

THE DETERMINANTS OF THE TRAVEL DEMAND  
MODELS FOR SIX MAJOR U. S.  
INBOUND MARKETS

By

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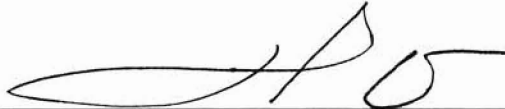
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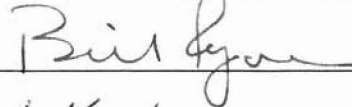
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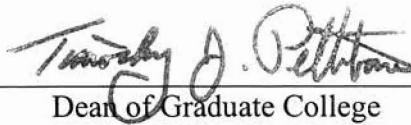


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CHAPTER 1  
INTRODUCTION

Background

Tourism today carries not only sociocultural and political significance, but also provides considerable economic benefits. In the 20<sup>th</sup> century, tourism has emerged as one of the largest and the fastest growing industries in the global economy (Eadington and Redman, 1991; WTO, 1990; WTTC, 1992). For many countries, tourism expenditure has become an important source of business activity, income, employment, and foreign exchange. Realizing the growing significance of tourism, government, private sectors, and communities in many countries have begun to channel their resources into tourism development.

The United States, a huge country, which sprawls over a total land area of 3,618,770 sq. miles and with a population of 282.1 million (U.S. Census Bureau, 2002), comprises continental America, plus the outlying areas of Alaska and Hawaii. It is a nation of geographic and climatic diversity, embracing deserts, lakes, vast waterways, canyons, plains, forests, rolling farmland soaring, and snow-capped mountains - natural repositories for much of the country's economic wealth and a source of fascination for tourists. The United States' potpourri of races, colorful history, wildlife, dynamic pop culture and vast, empty spaces make it a magnet for visitors from neighboring countries like Canada and Mexico, and from overseas, particularly for travelers from more ancient lands and from heavily populated countries such as Japan, the United Kingdom and continental Europe.



In 2001, tourism in the United States was in a historical decline. The number of international arrivals dropped from a peak record of 50.9 million in 2000 to 45.7 million in 2001, representing a negative annual growth rate of 10.2% (OTTI, 2002). The main causation of the decline was the terrorist attacks on September 11 2001. People said that the terrorist attacks were the most horrible tragedies in the history of human beings. The United States tourist industry, however, described it as the worst moment in the travel history (OTTI, 2002). It was roughly estimated that 9.2 billion of tourist spending was lost after the attacks. The exact impact of 9-11 has not yet been estimated.

#### Significance of Tourism in the United States Economy

<sup>A</sup> The travel and tourism sector is an essential component of the United States economy. The travel and tourism sector is a diverse group of industries that supply goods and services purchased by leisure, business, and other travelers. These industries include, to name a few, the lodging industry, the airline industry, travel agents, tour operators, tour guides, car rental companies, meeting and convention planners, restaurants, resorts, amusement parks, camping and recreation areas, natural attractions found in parks and forests, and other suppliers of all these businesses.

<sup>Q</sup><sub>ck</sub> Travel and tourism is the United States' largest service export, with \$94.5 billion of international travel spending within the United States, generating a \$14 billion trade surplus in 1999 (OTTI, 2002). The travel and tourism sector is the third largest employer, directly supporting more than 7.8 million employees and with travel-generated payrolls totaling \$171.5 billion in 2000 (AHLA, 2001). The travel and tourism sector is the United States' third largest retail sales industry, behind automotive and food stores in 2000, generating \$99.5 billion in federal, state and local tax revenues.

At the beginning of 2002, the World Travel and Tourism Council (WTTC) made the following forecasts: (1) the tourist industry in the United States is expected to contribute 4.3% to the Gross Domestic Product (GDP) in 2002; (2) the number of employment generated is estimated at 16,387,400, representing 12.1% of the total employment; (3) amount of exports generated is expected to be \$158.3 billion, accounting for 15.1% of the total exports; (4) capital investment is estimated at \$205.2 billion or 10.4% of the total investment (WTTC, 2002).

#### Economic Impacts of Inbound Tourism on the United States

Over the last two decades, inbound tourism had evolved from an emerging sector to an established leader in a modern services economy (OTTI, 2002). Growing from \$13 billion in 1980 to \$102.5 billion in 2000, travel and tourism's export contributions to the United States economy had grown nearly 800% (OTTI, 2002). The United States had continued to produce a travel surplus, generating \$14 billion in 2000. The travel surplus had been produced continuously since 1989, peaking at \$26.3 billion in 1996. A surplus occurs when international visitors to the country spend more than the United States residents who travel abroad.

Expenditures by international visitors from other nations in 2000 directly supported 1.1 million jobs in the United States (AHLA, 2001). Payroll revenues generated by international tourism were estimated at over \$22 billion, and federal, state and local taxes were estimated at over \$11 billion in 2000 (OTTI, 2002). In terms of travel receipts and exports, the United States ranks first among worldwide destinations. The United States' share of world travel receipts was 18% in 2000 (OTTI, 2002). Spending by international travelers to the United States is more than double the level for

any other countries.

#### Overview of International Tourist Arrivals and Receipts, 1960-2000

Table 1 shows the historical number of international tourist arrivals, tourist receipts, and special incidents in the United States from 1960 to 2001. International tourist arrivals to the United States boosted substantially over the past four decades. The total number of international arrivals increased 9 times from 5.6 million in 1960 to 48.5 million in 1999, with an average annual growth rate of 5.93%. The tourism receipts generated, on the other hand, increased 86 times from \$1,094 million in 1960 to \$94,516 million in 1999, with an average annual growth rate of 12.53% (OTTI, 2002). In 2000, the international tourist arrival showed a peak record of 50.9 million, generating a total receipt of \$102,787 million. Substantial growth in the tourist market made the United States hold the position as the number one travel and tourism destination for total receipts generated worldwide and the second or third destination for number of international arrivals over the past decade (OTTI, 2002).

International arrivals first experienced a decline in 1962 because of the Vietnam War during the period of 1964-1972. In 1982, second decline was recorded when there was world economic recession caused by the second oil crisis in 1979. First oil crisis happened in 1974, reducing the annual growth rate of international arrival to 1.2%. In 1984, international arrivals boosted amazingly, with the greatest annual growth rate in the history (25.2%), thanks to the Los Angeles Olympic Games.

**Table 1. International Arrivals and Tourist Receipts to the United States, 1960-2001**

Year	Tourist Arrivals	Annual Growth Rate	Tourist Receipts* (Million)	Annual Growth rate	Incidents
1960	5,552,990	N/A**	1,094	N/A**	
1961	6,303,847	13.52%	1,130	3.29%	
1962	5,873,079	-6.83%	1,148	1.59%	
1963	6,094,596	3.77%	1,220	6.27%	
1964	6,588,340	8.10%	1,448	18.69%	Vietnam War
1965	7,841,521	19.02%	1,651	14.02%	Vietnam War
1966	9,053,081	15.45%	1,907	15.51%	Vietnam War
1967	9,984,189	10.28%	2,017	5.77%	Vietnam War
1968	10,207,564	2.24%	2,186	8.38%	Vietnam War
1969	11,652,452	14.16%	2,493	14.04%	Vietnam War
1970	12,362,205	6.09%	2,875	15.32%	Vietnam War
1971	12,738,935	3.05%	3,149	9.53%	Vietnam War
1972	13,057,056	2.50%	3,516	11.65%	Vietnam War
1973	13,955,134	6.88%	4,387	24.77%	
1974	14,122,619	1.20%	5,136	17.07%	1 <sup>st</sup> Oil Crisis
1975	15,698,054	11.16%	5,736	11.68%	
1976	17,523,192	11.63%	6,971	21.53%	
1977	18,609,715	6.20%	7,516	7.82%	
1978	19,842,142	6.62%	8,786	16.90%	
1979	20,310,068	2.36%	10,597	20.61%	2 <sup>nd</sup> Oil Crisis
1980	22,179,000	9.20%	13,179	24.37%	
1981	23,475,024	5.84%	16,024	21.59%	
1982	21,502,788	-8.40%	15,567	-2.85%	World Economic Recession
1983	21,512,680	0.05%	14,557	-6.49%	World Economic Recession
1984	26,933,616	25.20%	21,244	45.94%	Olympic Games
1985	25,399,492	-5.70%	22,173	4.37%	
1986	26,007,748	2.39%	25,967	17.11%	
1987	29,500,445	13.43%	30,566	17.71%	
1988	34,095,212	15.58%	38,410	25.66%	
1989	36,563,703	7.24%	46,862	22.00%	
1990	39,539,010	8.14%	58,305	24.42%	
1991	42,985,520	8.72%	64,239	10.18%	Persian Gulf War
1992	47,556,490	10.63%	71,360	11.09%	Persian Gulf War
1993	45,778,817	-3.74%	74,403	4.26%	
1994	44,752,946	-2.24%	75,414	1.36%	
1995	43,316,966	-3.21%	82,304	9.14%	
1996	46,489,166	7.32%	90,231	9.63%	Olympic Games
1997	47,766,476	2.75%	94,294	4.50%	Asian Financial Crisis
1998	46,395,587	-2.87%	91,384	-3.09%	Asian Financial Crisis
1999	48,491,187	4.52%	94,516	3.43%	
2000	50,890,701	4.95%	102,787	8.75%	
2001	45,701,826	-10.20%	90,029	-12.41%	9-11

Source: U.S. Department of Commerce, ITA, Office of Travel & Tourism Industries; Bureau of Economic Analysis (Various years)

\*Tourist receipts refer to the sum of travel receipts and passenger airfares, \*\*N/A - Not available

In the period of 1985-92, international arrivals showed a steady growth. International arrivals first showed a relative peak during the period of Persian Gulf War in 1991 and 1992. Since then, international arrivals showed negative growths from 1993 to 1995. In 1996, international arrivals rebounded again. The main reason was the Atlanta Olympic Games. However, international arrivals declined in 1998 when Asian Financial Crisis happened in the Southeast Asia region (OTTI, 1999). In 2001, a year which described by the industry as the worst year in the history of the United States travel industry, international arrivals declined by 10.2% (OTTI, 2002). Undoubtedly, the historical declines were mainly due to the 9-11 terrorist attacks.

#### September 11 2001 Terrorist Attacks

The 9-11 terrorist attacks started when two commercial aircrafts hijacked by the terrorists crashed into the twin towers of World Trade Center in New York City in the morning of September 11, 2001. During the same morning, third aircraft crashed into the Pentagon, and fourth aircraft crashed into the Somerset County of Pennsylvania. The terrorist attacks symbolized the beginning of the political instability and economic disasters throughout the world. The tourism industry in the United States was the first one to be substantially hurt after the attacks because people were afraid of flying. International arrivals to the United States in September 2001 were recorded 29% lower than arrivals in September 2000. While the October 2001 decline was down by almost 34% when compared to October 2000. The drop in October 2001 was the largest single monthly decline in the history of the United States (OTTI, 2002).

## Major Tourist-generating Countries, 1960-2000

Table 2 shows the number of international arrivals and the corresponding market shares while Figure 1 shows the trends of the international tourist arrivals from the six major tourist-generating countries to the United States. The largest two tourist-generating countries were not surprisingly Canada and Mexico. They dominated the United States tourism inbound market over the past four decades. The dominance of the Canadian and Mexican tourists in the United States inbound market is largely attributable to their geographic proximities to the United States. In 2000, the number of international arrivals from Canada was found to be 14.6 million, accounting for 28.7% of the market share. Mexico, being the second largest tourist-generating country since 1960, contributing 10.3 million arrivals to the United States inbound market in 2000.

Table 2. International Arrivals from Six Major Tourist-generating Countries

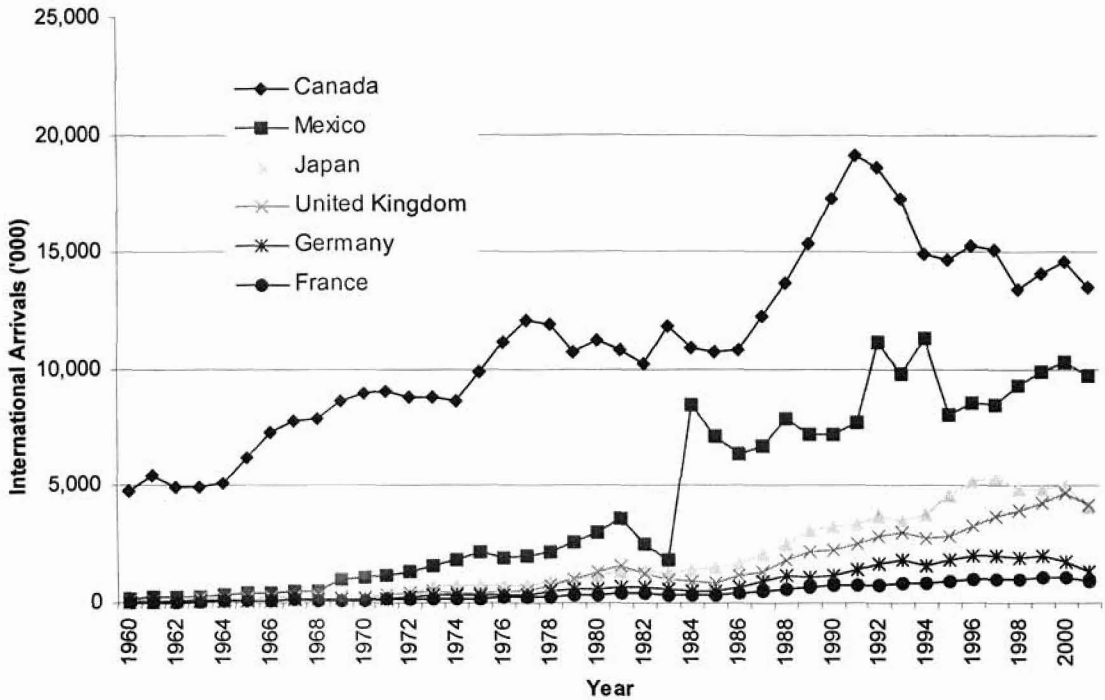
Year	Canada		Mexico		Japan		United Kingdom		Germany		France	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
1960	4,775,000	(86.0)	176,918	(3.2)	20,290	(0.4)	94,416	(1.7)	36,599*	(0.7)	24,169	(0.4)
1970	8,986,000	(72.7)	1,085,772	(8.8)	207,455	(1.7)	292,752	(2.4)	177,528*	(1.4)	116,347	(0.9)
1980	11,238,000	(50.7)	3,026,000	(13.6)	1,198,016	(5.4)	1,302,207	(5.9)	628,428*	(2.8)	360,670	(1.6)
1990	17,263,000	(43.7)	7,217,000	(18.3)	3,231,495	(8.2)	2,243,792	(5.7)	1,202,826*	(3.0)	716,036	(1.8)
2000	14,594,000	(28.7)	10,322,000	(20.3)	5,061,377	(9.9)	4,703,008	(9.2)	1,786,045	(3.5)	1,087,087	(2.1)

Source: U.S. Department of Commerce, ITA, Office of Travel & Tourism Industries

Figures in parenthesis represented the market share of the international arrivals

\*Data for former West Germany

Figure 1. Trend of International Tourist Arrivals from Six Inbound Markets to the United States, 1960-2001



Source: U. S. Department of Commerce, International Trade Administration, Office of Travel & Tourism Industries

Overseas markets refer to the countries other than Canada and Mexico. In 2000, Japan, being the largest overseas market since early 1970s, generated 5.1 million international arrivals to the United States, representing 9.9% of the market share. The United Kingdom dominated the second largest overseas market in 2000, producing an amount of 4.7 million arrivals to the United States. Germany and France shared the least parts of the inbound market in 2000, accounting for 3.5% and 2.1% respectively of the market share.

Although individual countries varied market shares of international arrival from year to year, their number of arrivals was generally on the rise. The average annual

market share of international arrivals from these six major tourist-generating countries was around 80% over the past four decades.

### Problem Statement

In order for the private sectors to make effective decisions on a range of important tourism policy issues, it should have an appreciation of factors influencing the international travel demand to the United States.

### Objectives

The purpose of this study is to identify the determinants of demand for international travel to the United States from six major tourist-generating countries and to measure their effects through a set of econometric models. The specific objectives of this study were as follows:

1. To identify the determinants of the travel demand for international tourist arrivals from six tourist generating countries to the United States;
2. To assess the impacts of 9-11, Asian Financial Crisis, Olympic Games, Persian Gulf War, World Economic Recession, Oil Crisis and Vietnam War on the number of international tourist arrivals from six tourist generating countries to the United States.

### Significance of the Study

Elasticities measure changes in demand as a function of changes in their determinants and provide useful information on the comparative advantages of tourism in development and in economic diversification (Vanegas and Croes, 2000). An accurate estimate, understanding, and forecasting of tourism demand based on appropriate analytical methods is important for investors in the United States and elsewhere to focus



development efforts and investments. The estimation of demand will make planning vital if the United States inbound tourism is indeed to realize its full economic potential.

The major significance of this study went to two aspects. Academically, it would provide new travel demand models for international travel in the United States. Practically, it would provide accurate models for forecasting purpose, which would be substantially beneficial for the private sectors in the sense of policymaking, tourism planning and budgeting. The travel demand model would also help to answer three vital questions: (1) how many tourists are likely to arrive at the United States in a given time? (2) which origin areas represent the best marketing opportunities for the United States? and, (3) which factors are most influential in determining future tourist arrival to the United States?

## CHAPTER 2

### REVIEW OF THE LITERATURE

#### Introduction

This chapter discussed the determinants of travel demand, international travel demand to the United States, general travel demand model, data, dependent variable and explanatory variables. Review of common methodological problems was also discussed.

#### Determinants of Travel Demand

Changes in the demand for international tourism are influenced by many factors (both the push and pull factors, or supply and demand factors), but most of the previous literatures focused on the economic factors in estimating a satisfactory explanation.

Economic theory suggests that the major determinants of the demand for travel are the income of tourists and the price of the goods and services relative to the price of substitutes (Loeb, 1982; Stronge and Redman, 1982; Uysal and Crompton, 1984). Demand theory also implies that demand for tourism is affected by other special factors such as political unrest, economic recession, and mega events. A review of previous studies indicated that income and price-type factors were the most important determinants of tourism demand (Barry and O'Hagan, 1972; Lee, Var and Blaine, 1996).

#### International Travel Demand Studies in the United States

Extensive review of literature revealed that quite a number of studies examined the international tourism demand from the United States to other countries. There was only one literature about the travel demand from foreign countries to the United States. It was the econometric evaluation of international travel to the United States made in 1982 (Loeb, 1982). Annual time series data of the period of 1961-1979 were used to

investigate the effects of real per capita income, exchange rates, and relative prices on the demand travel to the United States from seven tourist-generating countries. The results showed that all three variables proved to have a significant effect on the demand for travel in the United States. However, the degree of responsiveness attributed to the variables varied from country to country. The income variable was found to be significant and positive for all countries evaluated. The coefficients associated with the relative price variable were generally negative and significant for the demand model. The price coefficients indicated substitution effect, i.e. as relative prices in the exporting country increase vis-à-vis prices in the home country or alternative travel locations there was a reduction in the demand for travel service from the exporting country. The study's findings suggested that not only that exchange rates and real per capita income are important but also that relative prices are an important contributing factor to the United States' real travel exports.

Since the study had been conducted, no studies were found afterwards. The global environment in terms of political, economic, social, and technological aspects had changed dramatically after 1980s. The old travel demand model failed to explain the change of demand in response to the rapidly changing environment variables. A new model was indeed required to extend the estimation period by 22 years to 2001, thus taking the impacts of the political and economic changes that took place in the United States after 1980 and subsequently into account.

## Travel Demand Model

To suggest a new travel demand for the United States, review of relevant literatures was required. [Up until 1997, it was showed that 100 studies of empirical international tourism demand models were published (Lim, 1997). Tourism among West European and North American countries had dominated the research.] Small number of studies had examined international travel involving Australia, Japan, and Turkey. Studies about Asia, the Pacific, the Middle East and Eastern European had been ignored (Crouch, 1994a). However, [several studies about the Southeast Asia region had been found in recent years. For example, Qu and Rittichainuwat's study about Thailand in 2002, Qu and Kim's study about South Korea in 2002, and Qu and Lam's study about Hong Kong in 1997.] Part of the main reason was the emerging significance of the Asian share in the international tourism flow.

[Studies varied from each other in terms of the methodologies employed. The most important methodological dimensions included the nature of the demand coefficient estimation method, the functional form of the model, the type of data used, whether a single or simultaneous equation approach was adopted, and the way in which multicollinearity and serial correlation were managed (Crouch, 1994a)]

## Theoretical Model

Classical economic demand theory reveled that the demand is dependent on the income and price changes. In addition, the demand is also dependent on some qualitative factors such as political instability and economic recession in destinations (Lim, 1997). The general international tourism demand model typically estimated was found to be:

$$DT_{ij} = f(Y_j, TC_{ij}, RP_{ij}, ER_{ij}, QF_i),$$

Where:

$DT_{ij}$  = demand for international travel services by origin  $j$  for destination  $i$ ;

$Y_j$  = income of origin  $j$

$TC_{ij}$  = transportation cost between destination  $i$  and origin  $j$

$RP_{ij}$  = relative prices (i.e., the ratio of prices in destination  $i$  to prices in origin  $j$  and alternative destinations);

$ER_{ij}$  = currency exchange rate, measured as units of destination  $i$ 's currency per unit of origin  $j$ 's currency;

$QF_i$  = qualitative factors in destination  $i$

It was found that most econometric analysis of tourism demand had used single-equation models. Relatively few studies used a complete demand system to describe the allocation of travel expenditure among various categories of goods, in a particular destination, or among various categories of goods in a particular destination, or among various groups of destination/holiday types by a particular tourism market (Divisekera, 1993, 1994; Fujii, Khaled and Mak, 1985, 1987; O'Hagan and Harrison, 1984a, b; Pyo, Uysal and McLellan, 1991; Smeral, Witt and Witt, 1992; Syriopoulos and Sinclair, 1993; White, 1985). Few studies used simultaneous equations. The advantages of using single-equation were: (1) the explanatory variables could be assumed predetermined; (2) the problem of simultaneity of supply and demand could be ignored (Bond, 1979; Hanlon, 1976; Kanafani, 1983; Uysal and Crompton, 1984).

Many functional forms were found among the studies. The functional forms that were used ranged from simple linear regression model to complex forms derived from

statistical or econometric theory, which were more difficult to estimate (Morley, 1991). These included log-linear, linear, Almost Ideal Demand System (O'Hagan and Harrison, 1984a; White, 1985), logit regression (Sheldon and Mak, 1987), a Box-Cox transformation of the variables (Fujii and Mak, 1981), and a specification built form (Witt, 1983). The error in specification of the model form could result in the incorrect inclusion or exclusion of the explanatory variable and false estimates of the values of parameter measuring the impact of variable on demand, such as elasticities. Moreover, the choice of functional form could affect the distribution of the residuals and bias of the test statistics (Morley, 1991).

Among those 100 travel demand studies, it was found that log-linear (73%) and linear (25%) regression models were the most commonly used models. The log-linear form appeared to be superior to the linear form (Crouch, 1994a). It often fits the data better and conveniently provides demand elasticities. The key features of the log-linear model include: (1) both the dependent variable and the set (or a subset) of explanatory variables are expressed in logarithms; (2) it has variable marginal effects and constant elasticities; (3) it yields a steady-state growth path; (4) it permits straightforward testing of whether the dependent variable should be expressed in nominal or real values; (5) it imposes non-negative restrictions upon variables; and (6) it permits the random errors in the equation to be normally distributed (McAleer, 1994; Ong, 1995).

#### Ordinary Least Square Estimation

As many as 83 of the 100 empirical studies reviewed used ordinary least square (OLS) estimation, either alone or in conjunction with other methods of estimation. The primary advantage of ordinary least square estimation is that it can yield the best linear

unbiased estimates of parameter when the assumptions of the classical lines regression model are upheld (Loeb, 1982). The “best” indicates minimum variance and “unbiased” indicates that the expected values of estimates are identical to their parameters. Besides, it has the ability to model cause and effect, to carry out “what if” forecasting, and to provide statistical measures of accuracy and significance. However, the use of regression analysis was not without critics. Summary (1987) concluded that “multivariable regression analysis has limited usefulness in identifying the significant factors which influence tourist’s decisions”. Uysal (1983) identified five limitations: (1) supply factors are often ignored; (2) it may be difficult to forecast explanatory variables for forecasting purposes; (3) the appropriateness of variables may change; (4) in the long term, non-economic factors, which are often omitted from such models, may be more important; and (5) they are frequently only static representations.

#### Data Form

Data in the form of annual time series had been most frequently used to determine the quantity of tourism demanded in the 100 previous studies (Lim, 1997). Typically, travel from a single origin country to a single destination country had been modeled in this way. The principal advantage of time-series analysis is that it enables the modeling of trends (Armstrong, 1972). However, it is limited to the samples size, which is often severely limited by the period of available data. Besides, data sources were not adequately described in the previous studies (Crouch, 1994a).

#### Dependent Variables

To measure the travel demand, tourist arrivals and departures (51%) and tourist expenditures and receipts (49%) were most frequently used in the 100 previous studies

(Lim, 1997). Demand theory suggests that the ideal demand variable should be able to measure the quantity of the product demand. Therefore, the demand measured in real money terms should be better. Nevertheless, reliable data is often not available (Anastasopoulos, 1984; O'Hagan and Harrison, 1984a). Data on tourist arrivals is more reliable as they are less responsive to determinants (Barry and O'Hagan, 1972). Besides, selection of dependent variable concerns the intended use of the results (Crouch, 1994a).

### Explanatory Variables

The explanatory variables most frequently used in the studies included the levels of income of potential tourists (84%), relative price levels in the two countries and in alternative destinations (73%), the cost of travel from the point of origin to the destination (55%) and the currency exchange rates (25%) (Lim, 1997). The selection and definition of explanatory variables were often based on the availability of suitable data and the objectives of the study. However, it was argued that degree of freedom, multicollinearity, serial correlation, and reliability of data should be taken into consideration when selecting these variables (Crouch, 1994a).

The income variable was the most commonly included in the demand models as a major determinant of tourism demand (Uysal and Crompton, 1984). Demand theory implies that as per capita incomes rise, more people are likely to travel, and tourist expenditures are a positive function of incomes. This hypothesis was supported by a host of empirical studies (Akis, 1998; Artus, 1972; Barry and O'Hagan, 1972; Gray, 1966; Jud and Joseph, 1974; Kwack, 1972; Laber, 1969; Loeb, 1982; Qu and Lam, 1997; Stronge and Redman, 1982). Generally, income variable was found to be highly elastic. This explained to tourism as a luxury product and service (Martin and Witt, 1989).



Besides, income was found to be the single most important determinants of demand for international tourism. It frequently provided the greatest explanatory power (Archer, 1980; EIU, 1975;). This study incorporated income as the real per capita income in the origin country.

Demand theory also hypothesizes that the demand for travel is an inverse function of relative prices. That is the greater cost of living in the destination country relative to the origin country, the lower tourism demand, else equal. Previous research supported the hypothesis that the relative price variable is significant (Akis, 1998; Kwack, 1972; Loeb, 1982; Quayson and Var, 1982; Uysal and Crompton, 1984; Witt and Martin, 1987). However, the estimation results of price elasticities varied from study to study. Numerous studies had obtained high price elasticities (Sauran, 1978). Others had yielded low elasticities, in many cases, unexpected signs were produced, and statistically insignificant values were obtained. The result was that there was still much uncertainty as to the impact of prices on the demand for international tourism distribution (Crouch, 1994b). In this study, relative prices were taken as the ratio of consumer price indices between the origin country and the United States.

Exchange rates were indicated to have a significant effect on international travel (Crouch, 1994b). Travelers are concerned with the price of foreign currency. Thus, if the price of foreign currency declines, travelers will demand more foreign travel services, else equal. Exchange rates showed a modest impact on tourism demand over the previous studies. It was believed that the inclusion of exchange rates as an explanatory variable was not clear cut (Witt and Martin, 1987) because of the interrelationship between exchange rates and relative price. However, because of its more rapid

fluctuation than relative prices, exchanges rates had been specifically examined in the previous studies. In this study, the effect of real exchange rates was examined.

The variable of transportation cost may be an important determinant in explaining tourism demand. Decrease in relative transportation costs is likely to increase the demand for international travel. Among the studies that had modeled transportation costs, no satisfactory estimate was found (Gray, 1966; Jud and Joseph, 1974; Martin and Witt, 1988; Quayson and Var, 1982; Stronge and Redman, 1982). Inclusion of this variable in the model also led to multicollinearity between explanatory variable and dropping the transportation cost variable from the model (Fujii and Mak, 1980; Jud and Joseph, 1974; Prachowny, 1969). Therefore this variable was sometimes eliminated in the demand models (Gray, 1966; Little, 1980; Qu and Rittichainuwat, 2002). Due to data unavailability, transportation cost variable was not included in this study.

An important consideration associated with the selection of explanatory variables concerns their definition (Crouch, 1994a). It was found a multitude of ways in which factors such as income, price, travel cost, and so forth should be defined. Examples include if they should be represented in real or nominal terms and if absolute or relative price definition should be more effective. Another example is if prices for changes in exchange rates should be adjusted. However, it was concluded that the selection and definition of these explanatory variables would be determined by the availability of suitable data and the specific objectives of the studies. Review of literature showed that variable definitions were expressed in vague or ambiguous terms (Crouch, 1994a).

## Dummy Variables

Dummy variables representing various disturbances that might have biased the estimated parameters were also included in the demand model studies (60%) (Lim, 1997). Typically, such disturbances include political factors (political unrest or terrorism), economic factors (recession or oil crisis) and special events (Olympic Games or Expo). Review of the major issues, such as natural disasters, political circumstances, special incidents, and social and cultural changes in the host country and other parts of the world could help identify the issues that might have had impact on the international travel demand in the host country (Qu & Rittichainuwat, 2002). Seven incidents including 9-11, Asian Financial Crisis, Persian Gulf War, World Economic Recession, Oil Crisis, Vietnam War, Olympic Games and were identified in this study. The first seven dummy variables were expected to have a negative sign, since they might cause a decline in the international travel demand to the United States. The dummy variable of Olympic Games was expected to have a positive sign, as one would expect the mega-sporting event to attract more tourists to the United States.

## Common Methodological Problems

Serial correlation or autocorrelation was one of the most common problems in the travel demand analysis (Crouch, 1994a). It happens in time series data when the disturbance terms in a certain time period is correlated with those in a future period. With serial correlation, the estimated coefficients would be still unbiased and consistent, but inefficient. The most commonly used test for serial correlation was the Durbin-Watson (DW) tests. Since the range between  $d_l$  and  $d_u$  leaves many case with inconclusive results, this study obtained a Durbin-Watson probability using a SPSS 11

for Windows program to detect serial correlation more precisely. It was stated that attention should be solely put on the Durbin-Watson upper limit  $d_u$  (Witt and Martin, 1987). The desirable calculated Durbin-Watson values should be lie as close to two as possible, and values closes to or within the range 2 plus or minus  $d_u$  were considered acceptable. Whenever the criterion was not satisfied, it meant there was serial correlation and Cochrane-Orcutt (CORN) procedure would be used to solve this problem. Application of the Cochrane-Orcutt procedure had been frequently relied upon (Loeb, 1982; Lee, Var and Blaine, 1996; Witt and Martin, 1987;). It was said that little consideration had been given to the possibility that serial correlation was due to misspecification (Johnson and Ashworth, 1990). However, it was suggested that serial correlation required closer analysis as regards the dynamics and lag structure of demand models.

Multicollinearity was another common methodological problem encountered in the travel demand studies when using ordinary least square estimation (Crouch, 1994a). Multicollinearity emerges when two or more of the explanatory variable correlate with each other. It would make the separation of the effects of certain determinants difficult. One example was the rising income and falling real airfares after the Second World War had made it difficult to isolate individual effects (Gray, 1982). To overcome this problem, the following methods were suggested: (1) dropping collinear variables from the model; (2) combining collinear variables to form a single composite variable; (3) pooling data to increase the variability in the explanatory variables; and (4) using ridge regression to estimate the coefficients (Crouch, 1994a).

## Conclusion

Among those 100 previous studies about travel demand found until 1997, only one study was about the international travel demand from foreign countries to the United States. Single log-linear equation specifying tourist arrivals as the dependent variable and the income and price factors as the independent variables was the most commonly employed function form of travel demand. Ordinary Least Square was the most frequently used estimation technique. Multicollinearity and serial correlation were the most commonly encountered methodological problems in the previous studies.

## CHAPTER 3

### METHODOLOGY

#### Introduction

This chapter described the research design, data sources, data observations, definition and evaluation of secondary data, functional form, variables involved in the model, and data analysis procedures.

#### Research Design

The research design of this study was explanatory and quantitative in nature. Secondary data were used throughout the study. Annual time series data were selected during the period of 1960 and 2001. The data of 42 years were selected based on data availability, reliability of data sources, sufficiency of data, and ability of the variable to be measured in the model. Six major origin countries were selected because of their significant market shares of international arrivals to the United States.

#### Data Sources

Data on international arrivals were taken from the U.S. Department of Commerce, International Trade Administration, Office of Travel and Tourism Industries (OTTI, Various years). Data on consumer price index, exchange rate, population, and gross domestic product (GDP) during the period of 1960-2000 were obtained from International Financial Statistics Yearbook, published by the International Monetary Fund (IMF, Various years). Additional data for 2001 were obtained from governmental statistics agencies in individual origin countries. These included Canada Statistics (Canada), National Institute of Statistics, Geography and Informatics, Mexico (Mexico), Statistics Bureau and Statistics Center (Japan), Office for National Statistics (the United

Kingdom.), Federal Statistical Office (Germany), National Institute for Statistics and Economic Studies (France), and Department of Labor, Bureau of Labor Statistics (the United States).

### Data Observations

Historical data for the period of 1960-2001 were used throughout the study. The 42-year historical data were examined in terms of trend and variance during the period of 1961-2001. Figure 1 plotted international tourist arrivals from those six major tourist-generating countries to the United States during the period of 1960-2001. It was obvious that from the plot that despite some fair amount of variations there was a clear upward linear trend in international tourist arrivals. Forty-two observations were recorded for each of the six major tourist-generating countries in terms of tourist arrivals, real per capita incomes, relative prices, and real exchange rates except real per capita incomes for Japan. Due to data unavailability from 1960 to 1964, thirty-seven observations were recorded for Japan's real per capita incomes. Besides, data for tourist arrivals from Germany were only available since 1991. Before 1991, those data were only from former West Germany.

### Definition of Secondary Data

Secondary data are data gathered and recorded by someone else prior to the current needs of the researcher (Zikmund, 1997). Secondary data are usually historical, already assembled, and do not require access to respondents or subjects. Contrasts to secondary data, primary data are data gathered and assembled specifically for the project at hand. There are many sources for secondary data collection. For example, there are secondary data on international arrivals to the United States in several tourism

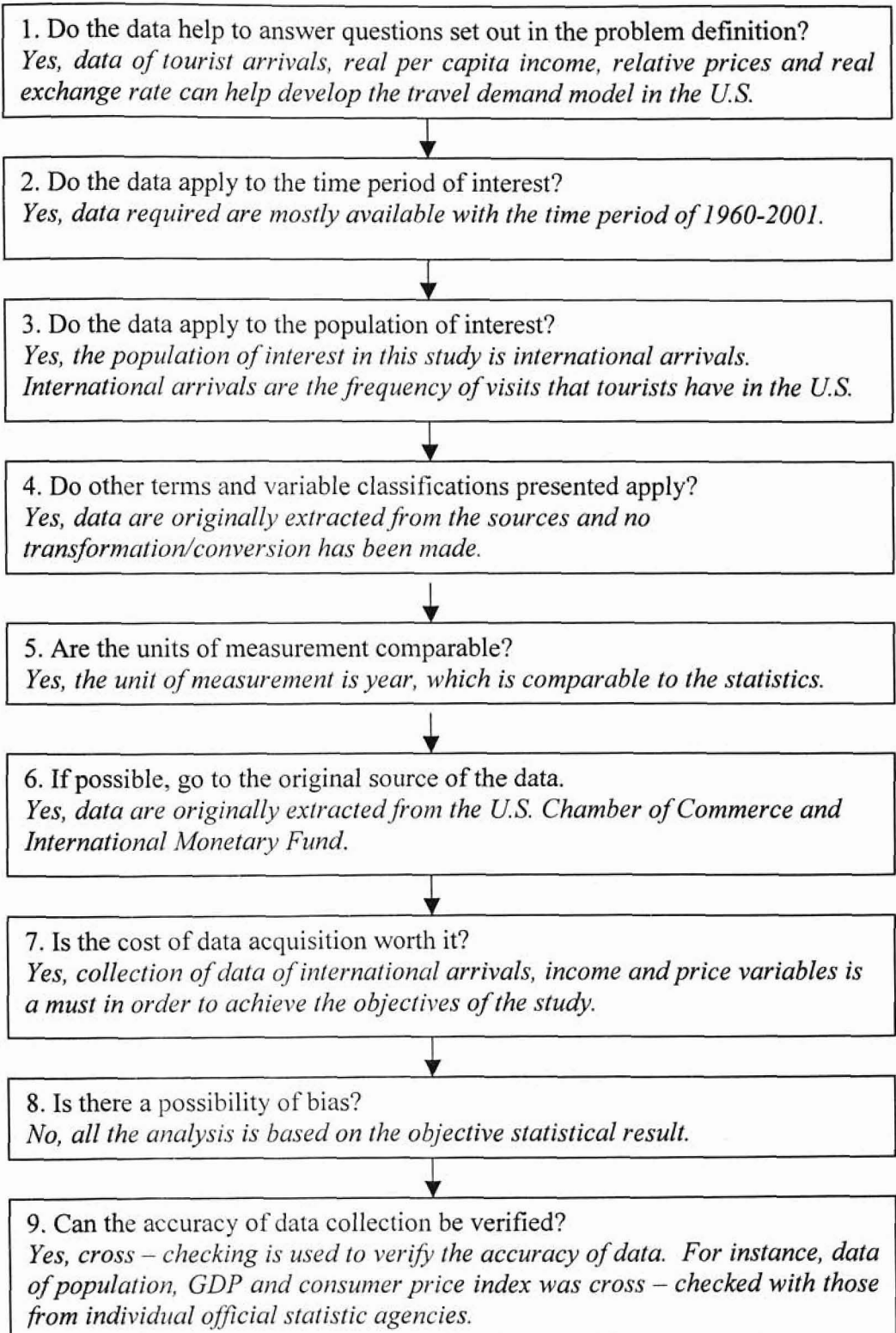
organizations like the U.S. Chamber of Commerce, International Trade Administration, Office of Travel and Tourism Industries, and the World Tourism Organization. Economic data for various countries are found in the publications released by the World Bank Group, International Monetary Fund, and individual governmental statistics agencies.

#### Evaluation of Secondary Data

Secondary data cannot be used unless they have been evaluated. The following is a nine-step evaluation process for secondary data to be evaluated. The process goes systematically, in which secondary data are evaluated successively until the whole process has been gone through. It is only secondary data have gone through the whole process that they can be used in the study. Figure 2 shows the results of the evaluation of secondary data for the current study.



Figure 2. Results of the Evaluation of Secondary Data



## Variable Specification

The dependent variable of international arrivals was selected in the model building based on the review of the literature.

The explanatory variable of real per capita income was selected because of its highly explanatory power to the travel demand for international tourism. The real per capita income was derived as follows:

$$RYPC_{i,t} = (GDP_{i,t} \div P_{i,t}) \times (CPI_{i,b} \div CPI_{i,t})$$

where  $GDP_i$  is the Gross Domestic Product of country  $i$ ,  $P$  is the population,  $CPI_{i,t}$  is the consumer price index of country  $i$  at a given year  $t$  and  $CPI_{i,b}$  is the consumer price index of country  $i$  at the base year. GDP was presented in International Monetary Fund as the sum of final expenditures. The population, which represented mid year estimates, was originally provided by the United Nations.

Real per capita income was chosen as it was assumed that the increase in income of tourists from origin countries would increase the demand for foreign tourism. The expected sign on this parameter estimate was positive.

Relative price was chosen in the model as it was assumed that the increase in the living cost in the United States would reduce the demand for foreign travel from origin countries. The relative price was taken as the ratio of consumer price index in the United States to consumer price index in country  $i$ . The expected sign of the parameter was negative. Consumer price indices (CPI) were estimated by putting year 1995 as the base year. Since consumer price indices varied day by day, the period average figures were taken for individual years.

Real exchange rate was selected in the model development. The real exchange rate was derived as follows (Ellis, 2001):

$$REX_{i,t} = e_{i,t} \times (CPI_t \div CPI^*_{i,t})$$

where  $CPI$  is the consumer price index of the United States,  $CPI^*_i$  is the consumer price index of country  $i$  at a given year  $t$ , and  $e_{i,t}$  is the nominal exchange rate between the currency of country  $i$  and the U. S. dollar.

Real exchange rate was picked up as it was assumed that the price of the host currency would influence tourists to travel to the United States. The expected sign of this parameter was negative, as the increase of the value of the U. S. dollar would decrease people's propensity to travel to the United States. The nominal exchange rates were presented as the market rate of local currency relative to one U. S. dollar. Period average figures were taken for individual years.

#### Dummy Variable Specification

Review of the major issues and incidents happened in the United States over the past four decades revealed the possible association of the incidents to the change in the demand of international tourism to the United States. Seven dummy variables were selected in this study.

The dummy variable '9-11' was included in the model to allow for changes in demand due to the impact of the terrorist attacks in 2001. The expected sign on this parameter estimate was negative as travel to the United States was expected to decrease due to the safety issue of air travel. International travel is extremely vulnerable to the demand of air travel.

The dummy variable of 'Asian Financial Crisis' was included to allow for the change in demand due to the impact of the Asian Financial Crisis in 1997 and 1998. The expected sign of this parameter estimate was negative as travel to the United States was expected to decrease due to the presence of financial crisis in major Asian markets.

The dummy variable of 'Olympic Games' was included to allow for the change in demand due to the impact of the Olympic Games in 1984 and 1996 in the United States. The expected sign of this parameter estimate was positive as the mega events were expected to attract more international visitors to the United States.

The dummy variable of 'Persian Gulf War' was included to allow for the change in demand due the war between the United States and Kuwait in 1991 and 1992. The expected sign of this parameter was negative, as international travelers would tend to stay home where they feel most secure.

The dummy variable of 'World Economic Recession' was included to allow for the change in demand due to the worldwide economic downturn in 1982 and 1983. The expected sign of this parameter was negative as travel to the United States was expected to decrease because of the decreasing disposable income in outbound countries.

The dummy variable of 'Oil Crisis' was selected to account for the change in demand due to the oil crisis in 1974 and 1979. The expected sign on this parameter was negative as the demand for travel to the United States was expected to decrease when the cost of transportation increased.

The dummy variable of "Vietnam War" was selected in the model to allow for the change in demand due to the war between the United States and Vietnam during the

period of 1964-1972. The expected sign of this parameter estimate was negative as travel to the United States was expected to decrease during the period of the war.

The dummy variables took the value of 1 for the years of occurrence of the special event, and the value of 0 (zero) for other years.

#### Model Specification

Based on the theoretical explanation, six models were examined in this study. The dependent variable was the number of international arrivals from individual origin country. The explanatory variables were real per capita income, relative price, real exchange rates, dummy variables of 9-11, and other incidents. This study ran the regression in both log-linear and linear form. The result as expected showed that the former fit the data better than did the latter in terms of expected signs and statistical significance. The general travel demand model for this study therefore was as follow:

$$\ln TITA_i = \beta_{0i} + \beta_{1i} \ln RYPC_i + \beta_{2i} \ln RP_i + \beta_{3i} \ln REX_i + \beta_{4i} D_1 + \beta_{5i} D_2 + \beta_{6i} D_3 + \beta_{7i} D_4 + \beta_{8i} D_5 + \beta_{9i} D_6 + \beta_{10i} D_7 + \epsilon$$

Where:

$i = 1, 2, \dots, 6$  and 1=Canada, 2=Mexico, 3=Japan, 4=U. K., 5=Germany, 6=France

$TITA_i$  : Total number of international arrivals to the U. S. from country  $i$ .

$\beta_0$  : Coefficient of intercept

$\beta_1 \dots \beta_{10}$ : Coefficients of 10 independent variables

$RYPC_i$ : Real per capita income of country  $i$  measured as the division of GDP by population and consumer price index ratio of country  $i$

$RP_i$  : Relative price measured as the ratio of consumer price index of the United States to consumer price index of country  $i$

REX<sub>*i*</sub> : Real exchange rate measured as the value of currency of country *i* per U.S dollar  
then multiplying by the ratio of CPI of the United States to CPI of country *i*

D<sub>1</sub> : Dummy variable of 9-11 terrorist attacks in 2001

D<sub>2</sub> : Dummy variable of Asian Financial Crisis in 1997 and 1998

D<sub>3</sub> : Dummy variable of Olympic Games in 1984 and 1996

D<sub>4</sub> : Dummy variable of Persian Gulf War in 1991 and 1992

D<sub>5</sub> : Dummy variable of World Economic Recession in 1982 and 1983

D<sub>6</sub> : Dummy variable of Oil Crisis in 1974 and 1979

D<sub>7</sub> : Dummy variable of Vietnam War during the period of 1964-1972

ε : Random error term

The coefficients provide estimates of the effect of the explanatory variables on the dependent variable. For example,  $\beta_{1i}$  provides an estimate of the effect on the number of international arrivals from origin country *i* to the United States due to a unit change in real per capita income. Similarly,  $\beta_{2i}$  is an estimate of the effect on the number of international arrival due to a unit change in the relative prices.

### Data Analysis

Four steps were involved in developing travel demand models from the tourist-generating countries to the United States: (1) determine the functional form of the equations; (2) estimate the parameters of the equation; (3) test the statistical significance of the results using *t*-test and *F*-test; and (4) check the validity of underlying regression assumptions (Makridakis and Wheelwright, 1978).

SPSS 11 for Windows was used to run the multiple regression analysis. As the most commonly used statistical technique, ordinary least squares (OLS) multiple

regression was employed to estimate an equation that fits a line to the data by minimizing the sum of squared deviations about the line.

The R square and model significant level procedures were performed on the model in order to find out the percentage of variation in the dependent variable that can be explained by explanatory variables. Appropriate diagnostic tests and residual analysis were performed to determine if the data in this study conformed to the regression assumption: independence, homoscedasticity; linearity; and normality. Test of autocorrelation, multicollinearity, and variance inflation factor (VIF) were conducted to evaluate the autocorrelation and collinearity effects in the model.

Durbin-Watson (DW) test was used to test for serial correlation. A theoretical value for the Durbin-Watson statistic was obtained from Durbin-Watson table. The significance level, the number of observations and the number of explanatory variables in the model equation determined the value of Durbin-Watson test.

In those cases where serial correlation was detected because of Durbin-Watson probability level (0.05), a Cochrane-Orcutt procedure was used in an attempt to alleviate this problem. The Cochrane-Orcutt procedure was simply described as follows: (1) run an OLS on the original equation in  $Y = X\beta + U$  and obtain the vector of residuals  $U$ ; (2) lag the residual one period; (3) run an OLS on the residuals and their lag where  $U_t = \rho U_{t-1} + \varepsilon$ . From this regression an estimate of  $\rho$  is given; (4) test the significant of  $\rho$  by using the normal  $t$ -test in this regression; and (5) make the transformation of the variables using the estimates of  $\rho$  and rerun the equation of the transformed variable using OLS (Crown, 1998).

Collinearity diagnosis was conducted to check if the explanatory variables correlated with each other. In the case of multicollinearity, collinear variable was removed from the model. *F*-test and *t*-test were conducted to test the goodness of fit of the coefficients and the significance of the coefficients respectively.

#### Limitation

The limitation of this study would be data availability and validity. Data on arrivals from Germany were only available after 1991. Data on real per capita incomes from Japan were not available from 1960 to 1964. The data for transportation cost was not available in this study, so the explanatory variable of transportation cost was not examined. The inclusion of both real exchange rates and relative prices as explanatory variables might lead to the unexpected signs of the coefficients.

The Durbin Watson statistics after Cochrane-Orcutt procedure showed that five of the demand models still suffered from serial correlation. Cochrane-Orcutt procedure could only improve the problem instead of solving the problem.

The travel demand model constructed generally considered only demand variables, and supply variables were ignored. There was a general implicit or explicit assumption that the supply of tourism services was perfectly elastic (Uysal and Crompton, 1985). For example, the availability of natural resources, infrastructures, superstructure, transportation facilities, and hospitality resources was not incorporated into the model and was assumed to expand in response to increase in demand.



## Conclusion

Six econometric models were constructed in this study. Single log-linear equation with the international arrivals as the dependent variable and income and price factors as the independent variable was estimated by using ordinary least square. Durbin-Watson test and collinearity diagnostic tests were employed to test the underlying assumptions of multiple regression analysis.

## CHAPTER 4

### FINDINGS

Ordinary least square estimates were obtained using the demand model for each country. This statistical procedure estimates an equation that fits the data best by minimizing the sum of squared errors between each observation and the estimated linear line. Models were estimated for the period of 1960-2001 for Canada, Mexico, United Kingdom, Germany, and France. The model for Japan covered the period of 1965-2001. The models reported were selected in terms of the following criteria: the expected sign of the estimated coefficient; the statistical significance of the coefficients; goodness of fit ( $R^2$ ); and non-existence of autocorrelation or multicollinearity. Since all variable of the equation except the dummy variables were estimated in the natural – logarithmic form, the coefficients associated with non-dummy variables were interpreted directly as elasticity estimates.

#### Travel Demand Model for Canadian Tourists to the United States

Table 3 shows the regression results of the determinants of international tourist arrivals from Canada to the United States. The result of the travel demand model was significant ( $P \leq 0.000$ ), and explained about 41% of the variation in the number of international tourist arrivals from Canada to the United States. The value of Durbin-Watson test was shown to be less than the upper limit ( $n=42, k=2, \alpha=0.05, d_u = 1.60$ ), which indicated that the model suffered from serial correlation. Cochrane-Orcutt (CORN) procedure was employed in an attempt to alleviate the problem. After Cochrane-Orcutt procedure, DW statistics was shown to be 1.268, which was closer to the upper limit. The Cochrane-Orcutt procedure indicated that  $\rho$  was equal to 0.797. The

signs of regression coefficients of 'Real Per Capita Income', 'Real Exchange Rate', and 'Oil Crisis' were as expected and they were statistically significant ( $P \leq 0.05$ ). They were remained in the model. The variables of 'Relative Prices', '9-11', 'Asian Financial Crisis', 'Olympic Games', 'Persian Gulf War', 'World Economic Crisis' and 'Vietnam War' did not prove to be statistically significant in the model ( $P \geq 0.05$ ). They were removed from the model.

Table 3. Regression Results of the Determinants of International Tourist Arrivals from Canada to the United States.

Constant		Number of International Tourist Arrivals from Canada to the U.S.				
Procedure:	CORN					
Method:	Enter					
Multiple R:	0.640					
R Square:	0.410					
Adjusted R Square:	0.362					
Standard Error:	7.4051E-02					
	DF	Sum of Squares	Mean Squares	F	Sig.	
Regression	3	0.141	4.700E-02	8.570	0.000	
Residual	37	0.203	5.484E-03			
Total	40	0.344				
Explanatory Variables in the Model						
Variables	$\beta$	SE $\beta$	Beta	VIF	T	Sig. T
Constant	1.104	0.528			2.091	0.043
RYPC	1.098	0.259	0.574	1.151	4.234	0.000
REX	-0.948	0.282	-0.447	1.111	-3.358	0.002
Oil Crisis	-0.156	0.055	-0.366	1.058	-2.818	0.008

Durbin-Watson d-Statistics = 1.268

The travel demand model for Canadian tourists to the United States was as follows:

$$\ln TITA' = 1.104 + 1.098 \ln RYPC' - 0.948 \ln REX' - 0.156 D_6$$

where:

$$\ln TITA' : \ln TITA_t - 0.797 \ln TITA_{t-1}$$

$$\ln RYPC' : \ln RYPC_t - 0.797 \ln RYPC_{t-1}$$

$\ln \text{REX}' : \ln \text{REX}_t - 0.797 \ln \text{REX}_{t-1}$

$\text{TITA}_t$  : Number of international arrivals from Canada to the United States at year t

$\text{TITA}_{t-1}$  : Number of international arrivals from Canada to the United States at year t-1

$\text{RYPC}_t$  : Real per capita income for Canadian tourists at year t

$\text{RYPC}_{t-1}$  : Real per capita income for Canadian tourists at year t-1

$\text{REX}_t$  : Real exchange rate between Canadian dollar and U. S. dollar at year t

$\text{REX}_{t-1}$  : Real exchange rate between Canadian dollar and U. S. dollar at year t-1

$D_6$  : Dummy variable of Oil Crisis in 1974 and 1979

The results indicated that 'Real Per Capita Income', 'Real Exchange Rate', and 'Oil Crisis' were the determinants of the travel demand model for Canadian inbound market. The coefficient of the 'Real Per Capita Income' was positive and statistically significant. This showed that the higher per capita income of Canadian tourists, the higher their demand for international travel to the United States. One percent increase in real per capita income for Canadian tourists will lead to 1.098 percent increase in tourist arrivals from Canada to the United States. The coefficient of the 'Real Exchange Rate' was negative and statistically significant. The result indicated that the higher the real exchange rates the lower the demand of international travel from Canada to the United States. One percent increase in real exchange rate will result in 0.948 percent decrease in tourist arrivals.

The values of Variance Inflation Factor (VIF), the test of the extent of multicollinearity and collinearity, for 'Real Per Capita Income' (1.151), 'Real Exchange Rate' (1.111), and 'Oil Crisis' (1.058) were relatively small. It showed that the model did not suffer from the problem of multicollinearity and collinearity.

## Travel Demand Model for Mexican Tourists to the United States

Table 4 shows the regression results of the determinants of international tourist arrivals from Mexico to the United States. The result of the travel demand model was significant ( $P \leq 0.000$ ), and explained more than 88% of the variation in the number of international tourist arrivals from Mexico to the United States. The model suffered from serial correlation. Cochrane-Orcutt procedure was conducted to alleviate the problem. The Cochrane-Orcutt procedure indicated that  $\rho$  was equal to 0.489. The signs of regression coefficients of 'Real Per Capita Income', 'Relative Prices', 'Olympic Games', and 'World Economic Recession' were as expected and they were statistically significant ( $P \leq 0.05$ ). The variables of 'Real Exchange Rate', '9-11', 'Asian Financial Crisis', 'Persian Gulf War', 'Oil Crisis' and 'Vietnam War' did not prove to be statistically significant in the model.

**Table 4. Regression Results of the Determinants of International Tourist Arrivals from Mexico to the United States.**

Endogenous Variable: Number of International Tourist Arrivals from Mexico to the U.S.						
Procedure:	CORN					
Method:	Enter					
Multiple R:	0.941					
R Square:	0.885					
Adjusted R Square:	0.872					
Standard Error:	0.23279932					
	DF	Sum of Squares	Mean Squares	F	Sig.	
Regression	4	14.961	3.740	69.014	0.000	
Residual	36	1.951	5.420E-02			
Total	40	16.912				
Explanatory Variables in the Model						
Variables	$\beta$	SE $\beta$	Beta	VIF	T	Sig. T
Constant	-5.585	1.839			-3.036	0.004
RYPC	2.708	0.362	0.578	1.861	7.486	0.000
RP	-0.179	0.036	-0.388	1.868	-5.020	0.000
Olympic Games	0.585	0.171	0.196	1.031	3.415	0.002
World Economic Recession	-0.432	0.172	-0.145	1.038	-2.512	0.017

Durbin-Watson d-Statistics = 1.267

The travel demand multiple regression model for Mexican inbound market was as follows:

$$\ln TITA' = - 5.585 + 2.708 \ln RYPC' - 0.179 \ln RP' + 0.585 D_3 - 0.430 D_5$$

where

$$\ln TITA' : \ln TITA_t - 0.489 \ln TITA_{t-1}$$

$$\ln RYPC' : \ln RYPC_t - 0.489 \ln RYPC_{t-1}$$

$$\ln RP' : \ln RP_t - 0.489 \ln RP_{t-1}$$

$TITA_t$  : Number of international arrivals from Mexico to the United States at year t

$TITA_{t-1}$  : Number of international arrivals from Mexico to the United States at year t-1

$RYPC_t$  : Real per capita income for Mexican tourists at year t

$RYPC_{t-1}$  : Real per capita income for Mexican tourists at year t-1

$RP_t$  : Relative price between Mexico and the United States at year t

$RP_{t-1}$  : Relative price between Mexico and the United States at year t-1

$D_3$  : Dummy variable of Olympic Games in 1984 and 1996

$D_5$  : Dummy variable of World Economic Recession in 1982 and 1983

The results indicated that 'Real Per Capita Income', 'Relative Prices', 'Olympic Games' and 'Oil Crisis' were the determinants of the travel demand model for Mexican inbound market. The coefficient of the 'Real Per Capita Income' was positive and statistically significant. This showed that the higher per capita income of Mexican tourists, the higher their demand for international travel to the United States. One percent increases in real per capita income for Mexican tourists will lead to 2.708 percent increase in tourist arrivals from Mexico to the United States. The coefficient of the 'Relative Prices' was negative and statistically significant. The result indicated that the

higher the relative prices the lower the demand of international travel from Mexico to the United States. One percent increase in real exchange rate will result in 0.179 percent decrease in tourist arrivals.

The values of Variance Inflation Factor (VIF) for 'Real Per Capita Income' (1.861), 'Relative Price' (1.868), 'Olympic Games' (1.031) and 'World Economic Recession' (1.038) were relatively small. It showed that the model did not suffer from multicollinearity and collinearity.

#### Travel Demand Model for Japanese Tourists to the United States

Table 5 shows the regression results of the determinants of international tourist arrivals from Japan to the United States. The result of the travel demand model was significant ( $P \leq 0.000$ ), and explained more than 97% of the variation in the number of international tourist arrivals from Japan to the United States. The Cochrane-Orcutt procedure indicated that  $\rho$  was equal to 0.420. The signs of regression coefficients of 'Real Per Capita Income' and 'Vietnam War' were as expected and they were statistically significant ( $P \leq 0.05$ ). The variables of 'Relative Prices' and 'Real Exchange Rate', '9-11', 'Asian Financial Crisis', 'Olympic Games', 'Persian Gulf War', 'World Economic Recession' and 'Oil Crisis' did not prove to be statistically significant in the model.

**Table 5. Regression Results of the Determinants of International Tourist Arrivals from Japan to the United States**

Number of International Tourist Arrivals from Japan to the						
Endogenous Variable: U.S.						
Procedure:	CORN					
Method:	Enter					
Multiple R:	0.989					
R Square:	0.978					
Adjusted R Square:	0.977					
Standard Error:	0.10746509					
	DF	Sum of Squares	Mean Squares	F	Sig.	
Regression	2	17.122	8.561	741.287	0.000	
Residual	33	0.381	1.155E-02			
Total	35	17.503				
Explanatory Variables in the Model						
Variables	$\beta$	SE $\beta$	Beta	VIF	T	Sig. T
Constant	-23.693	1.473			-16.090	0.000
RYPC	3.694	0.169	0.802	2.043	21.840	0.000
Vietnam War	-0.426	0.065	-0.242	2.043	-6.580	0.000

Durbin-Watson d-Statistics = 1.180

The travel demand multiple regression model was as follows:

$$\ln TITA' = -23.693 + 3.694 \ln RYPC' - 0.426 D_7$$

where

$$\ln TITA' : \ln TITA_t - 0.420 \ln TITA_{t-1}$$

$$\ln RYPC' : \ln RYPC_t - 0.420 \ln RYPC_{t-1}$$

$TITA_t$  : Number of international arrivals from Japan to the United States at year t

$TITA_{t-1}$  : Number of international arrivals from Japan to the United States at year t-1

$RYPC_t$  : Real per capita income for Japanese tourists at year t

$RYPC_{t-1}$  : Real per capita income for Japanese tourists at year t-1

$D_7$  : Dummy variable of Vietnam War during the period of 1964-1972

The results indicated that 'Real Per Capita Income' and 'Vietnam War' were the determinants of the travel demand model for Japanese inbound market. The coefficient



of the 'Real Per Capita Income' was positive and statistically significant. This showed that the higher per capita income of Japanese tourists, the higher their demand for international travel to the United States. One percent increases in real per capita income for Japanese tourists will lead to 3.694 percent increase in tourist arrivals from Japan to the United States.

The values of Variance Inflation Factor (VIF) for 'Real Per Capita Income' (2.043), and 'Vietnam War' (2.043) were relatively small. Therefore, this model had no problem of multicollinearity and collinearity.

#### Travel Demand Model for the British Tourists to the United States

Table 6 shows the regression results of the determinants of international tourist arrivals from the United Kingdom to the United States. The result of the travel demand model was significant ( $P \leq 0.000$ ), and explained more than 87% of the variation in the number of international tourist arrivals from the United Kingdom to the United States. This model suffered from serial correlation, so Cochrane-Orcutt procedure was used to alleviate the problem. The Cochrane-Orcutt procedure indicated that  $\rho$  was equal to 0.709. The signs of regression coefficients of 'Real Per Capita Income', 'Relative Prices', and 'World Economic Recession' were as expected and they were statistically significant ( $P \leq 0.05$ ). The variables of 'Real Exchange Rate', '9-11', 'Asian Financial Crisis', 'Olympic Games', 'Persian Gulf War', 'Oil Crisis' and 'Vietnam War' did not prove to be statistically significant variable in the model.

**Table 6. Regression Results of the Determinants of International Tourist Arrivals from the United Kingdom to the United States.**

Endogenous Variable: Number of International Tourist Arrivals from the U.K. to the U.S.						
Procedure:	CORN					
Method:	Enter					
Multiple R:	0.935					
R Square:	0.875					
Adjusted R Square:	0.865					
Standard Error:	0.12188484					
	DF	Sum of Squares	Mean Squares	F	Sig.	
Regression	3	3.840	1.280	86.161	0.000	
Residual	37	0.550	1.486E-02			
Total	40	4.390				
Explanatory Variables in the Model						
Variables	$\beta$	SE $\beta$	Beta	VIF	T	Sig. T
Constant	-2.158	1.094			-1.972	0.056
RYPC	2.369	0.401	0.557	2.622	5.914	0.000
RP	-1.602	0.354	-0.429	2.663	-4.521	0.000
World Economic Recession	-0.227	0.090	-0.150	1.041	-2.522	0.016

Durbin-Watson d-Statistics = 1.191

The travel demand multiple regression model was as follows:

$$\ln TITA' = -2.158 + 2.369 \ln RYPC' - 1.602 \ln RP' + 0.227 D_5$$

Where

$$\ln TITA' : \ln TITA_t - 0.709 \ln TITA_{t-1}$$

$$\ln RYPC' : \ln RYPC_t - 0.709 \ln RYPC_{t-1}$$

$$\ln RP' : \ln RP_t - 0.709 \ln RP_{t-1}$$

$TITA_t$  : Number of international arrivals from the United Kingdom to the United States  
at year t

$TITA_{t-1}$  : Number of international arrivals from the United Kingdom to the United States  
at year t-1

$RYPC_t$  : Real per capita income for British tourists at year t

$RYPC_{t-1}$ : Real per capita income for British tourists at year t-1

$RP_t$  : Relative prices between the United Kingdom and the United States at year t

$RP_{t-1}$  : Relative prices between the United Kingdom and the United States at year t-1

$D_5$  : Dummy variable of World Economic Recession in 1982 and 1983

The results indicated that ‘Real Per Capita Income’, ‘Relative prices’, and ‘World Economic Recession’ were the determinants of the travel demand model for British inbound market. The coefficient of the ‘Real Per Capita Income’ was positive and statistically significant. This showed that the higher real per capita income of British tourists, the higher their demand for international travel to the United States. One percent increases in real per capita income for British tourists will lead to 2.369 percent increase in tourist arrivals from the United Kingdom to the United States. The coefficient of the ‘Relative Prices’ was negative and statistically significant. The result indicated that the higher the relative prices the lower the demand for international travel from the United Kingdom to the United States. One percent increase in real exchange rate will result in 1.602 percent decrease in tourist arrivals.

The values of Variance Inflation Factor (VIF) for ‘Real Per Capita Income’ (2.622), ‘Relative Prices’ (2.663) and ‘World Economic Crisis’ (1.041) were relatively small. It showed that the model did not suffer from multicollinearity and collinearity.

#### Travel Demand Model for German Tourists to the United States

Table 7 shows the regression results of the determinants of international tourist arrivals from Germany to the United States. The result of the travel demand model was significant ( $P \leq 0.000$ ), and explained 73% of the variation in the number of international tourist arrivals from Germany to the United States. This model suffered from serial correlation, so Cochrane-Orcutt procedure was employed to alleviate the problem. The

Cochrane-Orcutt procedure indicated that  $\rho$  was equal to 0.685. The sign of regression coefficients of ‘Real Per Capita Income’ was as expected and statistically significant ( $P \leq 0.05$ ). The variables of ‘Relative Price’, ‘Exchange Rates’, ‘9-11’ and all the other incidents were proved to be statistically insignificant in the model.

**Table 7. Regression Results of the Determinants of International Tourist Arrivals from Germany to the United States.**

Number of International Tourist Arrivals from Germany to the						
Endogenous Variable: U.S.						
Procedure:	CORN					
Method:	Enter					
Multiple R:	0.857					
R Square:	0.734					
Adjusted R Square:	0.728					
Standard Error:	0.17964247					
	DF	Sum of Squares	Mean Squares	F	Sig.	
Regression	1	3.480	3.480	107.848	0.000	
Residual	39	1.259	3.227E-02			
Total	40	4.739				
Explanatory Variables in the Model						
Variables	$\beta$	SE $\beta$	Beta	VIF	T	Sig. T
Constant	-7.033	1.080			-6.514	0.000
RYPC	3.406	0.328	0.857	1.000	10.385	0.000

Durbin-Watson d-Statistics = 1.341

The travel demand multiple regression model for German inbound market was as follows:

$$\ln TITA' = - 7.033 + 3.406 \ln RYPC'$$

where

$$\ln TITA' : \ln TITA_t - 0.685 \ln TITA_{t-1}$$

$$\ln RYPC' : \ln RYPC_t - 0.685 \ln RYPC_{t-1}$$

$TITA_t$  : Number of international arrivals from Germany to the United States  
at year t

$TITA_{t-1}$  : Number of international arrivals from Germany to the United States  
at year t-1

$RYPC_t$  : Real per capita income for German tourists at year t

$RYPC_{t-1}$  : Real per capita income for German tourists at year t-1

The results indicated that ‘Real Per Capita Income’ was the determinant of the travel demand model for German inbound market. The coefficient of the ‘Real Per Capita Income’ was positive and statistically significant. This showed that the higher per capita income of German tourists, the higher their demand for international travel to the United States. One percent increases in real per capita income for German tourists will lead to 3.406 percent increase in tourist arrivals from Germany to the United States.

There was only real per capita income included in the model, so it was free from multicollinearity and collinearity.

#### Travel Demand Model for French Tourists to the United States

Table 8 shows the regression results of the determinants of international tourist arrivals from France to the United States. The result of the travel demand model was significant ( $P \leq 0.000$ ), and explained more than 87% of the variation in the number of international tourist arrivals from France to the United States. This model suffered from serial correlation, so Cochrane-Orcutt procedure was employed to alleviate the problem. The Cochrane-Orcutt procedure indicated that  $\rho$  was equal to 0.629. The sign of regression coefficients of ‘Real Per Capita Income’ was as expected and statistically significant. However, the variable of ‘Relative Prices’, ‘Real Exchange Rate’, ‘9-11’ and all the other incidents were not significant in this model.

**Table 8. Regression Results of the Determinants of International Tourist Arrivals from France to the United States.**

Endogenous Variable: Number of International Tourist Arrivals from France to the U.S.						
Procedure:	CORN					
Method:	Enter					
Multiple R:	0.934					
R Square:	0.872					
Adjusted R Square:	0.869					
Standard Error:	0.13522116					
	DF	Sum of Squares	Mean Squares	F	Sig.	
Regression	1	4.860	4.860	265.792	0.000	
Residual	39	0.713	1.828E-02			
Total	40	5.573				
Explanatory Variables in the Model						
Variables	$\beta$	SE $\beta$	Beta	VIF	T	Sig. T
Constant	-9.706	0.885			-10.969	0.000
RYPC	3.360	0.206	0.934	1.000	16.303	0.000

Durbin-Watson d-Statistics = 1.689

The travel demand model for the French tourists to the United States was as follows:

$$\ln TITA' = -9.706 + 3.360 \ln RYPC'$$

where

$$\ln TITA' : \ln TITA_t - 0.629 \ln TITA_{t-1}$$

$$\ln RYPC' : \ln RYPC_t - 0.629 \ln RYPC_{t-1}$$

$TITA_t$  : Number of international arrivals from France to the United States at year t

$TITA_{t-1}$  : Number of international arrivals from France to the United States at year t-1

$RYPC_t$  : Real per capita income for French tourists at year t

$RYPC_{t-1}$  : Real per capita income for French tourists at year t-1

The results indicated that 'Real Per Capita Income' was the determinant of the travel demand model for French inbound market. The coefficient of the 'Real Per Capita Income' was positive and statistically significant. This showed that the higher per capita

income of French tourists, the higher their demand for international travel to the United States. One percent increases in real per capita income for French tourists will lead to 3.360 percent increase in tourist arrivals from France to the United States.

The variable of 'Real Per Capita Income' was the only one explanatory variable in this model. There was no concern for multicollinearity and collinearity.

#### Overall Regression Results

Table 9 presents the overall regression results that were estimated for the six tourist generating-countries to the United States. Durbin-Watson statistics indicated that all the six travel demand models estimated using the ordinary least square method suffered from serial correlation at the 5% significant level. A Cochrane-Orcutt procedure (CORN) as described in the methodology was employed for the models to gain the efficiency of the parameter estimates by correcting this problem.

Table 9. Overall Regression Results of the Determinants of International Tourist Arrival to the United States.

Variable	Coefficients					
	Canada	Mexico	Japan	United Kingdom	Germany	France
Constant	1.104 (2.091*)	-5.585 (-3.036*)	-23.693 (-16.090*)	-2.158 (-1.972)	-7.033 (-6.514*)	-9.706 (-10.969*)
RYPC	1.098 (4.234*)	2.708 (7.486*)	3.694 (21.840*)	2.369 (5.914*)	3.406 (10.385*)	3.360 (16.303*)
RP		-0.179 (-5.020*)		-1.602 (-4.521*)		
REX	-0.948 (-3.358*)					
9-11						
Asian Financial Crisis						
Olympic Games		0.585 (3.415*)				
Persian Gulf War						
World Economic Recession		-0.432 (-2.512*)		-0.227 (-2.522*)		
Oil Crisis	-0.156 (-2.818*)					
Vietnam War			-0.426 (-6.580*)			
R <sup>2</sup>	0.410	0.885	0.978	0.875	0.734	0.872
DW	1.268	1.267	1.180	1.191	1.314	1.689
Procedure	CORN	CORN	CORN	CORN	CORN	CORN

1. Values in parentheses indicate t-statistics associated with the corresponding estimated coefficients.

2. All models were estimated in double-logarithmic form, but all seven dummy variables entered the equations in non-logarithmic form. CORN indicates estimation of the equations by the Cochrane-Orcutt procedure.

3. \* indicate significance at the 95% confident interval.



### Goodness of Fit R square

The statistical result indicated that the models explained between 41.0 and 97.8 percent of the variation in the dependent variable (number of international tourist arrivals). One of the six models accounted for at least 97% of the variation in the dependent variable and that the four of the six models explained at least 80% of the variation in the dependent variable. Five of the six models explained at least 73% of the variation in the dependent variable. Hence, the explanatory power of the models seemed quite good in general. However, the last model (for Canada) explained 41% of the variation in the dependent variable. This indicated that there existed poor association between the dependent and explanatory variables.

In general, the result shows a relative high goodness of fit, and the signs and magnitudes of the coefficients of the explanatory variables included appear to be theoretically satisfactory and are statistically significant in some of the cases. This is an indication that the variables considered are significant determinants of demand for tourism.

### Coefficients of Real Per Capita Income

The coefficients of income (RYPC) were significant at the 95% confidence intervals for all the countries, and the signs of the coefficients were all positive, as expected. The t-statistics indicated that all coefficients are significant at the 5% level. For all countries, the coefficient which indicated elasticity of demand in this model, is  $>1$ , (i.e. demand is income elastic). This is in conformity with economic theory, which indicates that for luxurious good and services demand is elastic with respect to income. Tourism is considered to be a luxurious service.

This result was similar to the findings of Loeb when investigating the effect of real per capita income of the foreign tourists to the United States. Elasticity measures the responsiveness of tourism demand (dependent variable) resulting from a change in one determinant (independent variable). The income elasticities vary from low of 1.098 for Canada to high of 3.694 for Japan. This indicated that the degree of responsiveness of foreign tourist arrivals to the United States due to change in income differs from country to country. For example, a 1% increase in income from the United Kingdom tourism will lead to an increase in tourist arrival to the United States by 2.4%, whereas the same percent increase in Germany tourists will generate tourist arrivals to the United States by 3.4%. In general, tourists from all the countries seem to be highly sensitive to income variable.

Standardized regression coefficient (Beta coefficient) was used to compare the impact between coefficients. The Beta coefficients eliminate the problem of dealing with different units of measurement in order to reflect the relative impact on the dependent variable of a change in one standard deviation in either variable (Hair et al., 1998). It was found that "Real Per Capita Income" had the highest impact on the number of international arrivals. It is the single most important determinant to the travel demand models. This is similar to previous studies that suggested that income variable had the greatest explanatory power over the number of tourist arrivals.

#### Coefficients of Relative Prices

The coefficients of relative prices had the expected negative signs for Mexico and the United Kingdom. They were proved statistically significant in the models of Mexico and the United Kingdom at 95% confidence interval. The price elasticities were  $-0.179$

and  $-1.602$  respectively. The most elastic response was found for the United Kingdom ( $-1.602$ ). Tourists from the United Kingdom and Mexico appeared to be more sensitive to relative prices than those from other countries.

#### Coefficients of Real Exchange Rates

The coefficient for the exchange rate variable had the expected negative signs for the model of Canada and was proved statistically significant at 95% confidence interval. The coefficient was found to be  $-0.948$ . Tourists from Canada appeared to be very sensitive to real exchange rates.

#### Coefficients of Dummy Variables

The dummy variable of '9-11' was not included in any of the models at 95% confidence interval. This was surprising to note that '9-11' had no significant effect on the number of international tourist arrivals. The significant effect of the '9-11' in the models was believed to be spilling over coming years. The dummy variables of 'Asian Financial Crisis' and 'Persian Gulf War' were not significant to be included in any of the six models at 95% confidence interval. The dummy variable of 'Olympic Games' was included in the model of Mexico. However, the dummy variable of 'Olympic Games' had no significant effect on the number of tourist arrivals from other countries to the United States. The dummy variable of 'World Economic Recession' was included the models of Mexico and the United Kingdom. The dummy variable had the negative sign as expected and proved to be significant at 95% confidence interval. It indicated that the demand for international travel from both Mexico and the United Kingdom decreased when there was worldwide economic downturn in 1982 and 1983. The dummy variable of 'Oil Crisis' was included in the model of Canada. This variable had the negative signs

as expected and proved to be significant at 95% confidence interval. The dummy variable of 'Vietnam War' was included in the model of Japan. It had the negative sign as expected and proved to be significant at 95% confidence interval.

## SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

### Conclusion

This study has identified real per capita income, real exchange rates, and relative prices as the determinants leading to the travel demands in the United States from six tourist-generating countries. In general, all three variables proved to have significant effect on the demand for travel in the United States. The income variable appeared to be the most important determinant, followed by relative prices and exchange rates in explaining demand for international tourism to the United States. However, the degree of responsiveness of the demand for travel attributed to the various variables varied country by country.

The income variable was found to be significant and positive for all tourist-generating countries evaluated. The values of elasticities vary from country to country from 1.098 to 3.694, indicating international travel to the United States was regarded as a luxury service. This not only implies that the demand for international travel to the United States is very responsive to changes in income level but with the increasing economic prosperity the demand for international travel from those six tourist-generating countries will continue to increase steadily. The statistical results of this study support this hypothesis and are consistent with the findings in previous studies of international tourism (Artus, 1972; Clarke, 1978; Gray, 1966; Jud and Joseph, 1974; Stronge and Redman, 1982).

The coefficients of relative prices were mostly negative but not significant. The coefficients of relative prices for Mexico and the United Kingdom were negative and significant at 95% confidence level. Mexico and the United Kingdom seem to be mostly

sensitive to the relative price. This implies that the prices of tourism services in the United States need to remain competitive in order to attract more international tourists from Mexico and the United Kingdom. However, the insignificance of the relative price support Crouch's suggestion that there was still much uncertainty as to the impact of prices on the demand for international tourism distribution (Crouch, 1994b). The coefficients of real exchange rates had the expected negative sign for most of the six countries but were only found to be statistically significant in the model of Canada.

### Implications

Tourism planners may be interested in the factors that are most important in determining and predicting foreign travel demand to the United States. They may be concerned about the relative importance of income, relative prices, and exchange rates – which one is the most significant in which country. The demand for international travel to the United States will highly depend upon these three variables. Without meaningful and accurate estimates, the private sectors like the airline industry, the hotel industry will not invest scarce resources efficiently and effectively. In this context, the findings of this study will provide useful information in helping policymaker and planner formulating proper tourism policies. Besides, the six travel demand models developed in this study can be used for forecasting purpose. This also helps policymaker plan and budget tourism policies.

The statistical result of the current study showed that special incidents did have negative impacts on certain inbound markets. Measures to counteract those negative impacts were highly recommended to the private sectors. It was suggested that aggressive promotion of the products and targeting new market segment should be

conducted during and after the special incidents. Repositioning of the image of the United States as the safe destination should be done after 9-11 in order to restore international tourists' confidence in traveling to the United States. Mexico and United Kingdom were sensitive to the relative price, so pricing strategies should be applied to attract tourists from these two markets. Olympic Games were proved to be failed in attracting tourists from most of the inbound markets. Careful studies about the demand and supply should be carried out in order to utilize the economic effectiveness of Olympic Games.

#### Future Research

The impact of 9-11 was shown to be insignificant in this study. It was believed that the impact would spill over coming years. It would be highly recommended to include the data on 2002 to see the exact impact of 9-11 on the number of international tourist arrivals.

To strike back, the Bush administration started the war to fight against terrorism in Afghanistan in 2002. The war on terrorism, which according to the United States officials will last 'years, not days and weeks', will have long-lasting negative impact on the travel and hospitality industry. Military conflicts and terrorist attacks have always had a devastating effect on worldwide travel and tourism. It would be interesting to see the impact after adding the variable "War on terrorism" in the model.

It would be also helpful to incorporate the supply factors into the model. Since this study adopted a microeconomic approach to identify the travel demand model of the international tourism to the United States, research using a macroeconomic approach was therefore highly recommended in the future.

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