Contribution of Tourism Development to Economic Growth in Mexico

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ABSTRACT

One of the major sectors that have been experiencing rapidly increasing economic growth in Mexico is the Tourism sector. This research study aims to inquire into the contribution of tourism development on economic growth in Mexico, where number of tourist arrivals is dependent on exchange rate and GDP per capita. To make this research study more precise, we use the GDP per capita of Brazil, Canada, Colombia and United States of America separately which are among the top 10 tourist countries who visits Mexico for tourism (WTO, 2014). After running the stationarity test, we ran the Johansen cointegration test to know if there is a long run relationship among the three variables. We found out that all the results for the four countries indicate two cointegration vectors using the trace test. After knowing the cointegration of the vectors, we ran the VECM to investigate the long run causality of the series. The Error Correction Term shows that there is a long run causality running from exchange rate and GDP per capita of USA to the number of tourist arrivals in Mexico while the Error Correction Term shows that there is no long run causality running from exchange rate and the GDP per capita of Brazil, Canada and Colombia to the number of tourist arrivals in Mexico. After knowing the causality of the variables, we ran the residual diagnostic test of autocorrelation, heteroscedasticity and histogram and normality where we found out the absence of autocorrelation, heteroscedasticity and residuals were normal distributed for all the countries and variables.

Keywords: Tourism, Economic growth, Johansen Cointegration, VECM, Residual diagnostics test.

ÖZ

Meksika'da turizm sektörü son zamanlarda en hızlı büyüme gösteren ekonomik sektör olarak karşımıza çıkmaktadır. Bu araştırmada amaçlanan turizm sektöründeki kalkınmanın Meksika'nın ekonomik büyümesi üzerindeki etkisi, gelen turist sayısının döviz kuru ve kişi başına düşen gelir konseptlerine bağlı olduğu bilgisi dikkate alınarak analiz edilmiştir. Bu çalışmayı daha da derinleştirmek maksadı ile Meksika'ya en çok turist gönderen 10 ülke arasında yer alan Brezilya, Kanada, Kolombiya, ve ABD gibi ülkelerin kişi başına düşen milli gelirleri çalışmaya ayrı ayrı dahil edilmiştir (DTÖ, 2014). Durağanlık testi akabinde, Johansen eş bütünleşim testi, üç değişken arasında uzun dönem ilişki bulunup bulunmadığını görebilmek için yapılmıştır. Dört ülke için bulgu testi sonrasında iki eş bütünleşim vektörünün var olduğu sonucuna ulaşılmıştır. Vektörlerin eş bütünleşim varlığı sonucunda serilerin uzun dönem nedensellik ilişkisnin testi için Vektör Hata Düzeltme Modeli uygulanmıştır. Hata düzeltme terimi döviz kuru ve kişi başına düşen milli gelirin ABD için uzun dönemli nedensellik ilişkisine işaret etmektedir. Aynı hata terimi döviz kuru ve kişi başına düşen gelirin Brezilya, Kolombiya ve Kanada'dan gelen turistler için uzun dönem nedensellik ilişkisine işaret etmemektedir. Değişkenler arasındaki nedensellik bilgisi ışığında yapılan hata payı diagnostik testi neticesinde otokorelasyon, değişen varyans, histogram ve normallik araştırılmış, tüm ülkeler ve değişkenler için otokorelasyon, değişen varyans ve hata paylarının normal dağıldığı sonucuna ulaşılmıştır.

Anahtar Kelimeler: Turizm, Ekonomik Büyüme, Johansen Eş bütünleşme modeli, Vektör Hata Düzeltme Modeli, Hata Payı Diagnostik Testi.

DEDICATION

I dedicate this project to Almighty Allah for the opportunity he gave me to undertake this project, to my parents for their support and effort, my brothers and sisters, and my entire family members.

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LIST OF ABBREVIATIONS

MDG	Millenniums Development Goals
RGDP	Real Gross Domestic Product
VECM	Vector Error Correction Model
GDP	Gross Domestic Product
OLS	Ordinary Least Squares
ADF	Augment Dickey Fuller
PP	Phillip Perron
KPSS	Kwiatkowski Phillip Schmidt and Schin
PACF	Partial Autocorrelation Function
JJ	Johansen and Juselius
ECT	Error Correction Term
WDI	World Bank Development Indicators
WTO	World Tourism Organization
TLGH	Tourism Led Growth Hypothesis
DF-GLS	Dickey Fuller- Generalized Least Squares

Chapter 1

INTRODUCTION

1.1 Background to the study

Tourism has been introduced as a sector in many countries involving the entire world. According to WTO, the tourism sector has been growing rapidly making it one of the largest and fastest growing sectors in the world as it has been over the past six decades. Tourism has added 9.2% of the world's global GDP according to the World Travel Tourism Council and forecasts and it reports it will continue to grow at 4% per annum in the next decade, as it will sum up to 9.4% of GDP (WTTC, 2010). A number of new stations have increased overtime which has invested in the development of tourism turning it into the key driver of socioeconomic growth.

Tourism industry is very large in Mexico. According to World Tourism Organization, Mexico has been among one of the most visited countries in the world for tourism. Mexico has a lot of tourist attractions such as beach resorts, festivals, and colonial cities etc. which also has a very nice and unique climate which increases its popularity.

Despite all the important contribution that tourism sector is giving to the development of Mexico and with all the efforts that government and citizens of the country are putting, research on that area is relatively scarce.

1.2 Statement of the Problem

Mexico's tourism sector has been identified as one of the major sector boosting economic growth with rises in GDP directly and indirectly and also increasing employment opportunities, labor productivity and poverty reduction. The major obstacles which tourism sector are currently facing are as follows:

- The need of physical investment in tourism infrastructure.
- Policy rules and regulations
- Environment sustainability
- Safety and security
- Health and hygiene
- Prioritization of travel and tourism
- Air and ground transport infrastructure
- Tourism infrastructure
- Human, natural and cultural resources
- Affinity for travel and tourism
- Price competitiveness in travel and tourism sector

1.3 Research Questions

The research questions raised over this study can be summarized as:

a. What are the contributions of tourism development on Mexico's economic growth?

b. If tourist development contributes to Mexico's economic growth, what is its implication?

1.4 Objectives of the Study

The main objective of this research work is to analyze the contribution of tourism development on Mexico's economic growth, while the study would specifically:

I. Identify how tourism development contributes to Mexico's economic growth.

II. Recommend the government on how to develop the tourism sector.

1.5 Research Methodology

This study will implement time series analyzes to investigate the contribution of tourism development in Mexico's economic growth.

This research project covers the period of (1980 to 2014) which will use ADF, DF-GLS unit root test and ACF and correlogram to examine the order of integration of the variables. The Johansen cointegration will be used to investigate the possible long run equilibrium relationship between the variables, the VECM test will be used to detect the nature of the causal relationship between the series.

1.6 Organization of the Study

The research project has six chapters. Chapter one deals with the introduction which includes: the background to the study, statement of the problem, the research questions, and objectives of the study, its limitations and the organization of the work.

Chapter two is about the literature review which includes: conceptual review and theoretical overview. Chapter three is related with empirical literature whereas

Chapter four deals with the methodology used throughout the study such as: research design, sources of data collection, method of analysis and model specification.

Chapter five is concerned with interpretation of empirical results. Chapter six deal with conclusion and policy recommendations.

Chapter 2

LITERATURE REVIEW

2.1 Conceptual Literature

As in many disciplines and sub-disciplines in social science, tourism does not have a single world-wide accepted definition. Again, the revenues generated by a country, be it direct or indirect payments by tourists for food and other services, are considered as tourism revenues.

According to the World Tourism Organization (WTO), tourism sector is the largest and fastest growing industry in the whole world, accounting for more than 30 percent of the world's service businesses (WTO 2006). World tourism grew from 25 million tourists in 1950s to 1018 million tourists arrivals in 2010 and is projected to increase to 1600 million tourist arrivals world-wide in the year 2020 (WTO). The world international tourism revenues has increased from 106.5 billion US dollars in 1980 to about 800 billion US dollars in 2007, accounting for more than 6% of general export earnings world-wide in 2007 (WTO 2007). Therefore, travels and Tourism is currently considered as one of the major economic activities across countries. Being one of the important activities, the industry has a lot of direct and indirect effects.

The growing relevance of the sector induced the United Nations Statistic Division agrees to establish a satellite accounting method so as to determine the quantity of the contribution of Tourism sector to the world economy. But World Travel and

Tourism Council (WTTC) perceived that the total impact of the sector is much higher, hence it instead aimed, through its annual research, at determining the sector's direct and indirect impacts.

2.2 An Overview of the Mexican Tourism

In the case of Mexico, tourism sector has witnessed the series of structural changes by the national government for the past three decades, aiming at promoting the sector both regionally and nationally. This has been understood by the analyses of different researchers and stock-holders. Despite the down-fall of position in the world tourism ranking and world share loss in 1990, the Mexican tourism sector growth faster than most of the emerging economies of the world when considering the absolute numbers, where 10.4 million international tourists arrived to Mexico in 1990 as compared to only 2.3 million in 1970 (Jimenez 1992).

During 1982, the Mexican economy witnessed a huge structural change. This happens as a result of debt crisis which drastically abstracts the import substitution model of the economy that was in existence for over 40 years. These economic crises led the Mexican government to adopt structural adjustment policy as a negotiated policy with International Monetary Fund IMF and World Bank to support the country to build more export oriented economy. Initially at that time, the government gave priority to the policies and projects that will enhance the tourism sector development in the country for mainly two reasons:

1) Modernizing the sectors that are believed to contribute more to the development of the economy.
2) The need to develop something that will link productive machineries to the general world markets.

Hence, the Mexican government intervened more than ever at that period and more than most of countries at that period. Also, various tourism-related infrastructures have been built in many regions of the country to attract more domestic and international tourism and investment (Brenner et. al, 2002).

For the tourism policies to be implemented in Mexico, the government established two bodies to take the responsibility of executing the official tourism-related projects and harnessing the sector's data-base.

First, is the SECTUR which is the Mexican tourism secretariat charged with the responsibility of harmonization and implementation of policies related to the frequently visited areas such as beaches, resorts, major cities and other tourists centers.

FONATUR, on the other hand, means the National Tourism Promotion Funds, is also a government agency established for promoting and attracting investment in tourism sector. This agency was recorded to have succeeded in promoting up to 40% hotel rooms provision at seaside and more than 50% of the total investment in the sector, which include investing more than 1.5 billion US dollars in Cancún, Ixtapa, Los Cabos, Huatulco and Loreto among others.

2.3 Tourism Development Theories

By its nature, development can be seen as a process of positive change. This positive change is explained differently by many people, which we are going to talk later in detail. But it is imperative to state that the reason for the inclusion of development theories to this research is to use them as a framework for better understanding of tourism development patterns and distribution (Woodcock and France 1994).

For understanding the concept of development, as many concepts in economics, it has no worldwide accepted definition. But one can be able to see the true picture of it giving the Todaro's three (3) development goals, namely;

1) Human needs for survival (food and shelter).
2) Standard of living (like Health and education).
3) Fundamental human-rights (like political sovereignty and social justice).

Improving the above three fundamentals may be referred to as development (Todaro 1994).

Various development approaches has been introduced, ranging from classical invisible hands theories, economic diffusions, endogenous and exogenous growth models, capital or labor intensity models, balanced and unbalanced growth models and many others, just to mention but a few.

The two growth policies that have wide acceptance and which deemed to be the best in application, as far as tourism demand is concerned, are descriptive and explanatory models. The infusionist theory is of the examples of explanatory model, where the preconditions (necessary and sufficient conditions) at which development can be achieved is discussed (Rostow, 1990). In tourism sense, those natural and environmental beauties that pull people to go to a destination are the preconditions for the tourism demand of the destination in question.

On the other hand, the descriptive models concerns mainly the physical infrastructures and investments that were developed for the attraction of tourists, such as luxurious hotels and other artificial beauties that will make people want to

visit a destination. Significant amount of researches on tourism concentrate on the descriptive models for estimating demand behavior (Cooper 1990, Butler 1980).

2.4 The Concept of Resort Life Cycle

The concept of resort life cycle has been in tourism literature for over 70 years. Many scholars tried to explain the various resort developments by adopting the concept of life cycle. Earliest studies on that regard were the work of Gilbert (1939) who considered the cycle as three stages as evolution, discovery, growth and decline. Defert (1954) gave a theoretical concept of destination born, grow old and die. He further argued that, the resort may escape declining and rejuvenate if proper measures were taken. Plog (1973) tries to relate the rise and fall of tourist demand and the popularity of the resort to the psychological behavior and personalities of tourists. He argues that the resort life cycle is attributable to the type of traveler ranging from allocentrics to mid-centrics to psychocentrics.

Richard Butler (1980) developed a hypothetical model on tourist area evolution. He showed that the tourists visit to a destination follows a hypothetical S-shaped curve, which shows that the life cycle of a resort evolves through six different stages. These stages are;

1) Exploration stage
2) Involvement stage
3) Development stage
4) Consolidation stage
5) Stagnation stage
6) Rejuvenation/declining stage

Rostow (1960) identified five development stages, which according to him countries must go through the series of these stages;

1) Traditional society
2) Precondition for take off
3) Take off stage
4) Drive to maturity and
5) The period of mass consumption

Although Rostow's stages of growth does not say anything about tourism in particular, but we can be able to use any activity that leads to economic growth as a tool for explaining economic growth of tourism.

The first stage which is the traditional stage can be used to describe the stage where tourist do not start coming to destination, or the destination is not yet discovered by tourists.

The second stage is the precondition for takeoff stage, when related to tourism we can say is the stage when destination is discovered by allocentric tourists (explores or drifters).

The third stage being the take off stage will refer to the time period when the destination is visited by increased number of tourists. This is the time when mid-centric people involved in the destination.

The fourth stage is the drive to maturity stage. At that stage tourists start visiting the destination in mass quantities. This is the period of consolidation (Butler 1980).

The final stage is the stage when organized mass tourists start visiting the destinations. This is a stage where the destination starts witnessing a declining market for tourism. The visitors at this stage were mainly psycho-centric. At that stage, proper measures need to be taken in order to rejuvenate the demand for destination or if allowed the market will decline.

Chapter 3

EMPIRICAL LITERATURE

3.1 Empirical Literature

It was argued that the major sources of revenues of Island countries are basically international trade and tourism (Katircioglu 2009), this may be as a result of what Mehmet and Tahiroglu perceived as a comparative advantage of those islands, physical and demographic futures which attract international tourists.

Schubert, Brida and Risso identified six important contribution of tourism to countries' development.

First, tourism is an important sector for foreign exchange earnings, which help government to pay for capital and factor inputs for production and manufacturing sector.

Second, tourism also helps in the course of the provision of infrastructure which strengthen the local industries and allowing for competition with foreign ones.

Third, tourism helps the growth of economic firms through the multiplier effect.

Fourth, tourism helps the economy through employment generation, income increase and welfare of the populace.

Fifth, tourism causes productivity increase hence the advantage of economies of scale.

Finally, tourism stimulates technological advancement through research and development as well as the diffusion and absorption of new technologies in the production.

The belief that tourism has very important role in the long-run development of economies is what brought about the concept of 'Tourism-Led Growth Hypothesis' (TLGH).

Now the major questions that have been increasingly drawing attentions of many researchers are the magnitude and role of the direction of causality between tourism and growth. That is which actually causes which and by how much?

Various researches have been conducted concerning the tourism demand and tourism-growth and their relationship with overall economic growth across many nations by different researchers. Po and Huang (2008) adopted non-linear approach to conduct cross country analysis on the relationship between tourism and economic growth and their nexus; they used 88 countries for the research and found highly significant positive relationship between tourism and economic growth.

Katircioglu (2009) studied the long-run equilibrium relationship between tourism demand and economic growth of Cyprus and the direction of causality between them. He used Co-integration and Granger causality tests. The result of this research showed a strong long-run equilibrium relation between real per capita income, international trade and tourism growth. Granger causality results reveal that, growing per capita real income Granger causes international trade and attracts tourism. Also growth of international trade causes tourism sector growth.

In the case of Croatia, Mervar (2010) uses quarterly data from 2000 to 2008, to observe the direction between economic growth and tourism sector growth. In his case he adopted Toda–Yamamoto long-run causality test. The result for this research also shows a unidirectional causality from GDP growth to tourism development. Therefore, growth-led tourism development is realized.

Mexico is currently among the most frequently visited tourism destination areas with more than 20 million international tourist arrivals in a year (Touropia). Since 1950s, the Mexican tourism sector is witnessing a tremendously increase in growth, it was recorded that between 1950s and 1970s the sector grown more than 12 percent yearly. The growth of this sector impacted virtually all the corners of the economy, which included:

1) increase in foreign exchange earnings,
2) increase in employment opportunities
3) increase in national income in general

However, despite the above recorded positive impacts of the tourism sector in Mexico, some critics argued that the development of tourism is more of a course than a blessing because;

1) the actual benefit is very small
2) it comes a very high social cost
3) and it come with other diseconomies

Those that criticize the sector gave the account of some imported diseconomies that tourism brought, be it the destruction of cultural and social values and other environmental diseconomies which often hard or even impossible to quantify their cost.

Therefore, to bring a reasonable argument against the promoters of tourism sector is somehow difficult as they can easily show the effect of the sector on foreign exchange, employment and on other parts of the economy in numbers and quantities.

Carrera, Brida and Riso (2007) argued, tourism sector is one of the most significant sectors in the Mexican economy with a huge multiplier effect to the various sectors of its economy.

Carrera, Brida and Riso (2007) adopted Johansen co-integration test to investigate the possibility of the existence of causal relationship between tourism expenditure and economic growth. They used quarterly data for this research, and the findings from causality and co-integration tests shows the existence of long-run relationship, and that real GDP grow 60% more than tourism expenditure, whereas causality goes to GDP from expenditure in a short-run.

Seetanah (2010) studied the relationship of tourism and economic growth among the Latin American economies, including Mexico, between the periods of 1985 to 1998. He used the panel data in the analyses process and adopted an Arellano-Bond estimator to enable the panel's dynamism. The result of this research showed that, tourism sector can give a sufficient growth for low income as well as medium income economies, but the sector may not be adequate for growing high income countries. The paper further investigates the direction of causality between tourism arrival, GDP and other variables such as price level, safety level, education level and infrastructural investments using a generalized least squares method. The results revealed that those small income countries need sufficient level of education and adequate infrastructural development to attract international tourism. Medium income countries on the other hand, need a high social development and high per capita income to be able to attract tourism. Lastly, the price level in the destination countries does not have any effect on the growth of their tourism sectors.

Aguilar (2002) also studied the impact of tourism on the economic growth in Mexico and its effect on regional development of the country. He found that, despite the government intervention policies, the sector contributes only 5% of the GDP, and the sector mainly employs low-skilled workers. Again, the concentration on luxurious resorts in sea-side and other major city areas led to too much attention upon investment that is more of foreign enclave growth, this led to high urbanization and lack of necessary services for the national population.

Chapter 4

METHODOLOGY

4.1 Introduction

This chapter focuses on the methodology employed in this study. Specifically, this chapter discusses the nature, sources of data collected, the techniques of data analysis and the model specification.

4.2 Nature and Sources of Data Collected

This study will implement time series data which covers the period 1980 to 2014. The data used in this research study are obtained from secondary sources namely; Banco de Mexico, Main Economic Indicators- copyrights OECD, Oxford Economics, World Bank WDI, INEGI - Instituto Nacional de Estadistica, Geografia e informatica- Mexico, World Development Bank Indicators.

4.3 Techniques of Data Analysis

This study implements ADF, DF-GLS unit root stationarity test to know the order of cointegration of the series to avoid spurious or meaningless regression. If the variables are cointegrated of the same order then will apply Johansen cointegration test to know the possibility of long run relationship among the series. If we have a long run relationship among the series, then the VECM approach will be used to estimate the speed of adjustment of the series towards their long run relationship.

4.4 Model Specification

To analyze the contribution of tourism development on Mexico's economic growth, the model tries to explain the determinant of number of tourist arrivals depends on the growth of GDP and other explanatory variables.

Modeling tourist arrivals: demand for tourism has been carefully examined in the literature. In the tourism literature, many economists have paid more attention to forecasting demand for tourism mostly using time series method. Within this approach, the determinants of demand commonly used are income and price levels which are mostly measured using exchange rates and consumer price index and transportation cost. Other exogenous variables are also added depending on the research study such as dummy variables, lagged dependent variables. One of the great advantages of these models is their ability to deal with trend and seasonal factor. The aim of all these models is demand forecasting and not the exploration of demand determinants. Many approaches considered prices of destination and tourist income as more important determinants for tourism demand. For this research study, tourist arrivals model is based on exchange rate, tourist price index (proxy for consumer price index), and gross domestic product. All the variables used in this model are all expressed in real terms but we use GDP per capita of four different countries. The model is expressed as:

TA= f(TPI, EXRT, GDP)……..(4.1)

For the purpose of this study, a log linear specification is used to test the contribution of tourism development on economic growth in Mexico and all series are transformed into log form.

$\ln TA = \beta 0 + \beta_1 \ln TPI + \beta_2 \ln EXRT + \beta_3 \ln GDP + u$……..(4.2)

where:

TA = tourist arrival

GDP = gross domestic product per capita

TPI = tourist price index

EXRT = real effective exchange rate

u_t = random disturbance error term

4.5 Stationarity Test

The critical axiom involving time series regression analysis is that the series understudy is stationary because regressing a non-stationary series often lead to the phenomenon of spurious or meaningless regression.

Non-stationary time series are often trending over a sustained period of time but the trend is often stochastic and not deterministic. There are several ways to indicate whether a time series is stationary or not, they are as follows;

I. **Time series plot**: where the series are plotted and you can see the graph which shows briefly the nature of the series.

II. **Unit root test**: these test consist of different variants such as; Augmented Dickey Fuller (ADF), Dickey Fuller –Generalized least Squares(DF-GLS), Phillips –Perron, Ng-Perron, Kwiatkowski –Phillips -Schmidt -Shin, Eliott –Rothenberg –Stock Point –Optimal. This research study will implement ADF, DF-GLS unit root stationarity tests.

III. **Autocorrelation Function (ACF) and Correlogram**

Augmented Dickey Fuller (ADF)

Augmented Dickey Fuller (ADF) is a transformed tryout for stationarity invented by Dickey and Fuller (1981). is formulated to adjust the limitations of DF test to capture higher order autocorrelation role. When error term is uncorrelated the augmented D.F try to correct for unit root test. Below is the ADF equation for stationarity tryout:

$\Delta Y_t = \beta_1 + \beta_2 t + \square Y_{t-1} + \sum_{i=1}^{r} a^i \Delta Y_{t-1} + e_t$ with

$\alpha_i = -\sum_{k=i+1}^{s} \square k$ and $\square = [\sum_{i=1}^{s} \square_i] - 1$……(4.6)

Where e_t is the white noise error term, $\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$, t is time, β is the intercept. To avoid autocorrelation problem among our error term, we determine the lag number difference empirically in other to avoid a biased estimation of □. ADF test can be with constant and trend, constant and none. The ADF hypothesis is:

H_0 : □= 0 (non-stationary)

H_a : □< 0 (stationary)

DF-GLS

According to the assumption of Gujarati, 2009, Econometric variables should be stationary. Hence, before specifying a model, Eliott, Rothenberg and Stock (ERS) employed a new test to derive an efficient version of the ADF test. In constitution of ERS feasible point optimal test, the DF-GLS is computed as follows:

$Y^d_t = Y_t - B^1 \varphi D_t$ ……(4.7)

Where B is the unknown parameter of the trend function and it can be estimated under the alternative model.

$\varphi = 1 + C/t$……(4.8)

The equation above is called ERS detrending procedure GLS detrending. After omitting the deterministic term, GLS test using detrending as estimared by OLS which general form is below is:

$$\Delta Y^{d}_{t} = >Y^{d}_{t-1} + \sum_{i=1}^{r} \quad + >_{t} \ \Delta Y^{d}_{t-j} + e_{t} \ldots\ldots\ldots\ldots\ldots\ldots(4.9)$$

Computing the t-statistic is >=0, where $D_t=1$, ERS says that the general distribution of the DF-GLS test is the same as ADF test, but ADF test has a higher point against the alternative than the DF-GLS test. Ng and Perron (2001), differs from ADF test because it provided the critical values. ERS shows the same power with DF-GLS test as ERS shows the optimal value C=13.5 and also gives the higher power than df test against local alternative.

Autocorrelation Function (ACF) and Correlogram

The acf at lagged k is known as $\rho_k = \gamma_k / \gamma_0$ = covariance at lag k/ variance

We use akaike information criteria (AIC) or Schwarz information criteria (SIC) to determine the lag length. To test for the statistical significance of each autocorrelation coefficient in the correlogram, we compute its standard error. For acf and correlogram, we use Q-value from the Q-statistics, n is the sample size and m is the number of lags (=df)

$$Q = n \sum_{k=1}^{k=m} \rho\hat{}_{k}^{2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4.10)$$

H_0 : a time series is stationary (purely random or white noise)

H_a : a time series is non-stationary

4.6 Cointegration Test

According to Gujarati, when you regress a non-stationary time series do not result into a spurious regression. This situation is called COINTEGRATION. To test for

cointegration, we have two types of test; Granger causality and Johansen cointegration tests which are now incorporated in several software packages.

If two time series Y and X are integrated of different orders then the error term in the regression of Y and X is not stationary and this regression equation is said to be unbalanced. On the other hand, if the two series are integrated of the same order, then the regression equation is said to be balanced. Only then we can apply the Johansen-Juselium maximum likelihood method of integration to obtain the number of cointegration vector/vectors.

Cointegration and Error Correction Mechanism (ECM)

Granger representative theorem: The ECM shows changes in the explained variable as a result of 1% change in the explanatory variable and the lagged equilibrium error term, u_{t-1}. Since cointegration only indicates that long run relationship exists between the two variables but it fails to show us the direction of the causal relationship. Engle and Granger suggest that if there is a cointegration between the variables in the long run, then there must be unidirectional or bi-directional Granger Causality between the two variables. For multiple time series, we will employ Vector Error Correction Model (VECM). VECM test is employed with the ECT, which estimates the speed of adjustment towards the equilibrium of the variables.

Chapter 5

EMPIRICAL RESULTS AND DISCUSSION

Table 1. ADF AND DF-GLS Tests of Unit Root of Brazil

Statistics (Level)	Lnta	Lag	Exrt	lag	LnGDPbra	lag
τT (ADF)	-2.588888	(1)	-2.917035	(0)	-1.980912	(0)
τμ (ADF)	-0.533028	(0)	-2.505431	(0)	-0.361479	(0)
τ (ADF)	3.345500	(0)	-0.525056	(0)	1.642827	(0)
τT (DF-GLS)	-2.707845	(1)	-2.687405	(0)	-1.967626	(0)
τμ (DF-GLS)	0.256783	(1)	-2.349444	(0)	-0.020950	(0)
Statistics (First Difference)	Δlnta	Lag	Δexrt	lag	ΔlnGDPbra	Lag
τT (ADF)	-5.482225	(0)	-5.507126	(0)	-4.782572	(0)
τμ (ADF)	-5.546714	(0)	-5.492061	(0)	-4.807371	(0)
τ (ADF)	-4.199755	(0)	-5.563137	(0)	-4.588511	(0)
τT (DF-GLS)	-5.365838	(0)	-5.260276	(0)	-4.894855	(0)
τμ (DF-GLS)	-5.194848	(0)	-4.721937	(0)	-4.874833	(0)

Table 2. ADF AND DF-GLS Tests of Unit Root of Canada

Statistics (Level)	Lnta	Lag	Exrt	Lag	LnGDPcana	lag
τT (ADF)	-2.588888	(1)	-2.917035	(0)	-2.181694	(1)
τμ (ADF)	-0.533028	(0)	-2.505431	(0)	-0.660006	(0)
τ (ADF)	3.345500	(0)	-0.525056	(0)	3.847437	(0)
τT (DF-GLS)	-2.707845	(1)	-2.687405	(0)	-2.261349	(1)
τμ (DF-GLS)	0.256783	(1)	-2.349444	(0)	0.129104	(1)
Statistics (First Difference)	Δlnta	Lag	Δexrt	Lag	ΔlnGDPcanada	Lag
τT (ADF)	-5.482225	(0)	-5.507126	(0)	-4.095052	(0)
τμ (ADF)	-5.546714	(0)	-5.492061	(0)	-4.164647	(0)
τ (ADF)	-4.199755	(0)	-5.563137	(0)	-3.402797	(0)
τT (DF-GLS)	-5.365838	(0)	-5.260276	(0)	-4.105822	(0)
τμ (DF-GLS)	-5.194848	(0)	-4.721937	(0)	-4.061962	(0)

Table 3. ADF AND DF-GLS Tests of Unit Root of Colombia

Statistics (Level)	Lnta	Lag	Exrt	Lag	LnGDPcol	lag
τT (ADF)	-2.588888	(1)	-2.917035	(0)	-2.445167	(1)
τμ (ADF)	-0.533028	(0)	-2.505431	(0)	0.769879	(0)
τ (ADF)	3.345500	(0)	-0.525056	(0)	2.999469	(0)
τT (DF-GLS)	-2.707845	(1)	-2.687405	(0)	-1.492082	(0)
τμ (DF-GLS)	0.256783	(1)	-2.349444	(0)	0.224434	(1)
Statistics (First Difference)	Δlnta	Lag	Δexrt	Lag	ΔlnGDPcol	Lag
τT (ADF)	-5.482225	(0)	-5.507126	(0)	-5.479597	(8)
τμ (ADF)	-5.546714	(0)	-5.492061	(0)	-4.019364	(0)
τ (ADF)	-4.199755	(0)	-5.563137	(0)	-3.503559	(0)
τT (DF-GLS)	-5.365838	(0)	-5.260276	(0)	-4.245085	(0)
τμ (DF-GLS)	-5.194848	(0)	-4.721937	(0)	-4.085423	(0)

Table 4. ADF AND DF-GLS Tests of Unit Root of USA

Statistics (Level)	Lnta	Lag	Exrt	lag	LnGDPus	lag
τT (ADF)	-2.588888	(1)	-2.917035	(0)	-1.137229	(1)
τμ (ADF)	-0.533028	(0)	-2.505431	(0)	-2.634043	(1)
τ (ADF)	3.345500	(0)	-0.525056	(0)	3.147625	(1)
τT (DF-GLS)	-2.707845	(1)	-2.687405	(0)	-0.734240	(1)
τμ (DF-GLS)	0.256783	(1)	-2.349444	(0)	0.694585	(1)
Statistics (First Difference)	Δlnta	Lag	Δexrt	lag	ΔlnGDPus	Lag
τT (ADF)	-5.482225	(0)	-5.507126	(0)	-5.048519	(0)
τμ (ADF)	-5.546714	(0)	-5.492061	(0)	-4.181592	(0)
τ (ADF)	-4.199755	(0)	-5.563137	(0)	-2.250387	(0)
τT (DF-GLS)	-5.365838	(0)	-5.260276	(0)	-4.514882	(0)
τμ (DF-GLS)	-5.194848	(0)	-4.721937	(0)	-2.505096	(0)

Note: Number of tourist arrivals; exchange rate; GDP per capita. All of the series are logarithmic. T stands for the most general model with an intercept and trend; is with an intercept but without trend; is the one without intercept and without trend. Numbers in parentheses are optimum lags in the case of ADF and DF-GLS tests (SIC).Tests were carried out in E-VIEWS 9.0.

From the above table, we discovered that all the series were not stationary at level because when tested using ADF and DF-GLS unit root test, we could not reject the null hypothesis which says that there is a unit root. Which qualify us to take the first difference and all the variables became stationary after taking the first difference which means they became integrated of order one I(1) since we rejected the null hypothesis. Johansen cointegration test will be done to know if there is any long run relationship among the variables.

5.2 Cointegration Results and Vecm Estimation

Cointegration of result for Brazil

Table 5. Johansen Cointegration Rank Test (Trace) Brazil

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.355542	28.74513	24.27596	0.0128
At most 1 *	0.305778	14.24673	12.32090	0.0235
At most 2	0.064576	2.202940	4.129906	0.1625

From the above table, trace test indicates two cointegration vectors which denote that we could now reject the null hypothesis at 0.05 levels. Since the series are cointegrated, then we have a long run relationship between the number of tourist arrivals, exchange rate and GDP per capita of Brazil. This means that we can now run the restricted VECM.

VECM (ECM) result for Brazil

Since all the series are cointegrated, we need to run VECM to know if there is long run causality between the series. If the ECT coefficient is negative and statistically significant- meaning there is a long run causality running from the independent variables to the dependent variable and vice versa.

Table 6. Vector Error Correction Estimates Brazil

Cointegrating Eq:	CointEq1	CointEq2	
LNTA(-1)	1.000000	0.000000	
EXRT(-1)	0.000000	1.000000	
LNGDPBRA(-1)	-0.697182	-17.91215	
	(0.18845)	(10.0620)	
	[-3.69950]	[-1.78018]	
C	-3.248266	50.77195	
Error Correction:	D(LNTA)	D(EXRT)	D(LNGDPBRA)
CointEq1	-0.017590	27.23255	0.317977
	(0.06151)	(8.27729)	(0.18569)
	[-0.28599]	[3.29003]	[1.71242]
CointEq2	-0.000204	-0.614954	-0.001079
	(0.00086)	(0.11581)	(0.00260)
	[-0.23659]	[-5.31012]	[-0.41520]
D(LNTA(-1))	-0.117310	26.59694	0.266013
	(0.18916)	(25.4563)	(0.57107)
	[-0.62017]	[1.04481]	[0.46582]
D(EXRT(-1))	-0.002836	0.265101	0.000476
	(0.00086)	(0.11507)	(0.00258)
	[-3.31638]	[2.30390]	[0.18436]
D(LNGDPBRA(-1))	0.026615	-20.17183	0.225595
	(0.06117)	(8.23184)	(0.18467)
	[0.43511]	[-2.45046]	[1.22162]
C	0.043909	-0.629286	0.028784
	(0.01310)	(1.76296)	(0.03955)
	[3.35188]	[-0.35695]	[0.72781]
R-squared	0.335311	0.667058	0.165180
Adj. R-squared	0.212221	0.605402	0.010584
Sum sq. resids	0.099808	1807.650	0.909714
S.E. equation	0.060800	8.182298	0.183557
F-statistic	2.724104	10.81904	1.068460
Log likelihood	48.89175	-112.8790	12.42871
Akaike AIC	-2.599500	7.204789	-0.389619
Schwarz SC	-2.327408	7.476881	-0.117527
Mean dependent	0.041726	-0.797976	0.051125
S.D. dependent	0.068501	13.02560	0.184536
Determinant resid covariance (dof adj.)		0.007297	

Determinant resid covariance	0.003997
Log likelihood	-49.35684
Akaike information criterion	4.445869
Schwarz criterion	5.534238

The ECT (speed of adjustment towards equilibrium) is 1.759%, It is negative and statistically insignificant at 1% level which indicates we have no long run causality running from exchange rate and GDP per capita of Brazil to the number of tourist arrivals in Mexico. The determinant of coefficient-33.5% of the variation in number of tourist arrivals can be explained by the variation in exchange rate and GDP per capita of Brazil. The unexplained part which is not included in the model is 66.5%. Significance test- F-statistic value shows that the whole equation is jointly significant because we rejected the null hypothesis.

Residual diagnostics for Brazil

Table 7. Breusch-Godfrey Serial Correlation LM Test Brazil

F-statistic	0.503733	Prob. F(2,26)	0.6100
Obs*R-squared	1.231007	Prob. Chi-Square(2)	0.5404

The hypothesis testing for serial correlation is;

Ho: no autocorrelation Ha: autocorrelation

From the above table, we could not reject our null hypothesis which means that the error terms are not correlated.

Table 8. Heteroskedasticity Test: Breusch-Pagan-Godfrey Brazil

F-statistic	1.291796	Prob. F(6,26)	0.2956
Obs*R-squared	7.578360	Prob. Chi-Square(6)	0.2706

Scaled explained SS	5.091510	Prob. Chi-Square(6)	0.5321

The hypothesis testing for Heteroscedasticity is;

Ho : constant variance (homoscedasticity)

Ha : variance is not constant (heteroscedasticity)

We also do not reject the null hypothesis from the above table which means that the variance of error term is constant.

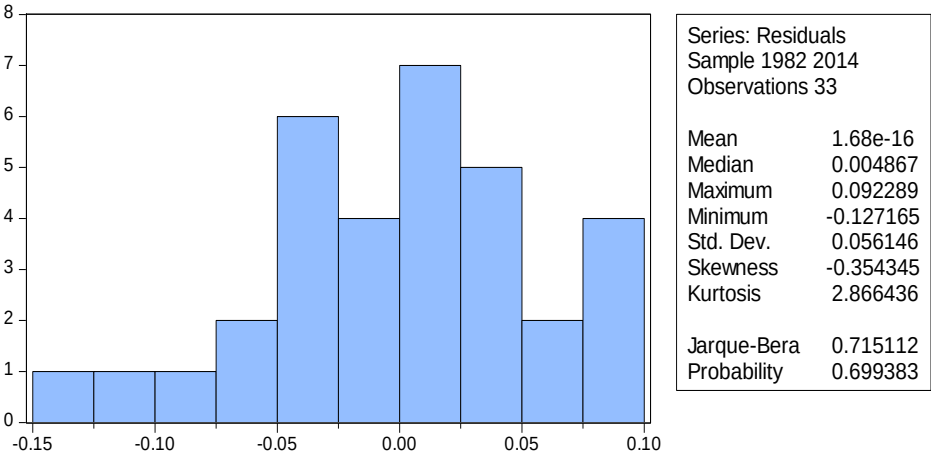

Figure 1. Histogram and Normality test for Brazil

Test for Normality: residuals are normally distributed. The hypothesis testing is:

Ho: Ut =0 (normally distributed) Ha: Ut ≠0 (not normally distributed)

From the above table we also could not reject the null hypothesis which means that the residuals are normally distributed.

Cointegration result for Canada

Table 9. Johansen Cointegration Rank Test (Trace) Canada

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.382484	31.59524	24.27596	0.0050
At most 1 *	0.324890	15.68760	12.32090	0.0131
At most 2	0.079191	2.722584	4.129906	0.1169

From the above table, trace test indicates two cointegration vectors which denote that we could now reject the null hypothesis at 0.05 levels. Since the series are cointegrated, then there is a long run relationship between the number of tourist arrivals, exchange rate and GDP per capita of Canada. This means that we can now run the restricted VECM.

VECM (ECM) result for Canada

Since all the series are cointegrated, we need to run VECM to know if there is long run causality between the series. If the ECT coefficient is negative and statistically significant- meaning there is a long run causality running from the independent variables to the dependent variable and vice versa.

Table 10. Vector Error Correction Estimates Canada

Cointegrating Eq:	CointEq1	CointEq2
LNTA(-1)	1.000000	0.000000
EXRT(-1)	0.000000	1.000000
LNGDPCANADA(-1)	-1.020544	-27.50634
	(0.22517)	(13.8028)
	[-4.53227]	[-1.99281]

C	1.292941	180.4383	

Error Correction:	D(LNTA)	D(EXRT)	D(LNGDPCANADA)
CointEq1	7.81E-06	30.82530	0.144873
	(0.07910)	(11.9690)	(0.08156)
	[9.9e-05]	[2.57543]	[1.77638]
CointEq2	-0.000263	-0.575908	-0.000911
	(0.00088)	(0.13243)	(0.00090)
	[-0.30028]	[-4.34871]	[-1.00975]
D(LNTA(-1))	-0.102773	32.01210	-0.313855
	(0.21862)	(33.0799)	(0.22540)
	[-0.47010]	[0.96772]	[-1.39242]
D(EXRT(-1))	-0.002824	0.276825	-0.001498
	(0.00087)	(0.13137)	(0.00090)
	[-3.25235]	[2.10729]	[-1.67299]
D(LNGDPCANADA(-1))	-0.062116	-14.70864	0.438345
	(0.19056)	(28.8346)	(0.19648)
	[-0.32597]	[-0.51010]	[2.23104]
C	0.047731	-1.246151	0.033638
	(0.01386)	(2.09770)	(0.01429)
	[3.44300]	[-0.59405]	[2.35340]
R-squared	0.324724	0.572393	0.242345
Adj. R-squared	0.199673	0.493206	0.102038
Sum sq. resids	0.101398	2321.618	0.107790
S.E. equation	0.061282	9.272856	0.063184
F-statistic	2.596730	7.228410	1.727253
Log likelihood	48.63101	-117.0079	47.62230
Akaike AIC	-2.583697	7.455026	-2.522564
Schwarz SC	-2.311605	7.727118	-2.250471
Mean dependent	0.041726	-0.797976	0.042692
S.D. dependent	0.068501	13.02560	0.066677

Determinant resid covariance (dof adj.)	0.001026
Determinant resid covariance	0.000562
Log likelihood	-16.99353
Akaike information criterion	2.484457
Schwarz criterion	3.572826

The ECT (speed of adjustment towards equilibrium) is 0.00078%, It is positive and statistically significant at 1% level which indicates we have no long run causality

running from exchange rate and GDP per capita of Canada to the number of tourist arrivals in Mexico. The determinant of coefficient-32.4% of the variation in number of tourist arrivals can be explained by the variation in exchange rate and GDP per capita of Canada. The unexplained part which is not included in the model is 67.6%. Significance test- f-statistic value shows that the whole equation is jointly significant because we rejected the null hypothesis.

Residual diagnostics for Canada

Table 11. Breusch-Godfrey Serial Correlation LM Test
Canada

F-statistic	0.720400	Prob. F(2,25)	0.4964
Obs*R-squared	1.798220	Prob. Chi-Square(2)	0.4069

The hypothesis testing for serial correlation is;

Ho: no autocorrelation Ha: autocorrelation

From the above table, we cannot reject the null hypothesis which means that the error terms are not correlated.

Table 12. Heteroskedasticity Test: Breusch-Pagan-Godfrey Canada

F-statistic	1.537424	Prob. F(6,26)	0.2055
Obs*R-squared	8.641983	Prob. Chi-Square(6)	0.1947
Scaled explained SS	6.581957	Prob. Chi-Square(6)	0.3612

The hypothesis testing for Heteroscedasticity is;

Ho: constant variance (homoscedasticity)

Ha : variance is not constant (heteroscedasticity)

We also do not reject the null hypothesis from the above table which means that the variance of error term is constant.

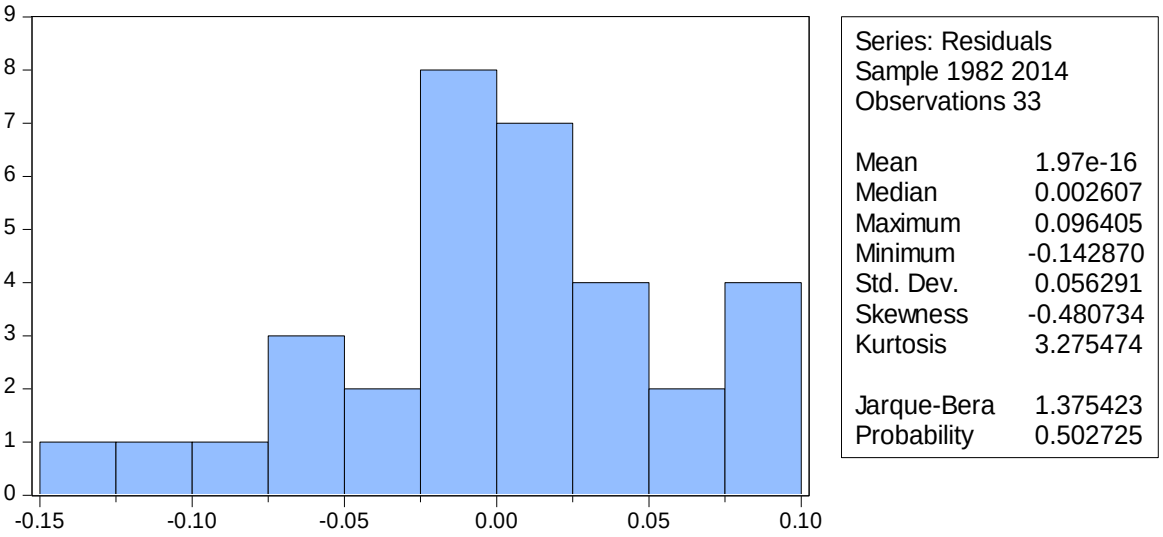

Figure 2. Histogram and Normality test for Canada

Test for Normality: residuals are normally distributed. The hypothesis testing is:

Ho: Ut =0 (normally distributed) Ha: Ut ≠0 (not normally distributed).

From the above table we also do not reject the null hypothesis which means that error terms are normally distributed.

Cointegration result for Colombia

Table 13. Johansen Cointegration Rank Test (Trace)
Colombia

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.330108	25.94561	24.27596	0.0305
At most 1 *	0.319295	12.72454	12.32090	0.0428
At most 2	0.000966	0.031881	4.129906	0.8839

From the above table, trace test indicates two cointegration vectors which denote that we could now reject the null hypothesis at 0.05 levels. Since the series are cointegrated, then there is a long run relationship between the number of tourist arrivals, exchange rate and GDP per capita of Colombia. This means that we can now run the restricted VECM.

VECM (ECM) result for Colombia

Since all the series are cointegrated, we need to run VECM to know if there is long run causality between the series. If the ECT coefficient is negative and statistically significant- then there is a long run causality running from the independent variables to the dependent variable and vice versa.

Table 14. Vector Error Correction Estimates
Colombia

Cointegrating Eq:	CointEq1	CointEq2	
LNTA(-1)	1.000000	0.000000	
EXRT(-1)	0.000000	1.000000	
LNGDPCOL(-1)	-0.501093	-6.212717	
	(0.12176)	(8.39743)	
	[-4.11532]	[-0.73984]	
C	-5.129423	-49.21874	
Error Correction:	D(LNTA)	D(EXRT)	D(LNGDPCOL)
CointEq1	0.006485	39.29682	0.145570
	(0.06486)	(7.89389)	(0.11559)
	[0.09997]	[4.97813]	[1.25942]
CointEq2	-0.000626	-0.481782	0.001341
	(0.00097)	(0.11821)	(0.00173)
	[-0.64431]	[-4.07573]	[0.77461]
D(LNTA(-1))	-0.176654	37.10534	0.024561
	(0.20783)	(25.2936)	(0.37036)
	[-0.84997]	[1.46698]	[0.06632]

D(EXRT(-1))	-0.002758	0.146496	-0.001477
	(0.00091)	(0.11016)	(0.00161)
	[-3.04758]	[1.32989]	[-0.91595]
D(LNGDPCOL(-1))	0.027455	-29.14693	0.248613
	(0.10943)	(13.3180)	(0.19501)
	[0.25088]	[-2.18854]	[1.27490]
C	0.046070	-0.492646	0.039452
	(0.01323)	(1.60979)	(0.02357)
	[3.48293]	[-0.30603]	[1.67373]
R-squared	0.329385	0.725298	0.199674
Adj. R-squared	0.205197	0.674427	0.051466
Sum sq. resids	0.100698	1491.447	0.319766
S.E. equation	0.061070	7.432280	0.108826
F-statistic	2.652314	14.25765	1.347253
Log likelihood	48.74530	-109.7064	29.68014
Akaike AIC	-2.590624	7.012508	-1.435160
Schwarz SC	-2.318532	7.284600	-1.163067
Mean dependent	0.041726	-0.797976	0.055111
S.D. dependent	0.068501	13.02560	0.111740
Determinant resid covariance (dof adj.)		0.001881	
Determinant resid covariance		0.001030	
Log likelihood		-26.98437	
Akaike information criterion		3.089962	
Schwarz criterion		4.178331	

The ECT (speed of adjustment towards equilibrium) is 0.6485%, It is positive and statistically significant at 1% level which indicates we have no long run causality running from exchange rate and GDP per capita of Colombia to the number of tourist arrivals in Mexico. The determinant of coefficient-32.9% of the variation in number of tourist arrivals can be explained by the variation in exchange rate and GDP per capita of Colombia. The unexplained part which is not included in the model is 67.1%. Significance test- F-statistic value shows that the whole equation is jointly significant because we rejected the null hypothesis.

Residual diagnostics for Colombia

Table 15. Breusch-Godfrey Serial Correlation LM Test
Colombia

F-statistic	0.849615	Prob. F(2,25)	0.4396
Obs*R-squared	2.100232	Prob. Chi-Square(2)	0.3499

The hypothesis testing for serial correlation is;

Ho: no autocorrelation Ha: autocorrelation

From the above table, we cannot reject the null hypothesis which means that the error terms are not correlated.

Table 16. Heteroskedasticity Test: Breusch-Pagan-Godfrey
Colombia

F-statistic	2.336828	Prob. F(6,26)	0.0614
Obs*R-squared	11.56124	Prob. Chi-Square(6)	0.0725
Scaled explained SS	8.256821	Prob. Chi-Square(6)	0.2199

The hypothesis testing for Heteroscedasticity is:

Ho : constant variance (homoscedasticity)

Ha : variance is not constant (heteroscedasticity)

We also do not reject the null hypothesis from the above table which means that the variance of error term is constant.

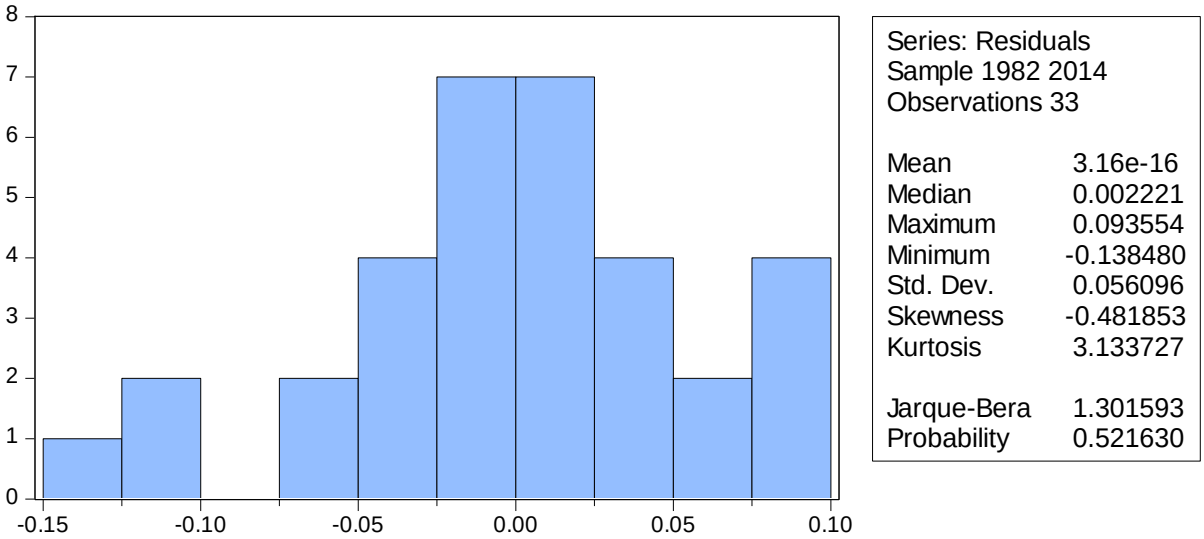

Figure 3. Histogram and Normality test for Colombia

Test for Normality: residuals are normally distributed. The hypothesis testing is:

Ho: Ut =0 (normally distributed) Ha: Ut ≠0 (not normally distributed).

From the above table we also do not reject the null hypothesis which means that error terms are normally distributed.

Cointegration result for United States of America

Table 17. Johansen Cointegration Rank Test (Trace) USA

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.408488	31.03645	24.27596	0.0061
At most 1 *	0.327793	13.70903	12.32090	0.0291
At most 2	0.018071	0.601794	4.129906	0.4992

From the above table, trace test indicates two cointegration vectors which denote that we could now reject the null hypothesis at 0.05 levels. Since the series are cointegrated, then we have a long run relationship between the number of tourist

arrivals, exchange rate and GDP per capita of United States of America. This means that we can now run the restricted VECM.

VECM (ECM) result for United States of America

Since all the series are cointegrated, we need to run VECM to know if there is long run causality between the series. If the ECT coefficient is negative and statistically significant we can conclude that there is a long run causality running from the independent variables to the dependent variable and vice versa.

Table 18. Vector Error Correction Estimate USA

Cointegrating Eq:	CointEq1	CointEq2	
LNTA(-1)	1.000000	0.000000	
EXRT(-1)	0.000000	1.000000	
LNGDPUS(-1)	-1.102403	-28.50537	
	(0.06739)	(11.2924)	
	[-16.3589]	[-2.52429]	
C	2.361808	196.7874	
Error Correction:	D(LNTA)	D(EXRT)	D(LNGDPUS)
CointEq1	-0.358591	49.27674	0.049283
	(0.18148)	(30.0348)	(0.05769)
	[-1.97590]	[1.64066]	[0.85432]
CointEq2	-5.55E-06	-0.513185	-0.000167
	(0.00084)	(0.13913)	(0.00027)
	[-0.00661]	[-3.68859]	[-0.62496]
D(LNTA(-1))	0.043782	35.10455	0.002733
	(0.20271)	(33.5487)	(0.06444)
	[0.21598]	[1.04638]	[0.04242]
D(EXRT(-1))	-0.002781	0.302759	-0.000606
	(0.00082)	(0.13578)	(0.00026)
	[-3.38977]	[2.22980]	[-2.32300]
D(LNGDPUS(-1))	0.174843	-105.0980	0.437035
	(0.53132)	(87.9319)	(0.16889)

	[0.32907]	[-1.19522]	[2.58772]
C	0.031637	2.528101	0.021969
	(0.02462)	(4.07431)	(0.00783)
	[1.28509]	[0.62050]	[2.80742]
R-squared	0.416169	0.557749	0.404187
Adj. R-squared	0.308053	0.475850	0.293851
Sum sq. resids	0.087667	2401.126	0.008858
S.E. equation	0.056982	9.430302	0.018112
F-statistic	3.849258	6.810251	3.663247
Log likelihood	51.03193	-117.5635	88.85418
Akaike AIC	-2.729208	7.488699	-5.021465
Schwarz SC	-2.457116	7.760791	-4.749373
Mean dependent	0.041726	-0.797976	0.041273
S.D. dependent	0.068501	13.02560	0.021554

Determinant resid covariance (dof adj.)	5.72E-05
Determinant resid covariance	3.13E-05
Log likelihood	30.64614
Akaike information criterion	-0.402796
Schwarz criterion	0.685573

The ECT (speed of adjustment towards equilibrium) is 35.86%, It is negative and statistically insignificant at 1% level which indicates we have a long run causality running from exchange rate and GDP per capita of USA to number of tourist arrivals in Mexico. The determinant of coefficient-41.6% of the variation in number of tourist arrivals can be explained by the variation in exchange rate and GDP per capita of USA. The unexplained part which is not included in the model is 58.4%. Significance test- f-statistic value shows that the whole equation is jointly significant because we rejected the null hypothesis.

Residual diagnostics for United States of America

Table 19. Breusch-Godfrey Serial Correlation LM Test
USA

F-statistic	0.895580	Prob. F(2,26)	0.4206

Obs*R-squared	2.126873	Prob. Chi-Square(2)	0.3453

The hypothesis for testing serial correlation is;
Ho: no autocorrelation Ha: autocorrelation

From the above table, we reject the null hypothesis which means that the error terms are not correlated.

Table 20. Heteroskedasticity Test: Breusch-Pagan-Godfrey USA

F-statistic	1.565463	Prob. F(6,26)	0.1970
Obs*R-squared	8.757765	Prob. Chi-Square(6)	0.1877
Scaled explained SS	6.804667	Prob. Chi-Square(6)	0.3393

The hypothesis testing for Heterosscedasticity is;

Ho: constant variance (homoscedasticity)

Ha : variance is not constant (heteroscedasticity)

We also do not reject the null hypothesis from the above table which means that the variance of error term is constant.

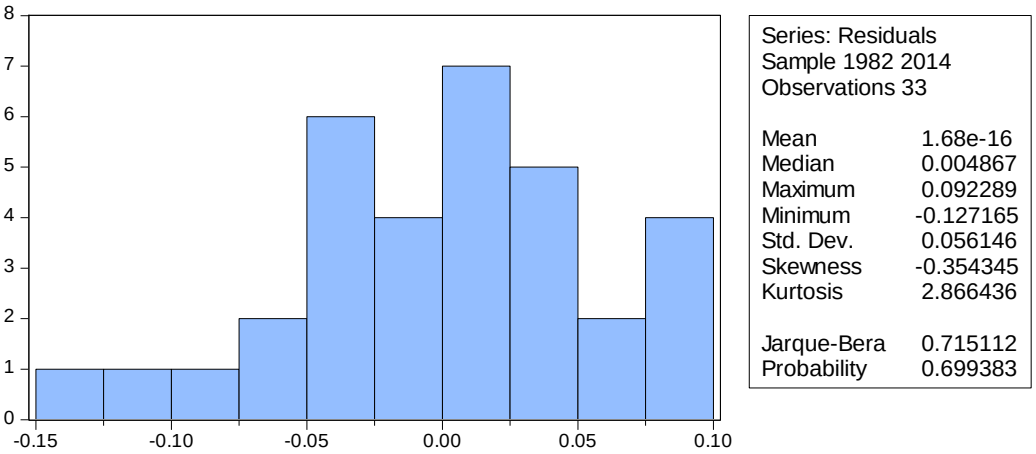

Figure 4. Histogram and Normality test for USA

Test for Normality: residuals are normally distributed. The hypothesis testing is:

Ho: Ut =0 (normally distributed) Ha: Ut ≠0 (not normally distributed).

From the above table we cannot reject the null hypothesis which means that residuals are normally distributed.

Chapter 6

CONCLUSION AND POLICY RECOMMENDATION

6.1 Conclusion

This research study empirically tested the contribution of tourism development to economic growth in Mexico. It used the GDP per capita of 4 countries among the top 10 tourists who visit Mexico for tourist according to the ranking of World Tourism Organization in 2014. This research study also question to see if there is long run equilibrium among the variables. In this study, the determinants of number of tourist arrivals in Mexico are exchange rate, GDP per capita and tourist price index which proxy is consumer price index. Tourist price index was eliminated from the model because it was stationary at order 2 and it was not significant at 0.05level. All the other variables were non-stationary at level but they became stationary after taking their first difference using the ADF test and DF-GLS test. Johansen cointegration test results show that United States of America, Brazil, Colombia and Canada all have 2 cointegration vectors which show that there is a long run relationship among the series used in this study. Therefore, all variables will converge together in the long run. The ECT which is the speed of adjustment of the series towards equilibrium shows that United States of America has a long run causality which is running from exchange rate and GDP per capita to the number of tourist arrivals in Mexico because of the negative sign of the ECT. While Brazil, Canada and Colombia has no long run causality running from exchange rate and GDP per capita to the number of tourist arrivals in Mexico because of the positive sign of the ECT. Therefore, Mexico

as a tourist destination has started to lose its popularity for tourist coming from Brazil, Canada and Colombia which means that Mexico would reach the decline stage according to Richard Butler (1980) hypothetical model of tourist evolution stages. For USA, Mexico as a tourist destination would rejuvenate for tourists arriving from USA because it still has not lost its popularity as a tourist destination to the Americans.

6.2 Recommendations

Recall that the scope of this research essay is limited in investigating and analyzing the contribution of tourism development in the overall growth of Mexico. To achieve that, specific objectives where set up which are;

I. Identify how tourism contributes to Mexico's economic growth.

II. Recommend the government on how to develop the tourism sector.

Based on the research findings, which is compatible with the previous researches, we discover that the tourism sector contributes a lot, to the development of Mexico. Therefore, the following recommendations could be made;

1) The Mexican government should provide policies that will develop its tourism sector and integrate other economic sectors to tourism through provision of inter-sectoral links, so as to have competitive advantage among countries in the Organization of American States (OAS). Projects ranging from building world class airports, provision of infrastructures. Such as good roads, highly efficient system of communication, as well as other policies that that will encourage investment on tourism related sector, such as tax incentive to hotels and etc.

2) The government should also apply sustainable laws and policies with regards to foreign tourism, better than other countries in the region. By doing that, the Mexican economy will be affected positively by the increase in income of Brazil and United States.
3) Based on the above findings also, government should maintain a relatively stable exchange rate, because that will increase tourists arrival from Brazil and United States, hence increase income generated from the sector which in turn will affect the Mexican economy positively.

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