TERRORISM'S EFFECT ON TOURISM: DEVELOPED VS. DEVELOPING

COUNTRIES

Except where reference is made to the work of others, the work described in this thesis is my own or was done in collaboration with my advisory committee. This thesis does not include proprietary or classified information.

_____

Alexi Simos Thompson

Certificate of Approval:

_____	_____
Richard P. Saba	John D. Jackson, Chair
Professor	Professor
Economics	Economics
_____	_____
T. Randolph Beard	George T. Flowers
Professor	Interim Dean
Economics	Graduate School

TERRORISM'S EFFECT ON TOURISM: DEVELOPED VS. DEVELOPING COUNTRIES

Alexi Simos Thompson

A Thesis

Submitted to

the Graduate Faculty of

Auburn University

in Partial Fulfillment of the

Requirements for the

Degree of

Master of Science

Auburn, Alabama
August 9, 2008

TERRORISM'S EFFECT ON TOURISM: DEVELOPED VS. DEVELOPING COUNTRIES

_____
Signature of Author

_____
Date of Graduation

THESIS ABSTRACT

TERRORISM'S EFFECT ON TOURISM: DEVELOPED VS DEVELOPING COUNTRIES

Alexi Simos Thompson

Master of Science, August 9, 2008
(B.S., Auburn University, 2003)

70 Typed Pages

Directed by John D. Jackson

This thesis studies the effect terrorism has on tourism between developing and developed countries. Using cross sectional techniques on a data set consisting of 60 countries, results conclude that terrorist events are more damaging to developing country tourism than to developed country tourist sectors. Possible explanations for the difference are given as well as policy adjustments based on the results.

The organization of the paper is as follows. Chapter 1 includes a brief history of tourism and terrorism and how they affect each other. Chapter 2 is a literature review including a discussion of the tourism model. Chapter 3 presents methodology. The model in this thesis is discussed in this chapter as well as explanation of all variables. Chapter 4 discusses the results of the regressions and other tests conducted on the data

including misspecification tests. Finally, Chapter 5 consists of the conclusion which discusses policy suggestions based on the results of this thesis.

Style manual or journal used:	American Economic Review
Computer software used:	Limdep
	Excel 2007

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

A. A Look at Tourism

Tourism has become a major economic activity in the 20th century. The supply of airplanes left over from World War II led to the growth of the airline industry. As the airline industry became more competitive and the world economy experienced substantial growth. Traveling, a luxury once enjoyed only by the wealthy, became affordable to the masses.

The economic significance of tourism today is quite evident. Tourism accounts for 10% of world GDP. Table 1 summarizes the growth in world tourism since 1992.

Table 1 **Tourism Growth Since 1950**

YEAR	International Tourist Arrivals (000)	Trips per thousand world population
1950	25282	10.05
1960	69286	23.24
1965	112729	34.28
1970	159690	44.24
1975	214357	54.04
1980	287906	64.70
1985	329636	67.9
1990	455594	86.52
1991	455100	84.53
1992	475580	87.49

Trips have increased nearly nine fold from 1950-1992. This increase reflects the growing importance of tourism in the world economy.

The tourism industry can benefit an economy in numerous ways. Tourism increases government tax revenue, reduces unemployment, and creates a more diversified economy. Much of the tourism industry is concentrated in developed countries, and the majority of tourists come from developed nations. However, tourism is widely considered a viable source of income for developing countries. Many less developed countries are geographically located in areas to attract tourists.

Countries such as those in the Carribbean have taken full advantage of their warm climate and beaches to attract millions of tourists yearly. Tourism comprises up to 50% of GDP in some countries like the Bahamas. These countries however enjoy the unique position of being relatively close geographically to the United States, a large developed country whose citizens travel extensively. Other developing countries have potential for economic growth through tourism but may lack the infrastructure and resources for tourism development.

Limited resources in developing countries constrict the number of sectors in the economy. Many developing countries export mainly agricultural products. Investment and labor used in agricultural production may come at the tourism's industry expense. The lack of resources may force developing countries to substitute between economic activities.

Easton (1998) studied the relationship between tourism and commodity trade in Canada and found evidence of substitutability between trade and tourism citing labor in one industry takes away labor from the other industry. Evidence of substitutability between trade and tourism in a country as developed as Canada suggests that for less developed countries substitutability may be even more pronounced.

Many small developing countries rely on agricultural exports, but heavy reliance on agricultural exports can be volatile. Droughts and fluctuating world prices can damage an agricultural based economy. Investment in the tourism industry enables the developing countries to diversify their economic base by relying less on agriculture

and to explore other opportunities for economic growth. As previously mentioned, tourism can increase GDP, foreign investment, and create jobs.

Yet like agriculture, tourism can be susceptible to outside influences. Natural disasters, political instability, terrorism, exchange rate fluctuations, domestic prices, and price volatility can all influence the location for a vacation. The main focus of this thesis is to find what, if any, effect terrorism has on tourism. Although several papers have previously studied this relationship, I go further by looking at the differential effect terrorism has on tourism between developed and developing countries. The following section gives a brief overview of terrorism before its economic effect on the tourism industry is discussed.

B. A Look at Terrorism

Terrorism is the "premeditated use or threat of use of violence by individuals or subnational groups to obtain a political or social objective through the intimidation of a large audience, beyond that of the immediate victim." (Enders, 2003).

By using violence against non-combatants, terrorists instill fear in citizens. Through intimidation, the terrorist group hopes to weaken the government's legitimacy while strengthening their own importance. The terrorist group accomplishes its goal(s) if through the threat or action of violence the government succumbs to their demands, usually political.

Defining what constitutes a terrorist act is necessary in studies involving terrorism because sources define this notion differently. Often comparing statistics on terrorism

from two data sources reveal very different numbers for identical events. This thesis adopts the definition of terrorism employed by the Memorial Institute for the Prevention of Terrorism (MIPT). The MIPT characterizes a terrorist group as a group "belonging to an autonomous non-state or subnational revolutionary or anti-government movement." Such movements use violence or threaten violence to achieve political goals. The violence is used against civilians to create fear.

Besides death and destruction caused by terrorism, terrorist acts can have serious effects on the economy. Tourism is one sector of the economy that terrorism can immediately affect. The following section describes how terrorism affects the tourism industry.

C. Terrorism's Effect on Tourism

Terrorism can unravel a country's tourism industry. Terrorism directly affects tourist decision making. Tourists may substitute between vacation spots if they feel threatened or unsafe in a country. Fewer annual tourists as a result of terrorism will typically result in losses of tourism revenue. Losses in tourism revenue may have a larger impact in those countries in which tourism constitutes a larger percentage of GDP.

Terrorism can also affect the amount of foreign investment that flows into the country, especially investment in tourism. Typically in less developed countries where resources are limited, foreign investment funds tourism businesses. The threat of terrorism discourages foreign investment as lenders invest their money elsewhere.

Finally, the threat of terrorism forces governments to invest more in security than they would normally. These funds could have been invested elsewhere that may be more beneficial to the economy if it were not for terrorism. For example, labor that could have been used to cultivate lands or aid in construction must be trained to become police officers. The opportunity costs of dealing with tourism may be large relative to available sources.

D. Concluding Remarks

Tourism has become an important source of world GDP since the 1950's. Tourism generates revenue, increasing foreign investment and employment opportunities. The tourism industry can be disrupted by terrorism and the use of violence creates a dangerous environment for tourists. Terrorism affects tourism by decreasing revenues through fewer tourists, discouraging foreign investment.

This thesis studies terrorism's differential impact on tourism between developed and developing countries. Theoretically, a developed country's tourism industry might suffer less than a developing country's tourism industry from a given incident simply because a developed country has a more diverse economy than its less developed neighbors.

Security added by a developed country will comprise relativity fewer resources from other economic sectors than in a less developed country. Diverting fewer resources allows developed countries to continue investing and marketing their tourism industry at similar pre-terrorism levels.

No formal investigations into the difference of terrorism's effect on tourism between developed and developing countries have been undertaken. This aspect of the results is unique and offers potential policy implications for lessening the detrimental effects of terrorism on tourism.

E. Study Overview

The sections of the paper are as follows. Section 2 presents a literature review, Section 3 methodology, Section 4 results, and Section 5 concluding remarks. The literature review analyzes a typical demand model for tourism which this paper builds upon.

Section 2 also looks at other literature on the topic of terrorism and tourism, and discusses the difference between previous work and this thesis. Methodology (Section 3) includes an explanation of econometric tests on the data set. This section relates economic theory to the independent variables. The results in Section 4 are discussed in the context of economic theory and compared to related results in the literature. Concluding remarks in Section 5 will offer policy suggestions based on the results.

2. LITERATURE REVIEW

A. Previous Literature

Terrorism's effect on tourism has gained the attention of US economists since the events of September 11. The following section discusses some of the more prominent literature on this topic, beginning with a discussion of a paper by Brakke (2004) who presents a model of tourism demand. I add a terrorism variable to construct a more complete model of the demand for tourism.

Included in the literature review is a discussion of previous articles that study the price elasticity of demand in the tourism industry. My paper focuses on terrorism's effect on tourism and the inclusion of independent variables PPP (purchasing power parity or the real price of tourism) and GDP of the host tourist country provides an opportunity to analyze the price elasticity of tourism.

Brakke (2004) looks at US tourism demand to 85 countries over a period of 16 years from 1984-1999 and uses a fixed effects model on a pooled data set. The fixed effects model utilizes dummy variables in a panel data set to measure factors that are constant over time but vary across cross section groups. The number of tourist arrivals is the dependent variable in the model. Independent variables are a price competitive index, income per capita in the source country of the tourist, and a political instability variable.

The price competitive variable looks at the relative price between the host country and the source country The source country is the US and US prices are used in the following calculation. The definition of purchasing power parity is P = eP*where P is the price in the tourist host country, P* is the price in the US, and e is the exchange rate between the two countries. By dividing P by eP* and multiplying this term by 100 we find competitive prices across countries relative to the US. Theoretically, a tourist should be attracted to a country that is relatively cheaper *ceteris paribus*.

This variable does not explicitly include transport costs. Transport costs are not included as a separate variable because this variable is not significant in other studies. Transport costs will not be of interest in a cross sectional study since distances and fuel prices may be similar across countries. Further, airline tickets are purchased in the country of tourist origin so unless this data can be clearly isolated it would not be conclusive.

Demand for tourism will rise as incomes of the source countries rise. As incomes rise, travel becomes relatively cheaper holding prices constant. Potential tourists will have more disposable income to spend on vacations.

The political instability variable of Braake comes from *Freedom House Country Ratings* (2005) Countries are rated 1 to 7 on political rights and civil liberties. A lower number indicates more freedom. Political strife can deter tourism by creating an unpleasant and unsafe atmosphere.

Braake found that income per capita of the source country has a positive effect on tourism demand, and political instability has a negative effect on tourism demand as

theory suggests. Relative prices, on the other hand, are not significant. Braake explains this result is a reflection of consumer tastes, and this conclusion is reflected by the dominance of highly developed nations to attract tourists. Developed nations are relatively more expensive than developing tourist nations but must be more able to accommodate tourist preferences.

The demand model used in this thesis is based upon the model composed by Braake with a few exceptions. As previously mentioned, a terrorism variable replaces the political instability variable used by Braake. Problems with multicollinearity will arise if both are included in my model because terrorism affects the political stability of an area. Also, GDP per capita of the host country (tourist destination) is an independent variable in this model. The inclusion of this variable is unique. Braake's study and other studies concentrate on the GDP of the source countries to explain tourist demand. GDP per capita of the host country is a proxy for the level of comfort and quality of tourist amenities that a country has. Obviously, the ability of a country to provide for the needs of tourists will increase demand for tourism in that country.

The negative effect of terrorism on tourism is persistent throughout the literature. Do terrorism incidences impact tourism permanently or have short term effects? This question is explored by Ally and Strazichick (2000). These two economists look at Egypt and Israel, two countries suffering from terrorism that nevertheless continue to attract a large number of tourists. The annual data from Egypt covers the years 1955-1997. This data was collected from the Bank of Egypt's Annual Economic Bulletin. Annual Israel data covers the year 1971-1997 and comes from the Israel Ministry of Tourism. Using a

two-break minimum Langrange multiplier unit-root test designed by Strazichik, they test whether the data is stationary. A stationary mean reverting result suggests that terrorism's effect on tourism is transitory while a non-stationary result shows that tourism never fully recovers from a terrorist act. Their tests provided stationary results indicating the effects of terrorism are not permanent.

Drakos and Kutan (2003) study the effects of terrorism on tourism in Greece, Turkey, and Israel using monthly data from January 1996 to December 1999. These countries receive large numbers of tourists despite being susceptible to terrorist attacks. Using a seemingly unrelated regression model, Drakos and Kutan find that terrorism negatively affects tourism and substitution effects exist between these countries. A higher number of terrorist attacks in Israel results in an increase in tourists to Greece. Drakos and Kutan also find that intensity of terrorist attacks affect tourist decisions.

Enders and Sandler (1991) study the effect that the ETA terrorist group has had on Spanish tourism. Spain is consistently in the top five visited countries in the world. Between 1985 and 1987, ETA specifically targeted tourists to damage the industry. The authors employ a vector autoregressive model on monthly data during 1970-1991. Enders and Sanders find that each transnational terrorist attack dissuaded 140,000 tourists from visiting Spain, resulting in decreased revenues when multiplied by average tourist expenditure (a value not calculated in the paper.)

Enders, Sandler, and Parise (1992) use an ARIMA model with a transfer function to study lagged effects of terrorism on tourism for Austria, Greece, and Italy. Looking at tourism receipts during 1974-1988, the authors find significant negative lagged effects of

terrorism on the tourist industry. The authors find losses of tourism revenue for continental Europe amounting to 16 billion SDR's.

The following literature review discusses the price elasticity of the tourism industry. Garin-Munoz and Amaral (2000) measure the demand for Spanish tourism services using an unbalanced panel data set of 17 countries from 1985-1995. The 17 countries are the tourist source countries. Most of the countries are European, however the US, Canada, and Mexico are also included in the data set. The unbalanced data set allows for different number of observations for the source countries. The authors employ OLS on a set of yearly data.

The dependent variable used in the paper is the number of nights per capita spent in hotels by tourist country of origin. Independent variables include real per capita income, exchange rates, and real prices. Real per capita income of the tourist source countries were calculated by expressing GNP of each country in 1990 U.S. dollars and dividing by the population of each country. Transportation costs were excluded from the model due to lack of data.

The results indicate that all real income per capita and exchange rates are significant at the 10% level. The model was in double log form so that results could be expressed in elasticities. Real income per capita and exchange rates are positively correlated with nights spent in hotels with coefficient estimates of 1.4 and 0.5. These results are across all countries.

The positive results of these variables suggest that as incomes rise in the source countries, people tend to travel more to Spain, and that a dpereciation of the Spanish currency (at that time the peseta) increases the demand for tourism as would be expected.

B. Conclusion

The previous literature uses time series or panel data and focuses on individual country or regional effects of terrorism on tourism. Terrorism's negative impact on tourism is the prevalent conclusion in previous studies. Topics including the longevity of terrorism's impact on tourism have been studied. The previous literature has not, however, looked at differences between developed and developing nations, the subject of this thesis.

Also, the previous literature concludes that tourism is a price inelastic industry. The results of this thesis yield similar results. The previous literature focuses on individual country studies, but I find that price inelasticity of tourism holds across a wide range of countries from various regions. The results are more general and policy suggestions perhaps more relevant than would be for countries not individually studied.

3. METHODOLOGY

Unlike previous research, this thesis is a cross sectional study while other papers studying the effects of terrorism use time series data. By using cross section techniques I can make general, cross country comments on terrorism. The effects of terrorism can have devastating effects on tourism but developed nations may suffer fewer negative effects than poorer nations due to economic diversity.

Cross sectional techniques are utilized to distinguish this difference. This thesis is a cross sectional study of 60 countries during 2003. All variables in the final regression are in log form to report tourism demand elasticities of independent variables.

A. Model

The fundamental regression equation examined is:

$$TPC = a_0 + a_1PPP + a_2TER + a_3GDP_S + a_4GDP_H + a_4INT + e$$

where TPC is tourist arrivals per capita, PPP is purchasing power parity, TER is the number of terrorist attacks, GDP_S is gross domestic product per capita of the tourist source country, GDP_H is gross domestic product per capita of the host country, and INT is an interactive term combining GDP_H and TERR. The error term, e, is assumed to be normally distributed.

The basis for this model comes from Braake (2004). Purchasing power parity, PPP, and GDP_S are the independent variables from Braake's tourism demand model. Braake also includes a political instability variable. The inclusion of a political instability variable and terrorism variable may lead to problems of multicollinearity and political instability is not included in the present study.

The dependent variable TPC is tourist arrivals per capita for 2003. This variable divides the total number of tourists visiting each country in the sample by the population of the country. The arrivals per capita variable standardizes the variable across countries. Some countries like the US attract a high number of tourists but rely little on tourism due to size and diversity. TPC in the US is small relative to countries like the Bahamas that attract fewer tourists but arrivals relative to the population in the Bahamas is large.

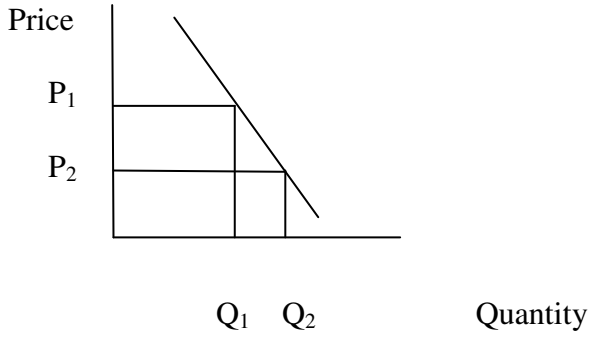
The assumption is that tourism is more important to countries that attract large numbers of tourists relative to the population. The sources for the data include *Tourism Market Trends* (2004) for the number of tourists and the *Penn World Tables* for the population for sample countries.

The independent variable PPP, one of the variables in Braake (2004), is the real exchange rate of the host country. This variable is listed in the *Penn World Tables*. Purchasing power parity is defined as PPP = P/eP* where P is the US price of the tourist source country, P* the price of the host country, and e is the exchange rate expressed as $/currency. PPP takes into account prices in both countries as well as the exchange rate between the currencies in the countries. The US is used as the base country to standardize relative prices across countries. The PPP value for the US is 1. A country

with a PPP value smaller than 1 is relatively more expensive than the US, and a country with a PPP value larger than 1 would be relatively cheap compared to the US.

Economic theory suggests tourists will be attracted to countries with lower relative prices. Low prices will increase the quantity of tourism demanded and attract visitors. This increase in the quantity demanded for tourism is depicted in Figure 2. P_1 represents initial prices corresponding with Q_1, with the number of tourists purchasing tourism at P_1. The decrease in the relative price to P_2 corresponds with the increase in quantity demanded for tourism at Q_2.

Figure 2. Decrease in Relative Prices (PPP)



One assumes this principle translates on average into tourists from developed nations traveling to developing nations where prices are cheaper. Poor countries like Thailand and Morocco attract many European tourists from developed nations such as France and England. My results will show that tourism is dominated by developed nations. The majority of tourists come from developed nations and travel to developed nations. Relative prices may be more pertinent to time series studies where changes in prices can be measured over time and tourists to a particular country might respond.

The variable GDP_S is the GDP per capita of the source country. The source country in the present thesis is the country of origin of the largest numbers of tourists. As Braake (2004) points out, higher incomes decrease the share of travel expense relative to income allowing longer and more frequent opportunities to travel. Assuming tourism is a normal good, a positive coefficient on GDP_S will reflect an increase of demand for tourism as incomes in the source country grow.

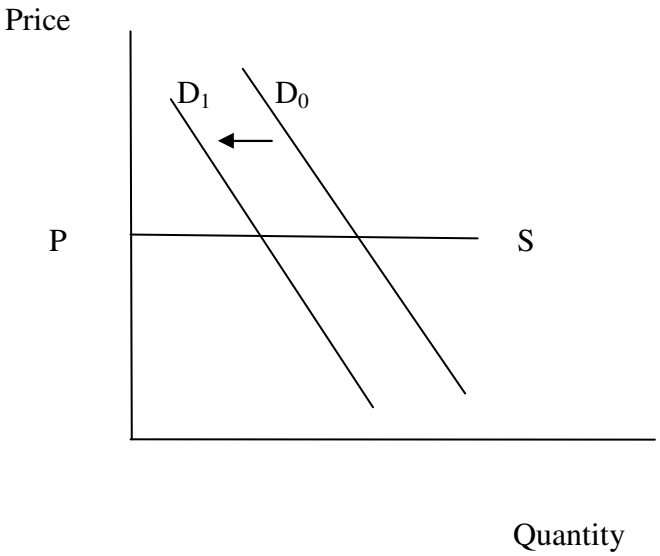
Source countries compiled from the *Compendium of Tourist Statistics* (1996) include the top source country of tourists for each host country for the year 1996. The base year of this thesis is 2003. Due to lack of data, source country data is from 1996. GDP of the source countries, from the *Penn World Tables*, are expressed in 2003 US dollars.

The last two independent variables, terrorism and GDP of the host country, are variables the present thesis adds to the Braake tourism demand model. These variables are also the focus of this thesis.

Terrorism instills fear in citizens and visitors, causes damage, and diverts resources to added security. Obviously, terrorism should negatively impact many sectors of the economy including tourism. Terrorists often deliberately attack tourists to receive greater media attention. The Bali nightclub bombing killed many tourists and damaged Bali's tourism industry (Henderson 2003). Tourists can be expected to substitute vacation destinations or just stay at home if they feel threatened in certain countries. Terrorism should decrease the demand for tourism at a given price (P) as tourists will substitute vacation destinations or simply stay home, shifting the demand curve from D_0

to D_1 in Figure 3. The supply curve (S) is assumed to be perfectly elastic meaning that at a given price of tourism, countries are willing and able to accommodate any number of tourists.

Figure 3. The Effect of Terrorism on the Demand for Tourism



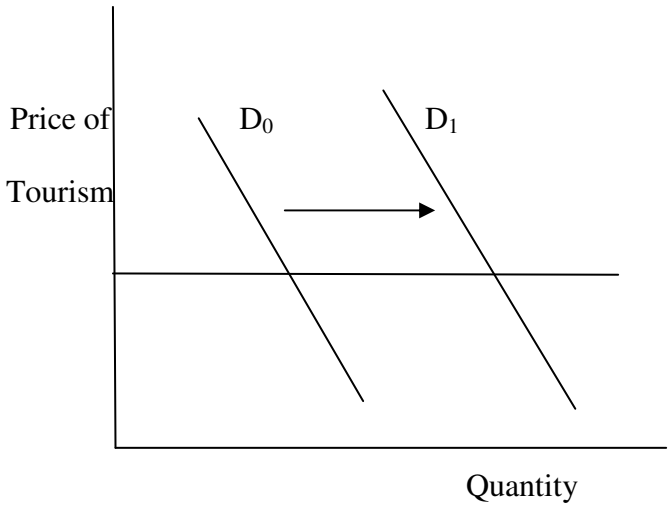
The terrorism variable includes the total number of terrorism incidences (domestic and international) that occurred in each country during the five year span from 1999-2003. Five years of terrorism incidences are included in the data since violent attacks occurring in past years may have an effect on current tourist decision making.

The other variable of interest is income per capita of the host country, GDP_H. The previous literature shows that tourism is a sector dominated by developed countries. Developed host countries may be more able to accommodate tourists than poorer nations. This variable represents a reflection of comfort and perhaps safety. Greater comfort and

tourist amenities will increase tourist demand for the host country resulting in more visitors.

GDP of the host country (quality of tourism services) was not included in the study by Braake who instead includes GDP of the tourist source country arguing that tourism is a normal good. As incomes rise, more money will be spent on tourism. I include both GDP of the source and host countries for reasons mentioned above. The results indicate economic significance of GDP_H validating its inclusion in the model. Increases in GDP_s and GDP_H should increase the demand for tourism at a given price, indicated by the shift from D_0 to D_1 in the following figure.

Figure 1. Increases in GDP_H and GDP_S on the demand for tourism



The ability for high GDP_H countries to provide for tourist demands may be reflected in higher relative prices (PPP) in developed countries. However, if tourists are concerned with prices, then one will expect PPP to be positive and statistically significant

signifying the ability for less expensive countries to attract a larger group of tourists than expensive countries. This result would reveal that tourists are price sensitive.

Developing countries are usually cheaper than developed ones, but expensive developed nations are better able to accommodate tourists. Theoretically, developed and developing nations will attract tourists for opposing reasons, and it is unlikely that both variables (GDP_H and PPP) will be significant. The results will reveal tourist preferences.

The last variable INT is an interactive variable between terrorism and GDP of the host country (TERR*GDP_H). In addition to the effect of terrorism on tourism, a contribution of this thesis is to look at the difference in the effect of terrorism on the economies of developed and developing nations. Theoretically, terrorism will harm a poor nation more than a developed country. A developed country has a more diverse economy and tourism is relatively less important to the economy than in a poorer nation. Definitely, the effects of 9/11 had negative effects on US tourism and economy (Looney 2002) but the US was perhaps able to rebound economically much quicker than if this attack had occurred in a smaller, less developed country. A positive interactive coefficient will indicate that higher GDP of the host country will offset, at least somewhat, the negative effects of a terrorist attack.

B. Data

The data on terrorist incidences was collected from the Memorial Institute for the Prevention of Terrorism (MIPT). The data includes both domestic and international incidences. It may be argued that a domestic terrorist incident targeting the government

may not discourage a tourist from visiting the country since the tourist is not the target but domestic terrorism is a signal of political instability and can create an unsafe environment for a visitor. The collection of this data involved physically counting the number of terrorism incidences for each country.

Tourism source data was collected from the *Compendium of Tourist Statistics* (2003). Tourist arrival data comes from *Tourism Market Tr*ends (2004). The data in the publications was gathered by the World Trade Organization (WTO). Data on tourism may be unreliable and it is necessary that all data come from similar sources. Countries may exaggerate tourism revenue for marketing reasons. The WTO is widely recognized as a viable source for tourist information. The WTO defines a tourist as "a person who travels to another place, outside their usual environment, for private interests or is sent there (by work) but is not employed at this place." (2006)

C. Descriptive Statistics

Descriptive statistics of all dependent and independent variables are useful background information and may indicate future problems in coefficient estimates. Ordinary Least Squares (OLS) estimation is used in this paper. One of the assumptions of OLS is that dependent variables are normally distributed. Non-normal distribution may be due to outliers and so on. Model misspecification is a problem resulting from non-normal distributed variables.

The Ramsey Reset Test examines misspecification of the model. A misspecified model will produce biased and inconsistent estimates thus the following analysis provides

a summary of descriptive statistics and histograms for all variables to provide reason for future econometric tests.

The dependent variable, tourist arrivals per capita, indicates the demand for tourism in the host country. The following histogram reveals the distribution of the dependent variable for the 60 countries. The appendix at the end of the paper includes the entire data set. The descriptive statistics follow the histogram so that interpretation of the distribution is possible. The histograms and descriptive statistics of the variables all report the natural log form of the variables since the regression is in log form. Figure 4 is a histogram of tourist arrivals and Table 2 lists the descriptive statistics for tourism arrivals per capita.

Figure 4. Histogram of TPC (in natural log form)

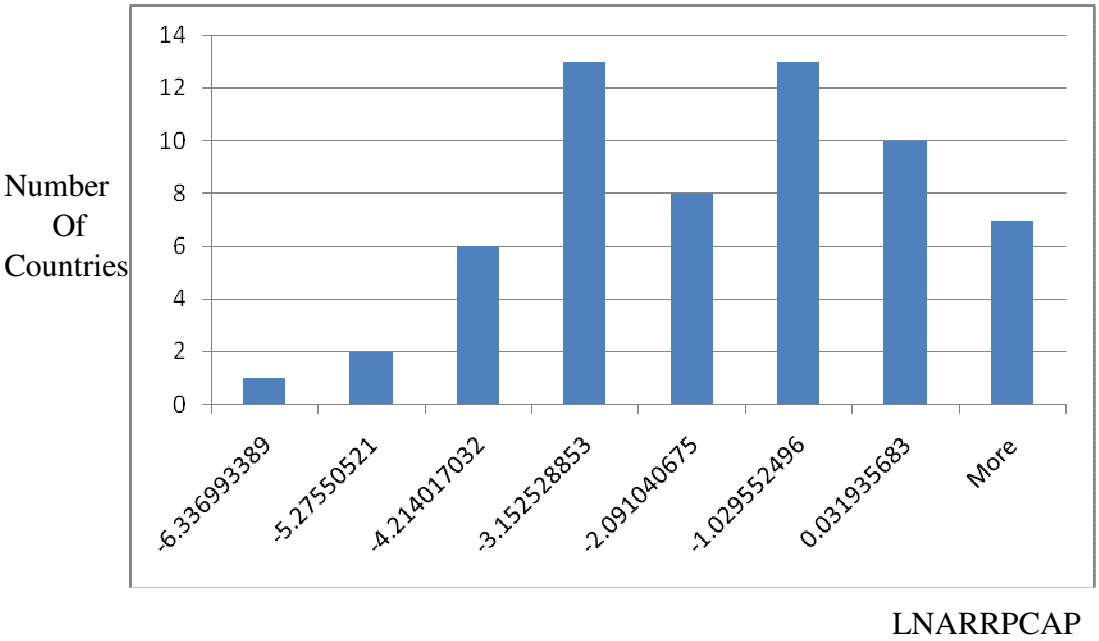


Table 2 Descriptive Statistics for TPC (in nat. log form)

MEAN	-2.3
STANDARD ERROR	.23
MEDIAN	-2.14
STANDARD DEVIATION	-1.8
SAMPLE VARIANCE	3.2
KURTOSIS	-.7
SKEWNESS	-.2
RANGE	-7.4
MINIMUM	-6.3
MAXIMUM	1.1
COUNT	60

The mean of -2.3 corresponds with the value of 0.005. The average tourist arrivals per capita is not very large and perhaps for the majority of countries in the sample tourism does not contribute greatly to the economy.

The histogram reveals, as the descriptive statistics indicate, a slight negative skew and negative kurtosis. Skewness measures the symmetry of the data. A normally

distributed data set will peak at the mean where the majority of the observations lie then decay rapidly on the right and left sides. The observations are tailed leftwards explaining the negative skew. Kurtosis, measuring the peak of the data set at the mean is low for this set of data. As the descriptive statistics show, the kurtosis is -0.7. There is no peak in this data, rather the data appears to cave in. Despite the low kurtosis, the standard deviation is relatively low therefore a significant number of observations do lie close to the mean which is what we should expect.

Next consider the independent variable of primary interest in the study, terrorism incidences. Figure 5 is a histogram of terrorism incidences and descriptive statistics are shown in Table 3.

Figure 5. Histogram of TERR (in nat. log form)

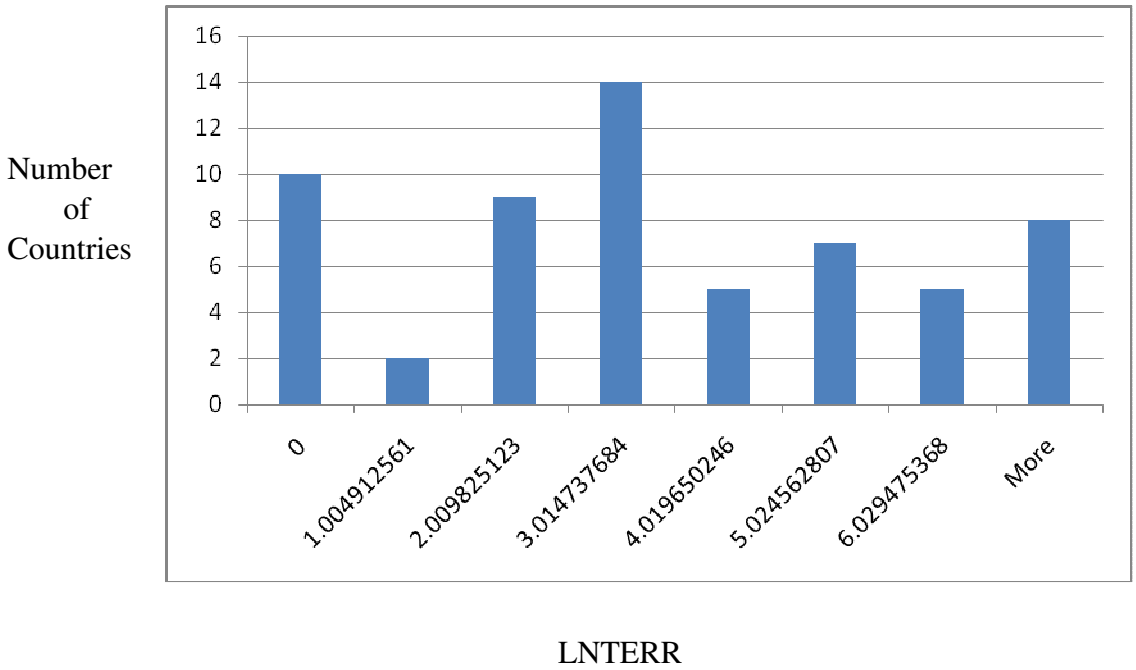


Table 3 Descriptive Statistics for TERR (in nat. log form)

COUNT	60
STANDARD ERROR	.28
MEDIAN	2.5
MODE	0
STANDARD DEVIATION	2.13
SAMPLE VARIANCE	4.54
KURTOSIS	-1.08
SKEWNESS	.23
RANGE	7.03
MINIMUM	0
MAXIMUM	7.03
SUM	177.3
COUNT	60

The average number of terrorism incidences across all countries is 120.9. This is an average of about 24 attacks per year per country over the five year period covered by the data. The skewness of the data is low, 0.23, indicated by the symmetry of the right and left sides of the histogram. Unfortunately the tails of the distribution are very fat, which explains the negative value of the kurtosis. The standard deviation is quite large

relative to the mean indicating a large dispersion in terrorism incidences among the countries in the sample. Countries suffering most from terrorism include Colombia and Spain, with 1135 and 732 terrorist incidences respectively across this 5 year period.

Australia and Portugal are examples of two countries in the sample not affected by terrorism with one attack each.

The next variable to encounter is PPP (purchasing power parity). Figure 6 is a visual representation of PPP and descriptive statistics of PPP are listed in Table 4. This data provides adequate background information on this variable pertaining to the countries in the data set.

Figure 6. Histogram of PPP (in nat. log form)

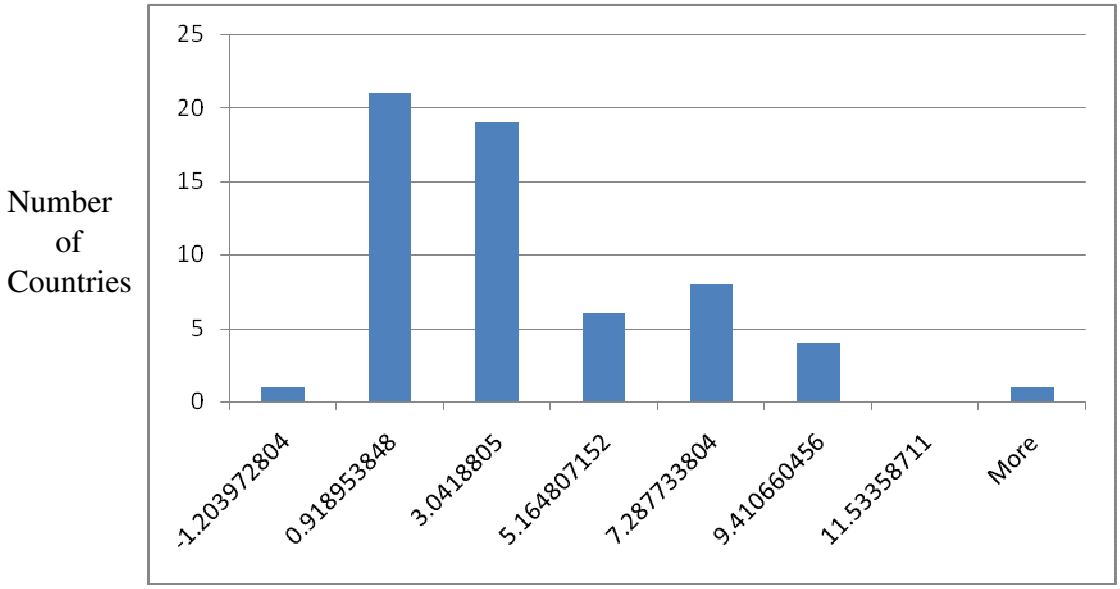


Table 4 **Descriptive Statistics of PPP (in nat. log form)**

MEAN	2.55
STANDARD ERROR	0.39
MEDIAN	2.03
MODE	2.48
STANDARD DEVIATION	3.0
SAMPLE VARIANCE	8.95
KURTOSIS	1.76
SKEWNESS	1.22
RANGE	14.86
MINIMUM	-1.2
MAXIMUM	13.66
SUM	153.26
COUNT	60

The positive mean value indicates the majority of the countries in the sample are cheaper than the US as PPP are relative prices between the host countries and the US. The US is given the value of 1. Countries where PPP < 1 are more expensive than the US while those countries where PPP > 1 are relatively cheaper. The natural log of one is zero thus the positive mean value indicates relatively cheaper prices than the US on average in the sample countries.

The positive kurtosis indicates a "peak" in the data with rapid decay on either side of the peak however the data is highly skewed to the right as indicated by the skewness value 1.22. A quick look at the histogram will point out the right tail. The data is spread out over such a large distance that the standard deviation is larger than the mean.

The next variable is GDP_s (GDP of the source country). The histogram is represented in Figure 7 and descriptive statistics for this variable are listed in Table 5.

Figure 7. Histogram of GDP_S (in nat. log form)

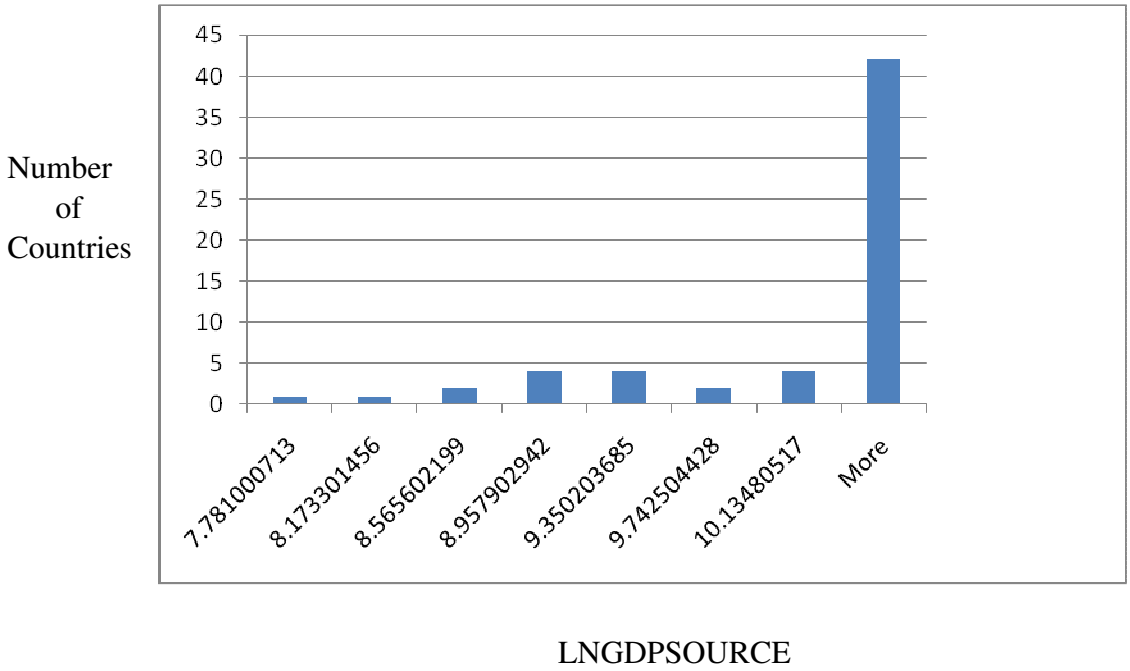


Table 5 **Descriptive Statistics of GDP_S (in nat. log form)**

MEAN	9.94
STANDARD ERROR	.09
MEDIAN	10.21
MODE	10.21
STANDARD DEVIATION	.67
SAMPLE VARIANCE	.45
KURTOSIS	2.23
SKEWNESS	-1.71
RANGE	2.75
MINIMUM	7.78
MAXIMUM	10.53
SUM	596.45
COUNT	60

The income of the source countries is on average very high. It is worth noting many of the source countries such as Germany and US appear several times in the data. The US and Germany are rich countries with large populations whose citizens enjoy traveling, accounting for their numerous appearances in the GDP_S data set. The multiple observations of Germany, the US, and other developed countries accounts for the large positive kurtosis or "peak" in the histogram as well as the negative skew. Most of the source countries are located near the high mean level with poorer source countries

making up the negative skew. As can be expected with so many observations around the mean the standard deviation is very low.

The range of host country income GDP_H observations vary widely across countries as some are highly developed and others are poor developing countries. The histogram showing GDP_H observations is depicted in Figure 8 and descriptive statistics are in Table 6.

Figure 8. Histogram of GDP_H (in nat. log form)

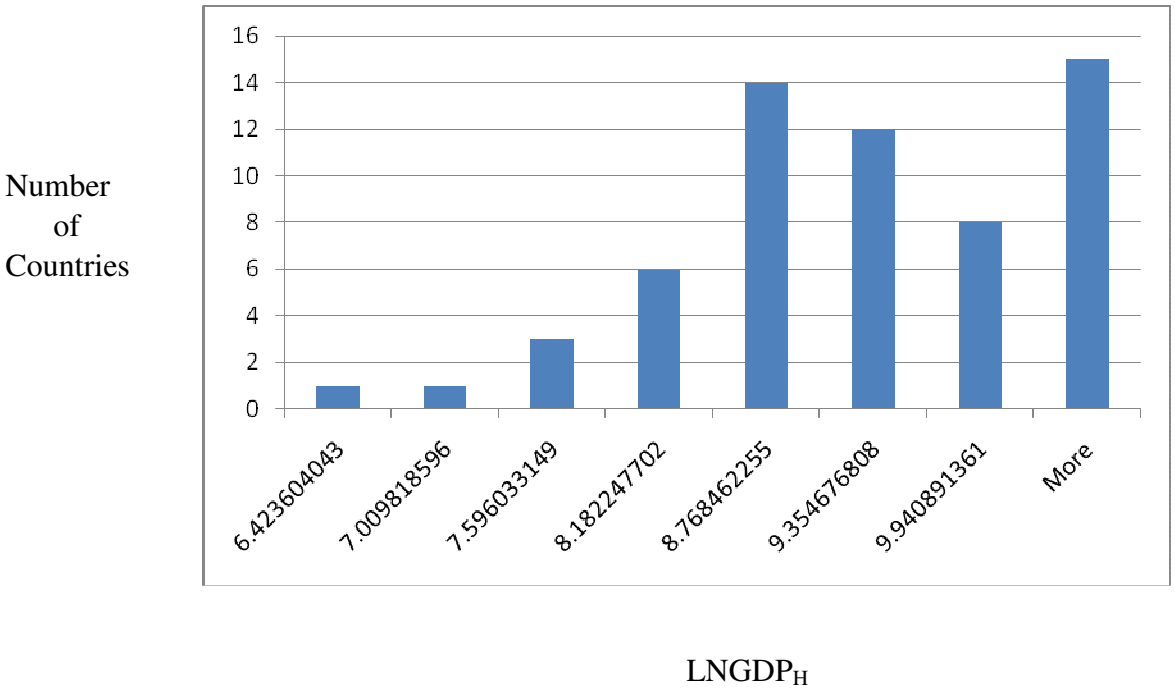


Table 6 **Descriptive Statistics of GDP_H (in nat. log form)**

MEAN	8.98
STANDARD ERROR	.13
MEDIAN	8.95
MODE	N/A
STANDARD DEVIATION	.98
SAMPLE VARIANCE	.97
KURTOSIS	-.32
SKEWNESS	-.42
RANGE	4.10
MINIMUM	6.42
MAXIMUM	10.53
SUM	538.85
COUNT	60

The mean of GDP for the host countries is quite high with a low standard deviation as the histogram indicates a large number of observations around the mean. The data is however skewed to the left as the negative skew implies. The left tail in the data set represents low income countries. Many of the low income countries in the data set are located in Africa. The kurtosis is low indicating the lack of a peak. Clearly the right tail of the data includes more observations than around the mean causing a non-normal distribution.

D. Jarque-Bera Normality Test

The Jarque-Bera Test tests the normality assumption, taking into account the skewness and kurtosis of the residuals of the regression. The null hypothesis is that the residuals are normally distributed. The Jarque-Bera follows a chi-squared distribution with two degrees of freedom. The 5% critical value is 5.99. The Jarque-Bera statistic is calculated in the following equation,

$$(T/6)S^2 + (T/6)(((k-3)^2)/4)$$

where S is skewness, k is kurtosis, and T is the number of observations. Failure to reject the hypothesis (Jarque-Bera value less than 5.99) means that the residuals of the regression are normally distributed. The values of kurtosis and skewness of the residuals from the tourism model are -.29 and -.47 respectively. The calculated JB statistic is 29.27, thus the null hypothesis is rejected and the residuals are not normally distributed. This result is not a surprise given the skewed variables. The residuals would probably resemble a more normal distribution with a larger data set. This is a shortcoming of the data, however the model passes misspecification tests.

4. RESULTS

A. Introduction

The results of this paper will provide insight into the terrorism and tourism industry. All econometric analysis was done using Microsoft Excel 2007 and Limdep. The Limdep results are included in the appendix. Variables are in natural logs so that elasticities can be reported.

B. Tables and Results

Table 4.A, on page 48, provides coefficient estimates and t-statistics. The R^2 of the regression is 0.57. The model explains 57% of the variation in tourism demand across countries. This seems reasonable given the array of countries represented in the sample.

The real exchange rate (PPP) is not significant suggesting tourists are insensitive to relative prices. This is contrary to economic intuition that higher prices will deter tourism. However countries like Spain, France, and Italy have remained among the top tourist destinations every year despite becoming relatively expensive especially with the recent euro appreciation. These countries are rich in history and have many tourist attractions. The average tourist is evidently more concerned with

an enjoyable time than the cheapest deal. These top tourist destinations are able to accommodate the demands of tourists so the tourism industry may not be as sensitive to prices as some other industries. This result indicates that tourists may not substitute a cheaper vacation for a more expensive vacation. A model using tourism revenues as the dependent variable is developed later to comment specifically on the price elasticity of the tourism industry.

Terrorism is significant at the 5% level with a t-statistic of -2.16. The critical t-statistic is -1.67. The coefficient estimate of terrorism is -1.67. A 1% increase in the number of terrorism attacks decreases the dependent variable tourism arrivals per capita (TPC) by 1.67%.

The effect of terrorism on tourism is very large even though the chance of being the victim of a terrorist attack is small even in a country experiencing a high number of terrorist attacks. The ability to instill fear in citizens and visitors is one of the goals of terrorist groups. By damaging the tourism sector, governments are more likely to concede to terrorist demands especially in countries where tourism is vital to the economy.

Tourists are sensitive to terrorist attacks and consider safety a priority when choosing where to travel. It must be noted that this coefficient estimate does not include the interactive variable. I argue that GDP of the host country will affect terrorism's effect on tourism. The overall effect will be discussed with interactive variable.

The GDP_S per capita of the source country is not significant with a t-statistic of 0.25. The most likely reason is that tourists visiting an area come from many countries

while the number of tourists form the primary source countries may comprise fewer than 10% of total visitors.

Also, GDP_S measures the income in the major source country. Most tourists, however, may earn above average incomes, especially those tourists travelling a long distance. GDP_s may not accurately represent the average incomes of actual tourists.

Income of the source country is statistically significant in Braake's tourism demand model. Economic theory suggests that GDP_H should be included with other independent variables. Most previous literature focuses on GDP_S. The inclusion of GDP_H in the model is unique to the present study.

Tourism is an industry that is dominated by developed countries as supported by the statistical significance of GDP_H. The variable's t-statistic is statistically significant at the 1% critical value. The 1% critical value is 2.40 and t-statistic for GDP_H is 2.45. The economic effect of GDP_H on TPC may include the interactive variable discussed below.

There are numerous reasons why GDP_H will affect tourism demand. As previously mentioned, wealthier countries can provide more comfort and safety for tourists with investment in the tourism industry. These countries may be able to lure more foreign direct investment as potential investors will be attracted by profit. Developed countries have more resources to spend on promoting their country as a tourist destination. This result shows that tourism is an industry that is dominated by the developed world.

The statistical significance of GDP_H gives greater insight into tourist preferences. PPP's statistical insignificance concludes that tourists are not attracted to cheap vacation

destinations. GDP_H's statistical significance shows that tourists are attracted to areas that provide greater comfort to tourists and are likely more expensive. Insensitivity to price is consistent with attraction to developed countries.

The interactive variable combines terrorism and GDP_H. The t-score of 1.96 indicates statistical significance at the 5% level. The elasticity coefficient is 0.16. We can conclude by the statistical significance that GDP_H does affect terrorism's effect on tourism. The level of the effect is discussed below.

Terrorism can seriously damage a country's image as a vacation destination. Tourism is relatively less important to developed countries than poor nations due to their economic diversity. Developing countries suffering from terrorist attacks must divert resources form other economic sectors to invest in security. This is a necessary measure yet the diversion of resources can take a toll on a fragile economy. Developed countries, on the other hand, can increase security without much affecting other economic sectors. A wider source of funds enables developed nations to repair their image as a tourist destination much more successfully than less developed country.

The interactive term must be included when deriving the full effect of terrorism and GDP of the host country on tourist arrivals per capita. The coefficient of terrorism is -1.66 yet we must include how GDP of the host country affects the effect of terrorism on arrivals per capita. To derive the total effect of terrorism on tourism, solve the following partial derivative:

$$\delta TPC/dTERR = -1.66 + 0.16\ MGDP_H$$

where $MGDP_H$ is the mean of the GDP per capita of the host countries across all countries. The mean of GDP_H is calculated by dividing the sum of all GDP_H by the number of countries in the data set. The value of the mean is 8.98. Taking into account GDPH's effect of terrorism on tourism $\delta TPC/\delta TERR = -0.22$. A 1% increase in terrorism attacks decreases tourist arrivals per capita by 0.22%.

To what extent does the effect of terrorism on tourism differ between developed and developing countries? By using the standard deviation this difference can be calculated. The mean value of GDP_H is 8.98 with a standard deviation of 0.98. Add and subtract the standard deviation from the mean value to separate developed from developing countries. Solve $\delta APC/\delta TER$ to find the effect on terrorism on tourism for what can be called developed and developing countries. One standard deviation comprises 67% of the data.

The results from this calculation indicate coefficients of -0.07 for developed countries and -0.38 for developing countries. For developed countries, a 1% increase in terrorism incidences decreases tourist arrivals per capita by 0.07% while developing countries suffer a 0.38% decrease in tourist arrivals due to a 1% increase in terrorist attacks. The difference is substantial. The effect of a 1% increase in terrorism on tourist arrivals is nearly 6 times greater in developing countries.

If two standard deviations were used in the calculation over 90% of the countries in the sample would be included. Following this logic, it is quite likely that the very top tourist countries are not affected at all by terrorism while the bottom countries are grossly affected.

Likewise, to find the total effect of GDP_H on tourism arrivals, we must also include terrorism's effect on the effect that GDP_H has on tourism. Tourists may believe more developed countries are safer and more comfortable, increasing the demand for tourism in that country. Terrorism can damage that image. The full effect of GDP_H on tourist arrivals per capita the following partial derivative must be solved:

$$\delta APC/\delta GDP_H = .7 + .16MTERR$$

where MTERR is the mean of terrorism attacks across countries in the sample. The derived coefficient is 1.17. A 1% increase in GDP_H increases arrivals per capita by 1.17%. A terrorism attack increases the relative importance of safety to tourists. GDP_H is used as a proxy for the quality and quantity of tourism services, and the safety factor is a major component of tourism services. Therefore, a terrorist attack on a country increases the effect of GDP_H on tourism arrivals. This result is a further indication of consumer's preference of quality vacation over bargain vacation.

C. More Evidence of Differences between Developed and Developing Countries

The Chow test provides further evidence of differences between developed and developing countries with regards to terrorism's effect on tourism. As mentioned previously, roughly half the sample countries are considered developed while the others are developing. Although the Chow Test cannot report elasticities, the results can be used to support the results obtained from the OLS analysis. The Chow Test compares the error sum of squares from the two subsamples to see if the two groups are statistically different (have different slopes and intercepts).

One of the subsamples is constrained while the other is unconstrained. The constrained subsample assumes there isn't a difference between developed and developing countries' tourism economies. Therefore, there is no interaction or dummy term in the constrained model since GDP_H does not affect terrorism's effect on tourism. Developed and developing countries are constrained because they are forced to have the same slope and intercept. The following is a depiction of the constrained subsample.

$$ATC = B_1 + B_2PPP + B_3TERR + B_4GDP_S + GDP_H$$

The unconstrained subsample assumes there is a difference in the impact of terrorism on tourism between developed and developing countries. A dummy variable is utilized in this subsample to differ between developed and developing countries. Developed countries are given a value of 0 and developing countries are given a value of 1, allowing slopes and intercepts to differ. The dummy variable, D, is interacted with the other independent variables in the model as shown below.

$$ATC = B_1 + B_2PPP + B_3TERR_i + B_4GDP_{Si} + B_5GDP_{Hi} + B_6D + B_7(D*PPP) + B_8(D*TERR) + B_9D*GDP_{Si} + B_{10}(G*GDP_{Hi}).$$

The null hypothesis of the Chow Test is $H_0: B_6 = B_7 = B_8 = B_9 = B_{10} = 0$. If the null hypothesis can not be rejected then the unconstrained subsample reduces to the constrained subsample and there is not a statistically significant difference between developed and developing countries' tourism sectors. If the null hypothesis can be rejected, this provides further evidence that terrorism does affect developing countries' tourism more than developed countries' tourism sector.

To test the null hypothesis the following F test is employed:

$$F = ((\ SSE_C\text{-}SSE_U)/k_C)/(SSE_U)/n\text{-}k_u)$$

where SSE_U is the residual sum of squares from the unconstrained sample, SSE_C is the residual sum of squares from the constrained subsample, k_C is the number of constraints (5), and k_u is the number of independent variables in the unconstrained sample, and n is the number of observations. A statistically significant F statistic indicates we prefer the unconstrained model to the constrained model and reject the null hypothesis. Thus, there is a difference between the two subsamples.

To utilize the Chow test on the sample of countries in the thesis countries are divided into developed and developing countries. This information comes from the World Bank. The World Bank classifies countries based on their 2006 GNI (gross national income). The World Bank takes into account changes in the exchange rates and inflation rates during 2006 as well as the previous two years during calculation. The World Bank classifies countries into four categories, low, lower middle, upper middle, and high income. Incomes are expressed in 2006 U.S. dollars. Low income countries are those with a GNI less equal to or less than $905. Lower middle income countries are those lying between $906 and $3595. Upper middle income countries lie between $3596 and $11,115. High income countries have a GNI equal to or greater than $11,116. For purposes of this thesis, countries in the low and lower middle income categories are considered developing countries. Countries in the upper middle and high income categories are considered developed countries.

The results from OLS analysis indicate a large difference between developed and developing countries with regards to terrorism's effect on the tourist industry. We

should expect a statistically significant F statistic supporting the stronger effect on developing countries.

The results from the Chow Test reject the null hypothesis. The F-statistic critical value at 5% is 2.40. The degrees of freedom for the numerator and denominator are 5 and 50 respectively. The numerator degrees of freedom equal the number of restrictions and the denominator degrees of freedom are obtained by subtracting the number of independent variables from the number of observations. The value obtained from the derivation is 2.8. The null is rejected and therefore the Chow test does support the difference in the effect of terrorism on developed versus developing countries.

D. Testing for Heteroskedasticity

The Breusch Pagan Test detects heteroskedasticity. Heteroskedasticity is a result of nonconstant variance. Heteroskedasticity leads to inefficiency of OLS estimates which cannot be trusted. The data sample contains countries that have a significant number of attacks (Columbia has over 1000) and countries with little or no attacks. These outliers could lead to heteroskedastic results.

The Breusch Pagan Test involves dividing the sum of the squared residuals by the number of observations in the sample (SSR/n) denoted by the Greek letter sigma, σ. Pi (π), the variable constructed by dividing the squared residuals by sigma, is regressed on the independent variables. This test shows whether the independent variables are in any way correlated with the error term. The $n*R^2$ obtained from this regression follows a chi-

squared distribution with the degrees of freedom equal to the number of independent variables.

The null hypothesis assumes homoskedasticity or constant variance. The test statistic for the Breusch Pagan test is $n*R^2$ where (n) is the number of variables in the model (60) multiplied by the R^2 value obtained by the Breusch Pagan model (.122). Heteroskedasticity is indicated by a ($n*R^2$) value larger than the critical χ^2 value. The degrees of freedom is equal to the number of variables in the regression (5). The χ^2 critical value for 5 degrees of freedom is 11.07. The obtained from the appropriate regression is 7.35, and the data is homoskedastic. The homoskedastic results show that variance is constant and the original model passes the Breusch Pagan Test.

Another step is to test for misspecification of the model using the Ramsey Reset Test.

E. Misspecification

The Ramsey Reset Test tests for misspecification in the regression. Nonlinearity arises from misspecification of the model. Failure to pass the Ramsey Test requires reevaluation of the variables included in the model.

The first step of the Reset Test is to run the regression E(y/x). The predicted y from this regression is then squared, cubed, raised to the fourth, and included in the regression $y = B_1x_i + B_2YHAT^2+B_3YHAT^3+B_4YHAT^4$. The null hypothesis is then tested that $H_0:B_2=B_3=B_4=0$. The model passes the Ramsey Test if the t-statistic for the coefficient B_2, B_3, and B_4 are not significant. If the coefficients are significant then

presumably there is some effect in the dependent variable occurring that the explanatory variables are not capturing. A joint F test can be used to test the null hypothesis. The F-statistic can be derived from the following equation:

$$((R^{2(new)}-R^{2(old)})/r)/((1-R^{2(new)})/(n-k)),$$

where $R^{2(new)}$ is the explained sum of squares from the model including the predicted y variables, $R^{2(old)}$ is the explained sum of squares from the model excluding the predicted y variables, (r) is the number of restrictions (3), (n) is the number of observations (60) and (k) is the number of independent variables including the predicted y variables (8). The derived F-statistic is 0.85. The numerator's degrees of freedom are equal to the number of restrictions (r) and the denominator's degrees of freedom are equal to (n-k). The critical F-statistic for 3 degrees of freedom in the numerator and 52 degrees of freedom in the denominator is 2.78. The derived statistic is smaller than the critical statistic ($0.85<2.85$). The insignificance of the predicted y variables means the null hypothesis cannot be rejected and the model is correctly specified.

F. Model Comparison

The influence of the interactive term on the results supports its inclusion in the original model. By excluding the interactive term and running the following regression,

$$TPC = B_1 + B_2PPP + B_3TERR + B_4GDP_S + B_5GDP_H + e_i$$

results between the two models are compared. We can expect similar coefficient estimates and high t-statistics for TERR and GDP_H. The results in Table A show these expectations are valid.

Terrorism's effect on tourism arrivals per capita decreases from -0.22 to -0.17 in the noninteraction model. The effect of terrorism on tourist arrivals per capita is -0.07 for high GDP_H countries and -0.37 for low GDP_H countries. As expected, the coefficient estimate in the second model, -0.17, lies in between -.07 and -.37 since we are not interacting the two variables in the second model. Further, -0.17 is quite similar to the coefficient estimate of -0.22 form the original model. Recall that -0.22 is the coefficient estimate from the original model before the differential effect of terrorism on tourism between high and low income countries are derived. These two estimates (-0.17 and -0.22) are similar. The significance of the interactive term in the original model suggests that -0.22 might be a more realistic coefficient estimate than -0.17.

The coefficient estimate in the non interactive model for GDP_H is 1.14 compared to 1.17 in the original model. Again, these coefficient estimates are very similar. The slightly higher coefficient estimate in the original model does suggest that terrorism positively influences GDP_H's effect on tourism arrivals per capita. Intuitively this does not make much sense. I believe what is important to note here than in either case GDP_H has a very large effect on the tourism industry.

G. Tourism Expenditure Model

Besides tourism arrivals, tourism receipts are often used as the dependent variable in tourism models. Receipts measure the amount that tourists spend in the tourist country. Arrivals and receipts are highly correlated, yet differences may offer further insight into tourist tastes and preferences.

The following model uses tourism receipts as the dependent variable. The independent variables are identical to the original model. Results are listed in Table 8. The results indicate the only variable of statistical significance is GDP_H with a t-statistic of 3.57. The coefficient estimate of GDP_H is 0.97. A 1% increase in GDP_H increases tourism revenues by 0.97%. As explained previously, high GDP_H is an indication of a high level of tourism accommodation and amenities. Thus, the positive correlation between tourism revenues and GDP_H is expected. This effect is large yet GDP_H's effect on tourism arrivals per capita is larger (1.17). This difference is understandable because while the high level of comfort and amenities indicated by high GDP_H will attract more tourists, the extent to which they indulge themselves while on vacation depends on their budgets.

It must also be noted that the steepness of the demand curve indicates the tourism industry's price elasticity. Elasticity measures how tourists react to changes in prices at a given price and quantity ($\Delta Q/\Delta P * P/Q$). A steeper demand curve indicates an inelastic demand curve, an increase in prices does not deter tourism. If tourism demand is price inelastic, an increase in prices increases tourism revenue. At a given price and quantity, a flatter demand curve means tourism demand is elastic. If tourism demand is price elastic then an increase in price will decrease the quantity of tourism substantially and decrease tourism revenue.

The price of tourism, PPP, is statistically insignificant in this model. Therefore, price of tourism is unit elastic. Unit elasticity implies that an increase in the price of tourism by a certain amount will decrease tourism arrivals per capita by the same amount.

The two affects offset each other and tourism revenues remain the same as before the price increase.

It is important to note the difference between the quantity of tourism demanded and the number of tourists. In the first model, real prices do not affect TPC (number of tourists). In the third model, due to unit price elasticity of demand for tourism, an increase in prices is offset by a decrease in the quantity demanded for tourism. Although the quantity demanded for tourism may decrease, the number of tourist arrivals is the same. For example, an increase in tourism prices may shorten their length of stay, but the same number of tourists will still visit the country.

a. Breusch Pagan-Model 2

The Breusch Pagan tests the revenue model for heteroskedasticity. Again, the conclusion focuses on the results from the first model because the R^2 value for that model is much higher. By regressing the pi variable constructed from this model on the independent variables the critical nR^2 value of 8.88 is obtained. The X^2 (Chi squared) critical value for 5 degrees of freedom is 11.07. The value 8.88 is less than the critical value therefore the model is homoskedastic or has constant variance.

b. Misspecification Test Model 2

As in the primary regression, the Ramsey Reset Test is used to indicate model misspecification in model 2. The predicted y from regressing the independent variables

on tourism receipts is squared, cubed, raised to the fourth then included in the following regression:

$$Y = B_1X_i + B_2YHAT^2 + B_3YHAT^3 + B_4YHAT^4 + e_i.$$

Statistically significant predicted y t-statistics indicate misspecification. The null hypothesis is H_0:B_2=B_3=B_4=0. As previously, the F-statistic is derived to test the null hypothesis. The formula for the F-statistic is:

$$((R^{2(new)}-R^{2(old)})/r)/ ((1-R^{2(new)})/(n-k))$$

The F-statistic derived from this equation is 1.45. The critical F statistic at 5% with 3 degrees of freedom in the numerator and 52 degrees of freedom in the denominator is 2.78. The null hypothesis cannot be rejected therefore the model is correctly specified.

TABLE 8. Results of Models

	Model 1	**Model 2**	**Model 3**
		DEPENDENT VARIABLES/MODEL	
	TPC/INTERACTION	TPC/NO INTERACTION	REC/INTERACTION
INDEPENDENT VARIABLES			
INTERCEPT	-8.47 **(-2.33)**	-12.46 **(-4.05)**	10.4 **(3.02)**
PPP	-0.06 (-0.95)	-0.07 (-1.16)	-0.04 (-0.74)
TERR	** -1.67 **(-2.18)**	** -0.17 **(-2.25)**	-0.75 **(-1.04)**
GDPS	0.06 0.25	0.06 (0.23)	0.17 (0.73)
GDPH	*** 0.70 **(2.45)**	*** 1.14 **(6.37)**	*** 0.97 **(3.57)**
INTERACTIVE	** 0.16 **(1.96)**		0.11 (1.36)
R^2	.57	.54	0.61
F	18.23	21.91	21.51
n	60	60	60

T-statistics are in parenthesis

* significant at the 10% critical value (1.30 for 55 degrees of freedom)

** significant at the 5% critical value (1.67 for 55 degrees of freedom)

*** significant at the 1% critical value (2.40 for 55 degrees of freedom)

5. CONCLUSION

The representative tourists appear to prefer quality vacations over bargain vacations. High GDP_H may serve as an indication of quality to tourists. Spain and Italy continue to be among the top five tourist destinations despite the adoption of the euro which is currently at an all time high value. PPP's insignificance and GDP_H's significance signify the price unit elasticity of tourism demand. Individual case studies may reveal for some countries that tourism is price inelastic, further advocating its development and role in an economy.

Many developing countries rely heavily on agricultural exports. Agriculture can be vulnerable to droughts and fluctuations in world prices. Tourism demand is unit elastic. Investment in the tourism sector may contribute to more economic growth than agricultural investment whose demand is more sensitive to prices. Economically, it makes more sense for poor countries that could potentially attract tourists to invest in tourism rather than agriculture. Many charities provide economic aid to developing countries by supporting their agricultural industries. These groups may find their money put to better use by supporting the tourism industry in poorer countries. Spillover effects, like improvements to infrastructure, may result from tourism sector investment.

This study is unique by using cross sectional analysis to compare terrorism in developed and developing countries. The conclusion is that terrorism is particularly detrimental to tourism in undeveloped countries. The developed countries' tourism industries are only slightly affected by terrorism. Economic diversity and availability of resources lessen the effect of terrorism in developed countries.

Though tourism is a sector dominated by developed countries, it should not be overlooked by developing countries. Tourism comprises 10% of world GDP and continues to grow. Tourist preference for quality is reflected by the significance of GDP_H. Developing countries suffering from terrorism face many obstacles if they wish to cultivate their tourism industry. Additional security is the most effective way to combat terrorists. Funds should be appropriated for security to establish a safe image for the country. Governments of developing countries must find ways to address the security dilemma to combat terrorism without reducing funding to other economic sectors.

This thesis provides a background for future studies on the same topic. The effect of terrorism on tourism is an interesting and relevant topic today that warrants further study.

One area that this thesis could improve upon is in the area of data collection. Due to limited resources, tourism source data (country names) came from 1996 when the base year of the study was 2003.

A panel data study consisting of countries in the same geographic region would yield more concrete or believable results. The cross sectional analysis includes many countries from various regions. It is difficult to determine why tourists are attracted to

some areas and not attracted to other areas. Furthermore, the countries that do benefit from tourism may attract tourists for different reasons. Some countries may have nice beaches, mountains with good hiking, or historic sights. Cross sectional analysis does not explain why tourists continue to go to the same countries or not to others.

A panel data study involving countries in the same geographic area may better explain tourist patterns. Presumably, countries in the same region should share geographic traits and perhaps even share similar traditions and cultures. Thus, the effect of a terrorist attack on tourism would be immediately felt. A tourist would simply substitute a vacation in one country to its neighboring country if they shared similar traits that attracted the tourist to the region in the first place. The effect of terrorism on tourism would be better isolated if the countries in the study share similar tourist attractions.

6. SUMMARY

Terrorism can cause tremendous economic shocks. The tourism sector is one of the economic sectors most directly affected by terrorism. Terrorism incidences deter tourist arrivals, foreign investment, and destroys infrastructure. Despite the damage terrorism can have on tourism, the extent to which countries are affected by terrorism attacks depend largely on the strength of its economy. This paper clearly shows that developed nations' tourism is much less affected by terrorism than developing countries' tourism. The ability to finance added security is one of several reasons given by this thesis as to the difference in tourism shocks due to terrorism between rich and poor countries.

REFERENCES

1. Aly, Hassan Y. and Mark C.Strazicick (2000). "Terrorism and Tourism: Is the Impact Permanent of Transitory? Time Series Evidence from Some MENA Countries" Ohio State University, Department of Economics, Columbus, Ohio.
2. Brakke, Michael (2004) "International Tourism, Demand, and GDP Implications: A Background and Impirical Analysis," *Undergraduate Economic Review* (1).
3. *Compendium of Tourism Statistics 2003*
4. Drakos, Konstantinos and Ali M. Kutan (2003) "Regional Effects of Terrorism on Tourism: Evidence from 3 Mediterranean Countries," *Journal of Conflict Resolution* 45 (5).; pp. 621-64.
5. Enders, Walt and Todd Sandler (2003)"*An economic perspective on transnational terrorism*."
6. Enders, Walt and Todd Sandler, "*Economic Consequences of Terrorism in Developed and Developing Countries: An Overview,*" 2005.
7. Enders, Walt Todd Sandler and Gerald Parise (1992) "An Econometric Analysis of the Impact of Terrorism on Tourism," *KYKLOS* 45.; pp. 531-554
8. Garin-Munoz, T. and Perez Amaral, T. (2000) "An econometric model for international flows to Spain*." Applied Economics* (7).; pp. 525-529.

9. Gujarati, Damodar N. (2003), *Basic Econometrics*, McGraw-Hill, Singapore.

10. Henderson, Joan C. (2003), "Terrorism and Tourism: Managing the Consequences of the Bali Bombings," *Journal of Travel and Tourism Marketing* 15 (1).

11. Looney, Robert (2002) "Economic Costs to the United States Stemming form the 9/11 Attacks," *Strategic Insights* 1 (6).

12. *Penn World Table*, http://pwt.econ.upenn.edu/

13. Sonmez, Sevil, Yiorgos Apostolopoulos and Peter Tarlow (1999) "Tourism in Crisis: Managing the Effects of Terrorism," *Journal of Travel Research*.

14. Tourism Market Trends, Europe 2004, WTO

15. Yearbook of Tourism Statistics 2004

16. Schmidt, Stephen (2005), *Econometrics*, McGraw-Hill/Irwin, New York, NY.

REGRESSION ANALYSIS RESULTS USING LIMDEP

MODEL 1: **Lhs=LNARRPCA;Rhs=ONE,LNPPP,LNTERR,LNGDPSOU,LNGDPHOS,INTER$**

```
| Ordinary    least squares regression              |
| Model was estimated Apr 06, 2008 at 00:55:11PM    |
| LHS=LNARRPCA Mean                 =  -2.309327    |
|              Standard deviation   =   1.779687    |
| WTS=none     Number of observs.   =         60    |
| Model size   Parameters           =          6    |
|              Degrees of freedom   =         54    |
| Residuals    Sum of squares       =   79.86644    |
|              Standard error of e  =   1.216145    |
| Fit          R-squared            =   .5726093    |
|              Adjusted R-squared   =   .5330361    |
| Model test   F[  5,    54] (prob) =  14.47 (.0000) |
| Diagnostic   Log likelihood       =  -93.71665    |
|              Restricted(b=0)      =  -119.2184    |
|              Chi-sq [  5]  (prob) =  51.00 (.0000) |
| Info criter. LogAmemiya Prd. Crt. =   .4866819    |
|              Akaike Info. Criter. =   .4860112    |
| Autocorrel   Durbin-Watson Stat.  =  1.8706852    |
|              Rho = cor[e,e(-1)]   =   .0646574    |
+---------------------------------------------------+
+---------+--------------+----------------+--------+---------+----------
+|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean X
|+---------+--------------+----------------+--------+---------+---------
-+
 Constant     -8.46528522     3.63176445    -2.331   .0235
 LNPPP         -.05593343      .05875897     -.952   .3454   2.55436943
 LNTERR       -1.66656932      .76547635    -2.177   .0339   2.95446854
 LNGDPSOU       .06058853      .24171834      .251   .8030   9.94085881
 LNGDPHOS       .70022444      .28589920     2.449   .0176   8.98085317
 INTER          .16423841      .08380972     1.960   .0552   26.3747344
```

MODEL 2: **Lhs=LNARRPCA;Rhs=ONE,LNPPP,LNTERR,LNGDPSOU,LNGDPHOS$**

```
+----------------------------------------------------+
| Ordinary    least squares regression               |
| Model was estimated Apr 06, 2008 at 01:00:32PM     |
| LHS=LNARRPCA Mean                 =  -2.309327     |
|              Standard deviation   =   1.779687     |
| WTS=none     Number of observs.   =         60     |
| Model size   Parameters           =          5     |
|              Degrees of freedom   =         55     |
| Residuals    Sum of squares       =   85.54622     |
|              Standard error of e  =   1.247151     |
| Fit          R-squared            =   .5422151     |
|              Adjusted R-squared   =   .5089216     |
| Model test   F[  4,    55] (prob) =  16.29 (.0000) |
| Diagnostic   Log likelihood       =  -95.77768     |
|              Restricted(b=0)      =  -119.2184     |
|              Chi-sq [  4]  (prob) =  46.88 (.0000) |
| Info criter. LogAmemiya Prd. Crt. =   .5217663     |
|              Akaike Info. Criter. =   .5213789     |
| Autocorrel   Durbin-Watson Stat.  =  1.8759510     |
|              Rho = cor[e,e(-1)]   =   .0620245     |
+----------------------------------------------------+
+---------+-------------+----------------+--------+---------+----------
+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean X|
+---------+-------------+----------------+--------+---------+----------
+
 Constant     -12.4637141     3.08102989    -4.045   .0002
 LNPPP         -.06945223      .05984034    -1.161   .2508   2.55436943
 LNTERR        -.17376427      .07717495    -2.252   .0284   2.95446854
 LNGDPSOU       .05823170      .24787802      .235   .8151   9.94085881
 LNGDPHOS      1.14313210      .17955432     6.366   .0000   8.98085317
```

MODEL 3: **Lhs=LNREC;Rhs=ONE,LNPPP,LNTERR,LNGDPSOU,LNGDPHOS,INTER$**

```
+-----------------------------------------------------+
| Ordinary    least squares regression                |
| Model was estimated Apr 06, 2008 at 01:08:00PM      |
| LHS=LNREC    Mean                 =   21.27961      |
|              Standard deviation   =   1.760484      |
| WTS=none     Number of observs.   =         60      |
| Model size   Parameters           =          6      |
|              Degrees of freedom   =         54      |
| Residuals    Sum of squares       =   71.82402      |
|              Standard error of e  =   1.153289      |
| Fit          R-squared            =   .6072163      |
|              Adjusted R-squared   =   .5708474      |
| Model test   F[  5,    54] (prob) =  16.70 (.0000)  |
| Diagnostic   Log likelihood       =  -90.53254      |
|              Restricted(b=0)      =  -118.5674      |
|              Chi-sq [  5]  (prob) =  56.07 (.0000)  |
| Info criter. LogAmemiya Prd. Crt. =   .3805450      |
|              Akaike Info. Criter. =   .3798744      |
| Autocorrel   Durbin-Watson Stat.  =  2.0466080      |
|              Rho = cor[e,e(-1)]   =  -.0233040      |
+-----------------------------------------------------+
+---------+-------------+---------------+--------+---------+----------
+
|Variable | Coefficient  | Standard Error |t-ratio |P[|T|>t] | Mean X|
+---------+-------------+---------------+--------+---------+--------+
Constant      10.3967532     3.44405716    3.019    .0039
LNPPP         -.04129735      .05572202     -.741   .4618    2.55436943
LNTERR        -.75146558      .72591280    -1.035   .3052    2.95446854
LNGDPSOU       .16815387      .22922516      .734   .4664    9.94085881
LNGDPHOS       .96825951      .27112253     3.571   .0008    8.98085317
INTER          .10772173      .07947802     1.355   .1809    26.3747344
```

DATA APPENDIX

VARIABLE SUMMARY

*All variables are in natural log form
LNARRPCAP-tourist arrivals per capita
lnrec-total tourism receipts
lnppp- purchasing power parity (price of tourism)
lnterr-number of terrorist incidences
lngdpsource-GDP per capita of the tourist source country
lngdphost-GDP per capita of the tourist host country
inter-variable interacting lnterr with lngdphost
dev.-developing country dummy
int-variable interacting lnterr with dev.

COUNTRIES	LNARRPCAP	lnrec	lnppp	lnterr	lngdpsource	lngdphost	Inter	Dev
ARGENTINA	-2.55995	21.46377	-0.16252	2.944439	9.152212	9.344738	27.52	0
BRAZIL	-3.7954	21.63112	0.09531	2.484907	9.344738	8.962003	22.27	0
CHILE	-2.27273	20.57244	5.497865	2.397895	9.344738	9.492733	22.76	0
CHINA	-3.66445	23.58008	0.683097	2.397895	10.14747	8.579467	20.57	1
COLOMBIA	-4.2012	20.51992	6.740968	7.034388	8.839364	8.773125	61.71	1
COSTA RICA	-1.14567	20.87255	5.303802	0	10.52711	9.093445	0	0
CYPRUS	1.093424	21.42389	-0.99425	2.302585	10.24359	10.07295	23.19	0

EGYPT	-2.56523	22.24584	0.223144	2.397895	10.20693	8.536811	20.47	1
INDONESIA	-3.96241	22.11877	7.49527	5.283204	10.2329	8.349229	44.11	1
JORDAN	-1.24451	20.5187	-1.20397	2.484907	8.536811	8.372877	20.81	1
LEBANON	-1.3009	20.73914	6.957887	4.234107	8.372877	8.86695	37.54	0
MALAYSIA	-0.78085	22.49839	0.24686	1.386294	10.2329	9.496844	13.17	0
MEXICO	-1.72151	22.97002	2.052841	2.70805	10.52711	9.04595	24.5	0
PHILLIPINES	-3.79264	21.10444	2.504709	5.361292	10.52711	8.274339	44.36	1
THAILAND	-1.85227	22.78021	2.479894	6.428105	9.496844	8.944868	57.5	1
Australia	-1.51095	23.05716	0.329304	0	10.14747	10.32846	0	0
BELGIUM	-0.43916	22.81883	-0.0202	2.484907	10.24359	10.20514	25.36	0
CZECH. REP	-0.70155	21.80981	2.721295	1.098612	10.20693	9.706502	10.66	0
GERMANY	-1.50189	23.85806	-0.03046	2.70805	10.24908	10.20693	27.64	0
GREECE	0.232165	23.0936	-0.19845	5.438079	10.20693	9.738999	52.96	0
HUNGARY	0.436543	21.95874	4.859657	0	10.20693	9.564264	0	0
IRELAND	0.463482	22.07781	0.173953	1.609438	10.24359	10.28869	16.56	0
ISRAEL	-1.7499	21.43573	1.358409	6.137727	10.52711	9.997936	61.36	0
ITALY	-0.38083	24.16439	-0.09431	4.828314	10.20693	10.11381	48.83	0
JAPAN	-3.199	22.90346	5.027624	2.995732	9.806871	10.14747	30.4	0
NORWAY	-0.33621	21.65582	2.300583	0	10.20693	10.44953	0	0
PORTUGAL	0.119688	22.66014	-0.41552	0	10.02262	9.848796	0	0
RUSSIA	-2.89215	22.22779	2.013569	5.648974	8.837577	9.410634	53.16	0
SLOVENIA	-0.34346	21.01743	4.917862	0	10.20693	9.985923	0	0
S. AFRICA	-1.86269	22.17488	1.118415	3.135494	7.781001	9.172628	28.76	0
SPAIN	0.206874	24.45544	-0.19845	6.595781	10.24359	10.02262	66.11	0
U.K.	-0.8749	23.84792	-0.41552	3.218876	10.2275	10.24359	32.97	0
U.S.	-1.96013	24.89007	0	4.584967	10.30145	10.52711	48.27	0
INDIA	-5.95342	21.98229	2.098018	6.232448	10.24359	8.074814	50.33	1
PAKISTAN	-5.75131	18.603	2.479894	6.222576	10.24359	7.893538	49.12	1
SRI LANKA	-3.67392	19.86524	2.876949	4.875197	10.24359	8.506735	41.47	1
BANGLAD.	-6.33699	17.85856	2.327278	4.70953	10.2338	7.762698	36.56	1
TURKEY	-1.67539	23.30371	13.65651	6.167516	10.20693	8.683008	53.55	0
NEPAL	-4.36071	19.10882	2.395164	5.937536	10.2338	7.337698	43.57	1
ALGERIA	-3.33741	18.89691	3.24142	4.143135	10.2275	8.701431	36.05	1
PERU	-3.41823	20.64314	0.470004	3.258097	10.52711	8.442849	27.51	1
IRAN	-3.81813	21.29819	7.687993	3.688879	7.893538	8.882685	32.77	1

MOROCCO	-1.94041	21.77269	1.105257	1.791759	10.2275	8.384121	15.02	1
VENEZUELA	-4.29264	19.59316	6.699414	4.382027	10.52711	8.839364	38.73	0
HONDURAS	-2.39025	19.63559	1.993339	1.609438	10.52711	7.785771	12.53	1
FRANCE	0.223648	24.33521	-0.04082	6.100319	10.20693	10.2275	62.39	0
TUNISIA	-0.66305	21.18259	-0.91629	0	10.20693	8.997366	0	1
KENYA	-3.5302	19.64151	3.282789	1.609438	10.20693	7.165911	11.53	1
ECUADOR	-2.89126	19.82186	-0.84397	3.637586	8.773125	8.43427	30.68	1
CAMBODIA	-3.82743	19.77909	6.732973	2.564949	9.937918	6.423604	16.48	1
GUATEMA	-2.7604	20.24684	1.22083	1.098612	10.52711	8.315559	9.14	1
ALBANIA	-4.45453	20.07318	3.804883	2.397895	10.11381	8.447985	20.26	1
LAOS	-3.40824	18.28142	7.758816	2.079442	8.944868	7.32138	15.22	1
NICARAGUA	-2.27727	18.83279	1.226712	0	10.52711	8.180228	0	1
COTE D IV'.	-4.5458	18.24633	5.241377	0	10.2275	7.857558	0	1
N. ZEALAND	-0.62885	22.10304	0.371564	0.693147	10.32846	10.09746	6.99	0
EL SALVADOR	-2.02155	19.31677	1.386294	0.693147	10.52711	8.527013	5.910	1
BELARUS	-5.08316	19.40276	5.573674	0	9.410634	9.518281	0	1
URUGUAY	-0.87703	19.65905	2.282382	1.098612	9.344738	9.152212	10.05	0
MADAGAS.	-4.8053	18.14624	7.781042	1.94591	10.2275	6.724806	13.09	1