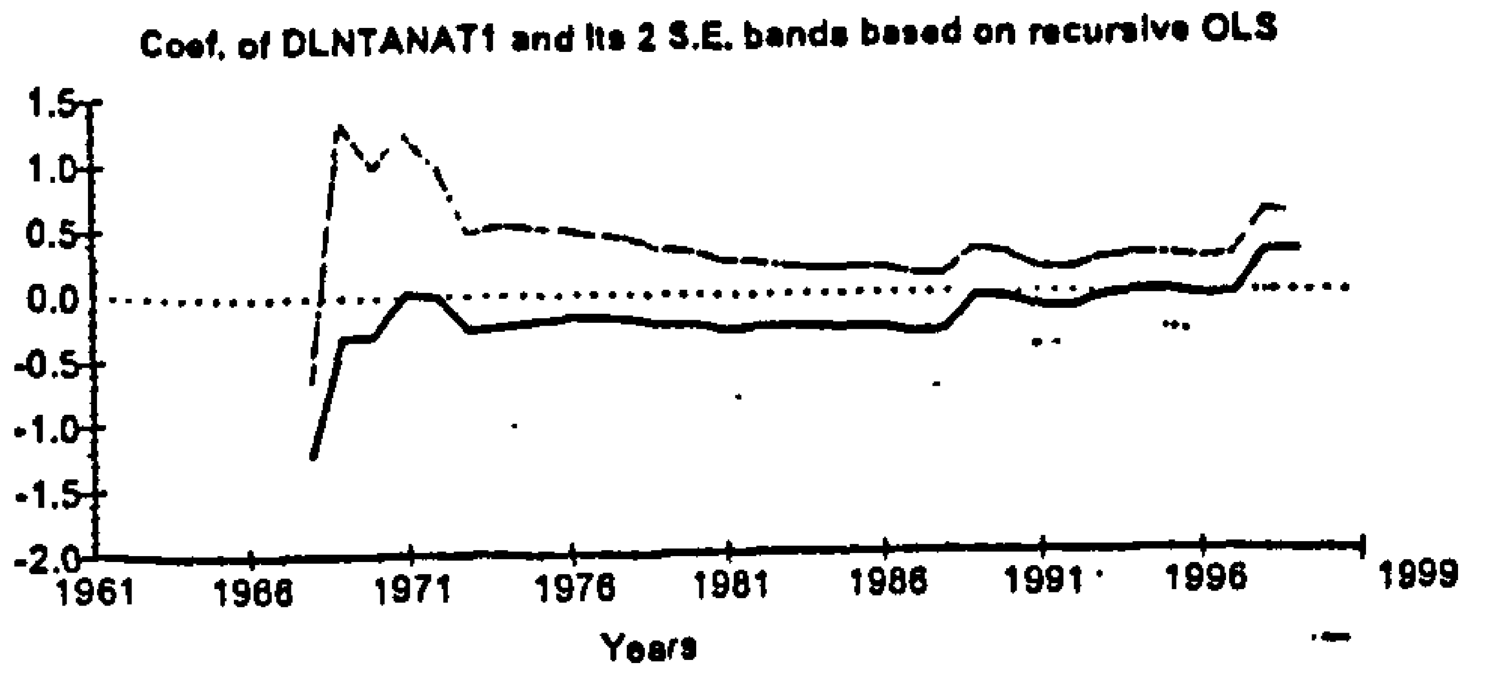
Appendix D Figure D.23B



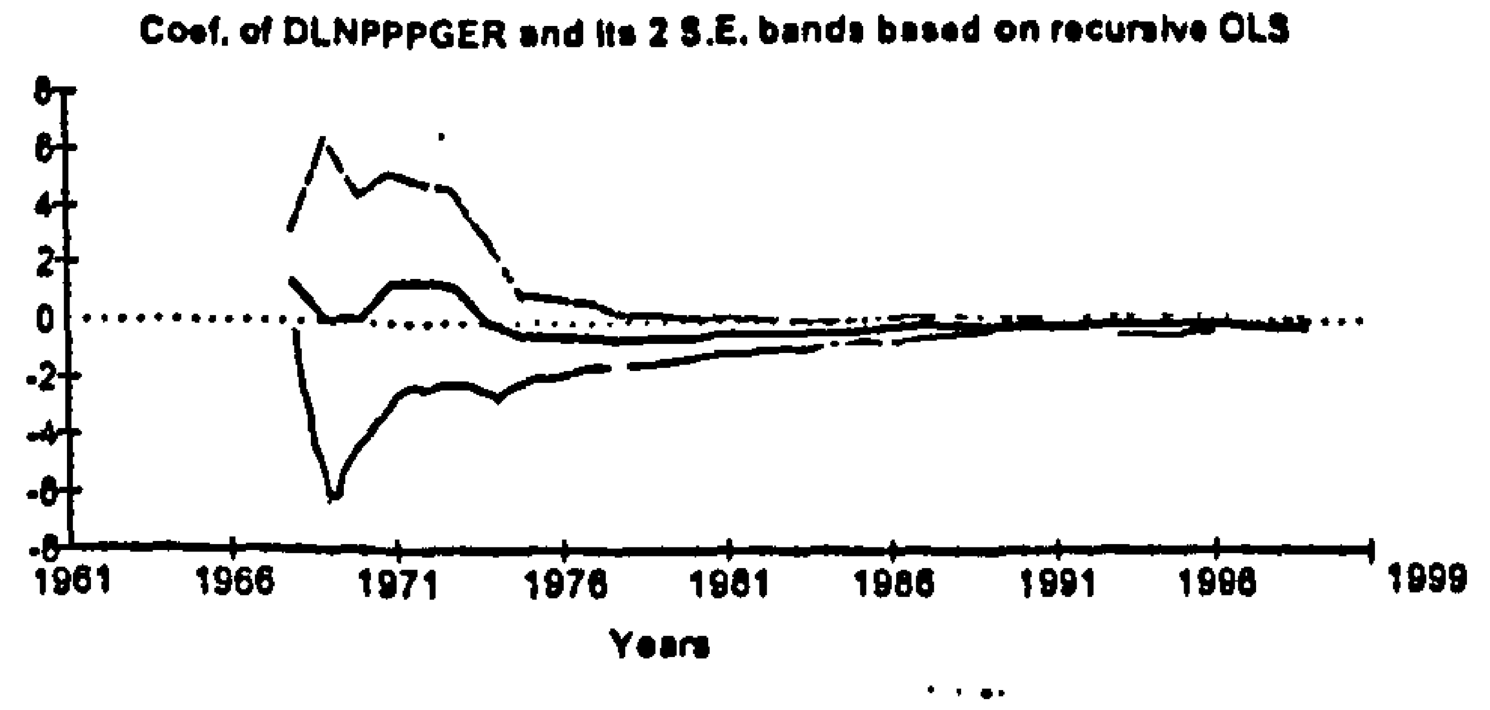
Appendix D Figure D.23D



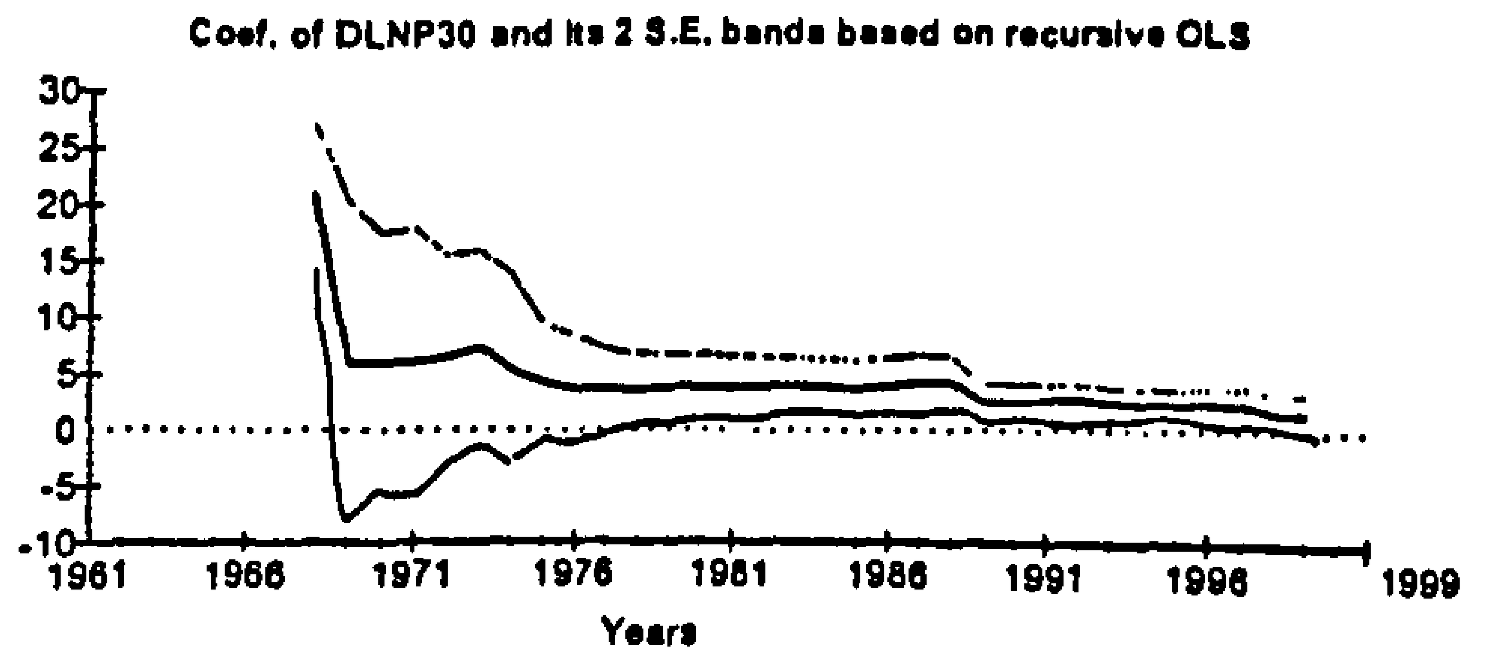
Appendix D Figure D.24A



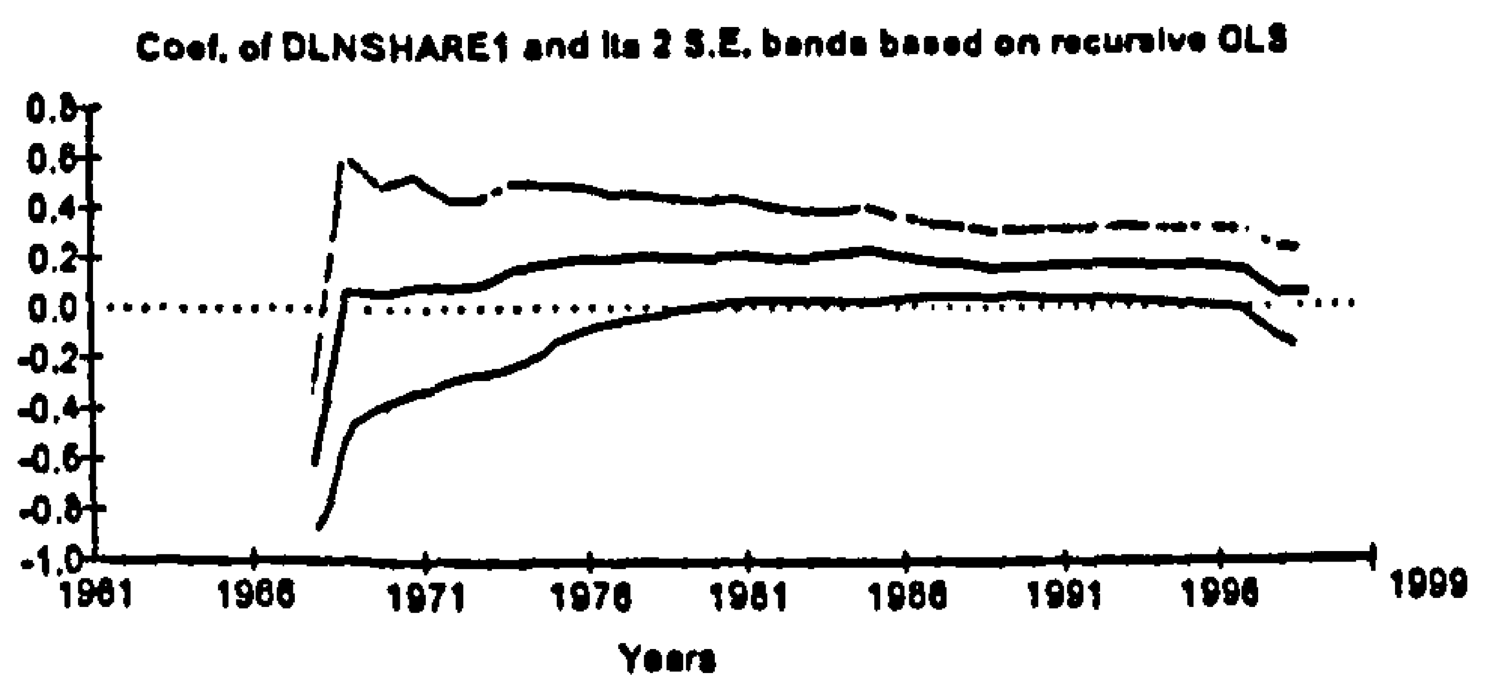
Appendix D Figure D.24C



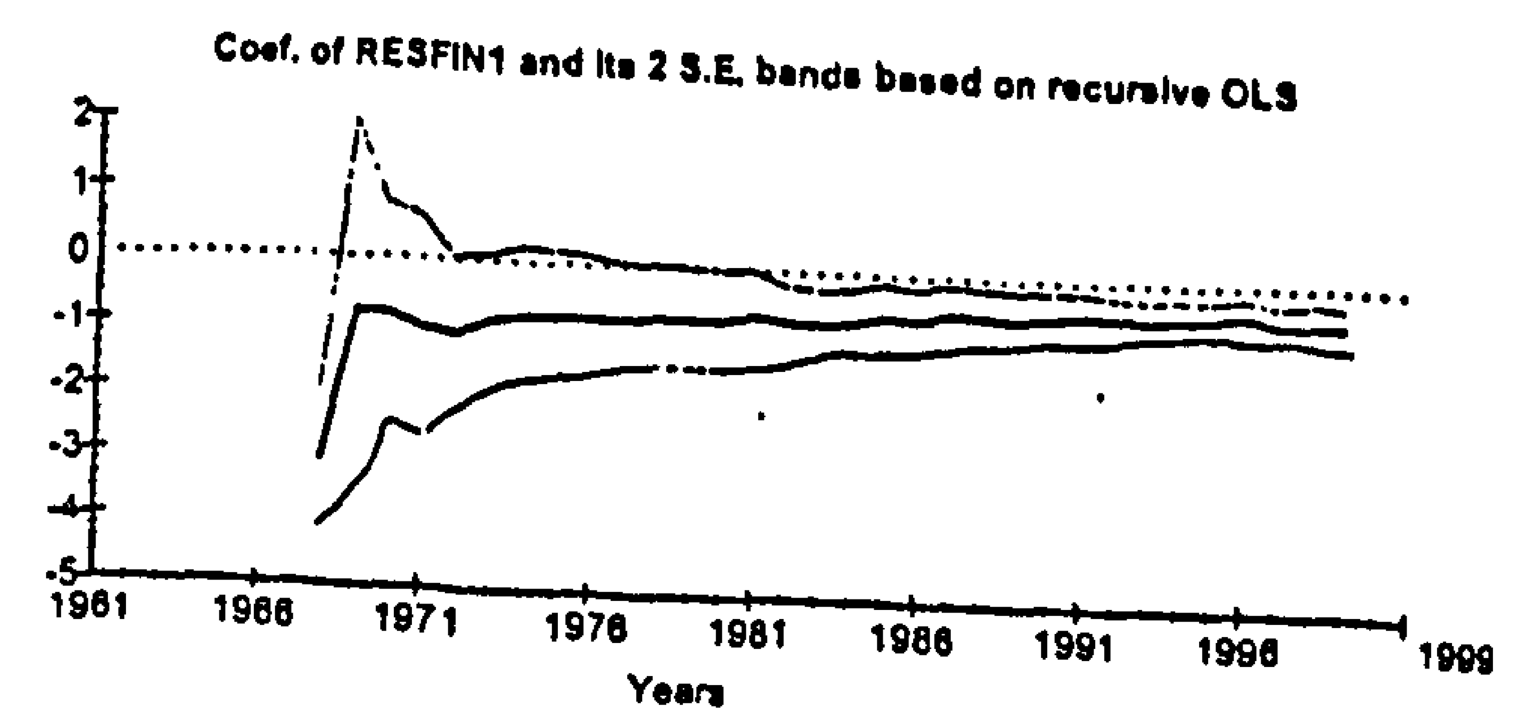
Appendix D Figure D.24B



Appendix D Figure D.24D



Appendix D Figure D.24E



Appendix E. Regression Results (Lin and Sung, 1982)

Table E.1 Regression Results - Time Series Model, (Lin and Sung (1982) results, 1962-1978)

Model 1 (Tourist Arrivals)

(Initial Regression)

$$ln\ TA = a_0 + a_1lnYCN + a_2lnPTC + a_3lnRC + a_4NC + a_5T + X_1D3 + X_2D4 + \mu$$

(Final Regression)

$$ln\ TA = a_0 + a_1lnYCN + a_2lnPTC + X_2D4 + \mu$$

a_0	a_1	a_2	X_2	R^2	DW
0.30774	3.89250	-0.76991	+0.14743	0.989	2.0223
(5.94)	(33.86)	(-2.16)	(1.97)		

Figures in parentheses, t-values

Model 2 (Tourist Expenditure)

(Initial Regression)

$$ln\ TE = b_0 + b_1lnYC + b_2lnPTC + b_3lnRC + b_4ln\ t + Y_1D3 + Y_2D4 + \mu$$

(Final Regression)

$$ln\ TE = b_0 + b_{1ln}YC + b_{2ln}PTC + b_3lnRC\ Y_1D_3 + Y_2D_4 + \mu$$

b_0	b_1	b_2	b_3	Y_1	Y_2	R^2	DW
	1.9	-0.8	-1.2348	0.1519	0.2529	0.973	2.10
(14.24)	(10.72)	(-2.57)	(-2.18)	(-2.73)	(2.99)		

figures in parentheses, t-values

Model 3 (Per Capita Expenditure)

$$ln\ ETN = c_0 + c_1lnYC + c_2lnPTC + c_3lnRC + c_4lnNC + Z_1D3 + Z_2D4 + \mu$$

c_0	c_1	c_2	c_3	c_4	Z_1	Z_2
0.51722	-1.99447	-0.60365	-1.23488	+3.89250	-0.15783	+0.10554

where:

TA	=	tourist arrivals, millions
TE	=	tourist expenditure, billions of 1973 dollars
ETN	=	tourist expenditure per capita
YCN	=	index of real per capita national income of countries of origin, 1973=100
YC	=	index of real national income of countries of origin, 1973=100
NC	=	index of population of countries of origin
PTC	=	index of local currency relative prices
RC	=	index of foreign exchange rate of Hong Kong dollars, expressed as price of Hong Kong dollars in terms of currencies of tourist-generating countries, 1973=1.0
T	=	time trend
D_3	=	political disturbance in 1966-68, 66-68, 1, otherwise, 0.
D_4	=	Expo in Japan in 70, 70 = 1, otherwise, 0
μ	=	disturbance terms

Table E.2 Regression Results – Cross-sectional and Pooled Cross-sectional Data, (Lin and Sung (1982) results)

Model 1

$\ln ET = d_0 + d_1 \ln Y + d_2 \ln VC + d_3 \ln AF + \mu$

	d_0	d_1	d_2	d_3	R^2	SE	n
1974	3.45	0.2837	0.619	-0.87	0.77	0.57	20
	(1.84)	(2.01)	(4.35)	(-3.73)			
1975	4.11	0.266	0.511	-0.841	0.68	0.41	20
	(1.90)	(1.73)	(3.22)	(-3.08)			
1976	4.24	0.246	0.559	-0.868	0.71	0.64	20
	(1.94)	(1.58)	(3.42)	(-3.26)			
1977	4.06	0.266	0.285	-0.880	0.78	0.54	20
	(2.18)	(2.03)	(4.12)	(-3.92)			
1978	5.33	0.319	0.458	-0.961	0.78	0.51	20
	(2.93)	(2.56)	(3.25)	(-4.48)			
Pooled	4.08	0.278	0.570	-0.885	0.74	0.55	100
	(4.89)	(4.09)	(9.17)	(-8.61)			

Model 2

$lnTA = e_0 + e_1 lnYN + e_2 lnVC + d_3 lnAF + e_4 lnN + \mu$

	e_0	e_1	e_2	e_3	e_4	R^2	SE	n
1973	6.16	0.320	0.567	-0.89	0.26	0.71	0.67	20
	(2.1083)	(1.38)	(3.13)	(-2.62)	(1.67)			
1974	5.74	0.264	0.615	-0.89	0.27	0.75	0.61	20
	(2.11)	(1.18)	(3.59)	(2.83)	(1.91)			
1975	6.13	0.212	0.554	-0.86	0.23	0.70	0.65	20
	(2.06)	(0.889)	(3.07)	(-2.46)	(1.46)			
1976	5.88	0.216	0.599	-0.83	0.21	0.73	0.64	20
	(1.92)	(0.881)	(3.13)	(-2.51)	(1.35)			
1977	5.71	0.205	0.594	-0.83	0.21	0.75	0.60	20
	(1.98)	(0.885)	(3.22)	(-2.58)	(1.46)			
1978	6.88	0.253	0.510	-0.93	0.24	0.76	0.56	20
	(2.60)	(1.23)	(2.92)	(-3.18)	(1.83)			
Pooled	6.07	0.247	0.573	-0.88	0.24	0.74	0.56	120
	(5.84)	(2.97)	(8.87)	(-7.39)	(4.43)			

Note Figures in parentheses, t-values.

where

ET = tourist expenditure of each region, millions of current US dollars

TA = tourist arrivals for each region, thousands

Y = national income of each region, billions of current US dollars

N = population of origin countries

YN = per capita national income, thousands of current US dollars

VC = total volume of merchandise trade between Hong Kong and each region, millions of current US dollars

AF = economy class airfares of scheduled flight from Hong Kong to capital of origin countries, Hong Kong dollars

μ = disturbance terms

Appendix F Results of Dickey-Fuller (1981) F-statistics for testing of deterministic trends in ADF regression model

This appendix provides the empirical results of the Dickey and Fuller (1981) F-statistics for testing of the presence or absence of deterministic trends in ADF regression model for unit roots testing. The Microfit output of Table F.1 is available on request.

Table F.1 Results of Testing for the presence of deterministic trends in Augmented Dickey- Fuller equation – Dickey and Fuller (1981) F-Statistics for deterministic trends.

Variables	Origin					
	U.S.	U.K.	Germany	Japan	Taiwan	China
LnTANAT	n.c	n.c	n.c	6.25**	n.c	2.46
LnRGDPPC	4.85**	6.60**	5.78**	2.33	n.c	5.92**
LnPPP	2.57	n.c	n.c	n.c	n.c	2.189
LnSHARE	n.c	n.c	n.c	n.c	n.c	n.c
LnRTRADE	n.c	n.c	9.48**	n.c	n.c	11.77**
LnSUB	n.c	n.c	n.c	1.79	n.c	n.c
LnP95	n.a	n.a	n.a	2.29	n.a	n.a
LnP90	n.a	n.a	5.75**	4.39	n.c	6.48**
LnP85	n.a	n.a	n.a	4.30	n.a	n.a
LnP80	4.90	7.1**	5.76**	4.16	n.c	7.36**
LnP70	n.a	n.a	6.41**	n.a	n.c	8.48**
LnP60	4.95	n.a	7.01**	n.a	n.c	9.83**
LnP50	n.a.	5.13	7.96**	n.a	n.c	8.28**
LnP40	5.00	n.a	9.09**	n.a	n.c	13.12**
LnP30	n.a	3.60	10.69**	n.a	n.c	15.10**

1. Our appropriate testing strategy of the number of unit root for the underlying variables is based on the Augmented Dickey-Fuller test with a generous lag structure that allows for both constant and trend term if there are no mixed results for the order of the integration, between the models with time trend and the models with no trend. In case there are conflicting results of unit root tests statistics between the ADF regression models with only constant term and ADF regression models with both constant and trend term, we applied Dickey-Fuller (1981) time trend test based on F statistics to indicate the significance of the time trend term in the ADF regression model. The procedures of the tests are provided in Dickey and Fuller (1981). The critical values for Dickey- Fuller F statistic is provided in Dickey and Fuller, (1981), Table VI, p 1063.
2. ** indicates the presence of a linear time trend in model is preferred in the equation 6-1 at 90% confidence level. For those value without the sign ** indicates the absence of a linear time trend is preferred in the equation 6-1.
3. n.c. indicates there is no mixed results of the numbers of unit root, complied from the models with

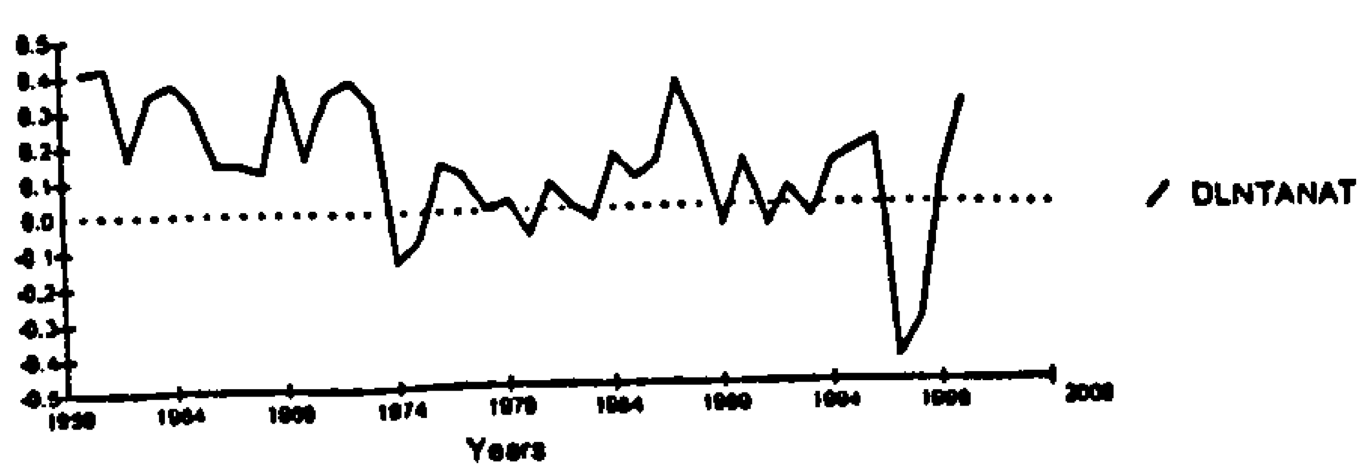
constant only and models with constant and linear trend and n.a indicates the underlying variable is not available for testing.

4. The Microfit output for the results of Dickey-Fuller F statistics is available on requests.
5. The critical value of Dickey-Fuller F statistics is 5.91 (China), 5.80 (Taiwan and U.K.) and 5.75(U.S., Ger, Japan) at 90% confidence level. (By interpolation) If the F-statistics is higher /lower than the critical value, it indicates the presence/absence of time trend in the equation 6-1.

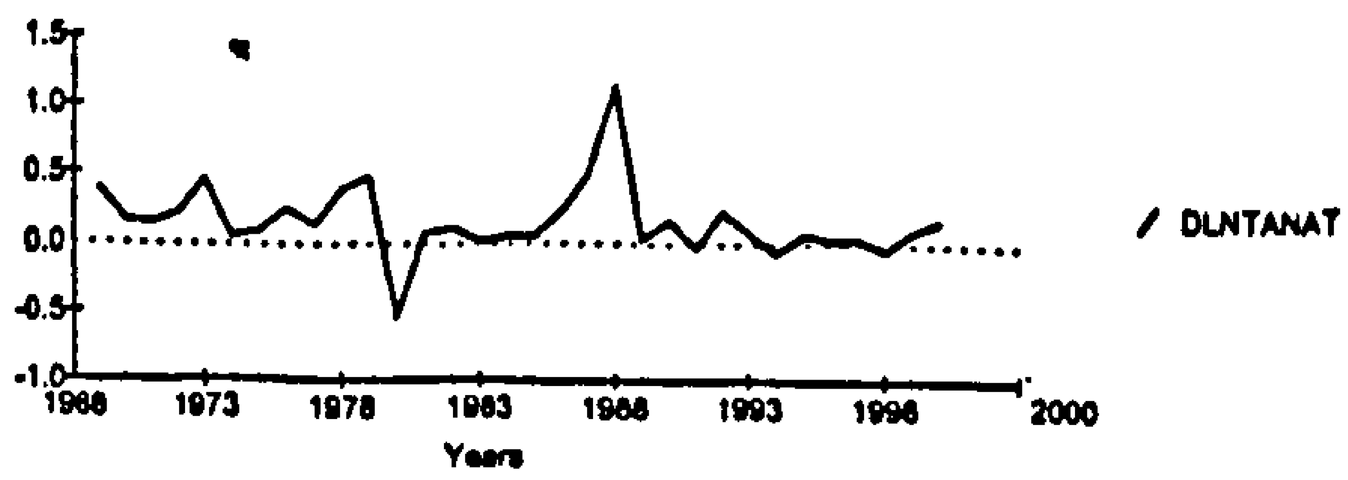
As shown in Table F.1, we have carried out Dickey-Fuller Time trend test based on F-statistics to examine whether or not the ADF regression model for unit root testing contains a linear time trend. Overall the results of F-statistics indicated that the variables of LnTanat(JAP), LnRGDPPC(U.K.), LnRGDPPC (GER), LnRGDPPC(CHI), LnRTRADE(GER), LnRTRADE(CHI), LnP90(GER), LnP90(CHI), LnP80(U.K), LnP80(GER), LnP80(CHI),LnP70(GER), LnP70(CHI), LnP60(GER), LnP60(CHI), LnP50(GER), LnP50(CHI), LnP40(GER), LnP40(CHI),LnP30(GER)and LnP30(CHI) are subject to a presence of a linear time trend variable in equation 6-1 for testing of the numbers of unit root. However, the results of F-statistics indicated that LnTANAT(CHI), LnRGDPPC(U.S.), LnRGDPPC(JAP), LnPPP(U.S.), LnPPP(CHI), LnSUB(JAP), LnP95(JAP), LnP90(JAP), LnP85(JAP), LnP80(U.S.), LnP80(JAP), LnP60(U.S.), LnP50(U.K.), LnP40(U.S.) and LnP30(U.K.) indicated the absence of a linear time trend variable in equation 6-1 for testing the numbers of unit root.

Appendix G Graphical Presentation of Absolute Tourist Arrivals and Annual Growth Rate of Tourist Arrivals for Each of Six Major Origin Countries and the Aggregate Tourist Arrivals for Hong Kong over the period 1959-1999

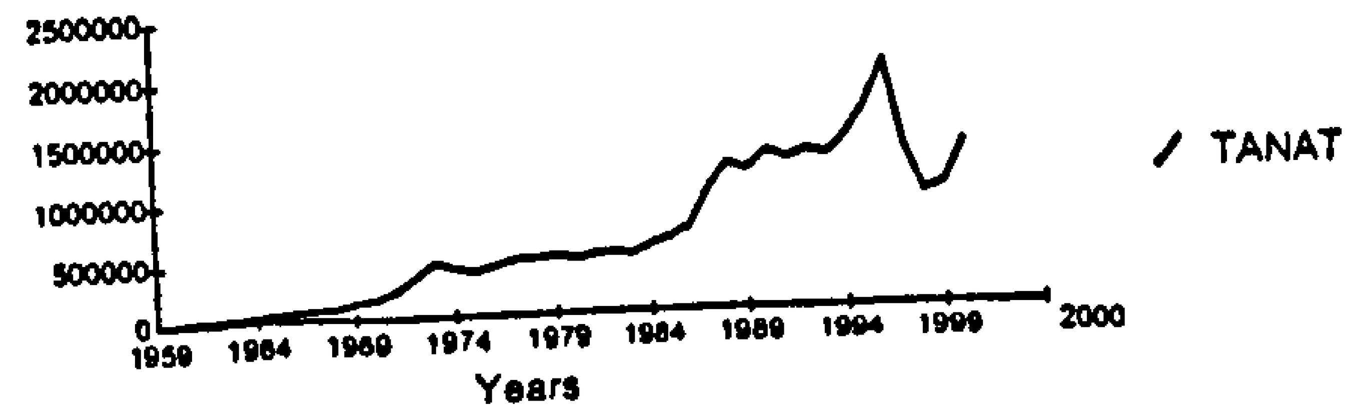
Appendix G Table G.1A Annual Growth Rate of Tourist Arrivals (Japan)



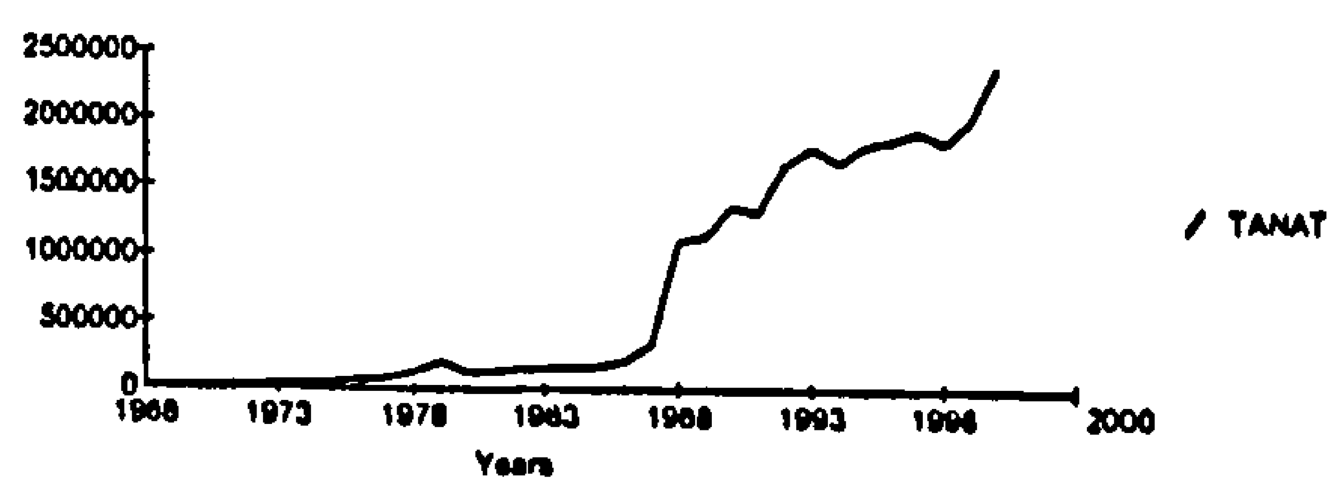
Appendix G Table G.2A Annual Growth Rate of Tourist Arrivals (Taiwan)



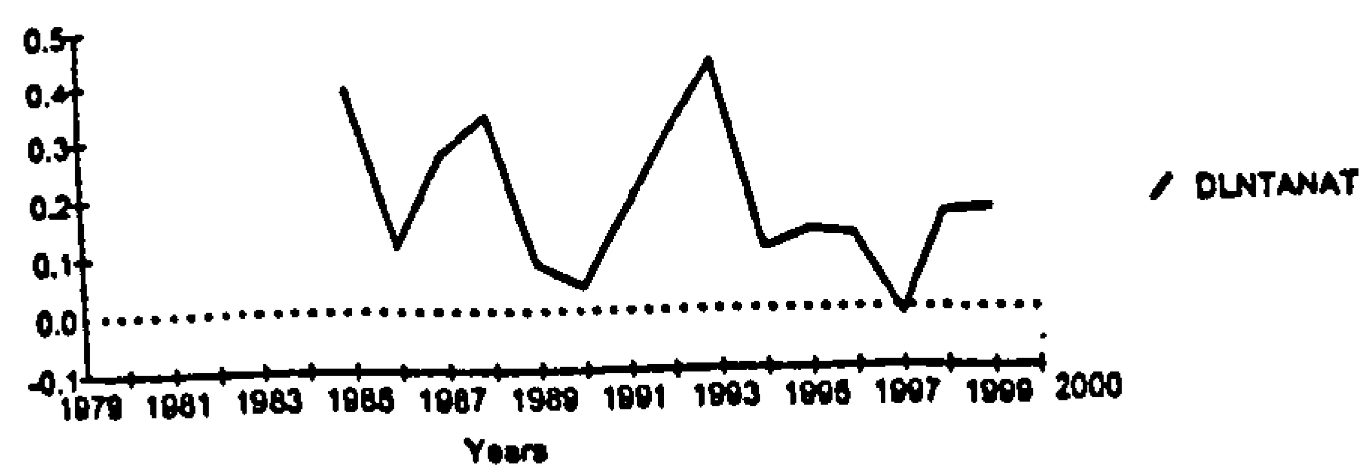
Appendix G. Table G.1B Annual Total Number of Tourist Arrivals (Japan)



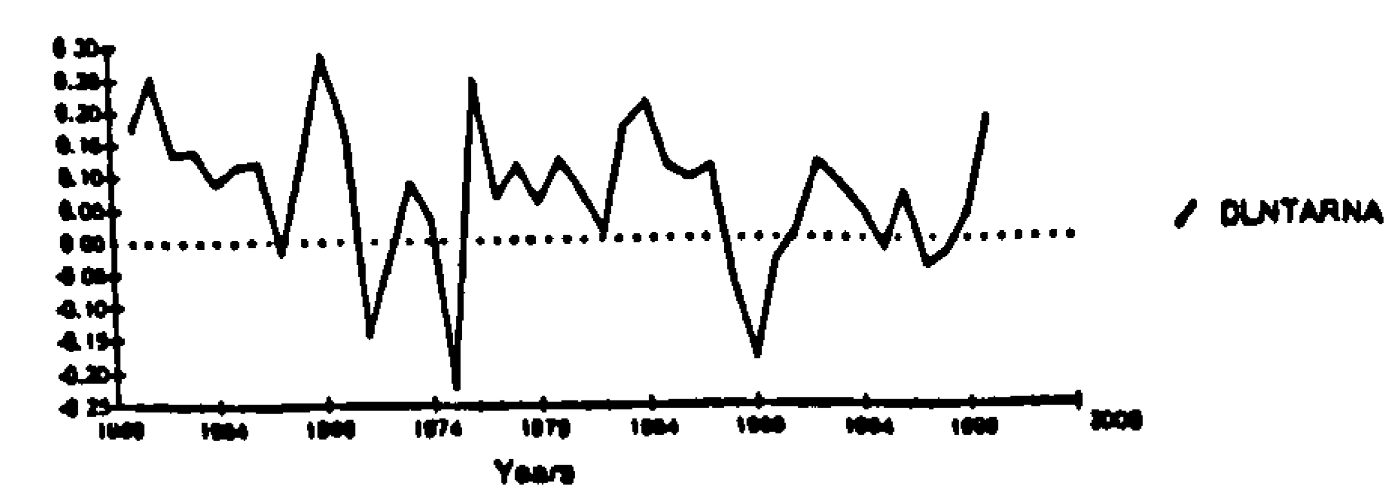
Appendix G. Table G.2B Annual Total Number of Tourist Arrivals (Taiwan)



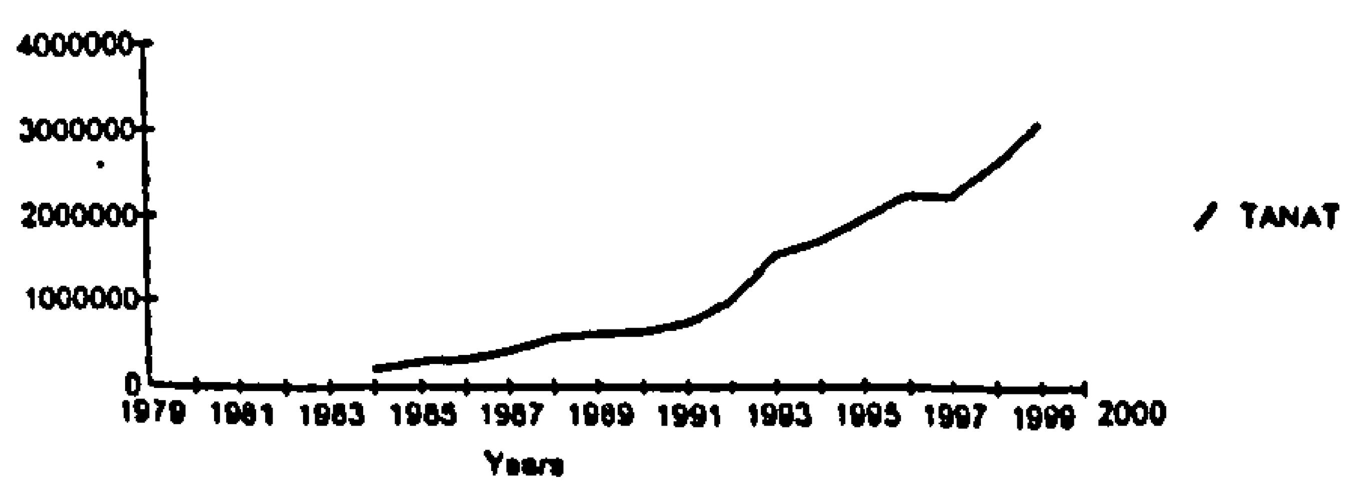
Appendix G Table G.3A Annual Growth Rate of Tourist Arrivals (China)



Appendix G Table G.4A Annual Growth Rate of Tourist Arrivals (United States)



Appendix G. Table G.3B Annual Total Number of Tourist Arrivals (China)



Appendix G. Table G.4B Annual Total Number of Tourist Arrivals (United States)