ABSTRACT

JING, TIANBI. Economic Determinants of Inbound Tourism in the United States. (Under the direction of Walter N. Thurman, Thomas Grennes, and Huixia Wang).

Historically, traveling for leisure was a luxury activity. However, with greater disposable income and the development of transportation, it has become customary for more people to travel. In this thesis, I use econometric and statistical methods to analyze the quarterly number of tourists traveling to the United States from different countries and address questions such as: Is there a relationship between the number of tourists and economic factors such as GDP and exchange rates? The results indicate that, firstly, economic variables matter. Secondly, economic impacts vary across countries. What's more, inbound GDP and U.S. GDP play different economic roles.

© Copyright 2012 by Tianbi Jing

All Rights Reserved

Economic Determinants of Inbound Tourism in the United States

by
Tianbi Jing

A thesis submitted to the Graduate Faculty of
North Carolina State University
in partial fulfillment of the
requirements for the degree of
Master of Science

Economics

Raleigh, North Carolina

2012

APPROVED BY:

Walter N. Thurman
Committee Chair

Thomas Grennes

Huixia Wang

DEDICATION

To my father, Guohua, you have encouraged me and given me important advice when facing problems. Thank you for supporting my overseas study.

To my mother, Fang, you are the person who knows me best and gives me the inspiration to create. You cannot be substituted for in my life.

To my dear friend, Min, you are a treasure. Thank you for accompanying me during hard times. I will never forget the day that we met and the days we have spent together since.

BIOGRAPHY

Tianbi Jing was born in Zhangjiagang, China on August 15, 1988. In 2006, she enrolled at Tianjin University of Finance and Economics, where she studied Public Finance and Taxation. It was her first time away from her parents and she experienced great times with classmates from different parts of the country. After earning her Bachelor's Degree, she went to the United States and attended North Carolina State University. She majored in Economics while also studying Statistics. During that period she traveled a lot, which helped her form the idea of writing on the economics of tourism. The methods she learned in biostatistics and econometrics are applied in her research. In her two years of experience at N.C. State, the most important thing she learned is the importance of a good attitude. She is now pursuing an interesting life after graduation.

ACKNOWLEDGMENTS

During this process I have been very fortunate to find so many willing participants to help me with this research.

I would like at this time to extend my gratitude to Walter N. Thurman, Thomas Grennes and Huixia Wang.

Thank you all for your patience, kindness, and continued guidance and support. Without you this research would not be the success that it is.

TABLE OF CONTENTS

List of Tables vi

List of Figures vii

Chapter One: Brief Overview of the U.S. Tourism Industry..... 1
- Introduction 1
- General data..... 2
- Country data and market share 3
- Employment 4

Chapter Two: Literature Review..... 7
- Tourism as a field of study..... 7
- Microeconomic foundations of tourism demand..... 7
- Introducing statistics to analyze the tourism industry..... 9
- Impact of economic factors in the tourism field..... 11

Chapter Three: Data Collection and Analysis 13
- Data collection..... 13
- Variables..... 14
- Methodology..... 15
- The assumptions for MLR..... 16
- Interpretation of inbound GDP effects..... 17
- Interpretation of U.S. GDP effects..... 19
- interpretation of exchange rate effects..... 20
- Considering lags..... 23
- Testing coefficient restrictions across countries 24

Chapter Four: Conclusion..... 26
- Conclusion..... 26
- Limitations..... 27

References..... 29

Figures and Tables..... 32

LIST OF TABLES

Table 1. Data Set for Each Country.....40

Table 2. Summary Table of Number of Tourists From 2004 to 2009.....45

Table 3. MLR for Five Countries.....46

Table 4. MLR by Using Real Exchange Rate.....48

Table 5. Modified Model by Using Lag Variables for Five Countries.....50

Table 6. General Model and Test Results.....54

Table 7. Annual Growth in Prices for Tourism Commodities in 2005–2010.....56

Table 8. National Travel and Tourism in the United States and Abroad in 2003–2009 ... 56

Table 9. Correlation Between Variable USAGDP and CPI.....57

Table 10. Definition of the Variables in MLR.....15

LIST OF FIGURES

Figure 1. Number of Inbound Tourists (Millions) Traveling to the United States from 2001 to 2011 32

Figure 2. The Distribution of Region of Tourists (Millions) in 2010 32

Figure 3. Change in Total U.S. Travel and Tourism Employment 33

Figure 4. Change in Total U.S. Travel and Tourism Employment 34

Figure 5. Consumer Choice Diagram 35

Figure 6. Canada GDP and Number of Tourists from Canada 36

Figure 7. U.S. GDP and Number of Inbound Tourists 36

Figure 8. Exchange Rate and Number of Tourists for Each Country 37

Chapter One

Brief Overview of The U.S. Tourism Industry

1.1 Introduction

The tourism industry is at least 2,000 years old. It may have begun in ancient Rome, where wealthy citizens wanted to spend their summers in the countryside and at the coast. The practice thrived for a time; however, it ceased when the empire did. The turbulent economic, social and military situation made it impossible for people to travel safely. During the medieval era, tourism again appeared because of a growing interest in pilgrimages. In the eighteenth century, the flourishing health and culture encouraged the start of more widespread and regular tourism. The industry steadily developed from the early nineteenth century, but it was expensive and limited to a small number of people. Everything gradually changed with the development of technology. In the 1960s, more and more people had disposable income and extra money. At the same time, reasonably-priced commercial aircraft were able to carry passengers to and from any airport in the world. See "Introduction to Travel and Tourism: An International Approach." (Coltman, M.M.,1989) for a detailed history of travel.

Every year tourists come to the United States for different reasons. They inject billions of dollars into the U.S. economy and help to create jobs in the tourism industry and related industries. How has tourism fared in recent years? When we look at this topic at the micro level, we can see tourism in terms of the tourists' experience. The price of airline tickets and hotels, their income, time, distance--these factors all will influence a tourist's decisions about travel decision. Similarly, when we talk about it macroscopically, GDP and ot

her macro variables must be introduced into the equation. If we want to understand tourism, then we should analyze the relationship between the number of tourists and key economic factors.

"Based on the definition provided by the World Tourism Organization, tourism can be divided into three categories. They are (1) domestic tourism, (2) inbound tourism and (3) outbound tourism. Domestic tourism involves residents of the given country traveling only within the countries; inbound tourism involves non-residents traveling in another country; and outbound tourism, involves residents traveling in another country." According to "International Tourism: An Economic Perspective First Edition" (Vellas, Francois and Becherel, Lionel, 1995). In this thesis, I focus on inbound tourism in the United States.

1.2 General Data

Since 2000, the number of inbound tourists in the U.S. has experienced several dramatic ups and downs. We can see in the time series in Figure 1 that from the year 2001 to 2003, the United States tourism industry suffered, mainly because of the September 11 attacks. People cared more about security, but the economy was also influenced, according to BBC News (Toyne, 2002). The number of inbound tourists dropped from 46.9 million to 41.2 million. In 2004, tourists began to recover their confidence from the attack. In that year, large growth in tourism numbers precede a continuous increase over the next few years. The growth rate reached about 12% in 2004. In 2008, the number of tourists had reached 57.9 million, which exceeded the original, pre-9/11 value in 2001. However, in 2009, the number decreased again because of the effects of the financial crisis and Great Recession. What was unexpected was

the situation becoming much better in 2010. In 2011, there was still a large increase, and the number exceeded 60 million.

Though the number of tourists has not always increased, the general trend, which is indicated by the straight line in Figure 1, is generally growing from 2001 to 2011.

1.3 Country Data and Market Share

According to "U.S. Travel and Tourism Industries: A Year in Review" (2010), the total number of inbound tourists was about 60 million in 2010. Over 26 million of these tourists (44 percent) came from overseas markets, 20 million travelers came from Canada and 13.5 million were from Mexico. We can say that Canada and Mexico dominate the U.S. inbound tourism industry. They are countries that border the United States and their policies encourage visitation.

What about the overseas markets? For a long time, several countries have played an important role in this area. The United Kingdom, Germany and Japan are good examples. Though some of them are not English speaking countries, they regularly send many travelers to the United States. In recent years, countries like China, Korea and Brazil, which are fast developing countries, also have contributed, both in the number of tourists and the amounts those tourists spend during their visits. Among them, Brazil and Korea ranked number one and two, in change in numbers of international visitation in 2010, while China and Brazil ranked one and two in the change in international visitation spending. In the pie chart in Figure 2, the distribution by region of tourists is clearly shown. Among overseas countries,

tourists from Western Europe, Asia and South America were 11.4, 7.0 and 3.3 million, respectively, in 2010.

In this thesis, I choose the top five tourist-sending countries and view them as representative of inbound U.S. tourism. They are Canada, Mexico, the United Kingdom, Japan and Germany. They constitute about 60% of total inbound tourists each year. According to the summary in Table 2, Canada is the top country in this list, approximately three times as large as the second largest traveler-sending country. As we will see, the time of year also influences tourism. In the third quarter when temperatures are moderate and people have more holiday time, these countries generate more tourists. Other quarters without special events or seasons are similar to one another.

1.4 Employment

Tourism is an industry that is connected with many other industries. This means that the tourism industry has great economic impact. U.S. travel and tourism employment accounts for about one in 17 U.S. non-farm workers, according to Travel Weekly (Danny King, December 4, 2011). According to the data of the Office of Travel and Tourism Industries and as shown in Figure 3, total U.S. tourism-related employment declined 1.4 percent and 7.8 percent, respectively, in 2010 and 2009, making the third consecutive year of declines in industry employment. Almost 1.1 million U.S. tourism jobs were lost between 2007 and 2010. "Clearly the economic downturn has taken a major toll on its industry in fact, the three years of declines in 2008, 2009, and 2010 are more than double the number of jobs lost in the three years following 9/11," the report said.

Labor numbers fell, too, even though the number of visitors from outside of Mexico and Canada reached pre-9/11 levels, largely because of a surge of tourists from countries such as Brazil, China and South Korea.

> "Such increases are reflected in increasing prices for both airline tickets and travel accommodations. Airfares rose 9.1% on average last year, more than offsetting an 8.5% drop in 2009, while accommodation rates increased 1.1% in 2010 after falling 3.2% a year earlier, the ITA said in its most recent report. Still, such price increases weren't enough to stop airlines and hotels from cutting staff. Employment in air transportation services fell by 15,000, to about 750,000 jobs, the lowest on record. The hotel sector, which is twice as large as the airline sector, declined by 13,000 jobs last year, to 1.6 million jobs, the ITA said. Despite a rebound in passengers and the ability to raise ticket prices, many airlines have had to cut staff and other expenses in order to stem losses triggered largely by surging fuel prices, which rose 19% in 2010. Southwest Airlines, long a model of airline profitability, cut 100 daily flights from its schedule this summer, though it later added a number of new routes. Meanwhile, American Airlines parent AMR Corp. filed for Chapter 11 bankruptcy reorganization in an effort to shed some of its debt and labor-cost obligations. The company has reported losses in 11 of the last 12 quarters. " (Travel Weekly)

When we graph total U.S. Employment (non-farm) and total U.S. travel and tourism employment together in Figure 4, it is obvious that employment in tourism industry was more impaired by the downturn than overall employment was. When total employment had a

downturn, total travel and tourism employment no doubt also experienced a decrease. However, when the economy recovered from the crisis, total travel and tourism employment lagged behind the recovery; employment levels in tourism remained dismal.

Chapter Two

Literature Review

2.1 Tourism as a Field of Study

The study of tourism has changed from purely a business forum to a practical field of research that combines social science and the humanities. "Tourism study is not a field that is growing into a science with theory, but a field of research that incorporates phenomena with diverse contributions and conceptual schemes. The dominance of strategic and policy focused work and the rapid growth of tourism studies has left a deficit in the development of theory in tourism as field" (Pearce, 2005). In a recent literature review of the field of tourism studies, Wanhill (2007) points out the broad distribution of seven categories of tourism. They are the tourism industry, macroeconomic assessment, demand modeling, tourism governance, supply issues, data analysis and statistical theory.

2.2 Microeconomic Foundations of Tourism Demand

Income is a key quantitative determinant of the demand for tourism. The foundations of microeconomics address how income can affect the allocation of consumption and leisure, while leisure can have a direct influence on the demand for tourism. Suppose that we have to make a choice between spending on leisure and consumption of other things, as is depicted in Figure 5. The x-axis stands for consumption of other things, while y-axis stands for the spending on leisure. The more money spent on leisure, the less can be used to consume other things. The trade-off can be shown by using the budget constraint, and the original optimum would be Point A, the point where the budget constraint is tangent to the indifference curve.

Now if we increase income, the budget constraint shifts outward. This results in an income effect. An increase in income makes people feel richer, and then they will spend more on both consumption and leisure. This process is shown in Figure 5 as the change from point A to point B. When people spend more on leisure, then the demand for tourism normally increases, too. In general, we can say that an increase in income has a positive effect on the demand for tourism.

Cost of living is another key determinant in the tourism demand function. The usual expression is the Relative Price, a term for the comparison between price in the visited country with price in the home country. Going abroad is a big event to normal people with limited disposable income. Higher relative price means a higher living cost in foreign countries. Thus, the demand for tourism will decrease. In modeling relative price, Witt (1995) modifies this variable by measuring the baskets of goods purchased by tourists. However, Kim and Uysal (1997) argue that relative price may not be independent, but may depend on other variables. They argue that it changes as the number of tourists change, and that cost of living cannot appear alone. The exchange rate must also be considered. Moreover, tourists may be more or less aware of exchange rates in the destination country, and different studies use different types of exchange rate. Gunadhi and Boey (1986), Martin and Witt (1985, 1987) use the exchange rate between the tourist origin and destination currencies. Others, like Little (1980) use the exchange rate between the tourist origin and a weighted average of destinations. Most recently, Song and Witt (2000) use the adjusted variable that includes both relative prices and exchange rate.

Cost of transportation is sometimes included in models of demand, as well. Especially in the early period of development of the tourism industry, when information could not be shared so broadly and transparently, travel agents were most commonly asked for the price. Tourists then could form an idea of the price of traveling. Gray (1966), Litter (1980), Song and Witt (1987, 1988) use transportation cost in their demand modeling in tourism.

The use of dummy variables also is prevalent in demand modeling. They have been used to represent sports events (Little, 1980; Kliman, 1981) and the oil crisis (Gunadhi and Boey, 1986).

The demand function can be commonly expressed as Q=f(Y,P,E,T,D,ε), where Q stands for a demand for tourism; Y is income of the tourists; P is the price of living at the destination relative to the hometown (which is a relative price that includes both foreign and domestic prices); E is the real exchange rate between home country and destination, here we use how much home currency can exchange for one dollar under purchasing power parity or ppp (If this is a nominal exchange rate, then the influence of exchange rate would be offset because it was also used in P); T is the transportation cost; D represent dummy variables for idiosyncratic event. In the function, $\frac{\partial Q}{\partial Y}\rangle 0, \frac{\partial Q}{\partial P}\langle 0, \frac{\partial Q}{\partial E}\langle 0, \frac{\partial Q}{\partial T}\langle 0$. The effects of dummy variables depend on the nature of the represented event.

2.3 Introducing Statistics to Analyze the Tourism Industry

With the development of econometric tools, more systematic methods of analysis appeared. Carr (2009) maintains that "The foundation for reviewing the breakdown of statistical processes in tourism began with Grazer and Stiff's (1987) work. Their study

analyzed statistical techniques used in 922 journal articles published in four marketing journals between the years of 1980-1985. Their study provided a foundation for tourism researchers."

Christopher P. Cooper (2003) cites Deaton and Muellbauer (1980) who developed the Almost Ideal Demand System (AIDS) model by combining consumer demand theory and individual customer behavior. According to their system, the consumer's income is first allocated among broad categories: food, accommodation and tourism are included in them. Then they consider detailed allocations within each category. The shares of total expenditure on tourism allocated to different areas can be expressed as the following:

$$w_i = \alpha_i + \sum_i \gamma_{ij} \log p_j + \beta_i \log(x/P) \quad \text{i, j=1,..., n.}$$

In the formula, w_i is the share of expenditure on tourism in area i; p_j is the price level in home country j; x is the budget for expenditures on tourism; P is the price index of the destination. Other variables are parameters. Deaton and Muellbauer's model has been widely applied. O'Hagan and Harrison (1984) used this model to analyze the perceived demand of U.S. tourists who traveled to different European countries. Syriopoulos and Sinclair (1993) used it to study high income European tourists who traveled to Mediterranean countries. The AIDS model is most appropriately used in cases where people in one country travel to several different countries. The subsequent empirical analysis in my thesis focuses on tourists from different countries who travel to one destination--the United States.

Sims (1980) and Johansen (1988) developed the vector auto regression (VAR) model.

$$\begin{pmatrix} y_t \\ x_t \end{pmatrix} = \Phi_0 + \Phi_1 \begin{pmatrix} y_{t-1} \\ x_{t-1} \end{pmatrix} + \cdots + \Phi_p \begin{pmatrix} y_{t-p} \\ x_{t-p} \end{pmatrix} + \varepsilon_t$$

x is some variable that is adjusted to y to make the prediction more precise for y/x is time-correlated. This model has been the workhorse in multivariate economic modeling and forecasting. Later, by applying different regression models, analysis of variance, nonparametric techniques, indexes and factor analysis, other influential articles were published. Reviews of those articles were conducted by Reid and Andereck (1989), Crawford-Welch and McCleary (1992), Baloglu and Assante (1999), and Palmer, Sesé, and Montano (2005). These reviews give us a good perspective on techniques used for analysis and provided specific examples of statistical methods used in tourism forecast modeling.

2.4 Impact of Economic Factors in the Tourism Field

As we have discussed above, economic factors are crucial in analyzing the forces that drive tourism. For some of the economic factors often talked about, such as taxes (Blake, 2000), the chain of impact is not obvious. Econometrics often uses time series analysis and regression analysis, both of which rely on accurate historical data, to account for such variables. Crouch (1994), Song and Li (2007), and Witt and Witt (1995) have published research that uses time series analysis and regression analysis in modeling in the past 10 years. "One review of Crouch's articles indicated income to be the most important determinant providing the greatest explanatory power for demand. Other factors were price, marketing, trends and fashion, special events, and other factors to include lag and lead effect, short and long term effects, and nature of competition." (Carr, 2009). In Witt and Witt's (1995) article, a comparison between economic and non-economic modeling of tourism suggests that economic modeling is more accurate. Recently, Jessica Carr (2009) analyzes a

more specific case in her article "Climatic and Economic Conditions Affecting Tourism in the Coastal Region of North Carolina." In it, she observes that there are relationships among economic conditions (variables) related to visitation to the coast of North Carolina. She studies 13 different models. Though many empirical models still have limitations, they are still useful for policy-makers and agencies.

Chapter Three

Data Collection and Analysis

3.1 Data Collection

To begin my exploration, I chose the top five countries that send the largest number of tourists to the United States every year. They are Canada, Mexico, United Kingdom, Japan and Germany. They speak different languages and come from different continents. Also, they represent different economic systems. Thus, it is advantageous to analyze the data individually. For this analysis, I collected 160 observations from the first quarter in 2004 to the fourth quarter in 2011. (These data include Mexico from the first quarter in 2002 to the fourth quarter in 2009 only because the data from Mexico in 2010 and 2011 includes Mexican visitors who stay within the border zone and travel with border crossing permits. They are not consistent with the data in previous years.)

The data come from the U.S. Department of Commerce (http://tinet.ita.doc.gov/), the International Trade Administration Manufacturing and Services Office of Travel and Tourism Industries (http://www.bea.gov/national/index.htm), and the U.S. Department of Commerce Bureau of Economic Analysis and the Organization for Economic Co-operation and Development (http://stats.oecd.org).

To account for visits (arrivals) to the United States, OTTI only selects I-94 records bearing certain visa types. They are types B-1, B-2, E-1, E-2, F-1, F-2, I, M-1, M-2, GMB, GMT, WB and WT. Also, to comply with globally accepted international tourism definitions and classifications (United Nations World Tourism Organization/UNWTO), a traveler must spend one or more nights in the United States for a period that does not exceed 12 months in

order to be classified a visitor to the United States. Also, the purpose of the trip must be for pleasure, business or study. In addition, all visitors are primarily recognized by residency rather than citizenship.

The number of inbound tourists in the U.S. changes quarterly, as evidenced by the fact that many seasonal coefficients (shown in Table 3) are quite significant ($p<.0001$). From the data in Table 1, July to September has the highest visitation rate. But besides this, are there other reasons that can explain the fact that the number is different from season to season? What I want to explore here are some economic factors.

3.2 Variables

What we want to analyze is where the differences among the number of U.S. tourists per quarter come from--whether there are relationships among the number of tourists and economic factors. Which variables account for the most in explaining the difference? My model is laid out in the table below. The dependent variable is numquarter, which stands for the logarithm of the number of tourists per quarter from each country. Independent variables are USAGDP, lagUSAGDP, inboundGDP, laginboundGDP, exchangerate and lagexchangerate. The other variables are seasonal factors. There are three dummy variables: season1, season2 and season3. The following table contains the definition of each variable.

Table 10. Definition of the Variables in MLR

Category	Name	Remarks
Dependent Variable	numquarter	ln(Number of tourists) per quarter
	USAGDP	ln(USA GDP) of the current quarter
	lagUSAGDP	ln(USA GDP) of the previous quarter
	inboundGDP	ln(foreign countries' GDP) of the current quarter
	laginboundGDP	ln(foreign countries' GDP) of the previous quarter
Independent Variable	exchangerate	ln(average exchange rate) of the current quarter
	lagexchangerate	ln(average exchange rate) of the previous quarter
	season1	1 if Jan-Mar, 0 otherwise
	season2	1 if Apr-Jun, 0 otherwise
	season3	1 if Jul-Sept, 0 otherwise

I use the logarithm format because it will be easier to interpret the results. That is, when there is a one percent change in the independent variable, the coefficient represents the number of percentage points by which the the dependent variable will change. Measures of GDP are in billions of dollars, volume estimates, fixed ppps, OECD reference year, annual levels, seasonally adjusted. The exchange rate measures how much home currency can exchange for one dollar. I calculate it by averaging the daily rate over the quarter. I use nominal exchange rates initially. I analyze the real exchange rate instead of the nominal exchange rate later.

3.3 Methodology

My methods are multiple linear regression. I use three models. They are

Model 1: MLR on USAGDP, inboundGDP and exchange rate

$$numquarter_{it} = \hat{\beta}_0 + \hat{\beta}_1 \cdot USAGDP_{it} + \hat{\beta}_2 \cdot inboundGDP_{it} + \hat{\beta}_3 \cdot exchangerate_{it} + \hat{\beta}_4 \cdot season1$$
$$+\hat{\beta}_5 \cdot season2 + \hat{\beta}_6 \cdot season3 + \varepsilon_{it}.$$

Model 1 is estimated separately for each of the five countries of origin.

Model 2: MLR considering lags

$$numquarter_{it} = \hat{\beta}_0 + \hat{\beta}_1 \cdot USAGDP_{it} + \hat{\beta}_2 \cdot lagUSAGDP_{i(t-1)} + \hat{\beta}_3 \cdot inboundGDP_{it}$$
$$+\hat{\beta}_4 \cdot laginboungGDP_{i(t-1)} + \hat{\beta}_5 \cdot exchangerate_{it} + \hat{\beta}_6 \cdot lagexchangerate_{i(t-1)} + \hat{\beta}_7 \cdot season1$$
$$+\hat{\beta}_8 \cdot season2 + \hat{\beta}_9 \cdot season3 + \varepsilon_{it}.$$

Model 2 is estimated separately for the five countries.

Model 3: the overall regression, which uses one regression to express five separate regressions

$$numquarter_{nit} = \hat{\beta}_0 \cdot canada + \hat{\beta}_1 \cdot mexico + \hat{\beta}_3 \cdot uk + \hat{\beta}_4 \cdot japan + \hat{\beta}_5 \cdot USAGDP_{nit} + \hat{\beta}_6 \cdot inboundGDP_{nit}$$
$$+\hat{\beta}_7 \cdot exchangerate_{nit} + \hat{\beta}_8 \cdot season1 + \hat{\beta}_9 \cdot season2 + \hat{\beta}_{10} \cdot season3 + \hat{\beta}_{11} \cdot season4 +$$
$$\sum_{n=1}^{4} c_n \cdot USAGDP_{nit} + \sum_{n=1}^{4} c_n \cdot inboundGDP_{nit} + \sum_{n=1}^{4} c_n \cdot exchangerate_{nit} + \sum_{n=1}^{4} s1c_n + \sum_{n=1}^{4} s2c_n + \sum_{n=1}^{4} s3c_n + \varepsilon_{nit}.$$

The subscript "nit" means country n in season i and year t.

In order to meet the assumptions of the error term, I also checked the serial correlation of the model residuals and did some adjustments if it was necessary. I used SAS 9.1 to analyze the data and generate the results.

3.4 The Assumptions for MLR

The assumptions upon which the multiple linear regression used in this analysis are based are:

1) Linear in parameters. The model in the population can be written as $y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \mu$

2) Random sampling. We have a random sample of n observations, $\{(x_{i1}, x_{i2}, \ldots, x_{ik}, y_i) : i = 1,2,\ldots,n\}$,

from the population model. However, I chose consecutive years and quarters to analyze the data in this article. It is a limitation that the data are not randomly selected.

3) Zero conditional mean. $E(\mu|x_1, x_2, \ldots, x_k) = 0$

4) No perfect collinearity. In the sample (and therefore in the population), none of the independent variables is constant, and there are no exact linear relationships among the independent variables.

5) Homoskedasticity. $Var(\mu|x_1, \ldots x_k) = \sigma^2$

3.5 Interpretation of Inbound GDP Effects

I choose the inbound traveler's home country's gross domestic product (GDP) as an explanatory variable because there is a common trend when we show inbound GDP and the number of tourists together. Take Canada as an example. In Figure 6, we can see clearly that during the recent period of global financial crisis, especially in the year 2009, the number of tourists coming into the U.S. decreased according to the dismal economic outlook of these tourists' home countries. In other years, the trend is increasing steadily. In the year 2010, with the recovery of economies all over the world, there should be prosperity in the tourism industry. The tourism market, and travel agents, can promote more in fast developing countries or in those that have relatively strong and stable economic systems. They are important overseas sources for tourism in the United States in the next few decades.

We can see in the MLR models in Table 3 that all the estimated coefficients on inbound GDP are positive, which means that when there is an increase in inbound GDP, the number of tourists rises. Most of the time, this variable is relatively significant, as it is in the case of

Canada and Japan. Larger GDP in these countries means more income devoted to travel. More people can afford to spend and will have an interest in traveling abroad. However, in other countries, this variable is not as significant as other variables. Germany is a good example. More disposable income may not come from higher wages but more time and energy devoted to work. Thus people may not have time to plan a long vacation, especially overseas. Short-distance destinations may be enough for them. According to Fritz's report--the truth about Germany (2006) "The most favorite destinations for Germans are inside Europe. The Coast and Island of Mediterranean Sea like Spain, Italy, Greece and Turkey or the Mountains of alps in Austria or Swiss." Among these countries, Canada is the country that is most influenced by the variable inboundGDP. When there is a one percentage increase in Canadian GDP, the number of tourists will increase by about six percent if other variables are fixed. Canada is followed by Mexico at 5.8 percent and Japan at 5.2 percent. Compared with them, the United Kingdom and Germany are less influenced by inboundGDP. " To compare the income elasticities reported here, one may refer to the following quote from The Economics of Tourism. "In terms of estimated elasticity values, an early study of US and Canadian outbound tourism (Gray, 1966) found that the per capita income elasticity values ranged between 4.99 and 7.01, implying that a rise in income of 1 per cent results in an increase in tourism expenditure of between 4.99 per cent and 7.01 per cent." A good economic environment in other countries, therefore, will generate more tourism opportunities for the United States.

3.6 Interpretation of U.S. GDP Effects

The GDP of the country being visited is an interesting variable because the empirical results may challenge expectations. Figure 7 gives us an idea that the number of tourists also behaves as it appears in the analysis of the inbound GDP, though there was a decrease between the year 2000 and 2003 while GDP grew. There should be an explanation for this. The 9/11 tragedy led to worry and doubt about safety in the United States; tourists would not choose to travel to the U.S. during the few years following the disaster. After 2003, the number of tourists gradually returned to the previous level. In order to analyze the effect of U.S. GDP, I skip forward to 2004 because the data may contain fewer political or social factors. Normally, the number of tourists also has a positive correlation with the US GDP. However, this may not hold when taking other variables into account and leaving them unfixed.

From the results in Table 3, it surprised me that four out five models have a negative estimate of the effect of U.S. GDP, though only two are statistically significant. When there is a one percent increase in U.S. GDP, the number of tourists decreases by 4.6 percent for the Canada model, 3.4 percent for the Mexico model, 2.3 percent for the United Kingdom model and 4.3 percent for the Japan model. Some of these results are quite significant, such as Canada and Japan. Why is that? The main reason may be that when there is an increase in US GDP, citizens in the United States may also choose to travel more. This can generate an increase in demand and increase the price of the services and good. This is shown in Table 7 and Table 8--the annual growth in prices for tourism commodities in 2005-2010 and internal travel and tourism in the United States by residents and nonresidents. Then travel in the U.S.

will become more expensive for foreign travelers and lead to fewer inbound tourists. Also, hotels and rental homes can be quite hard to reserve in popular tourist spots. Waiting too long can discourage travelers, and these travelers may have to work when rooms are available.

On the other hand, growth in U.S. GDP will give an impetus to business tourism, but this effect seems quite small. However, things are different for the Germany model. As we know, Germany is a country that puts emphasis on advanced manufacturing. When the U.S. economy is good, the cooperation between the U.S. and Germany may be closer. There will be more German business travelers who go to the U.S. to visit commercial partners and discuss new orders. Of course, in order to interpret this variable, all the other variables should be fixed. Inbound GDP is highly correlated with the U.S. GDP, and thus we may get the wrong idea that the sign of the U.S. GDP effect is the same as inbound GDP effect. A good combination of U.S. GDP and inbound GDP can help expand the scale of the market of overseas tourists.

3.7 Interpretation of Exchange Rate Effects

In this thesis, the exchange rate is expressed as the amount of foreign currency that can be exchanged for a U.S. Dollar. If the number increases, which means we must spend more to exchange for one dollar, then we say there is depreciation in the foreign currency or an appreciation in the U.S. Dollar. What we have in mind is that if tourism costs more, the number of tourists should be lower. Between 2000 and 2011, as is apparent in Figure 8, many foreign currencies went through a strong and steady period.

In Table 3, the exchange rate is significant most of the time and has a negative relationship with the number of tourists per quarter. This supports the previously stated hypothesis. What is unexpected here, though, is the Mexico model. The exchange rate estimate is positive. Though it is not very significant, we cannot just ignore it. We know that Mexico has a high emigration rate; many Mexicans come to the United States to find jobs. We can infer that when the U.S. dollar is appreciating, if Mexicans come to work in the United States and send back the money they've earned, then the wages expressed in US dollars can exchange for more Pesos. Mexico is a special case, unlike other countries who have fewer immigrants working in the U.S. Japan is another potentially confusing case; while the exchange rate effect is negative, the coefficient is not significant. Few changes in the exchange rate may be an explanation for this. The exchange rate is not so important in explaining the dependent variable in the case of Mexico and Japan compared with others.

Consider further the role of the exchange rate. We want to eliminate the impact of relative price. So what I want to do is to use the real exchange rate. I collected the relative price from 2001 to 2011 in order to calculate the real exchange rate by using the formula Real Exchange Rate=(Nominal Exchange Rate*Domestic Price)/(Foreign Price), while the nominal exchange rate tells how much foreign currency can be exchanged for a unit of domestic currency. Relative price and real exchange rate can all be found in OECD iLibrary. By applying this, we get the result in Table 4.

In the Canada Model, we can see that the results do not change much except for the real exchange rate. The estimated coefficient changes from -0.5133 to -0.0614. Though the sign

stays the same, the variable becomes insignificant. The R-squared is larger if we use the nominal exchange rate.

For the Mexico model, we can see that not only does the sign not change, but also the coefficients of the variables are almost the same. The percentage change in real exchange is less than 15%. The p-value is smaller. However, the R-squared becomes larger.

In the United Kingdom Model, almost all the economic factors change by a large degree. The real exchange rate becomes insignificant, while other variables such as inboundGDP and USAGDP become more significant.

The Japan Model changes a great deal. The real exchange rate has an opposite impact when compared with the nominal exchange rate. Because the p-value is insignificant, just as the original p-value is, we cannot reject that exchange rate plays no role in explaining changes in the number of tourists. What's more, other variables such as inboundGDP and USAGDP also become quite insignificant. Thus, in the model with real exchange rate, we can say that economic factors have no power in explaining the changes in the number of tourists coming to the U.S. from Japan.

When we look at the Germany Model, the biggest change appears to be in the U.S. GDP effect; it changes from 0.3760 to -3.7100, which is a large jump. The substitution of real exchange rate also results in the significance of other variables, which enhances the importance of these economic factors overall. If we view economic factors as important determinants, then Germany would be a good application of using real exchange rate as a predictor of incoming tourism.

For the Canada model and the United Kingdom model, the R-Squared is larger if we use the nominal exchange rate. For the Japan model, the economic variables become insignificant when the real exchange rate is used. However, the R-Squared does not change much. Sometimes the nominal exchange rate may be better than the real exchange rate in analyzing where the differences among the number of tourists come from, and it may also be more useful in predicting future values. Nominal exchange rate contains many other factors that may influence the number of tourists in general. Perhaps money illusion is one reason. Under this interpretation, people have the tendency to think of currency in terms of the nominal rather than the real; they tend to use the nominal exchange rate to make travel decisions.

3.8 Considering Lags

In the next models, I add in three lags of previously considered economic variables. They are the lag in U.S. GDP, the lag in inboundGDP and the lag in exchange rates, which are the values of last quarter. I do this because I want to check whether the model displays dynamic effects.

There are no autocorrelations in the residuals of any of the models here. From the output in Table 5, we can see two sections. One is a modified regression model. The other is a test which tells us whether the modified model is better. The hypothesis is that all lag variable coefficients are equal to zero. Adjusted R-squareds are all larger than 0.85, but they don't change a lot when compared with the original models. For Canada, Mexico and the United Kingdom, we fail to reject the null hypothesis that these lag variables are not important in the analysis (at the 5% significance level). However, for Japan and Germany, which are large

countries in terms of GDP, these lag variables do matter. GDP in the last year (U.S. or incoming) is always more significant than GDP in this year. On the contrary, the average exchange rate of this quarter counts more than the average exchange rate of last quarter.

When we look at the long-term effect of economic factors by summing up the contemporary and lag effects, usually we get a similar result to the short-term effect estimated in Table 3. However, the United Kingdom and the Japan models are different. For example, the effect of U.S. GDP for the lagged Japan model is -0.63, which is less than the original one of -4.26. In the long run, the impact of U.S. GDP on Japanese tourism in the U.S. is limited.

3.9 Testing Coefficient Restrictions across Countries

Table 6 shows the overall model, which analyzes the five countries in one nesting model. Any estimator of the variable in individual models can be derived by adding coefficients together from the nesting model. These new variables denoted by c*, relate to different countries, which are combinations of country dummies and one other variable. The interactions mean the different impacts that come from countries. Can these cross-country differenced be ignored? Or must we conclude that the five models are different? Consider the test:

$$\begin{aligned}
&c1USAGDP = c1inboundGDP = c1exchangerate = s1c1 = s1c2 = s1c3 = s1c4 \\
&= c2USAGDP = c2inboundGDP = c2exchangerate = s2c1 = s2c2 = s2c3 = s2c4 \\
&= 3USAGDP = c3inboundGDP = c3exchangerate = s3c1 = s3c2 = s3c3 = s3c4 \\
&= c4USAGDP = c4inboundGDP = c4exchangerate = 0
\end{aligned}$$

The test result is found in Table 6: that at least one of these variables is not equal zero. This means that difference exists among countries. The impacts of GDP, exchange rate and seasons are different for each country. We cannot simply use the same estimator to predict the number of tourists from each country.

What about each economic variable across countries? Here I perform three tests to check whether these individual variable can be integrated by using one value for all countries.

Test 1: $H_0 : c1USAGDP = c2USAGDP = c3USAGDP = c4USAGDP = 0$

Test 2: $H_0 : c1inboundGDP = c2inboundGDP = c3inboundGDP = c4inboundGDP = 0$

Test 3: $H_0 : c1exchangerate = c2exchangerate = c3exchangerate = c4exchangerate = 0$

The results in Table 6 show that the p-value for the first two tests are quite large compared with the third test (p=0.0048). So, the third test tells us that the impact of the exchange rate is quite different across countries. The difference is very significant (under 0.05 significance level), while the impacts of the other two variables are not statistically different across countries.

Chapter Four

Conclusion

4.1 Conclusion

From the empirical analysis, we can draw the conclusion that the number of incoming U.S. tourists are correlated with economic factors, no matter what country the tourists are coming from. The results generated from Canada, the United Kingdom, Japan and Germany are close to what one might have expected. When there is an increase in the GDP of each country, which means people in these countries have more disposable income, the number of tourists who travel to the United States increases. Among the five countries, Canada, Mexico and Japan are influenced the most by their own GDP. Their estimated elasticities are all greater than 5. When income increases in these countries, people have greater propensity to travel to the United States.

When exchange rates rise, the number of tourists shrinks because of appreciation of U.S. Dollars.

U.S. GDP is the only thing that did not meet my expectation. The sign of the coefficient on the variable USAGDP is negative. There are two possible reasons for this. One is the interaction between demand and supply. Another is that the variable is highly correlated with other variables, such as CPI. If we regress U.S. GDP on CPI, the p-value is quite small. We know that U.S. CPI is a variable that plays an opposing role of attracting tourists. So there is no wonder that the estimator of U.S. GDP is negative here. Still, there is a reason to expect U.S. GDP to have a positive effect and that is because of business trips.

Finally, Mexico is a special case when we consider the variable exchange rate and even the real exchange rate. It is positive mainly because some Mexicans come to the United States to find jobs and then they send the earned money back.

Also, from what we have observed in the new employment data, loss of jobs is conflicted with more tourists. There are some reasons. Many tourists today are more independent and they can get information easier than in earlier years. Additionally, with the integration of the world communications and economies, policies between the United States and other countries are modified and communication among these countries become more convenient. Thus, this is a good time for the tourism industry. These days, travelers have become wiser, and they are more intentional about their own routes. Travel agents should be more information-oriented to help such travelers save time, and they should focus on smaller groups, like families.

4.2 Limitations

There are inevitably some limitations to this study. The first is understanding the reason that tourists come to the United States. Though more than half of the reason people come to the United States is for leisure, on business trips having fun in sight seeing is also possible. It is hard to classify these reasons, which causes some inaccuracy in empirical analysis. When I combine them together, some of the variables are not as significant as they would be if I were to consider just one reason. The aggregation of the several types of travel into one measure results in some loss of information. Another limitation is that some variables are highly correlated. The trends of U.S. GDP and inbound GDP are quite close. This situation also

exists between U.S. GDP and U.S. CPI. How to choose the right variables in an empirical model is important. What's more, the data I collected such as GDP and real exchange rate are available annually. However, my research design is quarterly arranged. Also, the number of observations is limited. Choosing the number of tourists for better communication among these countries or the money they spend adjusted to the time they stay in the United States as a dependent variable is arguable. All of these limitations may lead to biased estimation.

In this thesis I analyze the relationship between the number of tourists and economic factors, a method common to other articles, though they usually focus on one specific region. However, I emphasize analysis of different countries which have different backgrounds and economic systems in the interest of comparison. I come up with some interesting and, at times, unexpected results. In future analysis, I recommend that this model be improved by adding in other variables and doing model selection. Also, if I narrow the place to which tourists are attracted mainly because of leisure, such as Hawaii, generalizability of the analysis may increase.

REFERENCES

Archer, B.H. (1994). Demand forecasting and estimation. In J.R. B. Ritchie and C.R. Goeldner (eds.), *Travel, tourism and hospitality research (4 ed).* New York: Wiley.

Blake, A.T. (2000) *The Economic Effects of Tourism in Spain*, Tourism and Travel Research Institute Discussion Paper, 2001/2, Nottingham University Business School.

Blake, A.T. (2005) *The Economic Impact of the London 2012 Olympics*, Report of the Christel DeHaan Tourism and Travel Research Institute, Nottingham: Nottingham University Business School.

Carr, Jessica Leigh. (2009). An Analysis of Climate and Economic Condition Affecting Tourism in the Coastal Region of North Carolina, 12-30.

Coltman, M.M. (1989). *Introduction to Travel and Tourism: An International Approach, (1 ed).* New York: Wiley.

Cooper, Christopher P. (2003). *Classic reviews in tourism (Aspects of Tourism, 8)*, 22-30.

Crouch, G.L. (1994). The study of international tourism demand: a review of findings.*Journal of Travel Research*, 33(1), 12-23.

Deaton, A.S. and Muellbauer, J. (1980a) 'An almost ideal demand system', *American Economic Review*, 70: 312– 26.

Deaton, A.S. and Muellbauer, J. (1980b) *Economics and Consumer Behaviour*, Cambridge: Cambridge University Press.

Gray, H.P. (1966) 'The demand for international travel by the United States and Canada', *International Economic Review*, 7: 83– 92.

Grazer, W.F. and Stiff, M.W. (1987). Statistical analysis and design in marketing journal articles. *Journal of the Academy of Marketing Science*, 15(1), 70-73.

Gunadhi, H. and Boey, C.K. (1986) 'Demand elasticities of tourism in Singapore', *Tourism Management*, 7: 239– 53.

King, Danny. (2011) Travel lost jobs in 2010, even with increased visitor spending. *Travel Weekly.*

Kliman, M.L. (1981) 'A quantitative analysis of Canadian overseas tourism', *Transportation Research*, A,15: 487– 97.

Li, G., Song, H., and Witt, S. (2005). Recent developments in econometric modeling and forecasting. *Journal of Travel Research*, 44(1), 82-99.

Martin, C.A. and Witt, S.F. (1987) 'Tourism demand forecasting models: choice of appropriate variable to represent tourists' cost of living', *Tourism Management*, 8: 233– 246.

OECD iLibrary. From http://stats.oecd.org.

Pearce, P.L. (2005). Tourist behavior: themes and conceptual schemes. Clevedon, Buffalo, Toranto: Channel View Publications.

Reid, L.J and Andereck, K.L. (1989). Statistical analyses use in tourism research. *Journal of Travel Research*, 28(2), 21-24.

Song, H. and Witt, S.F. (2000). *Tourism Demand Modelling and Forecasting: Modern Econometric Approaches*, Cambridge: Pergamon.

Song, H., and Li, G. (2008). Tourism demand modeling and forecasting-a review of recent research. *Tourism Management*, 29, 203-220.

Stabler, Mike J., Sinclair, M. Thea and Papatheodorou, Andreas. (2010). *The Economics of Tourism second edition*, 45-76, 82.

U.S. Department of Commerce, International Trade Administration Manufacturing and Services Office of Travel and Tourism Industries. From http://tinet.ita.doc.gov/.

U.S. Department of Commerce Bureau of Economic Analysis. From http://www.bea.gov/national/index.htm.

Vellas, Francois and Becherel, Lionel. (1995). *International tourism: an economic perspective first edition,* 1-24. St. Martin's Press.

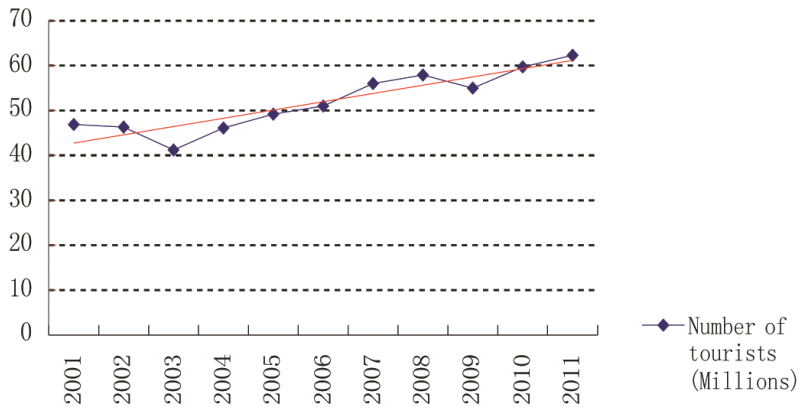
Wanhill, S.R.C.(2007) 'What tourism economists do (the distribution of submissions to the journal *Tourism Economics*)' paper delivered at the 6th DeHaan Tourism Management Conference, Tourism and Travel Research Institute, 18th December.

Witt, C.A., Witt, S.F. and Wilson, N. (1994) 'Forecasting international tourist flows', *Annals of Tourism Research*, 21: 612– 628.

Witt, S. and Witt, C. (1995). Forecasting tourism demand: a review of empirical research. *International Journal of Forecasting*, *11*(3), 447-475.

Zemanek, Steven L. (2011). U.S. Travel and Tourism Satellite Accounts for 2007-2010, 31-33.

Figures and Tables



Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of tourists (Millions)	46.9	46.3	41.2	46.1	49.2	51.0	56.0	57.9	55.0	59.7	62.3

Figure 1. Number of Inbound Tourists (Millions) That Come to the United States from 2001 to 2011

Note: The blue line indicates the specific number of inbound tourists from 2001 to 2011.
The straight line indicates the trend of number of inbound tourists from 2001 to 2011.

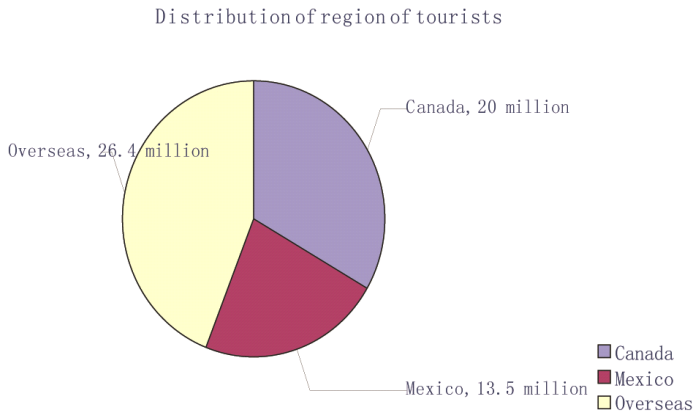


Figure 2. The Distribution of Region of Tourists in 2010

Note: Among the total inbound tourists, 20 million tourists come from Canada, 13.5 million tourists come from Mexico and 26.4 million are from overseas.

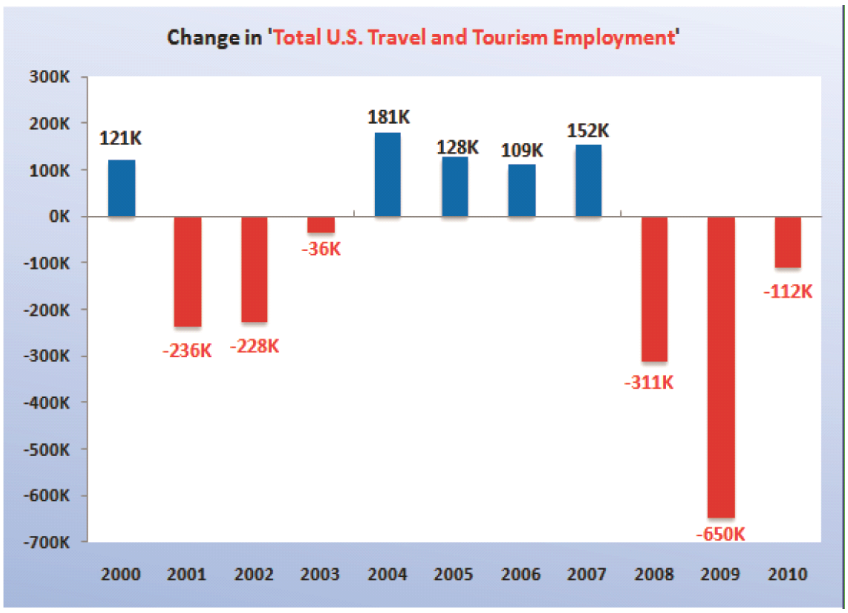


Figure 3. Change in Total U.S. Travel and Tourism Employment
Note:The blue bar indicates an increase in the number of inbound tourists
The red bar indicated a decrease in the number of inbound tourists

Sources of Figure1, Figure 2 and Figure3: U.S. Department of Commerce, International Trade Administration Manufacturing and Services Office of Travel and Tourism Industries. From http://tinet.ita.doc.gov/.

Figure 4. Change in Total U.S. Travel and Tourism Employment

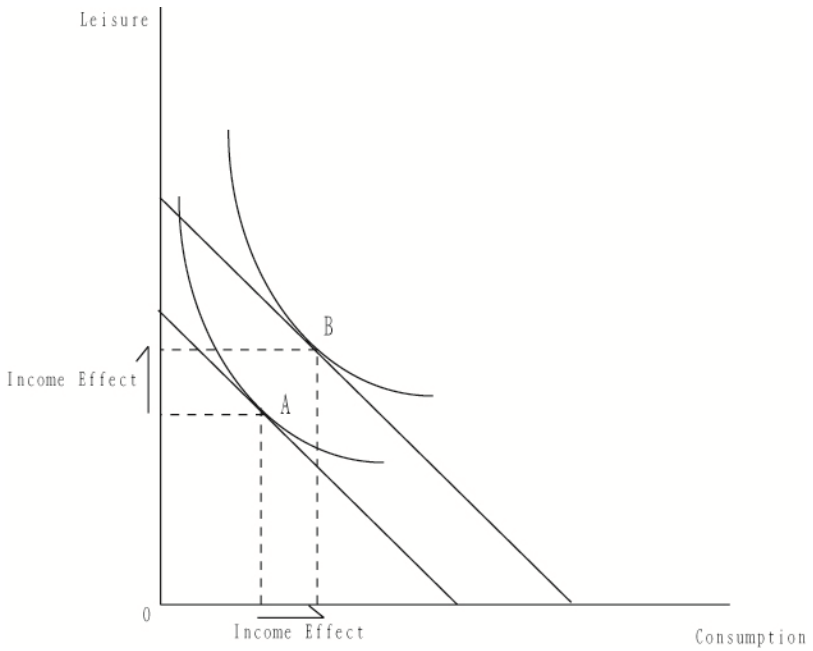
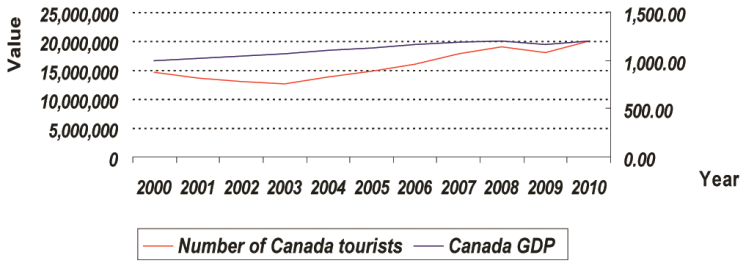


Figure 5. Consumer Choice Diagram

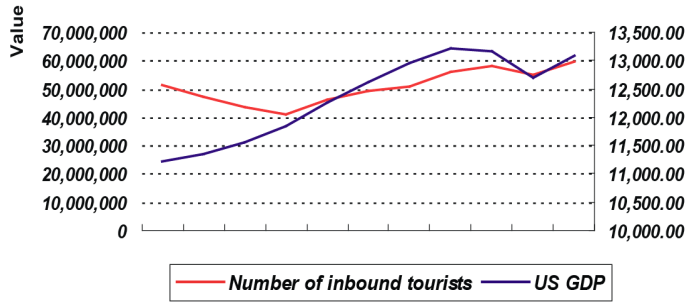
Note: Income is allocated between leisure and consumption and the original optimum would be point A. When income increases, the budget constraint shifts outward and the optimum becomes point B. This process is shown as the change from point A to point B. The spending on leisure and consumption increase both.



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of Canada tourists	14,593,881	13,507,446	12,968,103	12,659,739	13,849,488	14,864,741	15,992,000	17,760,000	18,910,000	17,964,454	19,959,496
Canada GDP	998.3777	1016.1863	1045.9055	1065.5799	1098.825	1132	1163.957	1189.564	1197.757	1164.582	1202.022

Figure 6. Canada GDP and Number of Tourists from Canada

Note: The number of Canada tourists is the total number of an entire year. Canada GDP is the real GDP (billions) in a specific year.

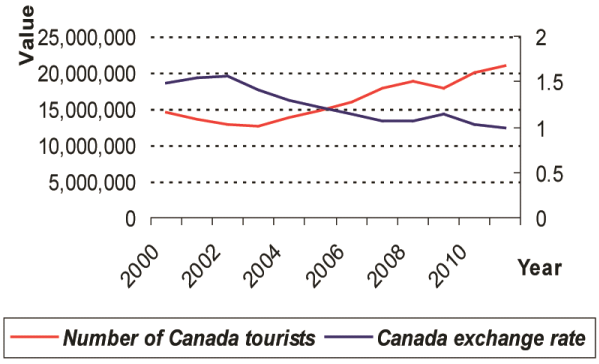


	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Number of inbound tourists	51,237,701	46,926,868	43,580,707	41,218,213	46,086,257	49,205,528	51,063,290	55,979,277	57,937,451	54,884,184	59,744,964
US GDP	11,216.40	11,337.50	11,543.10	11,836.40	12,246.90	12,623.00	12,958.50	13,206.40	13,161.90	12,703.10	13,088.00

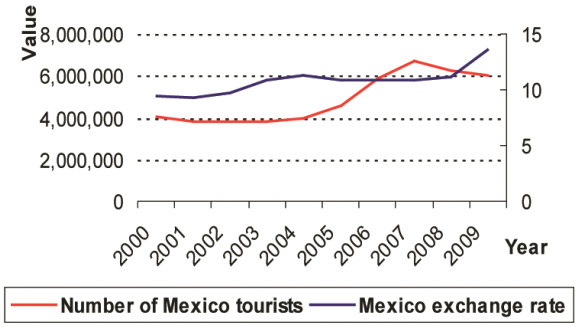
Figure 7. U.S. GDP and Number of Inbound Tourists

Note:The number of inbound tourists is the total number of an entire year. U.S. GDP is the real GDP (billions) in a specific year.

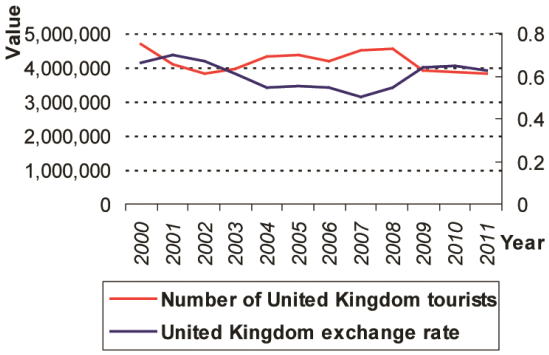
Figure 8. Exchange Rate and Number of Tourists for Each Country



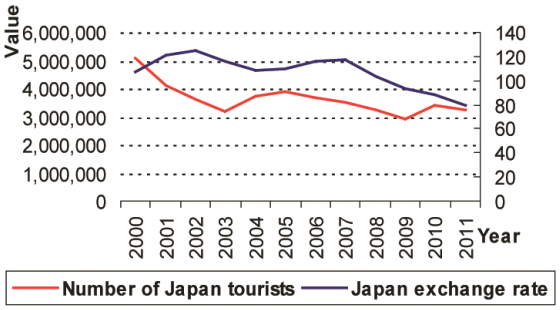
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of Canada tourists	14,593,881	13,507,446	12,968,103	12,659,739	13,849,488	14,864,741	15,992,000	17,760,000	18,910,000	17,964,454	19,959,496	21,028,177
Canada exchange rate	1.48511	1.54876	1.56932	1.40105	1.30102	1.21176	1.13436	1.0741	1.06704	1.1431	1.03016	0.989531



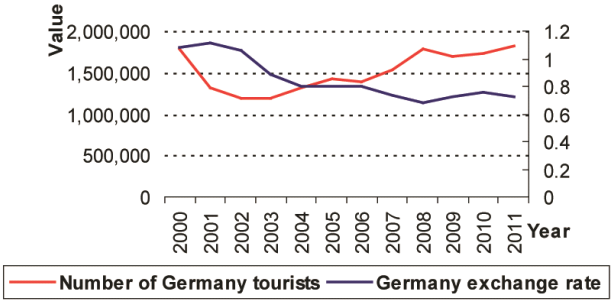
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Number of Mexico tourists	4,040,076	3,826,989	3,845,801	3,772,406	3,992,811	4,605,268	5,840,839	6,732,058	6,235,336	6,023,225
Mexico exchange rate	9.45556	9.34234	9.65596	10.789	11.286	10.8979	10.8992	10.9282	11.1297	13.5135



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of United Kingdom touris	4,703,008	4,097,258	3,816,736	3,936,112	4,302,737	4,344,957	4,176,211	4,497,858	4,564,895	3,899,167	3,850,864	3,835,300
United Kingdom exchange rate	0.660931	0.694655	0.667223	0.612472	0.54618	0.549998	0.543487	0.499772	0.543966	0.641919	0.647179	0.624141



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of Japan tourists	5,061,377	4,082,661	3,627,264	3,169,682	3,747,620	3,883,906	3,672,584	3,531,489	3,249,578	2,918,268	3,386,076	3,249,569
Japan exchange rate	107.765	121.529	125.388	115.933	108.193	110.218	116.299	117.754	103.359	93.5701	87.7799	79.807



Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of Germany tourists	1,786,045	1,313,756	1,189,856	1,180,212	1,319,904	1,415,530	1,385,520	1,524,151	1,782,299	1,686,825	1,726,193	1,823,797
Germany exchange rate	1.0854	1.11751	1.06255	0.886034	0.805365	0.80412	0.797141	0.730638	0.682675	0.719843	0.755045	0.719355

Note: All exchange rate are nominal exchange rate.

Table 1. Data set for each country

Canada Data set

Year	Quarter	Number of tourists	US GDP	Canada GDP	Exchange Rate
2004	1	3,049,228.00	12,246.90	1,098.83	1.318
	2	3,415,879.00	12,246.90	1,098.83	1.359
	3	4,399,636.00	12,246.90	1,098.83	1.308
	4	2,984,745.00	12,246.90	1,098.83	1.220
2005	1	3,382,826.00	12,623.00	1,132.00	1.226
	2	3,609,732.00	12,623.00	1,132.00	1.244
	3	4,810,989.00	12,623.00	1,132.00	1.203
	4	3,061,194.00	12,623.00	1,132.00	1.174
2006	1	3,529,825.00	12,958.50	1,163.96	1.154
	2	3,888,084.00	12,958.50	1,163.96	1.122
	3	5,183,530.00	12,958.50	1,163.96	1.121
	4	3,393,149.00	12,958.50	1,163.96	1.139
2007	1	3,697,497.00	13,206.40	1,189.56	1.172
	2	4,092,789.00	13,206.40	1,189.56	1.099
	3	5,789,960.00	13,206.40	1,189.56	1.045
	4	4,154,537.00	13,206.40	1,189.56	0.981
2008	1	4,493,983.00	13,161.90	1,197.76	1.005
	2	4,587,662.00	13,161.90	1,197.76	1.011
	3	6,070,811.00	13,161.90	1,197.76	1.042
	4	3,777,937.00	13,161.90	1,197.76	1.212
2009	1	3,961,961.00	12,703.10	1,164.58	1.245
	2	4,289,077.00	12,703.10	1,164.58	1.167
	3	5,792,237.00	12,703.10	1,164.58	1.097
	4	3,911,262.00	12,703.10	1,164.58	1.056
2010	1	4,336,808.00	13,088.00	1,202.02	1.041
	2	4,887,312.00	13,088.00	1,202.02	1.028
	3	6,419,238.00	13,088.00	1,202.02	1.039
	4	4,585,639.00	13,088.00	1,202.02	1.013
2011	1	4,572,633.00	13,315.30	1,231.59	0.986
	2	5,194,643.00	13,315.30	1,231.59	0.968
	3	6,841,109.00	13,315.30	1,231.59	0.982
	4	4,413,183.00	13,315.30	1,231.59	1.023

Table 1 Continued

Mexico Data set

Year	Quarter	Number of tourists	US GDP	Mexico GDP	Exchange Rate
2002	1	868,018.00	11,543.10	1,192.76	9.108
	2	791,029.00	11,543.10	1,192.76	9.478
	3	1,200,585.00	11,543.10	1,192.76	9.893
	4	986,169.00	11,543.10	1,192.76	10.163
2003	1	634,110.00	11,836.40	1,208.83	10.826
	2	943,562.00	11,836.40	1,208.83	10.450
	3	1,199,499.00	11,836.40	1,208.83	10.700
	4	995,235.00	11,836.40	1,208.83	11.184
2004	1	677,358.00	12,246.90	1,257.83	10.986
	2	1,029,720.00	12,246.90	1,257.83	11.370
	3	1,244,654.00	12,246.90	1,257.83	11.447
	4	1,041,079.00	12,246.90	1,257.83	11.320
2005	1	946,527.00	12,623.00	1,298.15	11.169
	2	922,325.00	12,623.00	1,298.15	10.971
	3	1,384,198.00	12,623.00	1,298.15	10.713
	4	1,352,218.00	12,623.00	1,298.15	10.707
2006	1	996,138.00	12,958.50	1,365.01	10.598
	2	1,406,271.00	12,958.50	1,365.01	11.178
	3	1,744,968.00	12,958.50	1,365.01	10.948
	4	1,693,462.00	12,958.50	1,365.01	10.889
2007	1	1,280,496.00	13,206.40	1,409.51	11.020
	2	1,633,584.00	13,206.40	1,409.51	10.881
	3	1,959,703.00	13,206.40	1,409.51	10.963
	4	1,858,275.00	13,206.40	1,409.51	10.851
2008	1	1,510,134.00	13,161.90	1,426.29	10.804
	2	1,431,202.00	13,161.90	1,426.29	10.428
	3	1,619,065.00	13,161.90	1,426.29	10.324
	4	1,674,935.00	13,161.90	1,426.29	13.056
2009	1	1,113,126.00	12,703.10	1,337.28	14.387
	2	1,433,625.00	12,703.10	1,337.28	13.310
	3	1,748,373.00	12,703.10	1,337.28	13.258
	4	1,728,101.00	12,703.10	1,337.28	13.063

Table 1 Continued

The United Kingdom Data set

Year	Quarter	Number of tourists	US GDP	Canada GDP	Exchange Rate
2004	1	906,957.00	12,246.90	1,931.34	0.544
	2	1,088,698.00	12,246.90	1,931.34	0.553
	3	1,172,002.00	12,246.90	1,931.34	0.550
	4	1,135,080.00	12,246.90	1,931.34	0.536
2005	1	989,750.00	12,623.00	1,971.62	0.529
	2	1,062,469.00	12,623.00	1,971.62	0.539
	3	1,157,384.00	12,623.00	1,971.62	0.560
	4	1,135,354.00	12,623.00	1,971.62	0.572
2006	1	885,653.00	12,958.50	2,023.02	0.571
	2	1,067,601.00	12,958.50	2,023.02	0.548
	3	1,122,374.00	12,958.50	2,023.02	0.534
	4	1,100,583.00	12,958.50	2,023.02	0.522
2007	1	916,198.00	13,206.40	2,093.14	0.511
	2	1,078,786.00	13,206.40	2,093.14	0.504
	3	1,251,216.00	13,206.40	2,093.14	0.495
	4	1,251,658.00	13,206.40	2,093.14	0.489
2008	1	970,945.00	13,161.90	2,070.06	0.506
	2	1,184,146.00	13,161.90	2,070.06	0.509
	3	1,290,683.00	13,161.90	2,070.06	0.530
	4	1,119,121.00	13,161.90	2,070.06	0.640
2009	1	723,008.00	12,703.10	1,979.53	0.697
	2	1,058,392.00	12,703.10	1,979.53	0.646
	3	1,124,509.00	12,703.10	1,979.53	0.610
	4	993,258.00	12,703.10	1,979.53	0.612
2010	1	727,090.00	13,088.00	2,020.94	0.641
	2	989,207.00	13,088.00	2,020.94	0.671
	3	1,153,021.00	13,088.00	2,020.94	0.645
	4	981,546.00	13,088.00	2,020.94	0.633
2011	1	697,850.00	13,315.30	2,036.87	0.624
	2	1,067,321.00	13,315.30	2,036.87	0.613
	3	1,125,771.00	13,315.30	2,036.87	0.623
	4	944,358.00	13,315.30	2,036.87	0.636

Table 1 Continued

Japan Data set

Year	Quarter	Number of tourists	US GDP	Canada GDP	Exchange Rate
2004	1	903,579.00	12,246.90	3,840.45	107.153
	2	870,966.00	12,246.90	3,840.45	109.727
	3	1,063,672.00	12,246.90	3,840.45	109.928
	4	909,403.00	12,246.90	3,840.45	105.779
2005	1	934,423.00	12,623.00	3,890.48	104.543
	2	908,330.00	12,623.00	3,890.48	107.530
	3	1,081,712.00	12,623.00	3,890.48	111.091
	4	959,441.00	12,623.00	3,890.48	117.225
2006	1	931,545.00	12,958.50	3,956.34	116.887
	2	836,744.00	12,958.50	3,956.34	114.499
	3	1,015,796.00	12,958.50	3,956.34	116.254
	4	888,499.00	12,958.50	3,956.34	117.778
2007	1	873,575.00	13,206.40	4,043.07	119.381
	2	793,787.00	13,206.40	4,043.07	120.798
	3	1,003,670.00	13,206.40	4,043.07	117.743
	4	860,457.00	13,206.40	4,043.07	113.113
2008	1	851,237.00	13,161.90	4,000.96	105.236
	2	760,040.00	13,161.90	4,000.96	104.630
	3	895,839.00	13,161.90	4,000.96	107.607
	4	742,462.00	13,161.90	4,000.96	96.081
2009	1	760,498.00	12,703.10	3,779.83	93.633
	2	559,531.00	12,703.10	3,779.83	97.353
	3	849,687.00	12,703.10	3,779.83	93.513
	4	748,552.00	12,703.10	3,779.83	89.787
2010	1	854,318.00	13,088.00	3,947.46	90.647
	2	739,605.00	13,088.00	3,947.46	92.105
	3	975,264.00	13,088.00	3,947.46	85.749
	4	816,889.00	13,088.00	3,947.46	82.542
2011	1	839,365.00	13,315.30	3,917.95	82.258
	2	636,154.00	13,315.30	3,917.95	81.549
	3	961,558.00	13,315.30	3,917.95	78.245
	4	812,492.00	13,315.30	3,917.95	77.324

Table 1 Continued

Germany Data set

Year	Quarter	Number of tourists	US GDP	Canada GDP	Exchange Rate
2004	1	263, 433. 00	12, 246. 90	2, 548. 74	0. 800
	2	356, 084. 00	12, 246. 90	2, 548. 74	0. 830
	3	380, 893. 00	12, 246. 90	2, 548. 74	0. 818
	4	319, 494. 00	12, 246. 90	2, 548. 74	0. 772
2005	1	297, 414. 00	12, 623. 00	2, 566. 00	0. 763
	2	365, 691. 00	12, 623. 00	2, 566. 00	0. 795
	3	416, 722. 00	12, 623. 00	2, 566. 00	0. 820
	4	335, 703. 00	12, 623. 00	2, 566. 00	0. 841
2006	1	275, 441. 00	12, 958. 50	2, 661. 01	0. 831
	2	366, 049. 00	12, 958. 50	2, 661. 01	0. 796
	3	406, 775. 00	12, 958. 50	2, 661. 01	0. 785
	4	337, 255. 00	12, 958. 50	2, 661. 01	0. 775
2007	1	303, 912. 00	13, 206. 40	2, 748. 13	0. 763
	2	384, 871. 00	13, 206. 40	2, 748. 13	0. 742
	3	448, 083. 00	13, 206. 40	2, 748. 13	0. 727
	4	387, 285. 00	13, 206. 40	2, 748. 13	0. 690
2008	1	362, 917. 00	13, 161. 90	2, 777. 90	0. 667
	2	471, 077. 00	13, 161. 90	2, 777. 90	0. 640
	3	528, 020. 00	13, 161. 90	2, 777. 90	0. 667
	4	420, 285. 00	13, 161. 90	2, 777. 90	0. 761
2009	1	309, 545. 00	12, 703. 10	2, 635. 35	0. 769
	2	454, 613. 00	12, 703. 10	2, 635. 35	0. 734
	3	499, 186. 00	12, 703. 10	2, 635. 35	0. 699
	4	423, 481. 00	12, 703. 10	2, 635. 35	0. 677
2010	1	347, 172. 00	13, 088. 00	2, 732. 67	0. 723
	2	415, 725. 00	13, 088. 00	2, 732. 67	0. 787
	3	534, 611. 00	13, 088. 00	2, 732. 67	0. 774
	4	428, 685. 00	13, 088. 00	2, 732. 67	0. 737
2011	1	306, 412. 00	13, 315. 30	2, 814. 53	0. 731
	2	508, 693. 00	13, 315. 30	2, 814. 53	0. 695
	3	565, 183. 00	13, 315. 30	2, 814. 53	0. 706
	4	443, 509. 00	13, 315. 30	2, 814. 53	0. 742

Note: All GDP (billions) are real GDP and all exchange rate are nominal exchange rate.

Table 2. Summary Table of Number of Inbound Tourists From 2004 to 2009

Country	Quarter	Year	Total
		2004	27,212,560
		2005	29,114,402
		2006	31,069,742
		2007	34,020,339
		2008	34,762,501
		2009	32,482,022
	1		41,099,129
	2		45,407,825
	3		57,456,347
	4		44,698,265
Canada			99,328,530
Mexico			33,429,537
United Kingdom			25,785,825
Japan			21,003,445
Germany			9,114,229
Total			188,661,566

Note: This summary table shows the total number of tourists in different years, in different quarters and from different countries. For example, in 2004, the total number of inbound tourists is 27,212,560, the total number of inbound tourists in the first quarter is 41,099,129 and the total number of inbound tourists from Canada is 99,328,530.

Table 3. MLR by Using Variables USAGDP, InboundGDP and Exchangerate

$numquarter = \hat{\beta}_0 + \hat{\beta}_1 \cdot USAGDP + \hat{\beta}_2 \cdot inboundGDP + \hat{\beta}_3 \cdot exchangerate + \hat{\beta}_4 \cdot season1$
$+ \hat{\beta}_5 \cdot season2 + \hat{\beta}_6 \cdot season3 + \varepsilon$ for Five Countries

Canada Model

Variable	Coeff.	Std Error	*p value*
Intercept	15.9195	4.2024	0.0009
inboundGDP	6.0276	0.6930	<.0001
USAGDP	-4.5775	0.7844	<.0001
exchangerate	-0.5133	0.1338	0.0008
season1	0.0442	0.0173	0.0170
season2	0.1259	0.0168	<.0001
season3	0.4055	0.0167	<.0001
R-square	0.9810		

Mexico Model

Variable	Coeff.	Std Error	*p value*
Intercept	4.0325	10.7935	0.7118
inboundGDP	5.7682	1.7659	0.0032
USAGDP	-3.3800	2.4476	0.1795
exchangerate	0.2430	0.2413	0.3236
season1	-0.3443	0.0589	<.0001
season2	-0.1571	0.0591	0.0135
season3	0.0888	0.0590	0.1450
R-square	0.8768		

United Kingdom Model

Variable	Coeff.	Std Error	*p value*
Intercept	17.1284	4.0369	0.0003
inboundGDP	2.4146	1.6387	0.1531
USAGDP	-2.3107	1.4968	0.1352
exchangerate	-0.4799	0.1676	0.0084
season1	-0.2466	0.0302	<.0001
season2	-0.0108	0.0303	0.7246
season3	0.0750	0.0304	0.0208
R-square	0.8732		

Table 3 Continued

Japan Model

Variable	Coeff.	Std Error	*p value*
Intercept	11.0052	5.6905	0.0645
inboundGDP	5.2465	1.5029	0.0018
USAGDP	-4.2623	1.1666	0.0012
exchangerate	-0.0937	0.1698	0.5859
season1	0.0352	0.0387	0.3726
season2	-0.1026	0.0390	0.0144
season3	0.1556	0.0387	0.0005
R-square	0.7530		

Germany Model

Variable	Coeff.	Std Error	*p value*
Intercept	-1.2351	8.6931	0.8882
inboundGDP	1.3045	1.6869	0.4469
USAGDP	0.3760	2.0874	0.8586
exchangerate	-0.8084	0.2783	0.0078
season1	-0.2135	0.0289	<.0001
season2	0.0747	0.0315	0.0263
season3	0.1984	0.0278	<.0001
R-square	0.9096		

Estimates of auto regressive parameters

Lag	Coeff.	Std Error	*t value*
1	-0.4252	0.1848	-2.30

Table 4. MLR by Using Variables USAGDP, InboundGDP and Realexchangerate

$numquarter = \hat{\beta}_0 + \hat{\beta}_1 \cdot USAGDP + \hat{\beta}_2 \cdot inboundGDP + \hat{\beta}_3 \cdot realexchangerate + \hat{\beta}_4 \cdot season1$
$+ \hat{\beta}_5 \cdot season2 + \hat{\beta}_6 \cdot season3 + \varepsilon$ for Five Countries by Using Real Exchange Rate

Canada Model

Variable	Coeff.	Std Error	*p value*
Intercept	7.0746	4.4287	0.1227
inboundGDP	7.2930	0.7716	<.0001
USAGDP	-4.5916	0.9899	<.0001
realexchangerate	-0.0614	0.7634	0.9366
season1	0.0263	0.0210	0.2218
season2	0.1168	0.0210	<.0001
season3	0.4074	0.0210	<.0001
R-square	0.9698		

Mexico Model

Variable	Coeff.	Std Error	*p value*
Intercept	5.3247	11.0744	0.6348
inboundGDP	5.7056	1.7484	0.0032
USAGDP	-3.4510	2.4465	0.1707
realexchangerate	0.2072	0.1913	0.2892
season1	-0.3433	0.0588	<.0001
season2	-0.1552	0.0591	0.0146
season3	0.0899	0.0589	0.1395
R-square	0.8775		

Table 4 Continued

The United Kingdom Model

Variable	Coeff.	Std Error	*p value*
Intercept	16.0331	5.8425	0.0111
inboundGDP	5.3125	1.3306	0.0005
USAGDP	-4.5437	1.4011	0.0033
realexchangerate	-1.0201	0.8904	0.2628
season1	-0.2441	0.0339	<.0001
season2	-0.0046	0.0339	0.8928
season3	0.0842	0.0339	0.0201
R-square	0.8401		

Japan Model

Variable	Coeff.	Std Error	*p value*
Intercept	-4.6225	11.8993	0.7010
inboundGDP	1.9501	1.9972	0.3381
USAGDP	-0.2610	2.4465	0.9159
realexchangerate	0.9604	0.8904	0.1480
season1	0.0324	0.0370	0.3894
season2	-0.1063	0.0370	0.0082
season3	0.1531	0.0370	0.0004
R-square	0.7705		

Germany Model

Variable	Coeff.	Std Error	*p value*
Intercept	22.7233	7.3020	0.0046
inboundGDP	3.1403	1.1194	0.0096
USAGDP	-3.7100	1.4195	0.0150
realexchangerate	-2.4861	0.5224	<.0001
season1	-0.2250	0.0318	<.0001
season2	0.0701	0.0318	0.0370
season3	0.1976	0.0318	<.0001
R-square	0.9174		

Table 5. Modified Model

$$numquarter = \hat{\beta}_0 + \hat{\beta}_1 \cdot USAGDP + \hat{\beta}_2 \cdot lagUSAGDP + \hat{\beta}_3 \cdot inboundGDP$$
$$+\hat{\beta}_4 \cdot laginboungGDP + \hat{\beta}_5 \cdot exchangerate + \hat{\beta}_6 \cdot lagexchangerate + \hat{\beta}_7 \cdot season1$$
$$+\hat{\beta}_8 \cdot season2 + \hat{\beta}_9 \cdot season3 + \varepsilon$$ by Using Lag Variables for Five Countries

Canada Model

Variable	Coeff.	Std Error	*p value*
Intercept	14.8962	5.0228	0.0071
inboundGDP	-7.9786	6.0095	0.1979
laginboundGDP	12.9408	5.8088	0.0364
USAGDP	7.2899	5.3868	0.1897
lagUSAGDP	-10.9517	5.0526	0.0413
exchangerate	-0.2584	0.1620	0.1277
lagexchangerate	-0.7040	0.2763	0.0183
season1	0.0563	0.0166	0.0026
season2	0.1448	0.0172	<.0001
season3	0.4165	0.0159	<.0001
R-square	0.9858		

Test result for lag variables all equal zero

Source	DF	Mean Square	F value	*p value*
Numerator	3	0.00235	2.50	0.0861
Denominator	22	0.00094007		

Table 5 Continued

Mexico Model

Variable	Coeff.	Std Error	*p value*
Intercept	0.7564	22.7583	0.9738
inboundGDP	2.5418	4.3718	0.5669
laginboundGDP	5.1348	4.8934	0.3054
USAGDP	3.0002	7.0145	0.6730
lagUSAGDP	-7.4665	9.3785	0.4345
exchangerate	-0.3635	0.4626	0.4404
lagexchangerate	0.5297	0.6205	0.4025
season1	-0.3566	0.0584	<.0001
season2	-0.1807	0.0595	0.0061
season3	0.0703	0.0588	0.2447
R-square	0.9858		

Test result for lag variables all equal zero

Source	DF	Mean Square	F value	*p value*
Numerator	3	0.01904	1.47	0.2499
Denominator	22	0.01295		

Table 5 Continued

The United Kingdom Model

Variable	Coeff.	Std Error	*p value*
Intercept	13.3602	4.0065	0.0030
inboundGDP	0.6181	1.9419	0.7532
laginboundGDP	7.4041	2.7933	0.0146
USAGDP	1.6570	2.0527	0.4282
lagUSAGDP	-8.0728	3.1456	0.0176
exchangerate	-0.7565	0.2604	0.0082
lagexchangerate	0.4134	0.3143	0.2019
season1	-0.2517	0.0282	<.0001
season2	-0.0202	0.0289	0.4914
season3	0.0670	0.0287	0.0292
R-square	0.9046		

Test result for lag variables all equal zero

Source	DF	Mean Square	F value	*p value*
Numerator	3	0.00752	2.41	0.0944
Denominator	22	0.00312		

Japan Model

Variable	Coeff.	Std Error	*p value*
Intercept	15.6435	6.0684	0.0172
inboundGDP	-1.0668	2.0346	0.6053
laginboundGDP	1.3767	1.1802	0.2559
USAGDP	4.1074	2.2087	0.0764
lagUSAGDP	-4.7266	1.3528	0.0021
exchangerate	0.0360	0.3410	0.9169
lagexchangerate	0.2308	0.4233	0.5911
season1	0.0278	0.0291	0.3513
season2	-0.1082	0.0314	0.0023
season3	0.1492	0.0291	<.0001
R-square	0.8788		

Test result for lag variables all equal zero

Source	DF	Mean Square	F value	*p value*
Numerator	3	0.02505	7.61	0.0011
Denominator	22	0.00329		

Table 5 Continued

Germany Model

Variable	Coeff.	Std Error	*p value*
Intercept	-25.1745	10.9440	0.0313
inboundGDP	-2.1724	1.8796	0.2602
laginboundGDP	6.1011	2.0073	0.0060
USAGDP	6.3082	3.1047	0.0544
lagUSAGDP	-5.5827	2.2834	0.0230
exchangerate	-0.3586	0.2950	0.2370
lagexchangerate	-0.1607	0.2884	0.5830
season1	-0.2193	0.0308	<.0001
season2	0.0727	0.0306	0.0268
season3	0.1980	0.0306	<.0001
R-square	0.9332		

Test result for lag variables all equal zero

Source	DF	Mean Square	F value	*p value*
Numerator	3	0.01909	5.12	0.0078
Denominator	22	0.00373		

Table 6. General Model and Test Results

Variable	Coeff.	Std Error	*p value*
canada	12.23958	12.03086	0.3110
mexico	0.35250	10.02152	0.9720
uk	13.44842	8.72902	0.1259
japan	7.32520	9.07209	0.4209
USAGDP	-1.04503	1.77686	0.5575
c1USAGDP	-3.53244	2.54488	0.1676
c2USAGDP	-2.33499	2.40361	0.3332
c3USAGDP	-1.26571	2.61342	0.6290
c4USAGDP	-3.21725	2.12997	0.1334
inboundGDP	2.38618	1.49809	0.1137
c1inboundGDP	3.64138	2.19880	0.1002
c2inboundGDP	3.38205	1.89950	0.0774
c3inboundGDP	0.02845	2.57804	0.9912
c4inboundGDP	2.86037	2.12926	0.1816
exchangerate	-0.79734	0.26571	0.0033
c1exchangerate	0.28403	0.40886	0.4885
c2exchangerate	1.04032	0.30995	0.0010
c3exchangerate	0.31749	0.34154	0.3544
c4exchangerate	0.70362	0.31596	0.0277
season1	3.46198	7.03456	0.6235
s1c1	0.26221	0.05581	<.0001
s1c2	-0.12632	0.05494	0.0232
s1c3	-0.02860	0.05475	0.6023
s1c4	0.25316	0.05497	<.0001
season2	3.75245	7.03439	0.5947
s2c1	0.05342	0.05498	0.3331
s2c2	-0.22956	0.05500	<.0001
s2c3	-0.08327	0.05477	0.1309
s2c4	-0.17505	0.05512	0.0019
season3	3.87731	7.03429	0.5825
s3c1	0.20815	0.05470	0.0002
s3c2	-0.10856	0.05495	0.0504
s3c3	-0.12235	0.05485	0.0275
s3c4	-0.04174	0.05489	0.4485
season4	3.67997	7.03430	0.6018
R-square	0.8299		

Note: Germany is the reference country.

Table 6 Continued

Source	DF	Mean Square	F value	*p value*
Numerator	24	0.04736	7.92	<.0001
Denominator	125	0.00598		

Note: Test result for c1USAGDP = c1inboundGDP = c1exchangerate = s1c1 = s1c2 = s1c3 = s1c4
= c2USAGDP = c2inboundGDP = c2exchangerate = s2c1 = s2c2 = s2c3 = s2c4
= 3USAGDP = c3inboundGDP = c3exchangerate = s3c1 = s3c2 = s3c3 = s3c4
= c4USAGDP = c4inboundGDP = c4exchangerate = 0

Source	DF	Mean Square	F value	*p value*
Numerator	4	0.00454	0.76	0.5542
Denominator	125	0.00598		

Note: Test result for H_0 : c1USAGDP= c2USAGDP= *c*3USAGDP= c4USAGDP= 0

Source	DF	Mean Square	F value	*p value*
Numerator	4	0.00781	1.30	0.2719
Denominator	125	0.00598		

Note: Test result for H_0 : c1inboundGDP = c2inboundGDP = c3inboundGDP = c4inboundGDP = 0

Source	DF	Mean Square	F value	*p value*
Numerator	4	0.02359	3.94	0.0048
Denominator	125	0.00598		

Note: Test result for H_0 : c1exchangerate = c2exchangerate = *c*3exchangerate = c4exchangerate = 0

Table 7. Annual Growth in Prices for Tourism Commodities in 2005 – 2010

[Percentage change from preceding period]

Commodity	2005	2006	2007	2008	2009	2010
All tourism goods and services	**4.9**	**4.5**	**3.7**	**5.7**	**–3.3**	**3.5**
Traveler accommodations	5.1	3.6	4.4	1.9	–3.2	1.1
Food and beverage services	3.2	3.2	3.7	4.5	3.8	1.3
Transportation	7.7	7.0	4.1	9.6	–9.1	7.2
Passenger air transportation	6.8	6.7	2.8	10.3	–8.4	9.0
Domestic passenger air transportation services	6.9	7.3	1.3	10.2	–6.8	7.5
International passenger air transportation services	6.9	5.5	5.3	10.5	–10.9	11.0
All other transportation-related commodities	8.4	7.3	5.1	9.0	–9.7	5.9
Passenger rail transportation services	3.6	7.2	4.7	3.7	1.4	0.9
Passenger water transportation services	1.1	–0.4	–0.5	–1.6	–9.3	1.2
Intercity bus services	3.6	7.2	0.8	6.4	3.9	4.8
Intercity charter bus services	2.3	3.5	3.1	2.5	1.3	4.5
Local bus and other transportation services	4.6	3.9	2.3	3.1	2.9	3.8
Taxicab services	4.6	3.4	2.0	4.0	4.7	4.1
Scenic and sightseeing transportation services	2.3	3.5	3.1	2.5	1.3	0.3
Automotive rental and leasing	1.0	6.6	2.1	8.4	10.0	–3.7
Other vehicle rental and leasing	0.1	0.8	6.6	6.7	–2.8	7.4
Automotive repair services	3.4	4.2	3.4	4.9	4.0	1.9
Parking	7.1	2.9	3.3	6.5	7.8	3.3
Highway tolls	12.6	10.8	5.8	13.6	–7.6	5.9
Travel arrangement and reservation services	0.2	3.5	2.3	0.1	0.5	0.8
Gasoline	22.1	12.7	9.7	17.0	–27.6	18.6
Recreation, entertainment, and shopping	2.2	2.4	2.6	3.6	1.3	0.9
Recreation and entertainment	3.2	3.2	3.2	3.4	0.5	0.8
Motion pictures and performing arts	3.1	3.5	3.5	2.6	1.5	1.5
Spectator sports	6.1	3.7	5.0	5.3	2.5	2.2
Participant sports	0.6	2.1	1.8	1.1	–0.7	–3.0
Gambling	3.4	3.2	3.0	3.8	–0.3	1.7
All other recreation and entertainment	3.3	3.5	3.6	3.6	1.5	–0.2
Nondurable PCE commodities other than gasoline	1.5	1.7	2.1	3.8	2.0	1.1

PCE Personal consumption expenditures

Table 8. National Travel and Tourism in the United States and Abroad in 2003–2009

Year	Millions of dollars			Share	
	Residents	Nonresidents (inbound)	Total	Residents	Nonresidents (inbound)
2003	502,293	64,391	566,683	88.6	11.4
2004	539,519	74,621	614,140	87.8	12.2
2005	579,495	81,867	661,361	87.6	12.4
2006	623,009	85,846	708,855	87.9	12.1
2007	655,179	96,935	752,113	87.1	12.9
2008	645,055	110,063	755,119	85.4	14.6
2009	567,783	93,998	661,781	85.8	14.2

Note: Sources of Table 7 and Table 8: Zemanek, Steven L. (2011). U.S. Travel and Tourism Satellite Accounts for 2007-2010, 31-33.

Table 9. Correlation Between Variable USAGDP and CPI

Correlation between USAGDP and CPI

Variable	Coeff.	Std. Error	*p value*
Intercept	7.76086	0.13380	<.0001
CPI	0.36424	0.02869	<.0001

The square root of R Square is 0.7106.
Note: The table shows the result of the correlation between USAGDP and CPI.