THE UNIVERSITY OF HULL

Estimating the International Tourism Demand for Egypt
'An Econometric Approach'

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by

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ABSTRACT

The thesis aims to identify the main factors that significantly affect tourism demand for Egypt. Both time series data and panel data are used to model and forecast tourism demand for Egypt from all origins, as well as three individual regions of origin, including Europe, Arab and the Americas. The methodological and econometric approaches introduced in this thesis proceed from the simple to the more complex structure to obtain more reliable estimation. First, we estimate tourism demand for Egypt using the co-integration and error correction (CI/ECM) approach based on a single equation, followed by using a system of equations approach over the period 1970-2009. All the estimated econometric methods, in addition to two univariate time series methods, are used to generate ex-post forecasting for all the models over the period 2005-2009. The preferred method is used in producing ex-ante forecasting of future tourism demand for Egypt for the period 2010-2014. Panel co-integration techniques are also used to estimate tourism demand models over the period 1980-2009. Finally, the causality relationship between tourism demand and its economic determinants is estimated based on panel data analysis, which may provide more guidance for policy makers in Egypt.

The results indicate that tourism demand for Egypt is found to be co-integrated with its fundamental determinants at the 1% significance level, with a high adjustment speed toward the steady state equilibrium. The importance of long-run income for all tourists from different nationalities is affirmed; with an elastic demand for non-Arab tourists. Price is also an important determinant, with a different effect in each originating region. It takes less than unity value for all tourists, except the Arab. Tunisia is found to be the most significant alternative to Egypt, with a complementary effect for Europe and the Americas tourists, but substitutability effect for Arab tourists. Hotel capacity is a significant and positive factor for all nationalities, except the Americas. Globalization is important in all models; it has a positive effect for all non-Arab nationalities. Political instability has a significant and negative effect, with the most effect on the Americas. All the determinants Granger cause tourist arrivals in the long run, but globalization and hotel capacity are of great importance with a bidirectional effect with tourist arrivals. Ex-post forecasting results show that the CI/ECMs outperform the other time series methods and produce highly accurate forecasts. The number of arrivals and nights from all origin markets is likely to increase in absolute terms (2010-2014), but with slower growth than recent trend.

LIST OF CONTENTS

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

A&P	Asia and Pacific
AB	Arellano and Bond
ACF	Autocorrelation Function
ADF	Augmented Dickey-Fuller
AIC	Akaike Information Criterion
AIDS	Almost Ideal Demand System
AIEST	International Association of Scientific Experts in Tourism
AMAPE	Adjusted Mean Absolute Percentage Error
AR	Autoregressive
ARCH	Autoregressive Conditional Heteroscedasticity
ARDL	Autoregressive Distributed Lag
ARIMA	Autoregressive Integrated Moving Average
BOP	Balance of Payments
CAPMAS	Central Agency for Public Mobilisation and Statistics
CBE	Central Bank of Egypt
CE	Co-integrating Equation
CI	Co-Integration
CIDW	Co-Integration Durbin Watson
CLSDV	Corrected Least Square Dummy Variable
CPI	Consumer Price Index
CUSUM	Cumulative Sum of Recursive Residuals
CUSUMQ	Cumulative Sum of Square of Recursive Residuals
DF	Dickey Fuller
DFE	Dynamic Fixed Effect
DGP	Data Generating Process
DOLS	Dynamics OLS
DW	Durbin-Watson
EAP	East Asia and Pacific
ECM	Error Correction Model
EG	Engle Granger
EG2S	Engle Granger Two Stage
EIA	Economic Impact Analysis
ESDS	Economic and Social Data Service
ESMOOTH	Exponentials Smoothing
EU	European Union
FE	Fixed Effect
FPE	Final Prediction Error
GDP	Gross Domestic Product
GFESM	Generalized Forecast Error Second Moment
GLS	Generalized Least Square
GMM	Generalized Method of Moments
GNI	Gross National Income
GNP	Gross National Product

HQC	Hannan-Quinn Criterion
HT	Harris-Tzavalist
IFS	International Financial Statistics
IID	Independently and Identically Distributed
IMF	International Monetary Fund
IPI	Industrial Production Index
IPS	Im-Pesaran-Shin
IUOTO	International Union of Official Travel Organizations
IV	Instrumental Variables
JB	Jarque-Bera
JML	Johansen's Maximum Likelihood
KOF	Konjunkturforschungsstelle Swiss Economic Institute
KPSS	Kwiatkowski-Phillips-Schmidt-Shin
LAIDS	Linear AIDS
LLC	Levin-Lin-Chu
LM	Lagrange Multiplier
LR	Likelihood Ratio
LS	Least Square
LSDV	Least Square Dummy Variable
MAE	Mean Absolute Error
MAPE	Mean Absolute Percentage Error
MG	Mean Group
MICE	Meetings, Incentives, Conferences, and Exhibitions
MLE	Maximum Likelihood Estimation
MW	Maddala and Wu
NDI	National Disposable Income
OECD	Organisation for economic co-operation and development
OIC	Organisation of Islamic Cooperation
OLS	Ordinary Least Square
OPEC	Organization of Petroleum Exporting Countries
PACF	Partial Autocorrelation Function
PMG	Pooled Mean Group
PP	Phillips-Perron
RE	Random Effect
RESET	Regression Equation Specification Error Test
RMSE	Root Mean Squared Error
SA	Saudi Arabia
SARIMA	Seasonal ARIMA
SARS	Severe Acute Respiratory Syndrome
SBC	Schwartz Bayesian Criterion
SC	Schwartz Criterion
SESRIC	Statistical Economic and Social Research and Training Centre for Islamic Countries
SIS	State Information Service

STS	System of Tourism Statistics
STSM	Structural Time Series Model
SUR	Seeming Unrelated Regression
TSAs	Tourism Satellite Accounts
TVP	Time-Varying Parameter
UAE	United Arab Emirates
UECM	Unrestricted Error Correction Model
UNWTO	United Nations World Tourism Organization
VAR	Vector Autoregressive
VECM	Vector Error Correction Model
VIF	Variance Inflation Factor
VMA	Vector Moving Average
WARP	Weak Axiom of Revealed Preference
WB	World Bank
WDI	World Development Indicators
WMRC	World Market Research Centre
WTTC	World Travel and Tourism Council

Chapter 1: Introduction

1.1 Background of the Thesis

After more than six decades of growth, tourism has become one of the largest sectors of the world economy. It provides a strong stimulus to global economic development because of its contribution to generating revenue, export earning and employment opportunities. In 2009, the direct impact of tourism sector constituted 3.2% of global gross domestic income, 2.8% of global employment (World Travel and Tourism Council (WTTC), 2011), 5.5% of total exports and 24% of service exports (World Bank (WB), 2010). Over recent years there has been a substantial growth in tourism: the number of tourist arrivals increased on average by 6% annually from 25 million in 1950 to 880 million in 2009 (United Nations World Tourism Organization (UNWTO), 2010), and is forecast to reach 1.6 billion by 2020 (WTTC, 2011). In addition, tourism receipts increased by 6.6% annually in real terms (1960=100) from US$ 2.6 billion in 1950 to US$ 117.6 billion in 2009, making it one of the world's fastest growing industries (UNWTO, 2010).

As a region, the Middle East has experienced very high tourism growth in terms of arrivals and receipts, which is an indication of a flourishing future for tourism in that region. It is equivalent to more than a 269-fold increase for arrivals and almost 158-fold for real receipts over the period from 1950 to 2009. The region attained the second strongest arrivals after Asia and Pacific (A&P) in the 1950s and the 1970s, third position after A&P and Africa in the 1960s, and was first in both the 1990s and 2000s. This led the Middle East share of world tourist arrivals increased substantially from 0.8% in 1950 to about 6% in 2009. In terms of receipts, the Middle East receipts grew rapidly, making this the fastest growing region worldwide in the 1960s, 1970s, 1990s and 2000s. Consequently, the share of this region of worldwide tourist receipts increased from 1.5% in 1950 to 5.1% in 2009 (UNWTO, various issues). Egypt's contribution to total visitor arrivals and receipts in the Middle East is very high, occupying the first position with a share of 19% of region's arrivals and 11% of regions' receipts in 2009 (Egypt Tourism in Figures, 2010). It is forecast that Egypt will remain the leading country in the Middle East in 2020 with the largest number of arrivals in the region, representing 19.1% of total Middle East visitors (WTTC, 2011).

The unique history and cultural heritage of Egypt were the primary factors in promoting international tourism to Egypt, since Egypt alone has one third of the world's known ancient monuments and the remains of perhaps the first civilization in the world. Besides cultural and archaeological tourist attractions, Egypt has natural tourist opportunities, including the River Nile and long coastlines and beaches (more than 3000 km of beaches situated on the Mediterranean and the Red Sea). Moreover, Egypt has a strong geographical location at the intersection of three continents - Africa, Asia and Europe - and enjoys a moderate climate and year-round sunshine. All of these characteristics provide Egypt's tourism industry with an international comparative advantage (Egypt the State Information Service (SIS), 2011).

Taking into consideration these unique features and the scale of the tourism experience in Egypt, tourism makes a large contribution to the Egyptian economy. More than 12.5 million people visited Egypt in 2009, staying 126.5 million nights and spending US$ 10.8 billion (Egypt Tourism in Figures, 2010), equivalent to 24% of Egypt's total exports and 50% of its service exports (WB, 2010). The sector was the largest source of currency in Egypt in 2009/10 (Central Bank of Egypt, 2011). According to the WTTC, tourism in Egypt directly contributed to 7.4% of total GDP, and 6.3% of total employment. In terms of direct and indirect contribution, tourism's share of GDP rose to 13.6%, and 11.4% of total employment in 2009 (WTTC, 2011).

Due to the important role of tourism in the Egyptian economy, tourism has been given greater attention in its national development strategies. The Ministry of Tourism has aims to increase the ability of Egyptian tourism to become globally competitive by attracting more tourists from its major origin markets and diversifying the tourist cities to attract tourists from non-traditional origins (Egypt SIS, 2011).

> According to the Sixth five-year plan, the Ministry of Tourism Plan aims at doubling the number of tourists to reach 14 million tourists by the end of the Plan 2007/12, increasing numbers of tourism nights to reach 140 million by the end of the Plan, with an average length of stay of ten nights/visitor, expanding hotel capacity to 240 thousand rooms, at a rate of 15 thousand rooms a year, providing about 1.2 million new job opportunities, with an annual rate of 200 thousand jobs, and finally increasing tourism income to reach $ 12 billion in 2011/12 (Ministry of Planning, 2011: 132).

To achieve these aims, the Ministry of Tourism has developed policies in a range of areas, including promotion, product diversification, eco-tourism, raising tourism awareness and training. Executed tourism investments were L.E 15.3 billion in the Fifth

Five-Year Plan (1997/98-2001/02), 85% of them were implemented by private investments and 15% by public investments. For the Sixth Five-Year Plan (2007/08-2011/12), tourism investments are estimated to be L.E 44.5 billion, with L.E 2.7 billion of these investments directed to tourism promotion activities (Ibid, 2011).

Understanding the economics underlying the demand for tourism is a key to designing appropriate policies to expand the sector. According to Quayson and Var (1982), modelling and forecasting tourism demand is important for two reasons. First, the public and private tourism sectors need accurate estimates and forecasts of tourism demand to ensure the efficient allocation of their scarce resources over time. Secondly, knowledge of demand elasticities of tourism is essential for estimating the tourist multiplier effects and for economic decision making. Archer (1987) pointed out the importance of tourism demand forecasting:

> In the tourism industry, in common with most other service sectors, the need to forecast accurately is especially acute because of the perishable nature of the product. Unfilled airline seats and unused hotel rooms cannot be stockpiled (p.77).

Along with the enormous growth in tourism flows in the world over the past two decades and the increasing importance of tourism demand research, there has developed a large number of studies investigating the main determinants of the demand for tourism in specific countries, producing more accurate forecasts of future tourism demand based on stronger theoretical foundations and using advanced econometric techniques.

Despite the importance of tourism to Egypt and its increasing role in the economy, few serious attempts have been made to model and forecast tourism demand in the country, particularly those involving advanced econometric analysis. Adopting such approaches to tourism demand for Egypt is important in identifying the main determinants of international tourism inflows to Egypt, and in obtaining accurate forecasts. Accurate estimation and forecasting of tourism demand is an essential for both the government and investors in Egypt in planning the economic development of the sector and the wider economy.

The term tourism demand as used in this thesis refers to the effective demand for tourism. This is the aggregate actual demand in the economy that is supported by the consumers' ability to pay. Whereas the notional demand includes latent demand, the effective demand excludes that not realised. The focus of this thesis is on the behaviour of inbound international tourists to Egypt. Domestic tourism and outbound tourism are beyond the scope of this thesis. Since the data provided on tourist arrivals to Egypt relates to both tourists and those taking excursions (same day visitors), the terms ‘tourist’ and ‘visitor’ are both used to represent visitors, and comprise both tourists and excursionists.

1.2 The Objective and the Contribution of the Thesis

This thesis examines tourism demand for Egypt over the period 1970-2009. This is very important for explaining the sector’s actual growth and for forecasting trends for its future development. The main purposes of this thesis are to examine the factors that determine the international tourist inflows from all origins, as well as individual regions of origin (Europe, Arab, and the Americas) to Egypt; estimate the long-run and short-run tourism demand elasticities simultaneously (1970-2009); identify the causal relationships between tourism demand in Egypt and its determinants; evaluate the forecasting performance of the applied econometric methods over different forecasting horizons (2005-2009), and finally forecast future tourism demand for Egypt over the period 2010-2014. This analysis is intended to improve our understanding of the key factors that enhance the demand for tourism from each specific area to Egypt and to provide the basis for building a robust econometric forecasting model for the demand for tourism from each area. In so doing, the analyses will provide more accurate evidence for policy and decision making.

While the previous studies contributed considerably to knowledge in the area of tourism demand, there is limited coverage of the literature on some aspects. Some developing countries are not considered adequately as focus areas. There are some factors can affect tourism demand and have not been examined before. Finally, rigorous econometric techniques are strongly recommended to model and forecast tourism demand. This thesis attempts to address these matters and contributes to the study of tourism demand in a number of ways. First, It intends to model and forecast tourism demand for Egypt, which has attracted very little attention in tourism demand literature. Second, most research has tended to focus on the effect of the income and prices on tourism flows rather than on destination-specific determinants. This research will adopt a more comprehensive approach by taking into consideration factors associated with the destination country, such as political instability, accommodation capacity and globalization in Egypt. Globalization is a new variable, which has not been included in previous literature, and it is introduced in this thesis to investigate the effect of the globalization on inbound tourism demand. Finally, this thesis attempts to use rigorous econometric analysis by applying alternative Co-Integration and Error Correction Models (CI/ECM) using both time series and panel data. Although CI/ECM analysis has been suggested as a solution to spurious regression and widely used in tourism demand literature, based on time series analyses, since the 2000s, no previous study in Egypt employed this approach.

1.3 The Organization of the Thesis

This thesis is in 10 chapters. Following this introduction, Chapters 2 and 3 provide a statistical and literature review to inform the analysis. Following an examination of some definitions of tourism, Chapter 2 comprises an overview of worldwide tourism and of tourism in Egypt. In the case of worldwide tourism, the focus is on global tourism contribution and trends since the 1950s, and the distribution of global tourism. In the case of tourism in Egypt, the chapter focuses on tourism contribution to the Egyptian economy, and tourism development in Egypt according to different indicators from the 1950s to the 2000s. The most important contributions to the literature on tourism demand analysis are reviewed in Chapter 3.

Chapters 4-9 constitute the core of the empirical analysis with its focus on using different econometric approaches to model and forecast tourism demand for Egypt from all origins, as well as three individual regions of origin, including Europe, Arab and the Americas. Using alternative methods of estimation is important to substantiate the empirical findings of our results and providing more evidence based on different approaches. Chapters 4-7 comprise the time series analysis. Chapter 4 presents a theoretical framework for establishing the most important determinants of tourism demand, identifying factors from both the demand and supply-side. Time series empirical models are constructed, and the data are examined using univariate techniques.

Chapter 5 presents estimates of tourism demand for Egypt using two alternative co-integration approaches within a single equation. The Engle Granger two-stage (EG2S) and the Autoregressive Distributed Lag (ARDL) are applied to identify the long-run relationships between tourist arrivals/nights and their main determinants in the different models. In addition, the associated ECM for each co-integration technique is estimated to investigate the dynamic short-run relationships among the variables over the period 1970-2009. In Chapter 6, the Johansen's Maximum Likelihood procedure (JML) is used as an alternative approach to co-integration, based on the system of equations approach, to model international tourism demand for Egypt over the period 1970-2009. In addition, its associated Vector Error Correction Model (VECM) is estimated.

In Chapter 7 both ex-post and ex-ante forecasts of tourism demand for Egypt are provided. In particular, five alternative econometric approaches based on the CI/ECM, as well as two univariate time series methods, including Autoregressive Integrated Moving Average (ARIMA) and naive no changes, are used to generate ex-post forecasting across five different time horizons for all the models over the period 2005-2009. The preferred method for each model, which produces the most accurate forecasting, is used in producing ex-ante forecasting of future tourism demand for Egypt from this market for the period 2010-2014.

Chapters 8 and 9 comprise the panel data analysis. Tests of panel unit root and panel co-integration are performed in Chapter 8. A description of the panel tourism demand models is provided over the period 1980-2009, and the variables of the panel models and their proxies are explained. The results of panel unit root tests of the variables in each model and the results of co-integration tests in each panel model are reported and discussed. Panel co-integration estimation of all the models is considered in Chapter 9. The CI and ECM based on the Pooled Mean Group (PMG) technique are applied for each model over the period 1980-2009, and the estimated elasticities are presented. The economic interpretations are presented and discussed, including a robustness analysis and treatment of cross-sectional dependence and multicollinearity in the data. Granger causality estimation is provided for each model to determine the causal relationships between tourist arrivals and its determinants based on the PMG technique.

Finally, Chapter 10 provides a summary of the study and outlines a number of conclusions about the theoretical, methodological and empirical issues. A summary of findings and any implications these might have for policy makers and others are presented. Implications for future research are highlighted.

Chapter 2: Background of Tourism 'World-Egypt'

2.1 Introduction

The objective of this chapter is to provide a background review of the importance of tourism worldwide and especially in Egypt, in addition to give a general overview of global trends of tourism demand and in the Middle East and Egypt for the period 1950-2009. Evidence relating to tourism demand indicators in Egypt is introduced and analysed. Growth in tourism demand, the importance of particular originating regions and countries, and the competitive status of Egypt relative to alternative Middle East destinations are discussed. Exploring the Egyptian tourism demand trends and patterns allows identification of the most important determinants of tourism demand for Egypt. The comparative status of Egypt among various alternative destinations helps in specifying and constructing the substitute prices variable in different models. In addition, important political incidents in Egypt and Middle East are reviewed to determine their effects on tourism in Egypt. Finally, important characteristics such as the purposes of tourism, seasonality and mode of transport in Egypt are explained and discussed.

The remainder of this chapter is structured as follows. In Section 2.2, conceptual and technical definitions of international tourism are provided. Worldwide tourism is explained in Section 2.3. Focusing on the Middle East, Section 2.4 discusses and analyses the region's tourism trends. Section 2.5 explores international tourism in Egypt, representing the contribution of tourism to the economy, trends of tourism demand, and other characteristics of tourism in Egypt. Finally, in Section 2.6, the major findings of the chapter are summarised.

2.2 Tourism Definitions

According to Burkhart and Medlik (1974), two kinds of tourism definitions can be distinguished in the literature: conceptual and technical definitions.

> The concept provides a notional, theoretical framework, which identifies the essential characteristics, and which distinguishes tourism from similar, often related, but different phenomena, technical definitions provide instruments for particular statistical, legislative, and industrial purposes (Burkart and Medlik in Leiper 1979: 394).

2.2.1 Conceptual Definitions

The International Association of Scientific Experts in Tourism (AIEST) introduced a conceptual definition for tourism as follows.

> Tourism is the sum of the phenomena and relationships arising from the travel and stay of non-residents, in so far as they do not lead to permanent residence and are not connected with earning activity (AIEST in Papadopoulos, 1985:10).

Some important issues arise from this definition. First it involves both a dynamic element, which is the movement of travellers to the places they visit, and a static element, the stay in another non-resident destination. Secondly, it distinguishes the movement of people from people permanently living and working in the host country. Finally, it differentiates tourists as temporary visitors from migrants who are persons involved in long-run economic and other earning activity. This definition can be criticised, since it excludes business travel from the concept of tourism.

Another definition of tourism suggested that:

> Tourism can be defined as the science, art and business of attracting and transporting visitors, accommodating them and graciously catering to their needs and wants (McIntosh 1977: ix).

This definition is more comprehensive. It considers other qualitative sides of tourism rather than its business components. However, it does not give a clear definition of the tourist, who is the most important agent in tourism. Nor does it focus on spatial or temporal aspects, which are also essential (Leiper, 1979). The importance of these elements was emphasised by Wahab, as follows:

> The anatomy of tourism is composed of three elements: man, the author of the act of tourism; space, the physical element to be covered; and time, the temporal element consumed by the trip and stay (Wahab, 1975: 8).

2.2.2 Technical Definitions

Technical definitions of tourism are employed in a wide variety of studies, surveys, and plans at both the national and international levels. They are particularly important for statistical measures. Since the 1930s, governments and tourist industry organizations recognized the necessity of a clear definition of tourists, which differentiates them from other travellers and to have a common base by which to collect comparable statistics. First, the League of Nations Statistical Committee [currently the United Nations World Tourism Organization (UNWTO)] defined an international tourist in 1937 as follows:

> An international tourist is a person who visits a country, other than that in which he habitually lives, for a period of at least twenty-four hours (Leiper 1979: 393).

In 1963, the United Nations held a conference in Rome on travel and tourism. The conference recommended for statistical purposes definitions of visitor.

> Visitor describes any person visiting a country other than that in which he has his usual place of residence, for any reason other than following an occupation remunerated from within the country visited (International Union of Official Travel Organisation (IUOTO) in Leiper 1979: 393).

More recently, according to the UNWTO, the following technical definition, has been agreed, on which tourism statistics in Egypt and in other countries are based:

> The activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes not related to the exercise of an activity remunerated from within the place visited (UNWTO in Hecht 2005: 3).

Therefore, this definition uses the word tourism to mean all travel, for a number of possible purposes, such as leisure, business (when one is paid from the home country), and travel for medical, religious, educational and other purposes. However, travel specifically for work paid in the place visited is not considered to be tourism.

2.2.3 Important Tourism Distinctions

The System of Tourism Statistics (STS) distinguishes between the following categories of tourism and tourists:

- International tourism and domestic tourism: domestic tourism is the tourism of residents' visitors within the economic territory of the country, whereas international tourism describes tourism of visitors, who crossing of borders to a country other than that in which they have their usual place of residence.
- Inbound tourism and outbound tourism: inbound tourism is the tourism of foreigners 'non-resident visitors' within the economic territory of the underlying country, whereas outbound tourism is the tourism of people from the underlying country to other countries.
- Tourists and excursionists: tourists are visitors who stay for at least 24 hours in the country they are visiting. Excursionists are visitors who stay for less than 24 hours in the country they are visiting (Ibid, 2005: 3-4). Hence the word 'visitors' includes both tourists and excursionists.

2.3 Worldwide Tourism

2.3.1 Contribution of Tourism to the World Economy

Tourism plays an important role in economic development at the regional, national, and international level. It helps in alleviating balance of payments deficits, and generates income, employment and tax revenue (Syriopoulos, 1990). The contribution of tourism has a multiplier effect on the destination's economy through its: direct effect, indirect effect and induced effect. The direct or primary effect is associated with the revenue of tourist services, including airlines, travel agents, hotels, restaurants, shops and other tourist services, which result from tourist expenditures. The indirect effect results from the additional revenue of other activities, which supply the recipients of the direct expenditure (tourist services) with their necessary inputs. So the indirect effect is associated with changes in economic activities due to various rounds of re-spending of tourism revenue in activities supplying inputs to the tourist industries. Finally, the induced effect is associated with changes in economic activities due to household spending of income resulting directly or indirectly from tourism expenditure. Both indirect and induced effects are called secondary effects (Khan, et al., 1990).

2.3.1.1 The Contribution of Tourism to the GDP

According to the World Travel and Tourism Council (WTTC), tourism makes a considerable contribution both directly and indirectly. As shown in **Figure 2.1** and **Table 2.1**, tourism's direct GDP[1] was very considerable, accounting for US$ 913.2 billion (constant prices) in 1990 and increasing continuously to year 2000. However, tourism's direct and indirect GDP accounted for 2.8 times its counterpart as a direct effect over this decade.

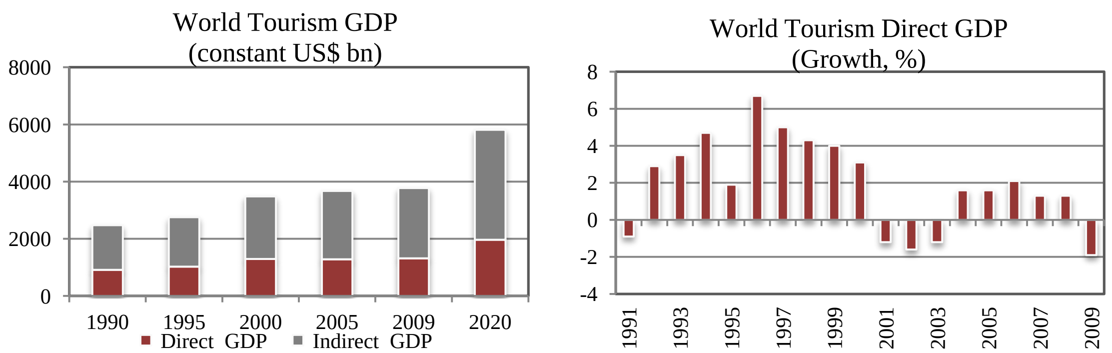


Figure 2.1: The value of global tourism's GDP and its growth rates (1990-2009)
Source: Calculated from WTTC data, 2010, Note: data about 2020 are forecasted.

[1] Direct tourism GDP is the total internal spending by the purchases made by the different tourism sectors (WTTC, 2011: 4).

The recessionary period of 2001-2003 saw tourism's direct GDP decrease in these three years, and then recover in 2004 and 2005 as illustrated in Figure 2.1. On average for the period 2000-2005, tourism's direct GDP decreased in absolute terms, however as a direct and indirect effect, tourism GDP increased with a very small annual growth rate through the same period. The global economic recession in 2008, in addition to the Swine Flu epidemic in April 2009, caused another decline in tourism's direct and total GDP. On average, the annual growth rate over the period 2005-2009 was just half percent whether as a direct effect or as a total effect.

As a share of global GDP, tourism directly contributed 3.7% in 1990, decreased to 3.2% in 2009 due to the economic and political crises in the 2000s. Including the indirect effect, tourism's contribution to global GDP reached 10% in 1990, then it decreased to 9.4% in 2009. It is forecast that tourism worldwide will generate, directly and indirectly, higher value of GDP, but with a decreasing share in 2020 as illustrated in Table 2.1.

Table 2.1: Tourism contribution to GDP as a direct and indirect impact (1990-2020)

Years	Tourism' s GDP (Direct Effect)			Tourism' s GDP (Direct & Indirect Effect)		
	2000 US$ billion	Growth (%)	Share (%)	2000 US$ billion	Growth (%)	Share (%)
1990	913.2	-	3.7	2474.8	-	10.0
1995	1029.3	2.0	3.7	2755.8	1.8	9.9
2000	1293.4	3.9	3.9	3481.9	4.0	10.7
2005	1281.7	-0.2	3.4	3673.1	0.9	9.9
2009	1318.2	0.6	3.2	3775.0	0.5	9.4
2020*	1968.4	3.4	3.1	5811.3	3.7	9.6

Source: Calculated from WTTC Economic Data Search Tool, 2010, * Forecasting data.

2.3.1.2 The Contribution of Tourism to Employment

Tourism is a complex industry, which involves numerous goods and services for tourists and can be considered labour intensive. Hence, it creates large numbers of jobs in many fields, for example, hotels, restaurants, bars, transport, tourist offices, and tour guiding. Moreover, tourism indirectly supports employment in other areas such as agriculture, construction, banking, music and arts (Li, 2004).

According to the WTTC (2010), as reported in **Table 2.2** and **Figure 2.2**, tourism generated directly 58.5 million jobs worldwide in 1990, equivalent to a contribution of 2.7% of total employment worldwide. These tourist jobs grew rapidly through the period 1990-2000, but more weakly over the period 2001-2009. Therefore, the share of tourism in total employment increased gradually to reach a peak in 2000, then, decreased gradually to the end of the period. The WTTC forecasts that the direct contribution of tourism to employment will rise considerably in absolute value in 2020, to raise its share again to that of year 2000.

Table 2.2: Tourism contribution to employment as a direct and indirect impact (1990-2020)

	Direct Tourism Employment			Direct and Indirect Tourism Employment		
Years	(million)	Growth (%)	% Share	(million)	Growth (%)	% Share
1990	58.5	-	2.7	162.7	-	7.5
1995	67.9	2.5	2.9	188.2	2.5	8.1
2000	78.9	2.5	3.1	216.0	2.3	8.6
2005	80.7	0.4	2.9	234.3	1.4	8.6
2009	82.0	0.4	2.8	236.5	0.2	8.2
2020*	104.7	2.1	3.1	303.0	2.1	9.2

Source: Calculated from WTTC Economic Data Search Tool, 2010, * Forecasting data.

Each direct job in the tourism sector creates more than 1.8 indirect jobs during the study period; hence the direct and indirect share of tourism in total employment reached 7.5% in 1990, increased to 8.2% in 2009. Finally, the WTTC forecasts that the total contribution of tourism to employment in 2020 will rise in absolute number and as a share of total employment.

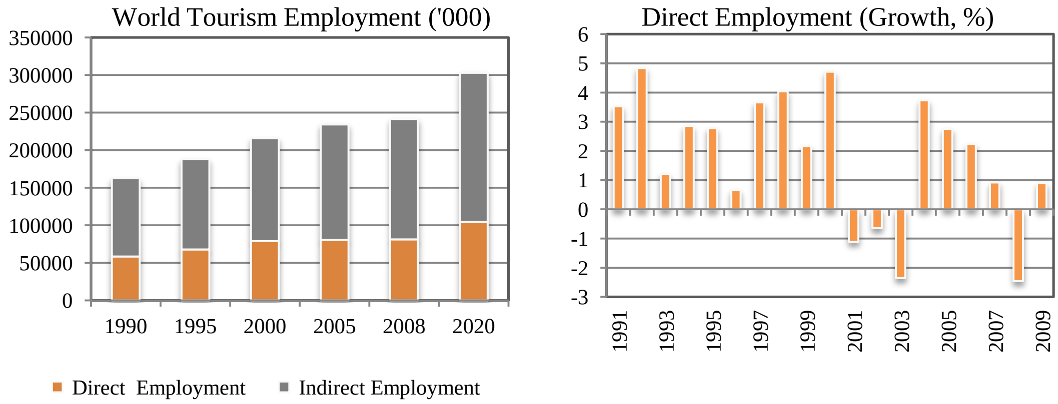


Figure 2.2: The global tourism's employment and its growth rates (1990-2009).
Source: Calculated from WTTC Economic Data Search Tool, 2010, Note: data about 2020 are forecasted.

2.3.1.3 The Contribution of Tourism to Exports

International tourism receipts, or expenditure by international visitors on goods and services within the economy, are an important source of exports and foreign currency worldwide. Despite continuous growth in total exports and service exports worldwide[2], the contribution of tourism receipts has increased over time as a share of world exports, and service exports from the 1970s to the 1990s. These shares decreased in the 2000s, as reported in **Figure 2.3**, because of the two periods of global economic recession

[2] The growth of total world exports was 17.3%, 5%, 5.1% and 10.8% annually in the 1970s, 1980s, 1990s and 2000s respectively (WB, 2010).

2001-2003, 2008-2009, and the Swine Flu epidemic of 2009. This may indicate that the tourism sector worldwide is more sensitive to economic and other shocks than are other export sectors.

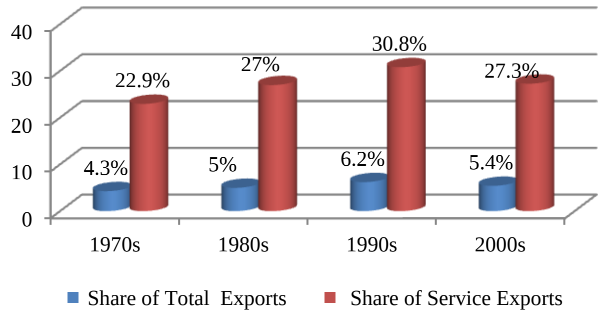


Figure 2.3: Tourism receipts' contribution to total and service exports worldwide (1970s-2000s)
Source: Calculated from the World Bank (WB), 2010

The previous result is consistent with findings by Syriopoulos (1990) which suggested that tourism has a considerable importance in the world economy; however tourism expenditure is prone to large fluctuations. These fluctuations are either because of global recession or because of the increasing competitiveness among destinations.

2.3.2 International Tourism Trends Worldwide

2.3.2.1 Growth of Worldwide International Tourism Flows (1950-2009)

International tourism, since the Second World War, has grown considerably and continuously. While international tourist arrivals have grown almost 35-fold over the period 1950-2009, real tourism receipts increased more than 45-fold as reported in **Figure 2.4**.

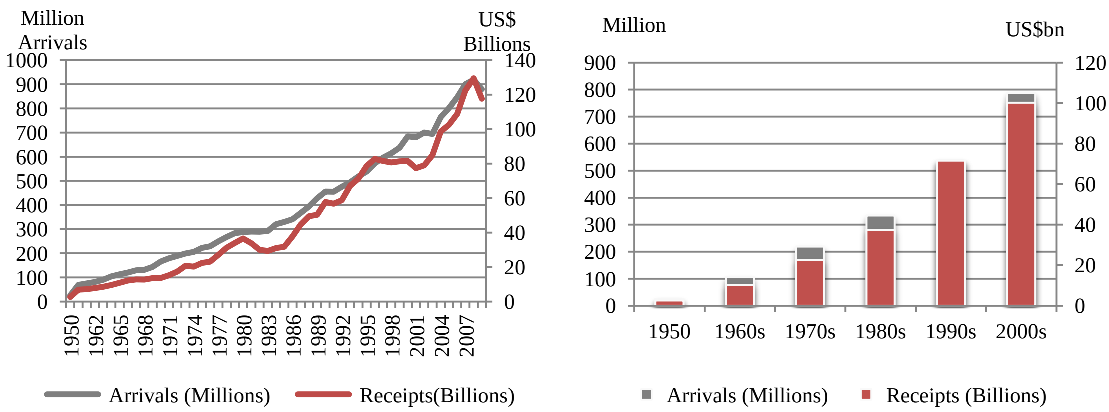


Figure 2.4: Tourist arrivals and real receipts, and tourism growth worldwide (1950-2009)
Source: Calculated from UNWTO, Year Book of Tourism Statistics, various issues.

The growing worldwide tourism flow seems likely to continue, in spite of several adverse economic and political events. As illustrated in **Figure 2.5**, international tourist arrivals and receipts grew rapidly and continuously from the 1950s to the 1970s. Lower growth rates were experienced in just two years. In 1968, a slowdown in world economic growth resulted in a slower growth rate of 1.1% for tourist arrivals and negative growth rate of 0.5% for receipts, compared with 7.5% and 7% as average growth rates of arrivals and receipts in the 1960s. In 1974, the arrivals and receipts growth rates were 3.4% and -1.9% respectively (compared with 5.5% and 9.6% as average growth rates of arrivals and receipts in the 1970s) following the Middle East War in 1973, and the subsequent actions of the Organization of Petroleum Exporting Countries (OPEC) in raising oil prices; global inflation and unemployment led to less world economic growth, which affected tourism flows in that year.

In general, the improvement in tourism movements and revenue through these three decades was a result of three factors: First, a rise in disposable per capita incomes and household expenditure especially in the developed countries in most European and North American economies (Papadopoulos, 1985); second, the improvement in transportation (especially in aircraft since the 1970s), as well as the decrease in transport cost; and finally changing social patterns of work and leisure, with more paid and longer holidays provided (Sharpley, 2005).

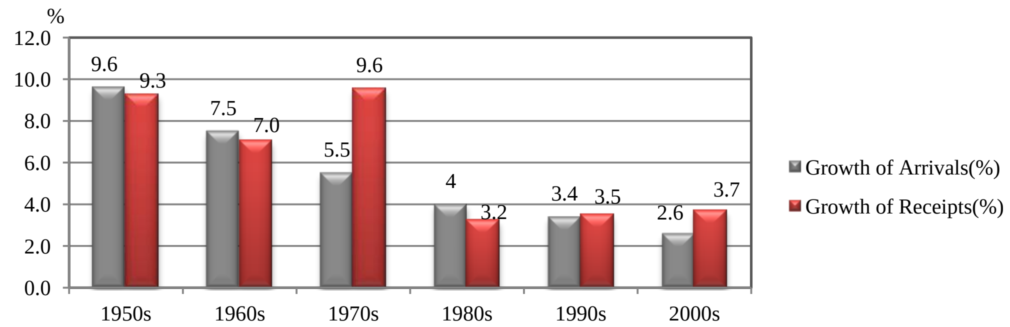


Figure 2.5: Average annual growth (%) of arrivals and real receipts worldwide (1950s-2000s)
Source: Calculated from UNWTO, Year Book of Tourism Statistics, various issues.

Since the 1980s, the growth rates of tourism flows decreased compared with their counterparts in the previous three decades as the market has matured. At the beginning of the 1980s, both arrivals and receipts experienced low growth rates due to the global economic recession caused, in part, by the second oil crisis. Then, the world arrivals decreased for the first time since the 1950s by 0.2% in 1982, whereas tourist receipts decreased more by 11.1% in the same year. Overall, international arrivals increased by only 4% per annum for international arrivals and 3.2% per annum for international receipts over the1980s. As far as the 1990s is concerned, international tourism grew steadily by 3.5% annually for both arrivals and receipts, except for the period of the Gulf War in 1991 and the Asian financial crisis in 1997-98, since tourist arrivals and receipts decreased in the first period, and grew slowly in the second period.

Tourist arrivals and receipts increased annually by 2.6% and 3.7% respectively in the 2000s, which are the worst in terms of tourist arrivals and third worst in terms of tourist receipts since the 1950s. This deterioration has resulted from successive economic and political crises; the events of 11 September 2001 and subsequent recession (2001-2003), followed by the global recession in 2008, and the Swine Flu in April 2009 as illustrated by **Figure 2.6.**

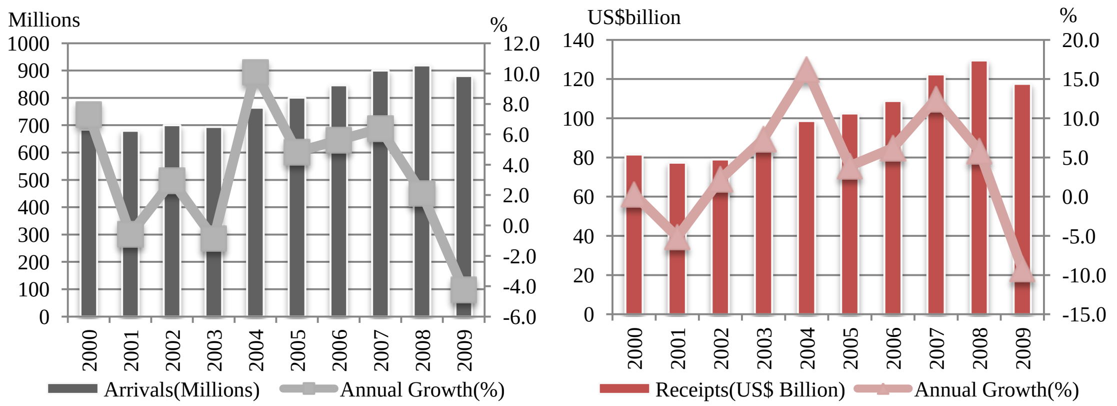


Figure 2.6: International arrivals and real receipts, and their annual growth rates (2000-2009)
Source: Calculated from UNWTO, Year Book of Tourism Statistics, various issues.

2.3.2.2 The Distribution of World International Tourism Flows (1950-2009)

Despite the high growth rates of both tourist arrivals and receipts worldwide through the period from 1950-2009, the distribution of tourism among the world regions has been unbalanced. Since the 1950s, international tourism has been dominated by two regions: Europe and the Americas. These two regions have received about 96% of global tourist arrivals and 93% of global tourism receipts in 1950 as reported in **Table 2.3**. Although these two regions maintained their dominant position throughout the study period, some kind of redistribution of tourism arrivals and receipts in favour of developing countries has been witnessed, especially in the Asia and Pacific (A&P) region, as can be seen from **Figure 2.7**.

Table 2.3: Average share (%) of tourist arrivals and receipts (1950s-2000s)

Region	Europe		Americas		Asia & Pacific		Africa		Middle East	
Years	arrivals	receipts	arrivals	receipts	arrivals	receipts	arrivals	receipts	arrivals	receipts
1950	66.60	42.14	29.61	50.48	0.94	1.71	2.07	4.19	0.78	1.48
1960s	72.08	59.16	23.03	31.68	2.12	4.61	1.25	2.78	1.52	1.77
1970s	68.56	62.96	23.16	24.32	4.80	6.65	1.83	3.01	1.64	3.06
1980s	64.56	55.17	20.76	25.66	9.97	13.26	2.83	2.42	1.87	3.50
1990s	59.21	52.05	20.27	26.08	14.40	17.48	3.75	2.10	2.37	2.28
2000s	55.35	50.67	16.66	22.11	18.74	20.32	4.53	2.96	4.74	3.94

Source: Calculated from UNWTO, Year Book of Tourism Statistics, various issues

Europe's market share in arrivals and receipts, almost the biggest share over the period of the study (1950-2009), decreased continuously and gradually. This leading position of Europe can be attributed to many reasons: the high level of income for most European countries, conditions of employment for European workers, which included paid holidays, the availability of natural and man-made attractions, a large oriented tourism sector, a high standard of infrastructure, and its geographical position, which does not necessitate travelling long distances. Furthermore, intra-regional tourism, within Europe, has been improved due to the breakup of the communist system in Eastern Europe, and the easing of border controls in both Western and Eastern Europe (Latham, 1998).

The Americas is the second leading region of the world in international tourism. It accounted for less than 30% of global arrivals and more than half of global real receipts in 1950, declining continuously and strongly over time to about 16.7% of the total arrivals and 22% of total receipts in the 2000s.

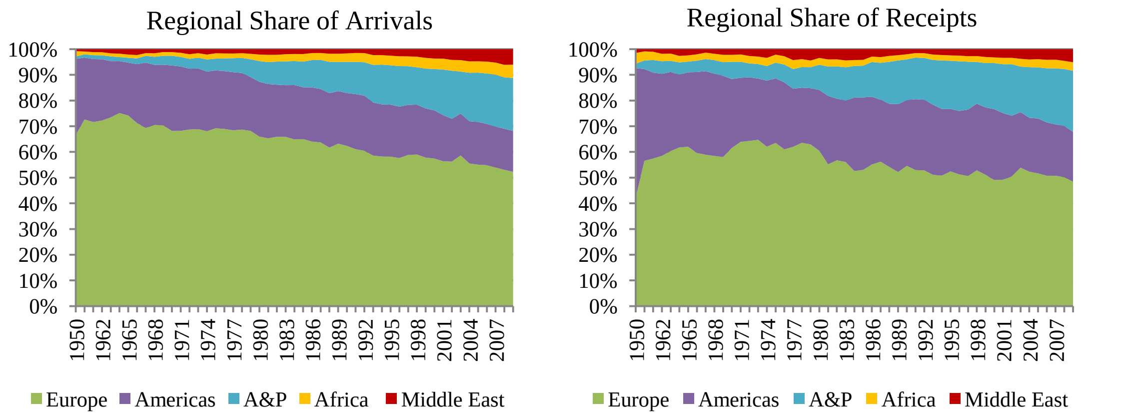


Figure 2.7: Regional market's share of worldwide arrivals and receipts (1950-2009)
Source: Calculated from UNWTO, Year Book of Tourism Statistics, various issues

The gradual decline in market share of both Europe and the Americas is mainly attribution to emerging new destinations, especially in the A&P region. The latter achieved the fastest arrivals growth rate from the 1950s to the 1980s, as illustrated in **Table 2.4**. It also had the fastest growth rate in receipts in the 1950s and the 1980s. Moreover, it registered the second strongest receipts growth rates after the Middle East in the 1960s and 1970s. Therefore, the A&P region managed to increase its market share strongly from less than 1% of global arrivals and 1.7% of global receipts in 1950 to 20.6% of arrivals and 23.8% of receipts in 2009 with increase more than 20-fold and 14-fold in world arrivals and receipts respectively over this period.

Table 2.4: Average annual growth rates (%) of tourist arrivals and receipts (1950s-2000s)

Region	Europe		Americas		Asia & Pacific		Africa		Middle East	
Decades	arrivals	receipts	arrivals	receipts	arrivals	receipts	arrivals	receipts	arrivals	receipts
1950	10.5	12.3	7.6	5.9	12.7	16.2	3.3	7.6	11.1	3.9
1960s	7.2	7.3	7.3	5.7	18.9	12.2	10.9	4.8	9.8	17.8
1970s	5.5	9.8	3.4	7.3	12.1	11.7	9.6	9.2	10.6	17.4
1980s	3.6	1.7	3.6	4.4	7.7	9.0	6.5	0.6	2.3	-0.6
1990s	2.6	2.8	2.7	3.7	5.9	4.3	6.0	5.3	11.1	8.1
2000s	1.6	3.6	0.9	0.2	5.07	6.7	5.10	8.0	7.8	8.6

Source: UNWTO, Year Book of Tourism Statistics, various issues

It is important to notice that these high growth rates of arrivals and receipts in Asia and Pacific (**Figure 2.8**) can be explained by some factors. First, a remarkable improvement in economic growth in East Asia and Pacific (EAP) countries, which supported regional tourism outflows from EAP to tourist destinations within the same region, since 77% of total arrivals to this region came from within this region in 2004 (Giacomelli, 2006). Second, gradual reduction of tourism restrictions was implemented in the most important Asian countries, including Japan, Taiwan and South Korea, and China in the 1970s, 1980s, and 1990s respectively; and finally, the political stability in that region (Lee, 2005).

The African region was fast-growing in terms of both arrivals and receipts. As far as arrivals are concerned, since the 1960s Africa has achieved annual growth rates faster than the world growth rates, achieving the second fastest growth rates in most decades as illustrated in Figure 2.8. In terms of tourist receipts, Africa achieved the second fastest growth rates after the Middle East in the recent two decades. Consequently, the market share of this region increased steadily from the 1960s until the 2000s in terms of arrivals, from 1.2% to about 4.6%, whereas the share of receipts fluctuated from one decade to another as illustrated in Table 2.3, which may be indicative also of fluctuating exchange rates in this region.

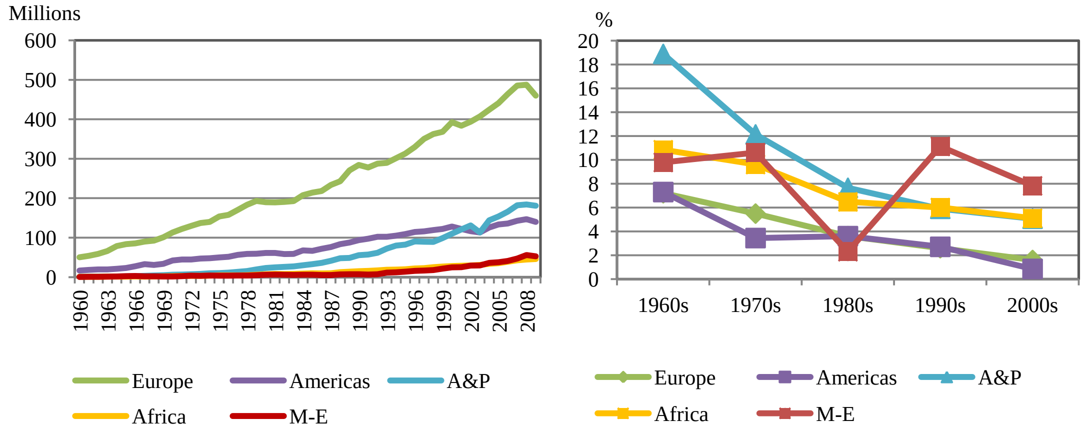


Figure 2.8: International tourist arrivals (1960-2009) and growth for different regions worldwide. Source: Calculated from UNWTO, Year Book of Tourism Statistics, various issues.

The Middle East region achieved very high growth rates in terms of arrivals and receipts throughout the study period; hence, its global share improved substantially. However it was the most erratically performing region due to a succession of adverse political events in this region (Latham, 1998). With respect to the growth rate of arrivals, Middle East attained the second strongest growth rate in the 1950s and the 1970s, and first position in the 1990s and 2000s. Therefore the Middle East share of world tourist arrivals increased about eight-fold from 0.8% in 1950 to about 6% in 2009 (UNWTO, 2011). In terms of receipts, Middle East receipts grew rapidly, making this the fastest growing region worldwide in the 1960s and the 1970s, but the first Gulf War (1980-1988) impacted heavily on the success of the tourism sector in this region, achieving a negative growth rate of receipts of 0.6% annually through the 1980s. Once again, tourism recovered in the 1990s but only after the second Gulf War (1990-1991), to occupy the fastest growth rates worldwide in the 1990s and 2000s. Consequently, the share of this region of worldwide tourist receipts trebled from 1.5% in 1950 to 5.1% in 2009 (UNWTO, 2011).

Roe et al. (2004) analysed international tourism flows, trends and distribution, worldwide according to the economic development criterion, rather than the geographical criterion, which is used in this study, and concluded that international tourist arrivals and receipts are redistributed in favour of developing countries since tourism is growing faster in these countries than elsewhere, which is consistent with our results.

It should be noted that the strong performance of tourism in the European, American and recently EAP regions has been accompanied by the region’s overall pattern of trade and economic growth, which supports tourism to the same region via regional tourism. Most European countries have high per capita income and high economic growth rates, which stimulates tourism in other European countries through intra-regional tourism. For example, in 2000 the Europe region was responsible for more than 90% of total arrivals to Greece, Spain, Russia and Italy. The Americas region was responsible for 97% of global arrivals to Mexico, and 80% of arrivals to Canada. More than 95% of tourists travelling to China came from A&P region, and 75% of Hong Kong's tourists came from the A&P region (UNWTO, 2007 and WB, 2010). Therefore, tourism is mainly intra-regional rather than inter-regional. Language, culture and proximity may present logical reasons for this preference.

2.4 International Tourism Trends in the Middle East

2.4.1 Growth of the Middle East Tourism Inflows (1950-2009)

Despite the small contribution of tourism in the Middle East compared to other regions worldwide, the rapid growth rate of this sector, especially in the recent decades, may indicate a flourishing future for tourism in this region.

International tourist arrivals to the Middle East have grown more than 269-fold between 1950 and 2009. Moreover, international tourism receipts (in real terms) increased by almost 158-fold, which is much more than their counterparts worldwide. **Figure 2.9** illustrates the growth in both tourist arrivals and receipts in the Middle East from 1960 to 2009; however there are fluctuations from one year to another due to the several negative political events. In the 1960s, tourism inflows increased strongly, except for 1967 due to the Arab-Israeli Six-Day War in June 1967. On average, tourist arrivals and receipts increased strongly in this decade.

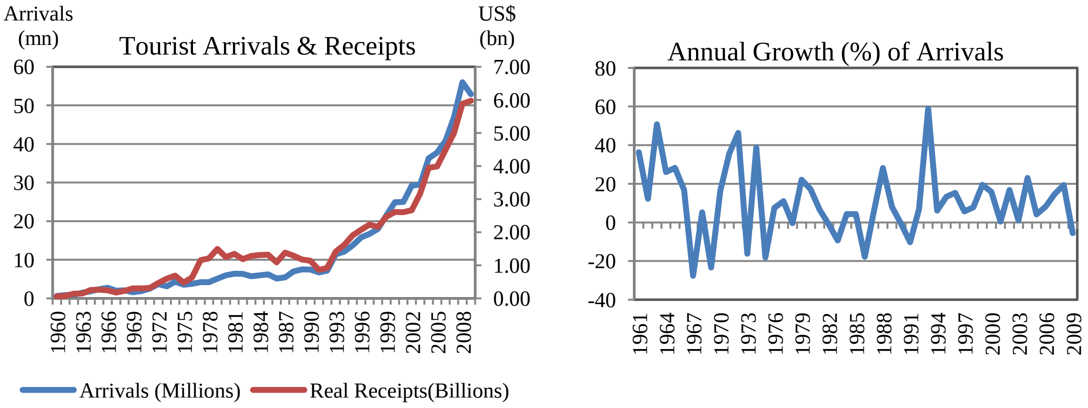


Figure 2.9: Tourist arrivals and receipts in the Middle East, and growth rates of arrivals (1960-2009).
Source: UNWTO, Year Book of Tourism Statistics, various issues.

Despite the Middle East War in October 1973 and the oil crisis in 1975[3], very high growth rates of arrivals and receipts were achieved in the 1970s as reported in **Figure 2.10**. The 1980s achieved the lowest growth rates in both arrivals and receipts throughout the period of the study. The First Gulf War between Iraq and Iran, which lasted from September 1980 to August 1988, affected tourist inflows to the Middle East dramatically throughout the decade. The performance of Middle East tourism recovered in the 1990s, except in the period of the Second Gulf War of 1990/91. The 2000s achieved a considerable growth despite the negative global economic and political events as discussed before.

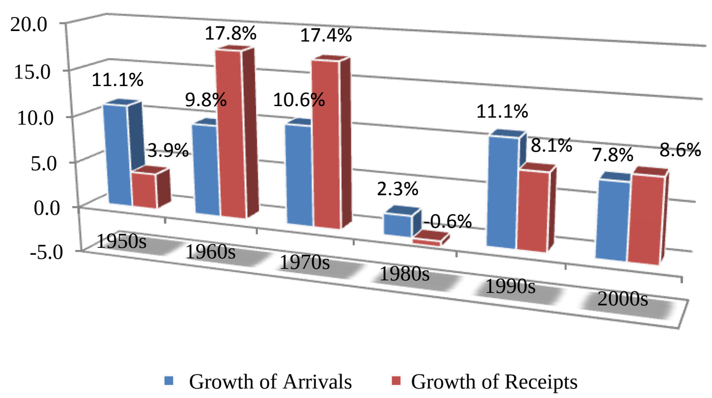


Figure 2.10: Average annual growth (%) of arrivals and real receipts in the Middle East (1950s-2000s)
Source: Calculated from UNWTO, Year Book of Tourism Statistics, various issues.

2.4.2 The Distribution of International Tourism Inflows to the Middle East Region

Like the worldwide trend, the distribution of tourism inflows and receipts to the Middle East region[4] is unbalanced as illustrated in **Figure 2.11**. Libya had the largest share of visitors[5] in the 1980s and up to 1991, ranging from 19% to 20% of all visitors to the Middle East. However, Libya's political isolation from 1992 to 1998, which prohibited air traffic to and from Libya forcing tourists to travel by land and sea, has prevented the development of the tourism in this country[6]. Therefore, its share decreased dramatically

[3] The OPEC stopped oil exports to the US and other western nations after the Middle East War in 1973 in retaliation for the support of Israel. Consequently, the prices of gasoline quadrupled from just 25 cents per gallon to over a dollar in just a few months (Frum, 2000).
[4] Data about Iran, Iraq and Palestine are not available; in addition, Israel is included as an East Mediterranean European country rather than a Middle East country in the UNWTO statistics.
[5] In this section, the number of visitors will be presented instead of the number of arrivals (overnight visitors) represented in the previous sections. Because of that the data are not comparable with the last Middle East data.
[6] These isolation sanctions were imposed by the UN after the Lockerbie Air Disaster in 1988.

over the period, achieving 2% of all Middle East visitors on average in the 2000s, to take the 9th position (just ahead of Qatar and Yemen) in 2009. Another dramatic change, but in the opposite way, was recorded by United Arab Emirates (UAE), since its share of the total Middle East visitors increased gradually throughout the study period. Consequently, its contribution increased from 3.8% in 1988 to more than 12% in 2009. This dramatic change improved its position from just the 8th country in 1988 to the 3rd position, after Saudi Arabia (SA) and Egypt in 2009. This strong and continuous growth of international inflows to UAE resulted from the great investments in this country in all sectors and industries, especially in the tourism sector.

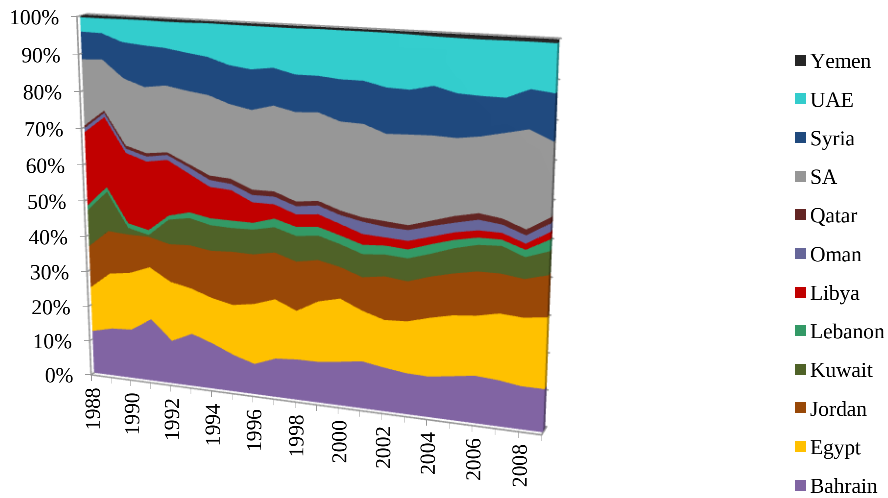


Figure 2.11: Middle East destinations' share of tourist visitors (1988-2009)
Source: Calculated from the WTTC Data Tool, 2010.

Tourism in SA plays a considerable role in the Middle East, since it achieved stable and continuous growth in visitors throughout the period. It took the second position with a 18% share of total visitors to the Middle East after Libya in 1988. From 1992 to 2008, SA became the leading destination in the Middle East, but it took the second position, after Egypt, in 2009. The decrease in its share in the last year was due to the Swine Flu epidemic in 2009. The stability of the growth in visitors to SA despite several negative events in the Middle East resulted from the purpose of tourism in this country, since 71% of total arrivals to SA come for religious reasons (from Muslim nation), 24% for business and professional reasons. Only 5% of total visitors to SA come for leisure, recreation and holidays in 2005, which has the most elastic demand for tourism and hence is the purpose most affected by political and other adverse events (UNWTO, 2007).

Egypt experienced increasing growth rates throughout the study period, representing an increase in its contribution to total visitor arrivals to the Middle East from 12.7% in 1988, occupying the 3rd position after Libya and SA, to the first position with share of 19% in 2009. Bahrain, Jordan and Syria have also an important contribution to tourist inflows to the Middle East as illustrated in Figure 2.11.

The above analysis refers to the number of visitors; the situation may differ in case of tourism receipts as illustrated in **Figure 2.12**, which shows the number of visitors as well as the real tourism receipts in the Middle East destinations in 2008.

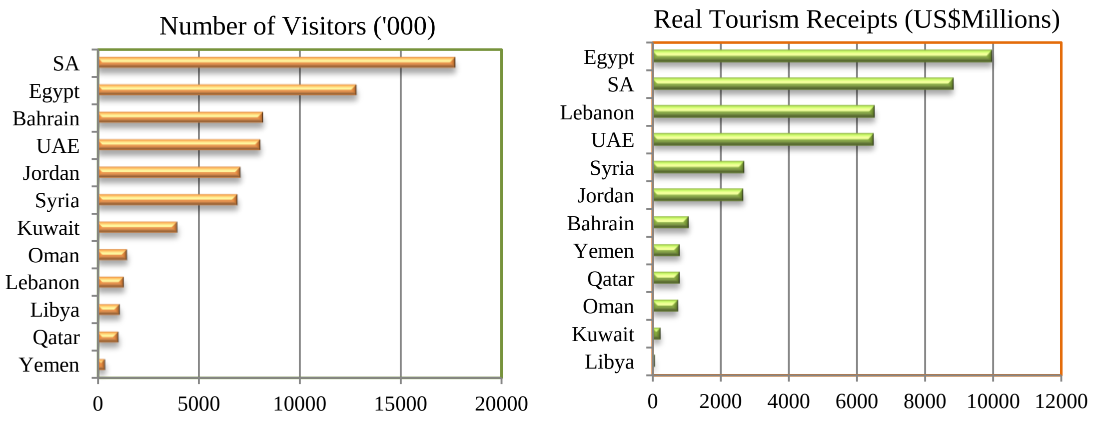


Figure 2.12: Visitors and receipts (in real terms) in the Middle East destinations in 2008
Source: Calculated from WTTC, 2011 and Egypt Tourism in Figures, 2009.

Egypt received the largest receipts in the Middle East in 2008, followed by SA, but the second biggest number of visitors after SA. Lebanon was the 3rd destination with respect to tourism receipts in the Middle East, although it took the 9th rank with respect to visitors, indicating a longer stay period and/or more expenditure for each visitor in Lebanon compared with other Middle East destinations. UAE took the 4th position in both number of visitors and receipts. Syria, Yemen and Qatar received more receipts and fewer visitors compared with others in the Middle East; the opposite is true regarding the rest of destinations.

The WTTC forecast that Egypt will remain the leading country in the Middle East with the largest number of tourist visitors in the region, account for 19.2 million visitors in 2020. SA is estimated to be the second important destination, attracting 19 million visitors at the same year. The remaining Middle East destinations are estimated to have the same relative importance in the region by 2020 (WTTC, 2010).

2.4.3 The Origin of Tourists to the Middle East Region

Intra-regional tourism plays an important role in inbound international tourism in the Middle East region as illustrated in **Figure 2.13**, since more than half (53%) of the international inflows to the Middle East were generated by countries within the region in 2005. Similar language, culture, proximity, and economic and political relationships between countries within the region can explain these large flows of tourist arrivals within the region.

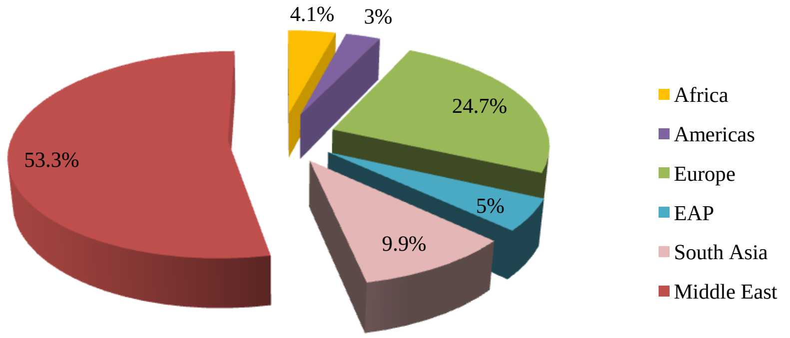


Figure 2.13: The distribution of international inflows to the Middle East region in 2005.
Source: Calculated from Compendium of Tourism Statistics, 2007.

Regarding inter-regional tourism, Europe is the most important origin market; it generated about a quarter of Middle East visitors. This result can be attributed to the high per capita income of many countries in Europe, large population, relatively short distance between the two regions, and the economic relationships between them. South Asia is the second largest generating region, followed by EAP, Africa and the Americas regions.

Turning to specific countries, Syria is the destination that most benefits from intra-regional tourism, since 76% of its visitor arrivals come from Middle East generating countries. Since 1970 Syria has hosted Arab citizens without entry visas, which enhances intra-regional tourism. Bahrain, Jordan and SA have more than 70% of their total arrivals from Middle East countries in 2005. In contrast, just less than 18% of total international inbound tourism to Egypt was generated by countries within this region, making it the destination that benefited least from the intra-regional tourism in this region (Compendium of Tourism Statistics, 2007).

Al Hamarneh (2005) captured more recent trends of tourism in the Arab region, and found that the increasing importance of intra-regional tourism is the main recent trend for this region; Syria is the destination that benefit most from regional tourism, Bahrain is the most important destination for SA tourists and the UAE is the main destination of tourists from the Gulf-countries.

In terms of inter-region tourism, Europe is of great importance as illustrated in Figure 2.13. More than 70% of international inflows to Egypt came from Europe in 2005. About 30% of tourist inflows to Oman, UAE and Qatar depended on tourism from Europe. Qatar is by far the most dependent on the EAP generating countries, since 21% of the total international tourism was generated by this region, followed by Yemen, UAE and Lebanon. South Asian countries were most important for arrivals to Kuwait, with 28%, followed by UAE and Oman. Except for Libya, which imported more than 48% of its arrivals from African countries, and to a much lesser extent UAE and SA, African countries were not significant originating regions to Middle East destinations. The smallest generating region to the Middle East in 2005 was the Americas. This is an important originating region for Lebanon, since 12% of total arrivals to Lebanon came from American countries (Compendium of Tourism Statistics, 2007).

2.5 Tourism in Egypt

Due to the unique features and the scale of the tourism experience in Egypt, represented in its history, heritage, location, climate, scenery and extensive beaches, tourism is of major importance for the Egyptian economy. Throughout history, the Egyptian tourism sector had attracted considerable attention from both the state and the private sector. However, this support did not yield the expected results as the development emphasis shifted to the industrial sector in the 1950s. Development of the tourism industry was further cut dramatically from the 1967 Arab-Israel war and up to the Middle East war of 1973. A change in economic philosophy to *al-infitah* (economic opening) in 1974, accompanied with the signing of the Peace Agreement in 1979, encouraged international tourism in Egypt (Attia, 1999).

> A great emphasis was directed to the tourism sector since the first five-year plan (1982/83-1986/87). The private sector was encouraged to invest in promising tourist destinations through tax exemptions reaching ten years, providing lands at nominal prices, developing and improving utilities and tourist services at the country level (Ministry of Planning, 2011: 5).

Moreover, 12.7% of the first five-year plan's total investment of production service sectors was directed to the tourism sector, equivalent to LE 375 million annually. This contribution increased over time to reach a peak in the fourth five-year plan (97/98-2001/02), with 15% of production service sectors' investments, equivalent to LE 2,038 million annually. Finally, in the sixth five-year plan (2007/08-2011/12), the tourism sector is planned to receive much more investment reach to LE 8,900 million annually, with a share of 12% of total production sectors investments (Ibid, 2011). Consequently, the accommodation capacity was enhanced, facilities for servicing the tourism sector were improved, and tourism demand increased substantially.

2.5.1 Tourism Contribution to the Economy in Egypt

> In the fiscal year 2006/07, the tourism sector succeeded in attracting large numbers of workers. It also contributed to creating more job opportunities for youth, in tourist sector as it was 2.5 million direct and indirect jobs. Tourism became the main source of Egypt's earnings of the foreign currency, surpassing other sources that were holding the first position in the eighties and the first half of the nineties. (Egypt SIS, 2012: 4).

2.5.1.1 Tourism Contribution to Balance of Payment (BOP)

Since the 1970s, tourism revenue has been one of the four largest sources of foreign currency in Egypt (the income from the Suez Canal, the remittances of Egyptian workers abroad, and petroleum exports being the other three sources) which are used to alleviate the deficit in the balance of payments. In 1975, tourism receipts and the remittances of Egyptian workers abroad were jointly the most important sources of foreign currency, each accounting for 16% of total foreign currency in Egypt as shown in **Table 2.5**.

Table 2.5: Main sources of foreign currency in Egypt, 1975-2009/10 in US$ billion (in real terms)

Export items	1975		1980		1990/91		2000/01		2009/10	
	amount	%	amount	%	amount	%	amount	%	amount	%
tourism receipts	1.5	16.0	1.7	8.5	2.5	16.7	4.9	26.5	10.6	23.4
remittances	1.5	16.0	6.4	32.9	3.9	25.5	3.4	18.5	8.6	19.2
Suez Canal dues	0.4	4.0	1.7	8.5	2.5	16.7	2.0	11.1	4.1	9.1
petroleum exports	0.7	8.0	7.1	36.6	3.4	22.5	2.9	16.0	9.4	20.8
other exports	5.1	56.0	2.6	13.4	2.8	18.6	5.1	27.8	12.4	27.5
total	9.1	100	19.4	100	15.2	100	18.4	100	45.1	100

Source: Central Bank of Egypt, Egypt's Balance of Payment (BOP) Data, 2010.

In 1980, following the second oil crisis which resulted in a strong increase in oil prices, the value of oil exports soared to US$ 3 billion, from just US$ 0.2 billion five years previously. This caused the share of petroleum exports to increase dramatically relative to others and was accompanied by an increase in the remittance contribution in the same year. Therefore, the share of tourism receipts decreased sharply, to just 8.5% in 1980. In

1990/91, tourism receipts increased again to contribute 16.7% of total foreign currency, but were in the last position among these main sources of currency in Egypt in that year. In the recent period (2000/01-2009/10), a significant change occurred in the relative importance of these sources in favour of tourism receipts, which became the most important single source of foreign currency in Egypt as shown in **Figure 2.14.**

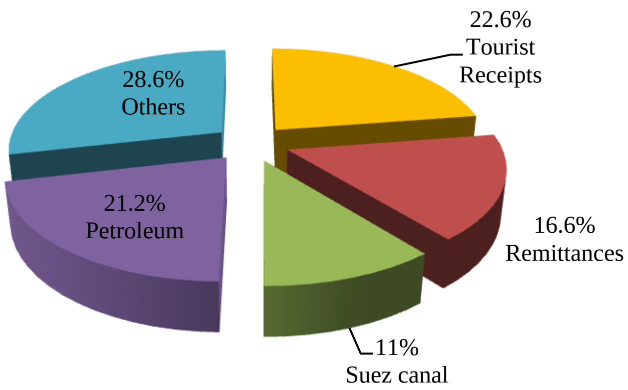


Figure 2.14: Tourism share in foreign currency compared with other sources, 2000/01-2009/10.
Source: Calculated from Central Bank of Egypt, BOP Data, 2010.

As a share of exports in Egypt, annual tourism receipts increased from US$ 2.1 billion (in real terms) on average in the 1980s to US$ 3.4 billion in the 1990s, with a higher share of total exports but a smaller contribution to service exports[7]. Although the 2000s witnessed high growth rates of both total exports and service exports in Egypt, 10.2% and 8.2% respectively, the contribution of tourism receipts on average in this decade increased again as a share of total exports and service exports, reaching in 2009 slightly less than a quarter of the total exports and half the service exports, with a value of US$ 9.8 billion (real prices), as illustrated in **Figure 2.15**.

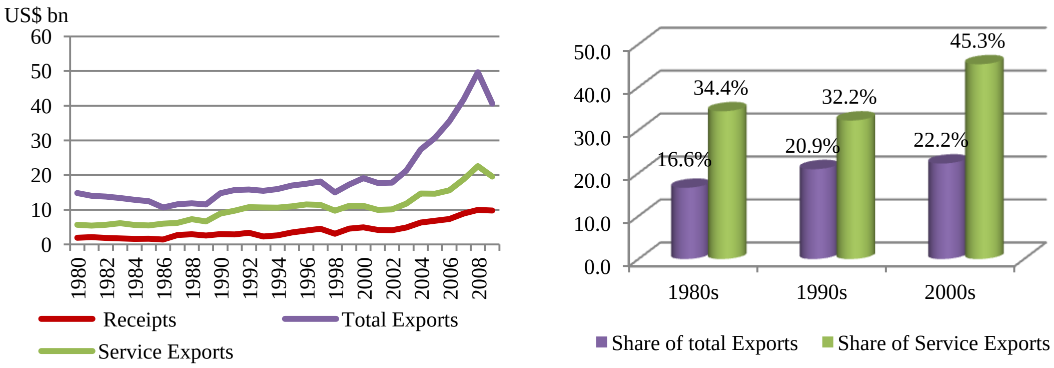


Figure 2.15: Contribution or tourism receipts to total and service exports in Egypt (1980s-2000s).
Source: Calculated from the WB, 2010 and Egypt Tourism in Figures, various issues.

[7] This result was due to the increasing importance of petroleum exports and the remittances of Egyptian workers in the 1990s.

The study of the SESRIC Centre (2010) analysed the importance of international tourism for the economies of the Organisation of Islamic Cooperation (OIC) member countries, and found that international tourism receipts as a share of exports witnessed a high contribution of more than 30% in three countries in the Middle East and North Africa[8] in 2008; Morocco (37.6%), Jordan (37%) and Egypt (34.4%). In contrast, this contribution was fewer in other countries; 16.6% in Turkey, 16.7% in Tunisia, 18.5% in Syria and only 4% in Bahrain. This result suggested that the contribution of tourism receipts to total exports in Egypt compares favourably with that contribution of most Middle Eastern and North African countries.

The key elements of tourism balance of payments are tourism receipts (inbound tourism) and tourism expenditure (outbound tourism). Regarding international tourism expenditure, it decreased sharply from 6.3% of total imports in Egypt in 1980 to just 0.9% of total imports in 1990, in addition it decreased in absolute value as illustrated in **Figure 2.16**. In 2000, tourism expenditure began to increase, representing 5% of total imports in 2008. Comparing tourism receipts with tourism expenditure in Egypt showed a positive and increasing surplus in tourism balance, accounting for 73.5% of tourism receipts in 2008. By comparison, the tourism balance of Morocco, Tunisia, Turkey, Syria and Jordan accounted for a high percentage of international tourism receipts of 84.9%, 84.5%, 84%, 74.6% and 65.9% respectively in 2008, whereas it accounted for a smaller share in the case of Bahrain (56.9%) and Lebanon (39.5%). In contrast, the tourism balance witnessed a tourist deficit in the case of Libya, Kuwait, UAE and Oman (SESRIC, 2010).

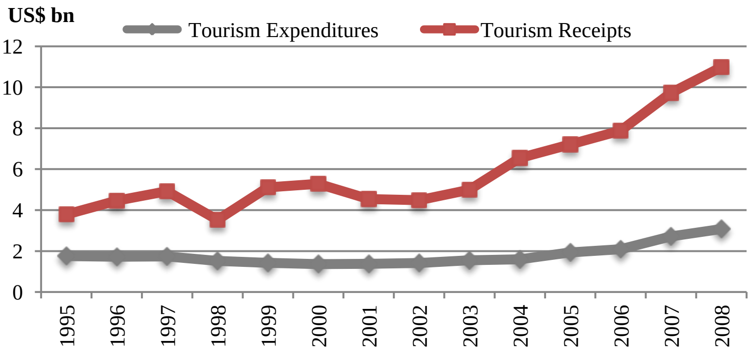


Figure 2.16: Tourism balance of payments in Egypt (1995-2008) in US$ billion (in real terms).
Source: Calculated from WB, 2010.

[8] The study focused on all the OIC member countries, but we only mentioned the results of the Middle East and North African countries, which are our interest in this chapter.

2.5.1.2 Tourism Contribution to Employment

Tourism contributes in creating new job opportunities in Egypt as illustrated in **Figure 2.17**. In 1990, tourism generated directly 3.5% of total employment in Egypt. The number of jobs increased continuously over time to take tourism's share to 4.9% in 2000. The period from 2000-2005 registered the highest growth rate of 8.8% annually, and its contribution to total employment rose to 7.2% in 2005, the highest contribution throughout the period. However, tourism witnessed a setback over the period from 2005-2009 due to the global crisis and economic down turn in 2008 and 2009, which caused a decrease in employment in these two years. Therefore the overall growth rate over this period was a small ratio, reducing tourism's contribution to 6.3% in 2009. It is forecast that the number of tourism jobs in Egypt will rise to 1.8 million in 2020 with a share of 6% of total employment in Egypt in the same year (WTTC, 2010).

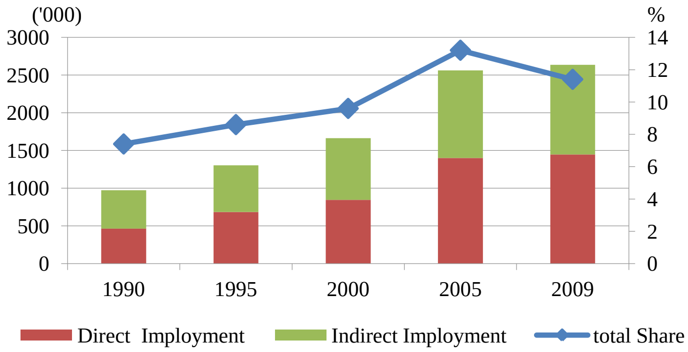


Figure 2.17: Tourism employment in Egypt, and share of total employment (1990-2009)
Source: Calculated from the WTTC data search tool, 2010.

The combined direct and indirect effects of tourism employment are approximately double the direct effect. Therefore, tourism's contribution to total employment in Egypt grew from 7.4% in 1990 to 11.4% in 2009. Finally, it is forecast that in 2020 tourism will generate more than 3.4 million jobs in Egypt as direct and indirect effects, with a share of 11.5% of total employment in the same year (WTTC, 2010).

2.5.1.3 Tourism Contribution to the GDP

Tourism in Egypt contributes significantly to total GDP directly and indirectly as illustrated in **Figure 2.18**. As a direct effect, tourism GDP increased continuously over time by 9% annually during the period 1990-2005. Despite the recessionary period (2008-2009), tourism GDP continued to grow by 1.4% in 2008, but decreased by 2.3% in 2009, making the overall growth of the period (2005-2009) just 2.2% annually. As a share of total GDP in Egypt, tourism's contribution increased from 4.2% in 1990 to 8.5% in 2005 as the highest contribution over the period of the study, but reduced to

7.4% of total GDP in 2009. The relative contribution of tourism to GDP is forecast to decline to 7.1% by 2020, equivalent to more than US$ 19 billion (constant prices) in the same year (WTTC, 2010).

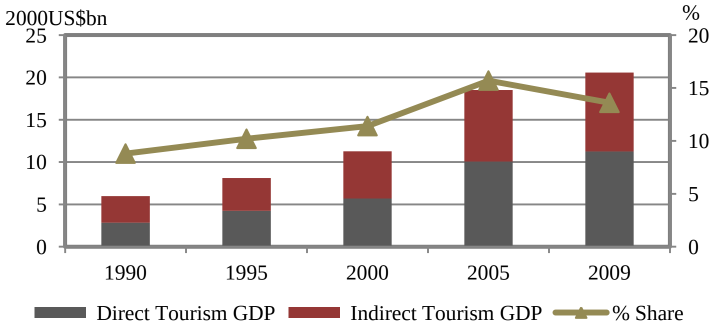


Figure 2.18: Tourism GDP in Egypt and its direct and indirect share of total GDP (1990-2009)
Source: Calculated from the WTTC data search tool, 2010.

Since tourism has linkages with most sectors of the economy, its full impact on the economy is much greater than its direct contribution to GDP. Tourism's direct and indirect contribution to GDP was estimated to be 8.8% of total GDP in Egypt in 1990, and increased to 13.6% of total GDP in 2009. It is forecast that the direct and indirect contribution of tourism to total GDP will increase to US$ 36.9 billion, equivalent to 13.7% of total GDP, in 2020 (WTTC, 2010).

As regards tourism's contribution to the economy in Egypt when compared to a global average in 2009, tourism plays a considerable role; as illustrated in **Table 2.6**.

Table 2.6: Tourism's contributions to the world economy and to Egypt's economy in 2009

Indicators	Amount		Indicators	Percentage (%)	
	World	Egypt		World	Egypt
Real Tourism Receipts (2005 base)	775.6 US$ billions	9.8 US$ billions	Tourism receipts % of total exports	5.5	24.1
			Tourism receipts % of service exports	24.8	50
GDP* (2000 base)	3775 US$ billions	20.6 US$ billions	GDP* % of total GDP	9.4	13.6
Employment*	236.5 million jobs	2.6 million jobs	Employment* % of total employment	8.2	11.4

Note: * Direct & Indirect Impact, Source: Calculated from WB, 2010 and WTTC, 2010 Data

2.5.2 Purpose of Tourism in Egypt

Given Egypt's Mediterranean climate, extensive beaches and coastlines situated on the Mediterranean and the Red Sea, beach tourism is of great importance. In addition, Egypt is famous for its diverse desert landscapes, mountains and natural protected areas, which stimulate other types of tourism, such as environmental, sports and safari tourism.

Moreover, the numerous historical treasures in Egypt make culture tourism a non-competitive component of tourism in Egypt (Egypt SIS, 2010). All of the above types of tourism in Egypt are included in leisure and recreational tourism.

Most tourist arrivals come to Egypt for leisure and recreational reasons, as illustrated in **Figure 2.19**. This type of tourism was the purpose of 91% of total arrivals on average in the first half of the 2000s, accounting for 5.4 million tourists annually on average over this period. This number increased to more than 10 million tourists in the second half of the same decade to increase the share of this dominant type to more than 93% over the second half of the 2000s (Egypt Tourism in Figures, several issues). Comparing with the global average, the share of leisure tourism in Egypt is very high. In 2007, about 50% of global international tourist arrivals were motivated by leisure tourism (A.T.E.I Thessalonikis, 2009).

5.5% of total arrivals over the period 2000-2004 visited Egypt for just one day. This share decreased by 1% over the period 2005-2009. Of all visitors arriving to Egypt in the first half of the 2000s, 1.4% came for conventions and business, declining slightly in the second half of the same decade. This is a very small share comparing with share of 15% of global tourist arrivals in 2007 (A.T.E.I Thessalonikis, 2009). Although Egypt is rich in its environments of therapeutic value due to its rich natural resources such as a dry and warm climate, numerous mineral and sulphuric streams and black curative sands, health tourism occupied a very small percentage of total tourism in Egypt, accounting for 1.6% on average in the first part of the 2000s, while its share reduced by half in the second part of the 2000s. Finally, tourism for study and training attained a very small number of tourists over the 2000s.

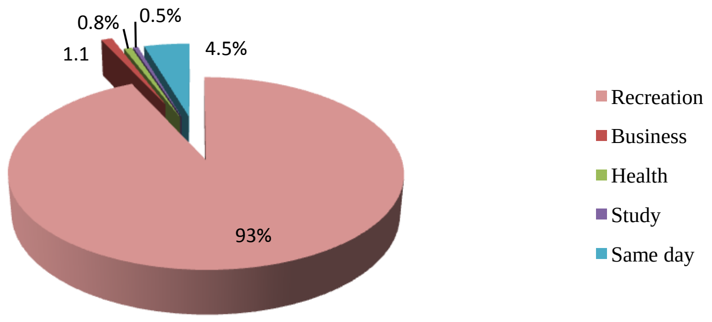


Figure 2.19: Tourist arrivals in Egypt according to the purpose of tourism (2005-2009)
Source: Calculated from Egypt Tourism in Figures, several issues

It is recommended that more interest has to be given to purposes other than leisure tourism in Egypt to attract more tourists; especially those which require a longer stay in the destination, such as health and education tourism, or which entail a higher average spend, as is the case for business and convention tourism.

Although, Al Hamarneh (2005) found that emerging new types of tourism, such as medical and spa tourism, MICE (Meetings, incentives, conferences, and exhibitions) and ecological tourism are an important recent trend in tourism for Arab region, including Egypt, there is no evidence of this trend in our study.

2.5.3 Tourism Development in Egypt

2.5.3.1 Growth of Tourist Arrivals in Egypt

International tourist arrivals in Egypt have grown rapidly from the 1950s to date, and at increasing rates, as illustrated in **Figure 2.20**.

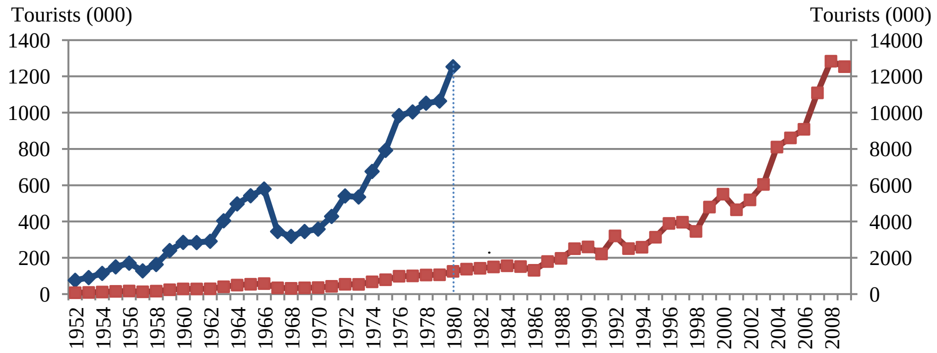


Figure 2.20: Tourist arrivals in Egypt (1952-2009)
Source: Calculated from CAPMAS, various issues and Egypt Tourism in Figures, various issues. Note that the blue line displays the tourist arrivals for 1952-1980 only, using the narrower scale shown on the left vertical axis, to illustrate the annual changes in this period. The red line uses the wider-ranging scale shown on the right vertical axis.

As reported in **Figure 2.21**, the 1950s witnessed a huge increase of tourist arrivals to Egypt by 15.5% on average per annum to achieve the highest arrivals growth rates throughout the study period. In 1957, the worst tourist arrivals growth rate in the decade was experienced (-25%), as illustrated in **Figure 2.22**, due to the Tripartite Aggression - war fought by Britain, France and Israel against Egypt on October 1956.

Whereas both 1963 and 1964 achieved the strongest growth rates in the 1960s, the Six Day War against Israel in June 1967 cut dramatically tourist arrivals by more than 40% in this year, followed by a further decrease in arrivals to Egypt in 1968. The period of recovery began in 1969 with emergence of Arab tourists as a result of increasing per capita incomes, especially from oil-rich countries. Consequently, the 1960s achieved an increase of arrivals to Egypt of 1.9% annually.

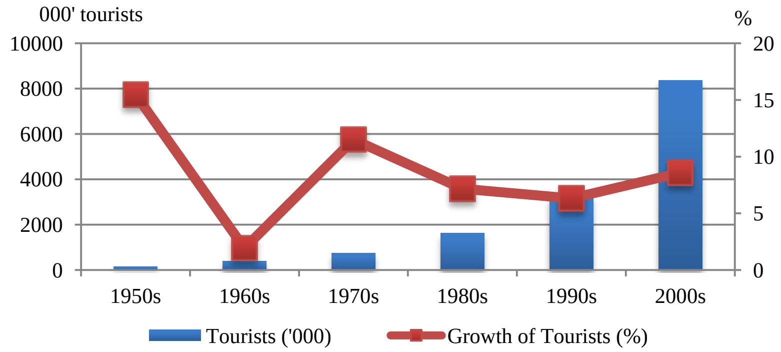


Figure 2.21: Tourist arrivals in Egypt and their growth (1950s-2000s)
Sources: Calculated from CAPMAS, various issues and Egypt Tourism in Figures, various issues.

A strong improvement in tourist arrivals was attained in the 1970s, which grew after the war by 11.5% annually over the decade. 1972 witnessed the highest growth in the decade; it was followed by a negative growth of 1.1% with the Middle East War in October 1973. Tourism recovered quickly in 1974 with a growth rate of 26.4% to exceed for the first time the number of tourists achieved before the Six-Day War in 1966. Then deterioration in tourist arrivals occurred from 1977 to the end of this decade as a result of President El Sadat's visit to Israel in 1977 and signing of the Camp David peace accord in 1979; therefore, most Arab countries boycotted Egypt and the number of Arab arrivals decreased dramatically (Aly and Strazicich, 2000).

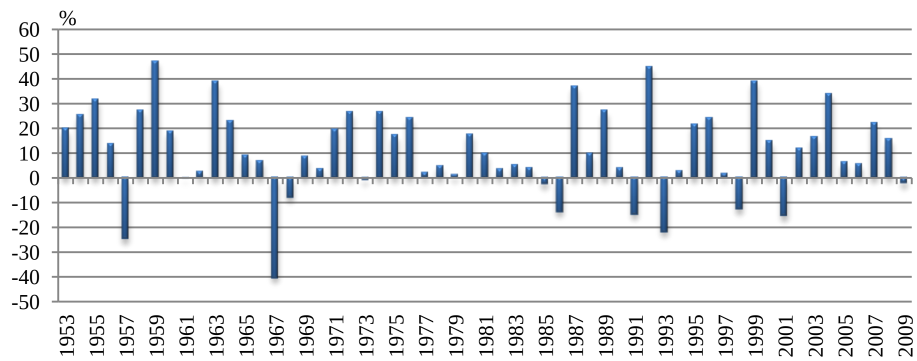


Figure 2.22: Annual growth rates of tourist arrivals to Egypt over the period 1953-2009
Sources: Calculated from CAPMAS, various issues and Egypt Tourism in Figures, various issues.

In the 1980s, several events affected tourism in Egypt. The global recession in 1981, along with the assassination of President El Sadat in the same year, and a period of riots and other acts of political violence in October 1985 and February 1986 were the main reasons for the deterioration of tourism in this decade. However, 1987 witnessed very strong growth of 37%, making it a boom year of this decade, as a result of the new monetary policies which permitted the free transfer of foreign currency. This led to a real depreciation of the Egyptian currency which reduced the cost of Egypt as a travel destination. Overall, the average growth rate was 7.2% annually in this decade. The 1990s was the decade that witnessed the most volatility in tourism numbers for the whole study period due to the political unrest in the Middle East and violence in Egypt. The second Gulf War in August 1990 affected tourism in all Middle East countries, with number of arrivals to Egypt declining by 14.8%.

> As a result of the 1990-91 Gulf War, the cancellation rate for tours in Egypt was around 70% in late 1990 and hotel occupancy rates fell to 35-70% (compared with 80-90% in 1989). The Gulf War is estimated to have cost Egypt about half of its tourism income for the year 1990-91. The Egyptian government offered assistance to the industry during 1990 and 1991. Despite the government support to tourism sector (reducing interest loans and a deferment of some taxes and insurance premiums), many tourism-related firms struggled to survive in the early 1990s (Gray, 1998: 96).

From October 1992 to mid-1994, successive terrorist incidents in Egypt reduced arrivals by 21.8% in 1993, followed by a small increase in arrivals by 3% in 1994. The Egyptian tourist authorities developed promotional campaigns specific to the most prominent tourist markets, aimed at improving the image of Egypt as a tourist destination (Helmy, 1999), leading to rapid recovery in 1995 and 1996 with 21.4% and 24.3% growth rates respectively. However, the Luxor attack of November 1997 meant only a very small increase in arrivals in the same year, and a substantial decrease in the following year. Overall, tourist arrivals grew with a growth rate of 6.3% annually in this decade, the second lowest growth rate throughout the study.

The 2000s achieved a considerable improvement in arrivals to Egypt. Despite the events of 11 September 2001, which affected arrivals negatively by 15.6% in that year, tourism witnessed high growth rates in most years of this decade, the exceptions being 2005, 2006, and 2009. The years 2005 and 2006 witnessed two successive terrorist attacks that resulted in relatively small growth rates. In addition, the global economic recession of 2008, along with the Swine Flu epidemic of 2009, caused a drop in arrivals by 2.3% in the latter year. Arrivals more than doubled in the 2000s achieving a growth rate of 8.6% per year over this decade.

To sum up, despite volatility caused by political and terrorist events, upward trend in tourism has been achieved over decades. Consequently tourist arrivals increased dramatically from just 76 thousand tourists in 1952 to more than 12.5 million arrivals in 2009, a 165-fold increase throughout the study period.

2.5.3.2 The Origin of Tourists to Egypt

Tourism inflows to Egypt depend heavily on three regions comprising the European, Arab and the American. The Non-Arab African and Asian countries constitute the rest of arrivals to Egypt as illustrated in **Figure 2.23**.

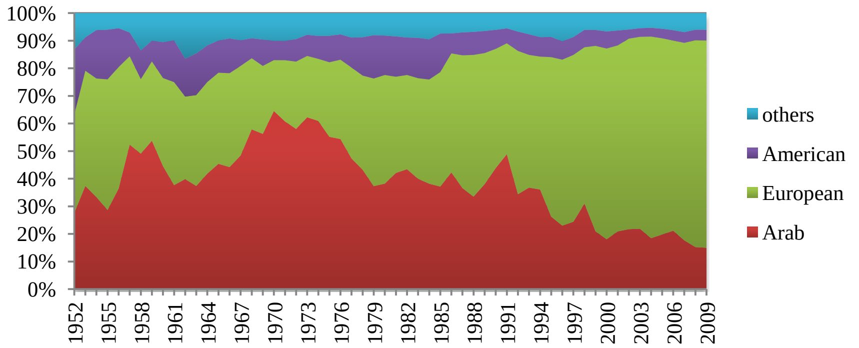


Figure 2.23: Shares of tourist arrivals to Egypt over the period 1952-2009
Source: Calculated from CAPMAS, various issues and Egypt Tourism in Figures, various issues.

2.5.3.2.1 European Region

Analysing the number of tourist arrivals from Europe to Egypt illustrates that the political stability in Egypt, especially after the Middle East War in 1973, the economic circumstances in the European countries, the economic and political relationships between Egypt and Europe, and its proximity are noted to be main determinants of tourism demand for Egypt through the period of the study.

The European region is of growing importance to Egypt, since more than 42% of total arrivals to Egypt during the period 1952-1956 came from this region. The Tripartite Aggression against Egypt in 1956, with the two Egyptian Wars (1967, 1973), lead to the contribution of Europe tourists to total arrivals decreasing considerably; therefore the average share of European arrivals fell to 28.8% on average over the period (1957-1973), falling back to the second position after Arab region. However from 1973, the share of European arrivals saw a marked increase, Europe returned to its position as the main origin of tourist arrivals to Egypt at the beginning of the second half of the 1980s and remained to end of the study period.

2.5.3.2.1.1 Main European Origin Countries

Whereas Western European countries dominated Egyptian tourism with more than 90% of total European tourists coming to Egypt in the 1980s, against just 10% from Central and Eastern Europe, the share of the latter countries increased to 21% in the 1990s and 22% in the first half of the 2000s, rising to 30.6% in the second half of the 2000s as illustrated in **Table 2.7**. This result can be attributed to the transformation of the economic status of these countries since the 1990s and enhanced freedom of movement, especially Russia, which began its economic reform in the early 1990s.

Table 2.7: Share of tourist arrivals from Europe region (1980s-2000s)

	1980s		1990s		Early 2000s		Late 2000s	
Country	Amount ('000)	Share (%)	Amount ('000)	Share (%)	Amount ('000)	Share (%)	Amount ('000)	Share (%)
France	125.8	18.4	176.3	9.9	345.3	8.4	494.1	6.3
Germany	124.5	18.2	316.7	17.7	783.7	19.0	1087.4	13.8
UK	104.2	15.2	272.4	15.3	396.8	9.6	1095.1	13.9
Italy	89.4	13.0	267.0	15.0	770.9	18.7	942.7	12.0
Israel	43.4	6.3	234.0	13.1	256.5	6.2	215.7	2.7
Benelux	38.4	5.6	99.6	5.6	243.7	5.9	416.9	5.3
Scandinavia	32.8	4.8	57.2	3.2	170.4	4.1	305.4	3.9
Greece	29.5	4.3	32.7	1.8	37.0	0.9	48.6	0.6
Switzerland	26.9	3.9	60.0	3.4	107.7	2.6	151.5	1.9
Spain	23.0	3.4	43.6	2.4	105.8	2.6	151.8	1.9
Austria	20.0	2.9	41.5	2.3	106.3	2.6	176.5	2.2
Russia	7.5	1.1	83.8	4.7	401.4	9.7	1430.6	18.2
Poland	5.6	0.8	17.1	1.0	89.2	2.2	347.9	4.4
CS	1.6	0.2	9.6	0.5	83.1	2.0	268.5	3.4

Sources: Calculated from Egypt Tourism in Figures, various issues and UNWTO, various issues. Note: CS stands for Czech Slovakia.

Turning to specific countries, France was the origin of the largest number of tourists to Egypt in the 1980s. Its share decreased gradually over time, but increased in absolute number to occupy the 5th position in the second half of the 2000s as reported in **Figure 2.24**. The gradual decrease in France’s share of the Egyptian market can be attributed to the importance of Tunisia to France as the most preferable destination, given the colonial and cultural relationship between the two countries. In contrast, Russia held the 12th position, in the 1980s, which improved strongly over time to occupy the first position in the second half of the 2000s.

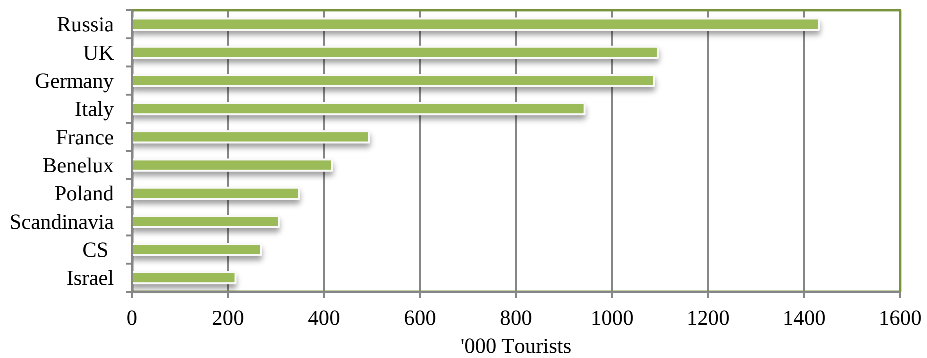


Figure 2.24: Top ten European generating countries to Egypt in the second half of the 2000s
Source: Calculated from Egypt Tourism in Figures, various issues

Germany, UK and Italy were all very important markets for Egypt throughout the period of the study, regularly appearing among the first four origin countries. The collapse of the Berlin Wall in November 1989 encouraged outbound tourism from Germany, so German tourist arrivals to Egypt increased more than 150% through the 1990s. In the first half of the 2000s, Germany remained the first tourist exporter, but it took the third position in the second half after Russia and UK, with a lower share, but higher average tourist number. Finally, it can be noted from Table 2.7 that tourism in Egypt depended on more European countries over time that is the degree of concentration decreased over time, since in the 1980s, more than 93% of total European tourists came from just 10 countries. This percentage reduced to less than 84% in the second half of the 2000s.

2.5.3.2.2 The Arab Region

The economic and political relationships between Egypt and Arab countries, the economic situation of these countries (prices of petroleum, level of income, improvement of quality of life), the political circumstances in Arab countries (civil wars, the Gulf wars, continuous conflict with Israel), as well as the distance between Egypt and Arab countries are the most important influences of Arab tourist inflows to Egypt over the period 1952-2009 as shown from the following discussion.

The second most important region over the period of the study was the Arab region. It contributed 33% of total arrivals to Egypt, over the period from 1952-1956, occupying the second position after Europe. Since 1957, after the Tripartite Aggression, the contribution of the Arab region increased dramatically at the expense of the contribution of the other regions, to become the first source of arrivals to Egypt over the period from 1957-1973, and constitute more than half the arrivals coming to Egypt as illustrated in

Figure 2.23. This trend can be attributed to various reasons: the increase of per capita income of most Arab countries, especially petroleum exporting countries; the increase of educational levels in these countries, and the political leadership of Egypt in the Arab world in this period (Mohammed, 1977).

After 1973, the share of Arab visitors to Egypt declined gradually and continuously up to the end of the period. This result can be explained by the political tension between Egypt and the Arab countries, except Sudan and Oman, due to the Egyptian peace treaty with Israel after the 1973 War, along with the decrease in the prices of petroleum in the 1980s and the first Gulf War (1980-1988), followed by the second Gulf War in 1990-1991.

2.5.3.2.2.1 Main Arab Origin Countries

The four leading Arab countries of Palestine, Libya, SA and Sudan accounted for 69% of total Arab tourists in the 1980s, reduced to 59% in the second half of the 2000s, since these four countries are located on the border with Egypt. Adding another three countries, Jordan, Kuwait and Syria, the total share of these seven countries increased to 86% in the 1980s and 79% in the second half of the 2000s, as reported in **Table 2.8**.

Table 2.8: Share of tourist arrivals from the Arab region (1980s-2000s)

	1980s		1990s		First 2000s		Second 2000s	
Country	Amount ('000)	Share (%)	Amount ('000)	Share (%)	Amount ('000)	Share (%)	Amount ('000)	Share (%)
SA	165.3	21.9	213.2	21.5	258.7	21.9	382.4	20.3
Sudan	142.4	18.8	81.1	8.2	67.1	5.7	145.8	7.7
Palestine	126.2	16.7	121.5	12.2	158.3	13.4	147.5	7.8
Libya	84.3	11.2	206.4	20.8	238.7	20.2	430.2	22.8
Kuwait	64.3	8.5	77.6	7.8	72.8	6.2	123.2	6.5
Jordan	55.9	7.4	57.3	5.8	92.0	7.8	158.6	8.4
Lebanon	15.9	2.1	23.6	2.4	39.9	3.4	62.8	3.3
Algeria	14.8	2.0	19.5	2.0	15.1	1.3	31.5	1.7
UAE	12.7	1.7	22.1	2.2	29.4	2.5	46.6	2.5
Qatar	10.8	1.4	11.7	1.2	12.0	1.0	22.2	1.2
Syria	9.3	1.2	70.3	7.1	76.7	6.5	105.1	5.6
Yemen	3.0	0.4	30.1	3.0	42.0	3.6	77.1	4.1

Source: Calculated from Egypt Tourism in Figures, various issues.

SA came at the top of Arab originating countries to Egypt in the 1980s with a share of 22% of total Arab arrivals, but becoming the second after Libya with a share of 20.3% in the second half of the 2000s, as illustrated in **Figure 2.25**. Egypt is also a considerable tourism market for the Sudanese. Sudan occupied the second position with a share of 18.8% in the 1980s, but its contribution (absolute and relative) has dropped over time because of political tensions between Egypt and Sudan, which resulted from the Halayib issue in 1993 (Warburg, 1994). In the 1990s, Sudan occupied the 4th position, then the 5th position (7.7%) in the second half of the 2000s. In contrast, Libya's contribution has improved over time from 11.2% of Arab arrivals in the 1980s (the 4th ranking), to 22.8% in the second half of the 2000s (the first ranking).

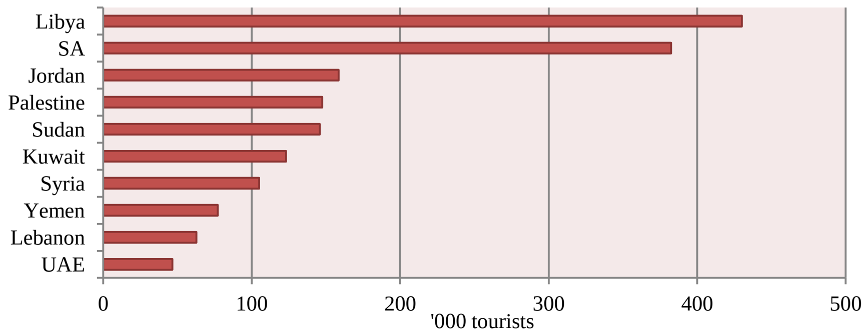


Figure 2.25: Top ten Arab generating countries to Egypt in the second half of the 2000s
Source: Calculated from Egypt Tourism in Figures, various issues

2.5.3.2.3 The Americas Region

The economic status of American countries and the economic and political relationships between Egypt and the Americas are crucial in determining tourist arrivals to Egypt over the period of the study as evident from the following discussion.

The Americas region represented the third most important source of tourist arrivals to Egypt throughout the period of the study. The share of this region constituted 17% of total arrivals to Egypt over the period from 1952 to 1956. This share decreased dramatically to just 7.7% over the period 1957-1973 because of the political instability in Egypt through this period. The Americas' share in tourist arrivals increased gradually after the 1973 war to reach 14% of total arrivals in 1985, but from the second half of the 1980s, a continuous fall in its share has been witnessed, with a small increase in the absolute number of tourists, to reach only 3.9% in 2009.

2.5.3.2.3.1 Main American Origin Countries

As reported in **Table 2.9** and **Figure 2.26**, the US and Canada constituted on average about 85% of all arrivals from the Americas region to Egypt over the period from the 1980 to 2009. The countries of Latin America contributed to 15% of total American arrivals over the same period. The major generator of arrivals to Egypt is the US, with a contribution of 78% of total Americas tourists in the 1980s decreasing to 65% in the second half of the 2000s; nevertheless this constituted a big increase in the absolute number of American tourists over this period. Canada's contribution to total American arrivals has grown continuously over time from 10% in the 1980s to 17.7% in the second half of this decade. The contribution of Latin American countries also rose throughout the period. The number of Brazilian tourists increased five-fold, tourists from Mexico and Argentina more than doubled, and finally Colombian tourists soared more than nine-fold over the period 1980-2009.

Table 2.9: Share of tourist arrivals from the Americas region (1980s-2000s)

	1980s		1990s		First 2000s		Second 2000s	
Country	Amount ('000)	Share (%)	Amount ('000)	Share (%)	Amount ('000)	Share (%)	Amount ('000)	Share (%)
US	143.0	77.7	150.9	70.8	165.3	68.4	267.4	65.4
Canada	18.6	10.1	26.5	12.4	39.7	16.4	72.3	17.7
Brazil	5.5	3.0	10.0	4.7	5.9	2.4	16.0	3.9
Mexico	4.9	2.7	5.6	2.6	9.6	4.0	13.8	3.4
Argentina	3.8	2.0	6.3	2.9	4.9	2.0	8.3	2.0
Colombia	2.2	1.2	3.7	1.7	3.9	1.6	8.7	2.1

Source: Egypt Tourism in Figures, various issues.

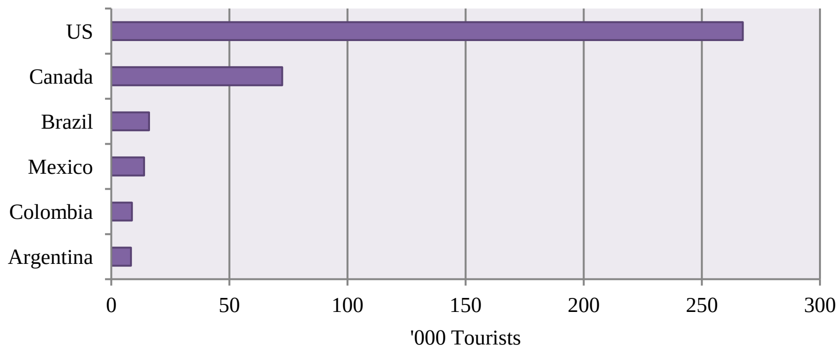


Figure 2.26: Top American generating countries to Egypt in the second half of the 2000s
Source: Calculated from Egypt Tourism in Figures, various issues

2.5.3.2.4 Other Markets

Other tourists to Egypt came from non-Arab African countries and non-Arab Asian countries. The share of these countries registered its peak in the 1950s, at 11.6% of total arrivals to Egypt, but decreased dramatically to just 1% in the 1960s because of the Six Day War in 1967 and the political instability in Egypt over that decade. Despite an increase in the share of these countries in the 1970s to reach 9%, their share declined again over time to reach 7.5% in the 2000s.

2.5.3.2.4.1 Main Other Generating Countries

Africa (non-Arab countries) and A&P region (non-Arab countries) together constitute important sources of tourists to Egypt. With regard to Africa, the important markets are South Africa, Nigeria and Ethiopia, with very small shares for Tanzania and Ghana. In the 1980s, the contribution of the latter four countries (without the share of South Africa) of total other tourists did not exceed 5% as illustrated in **Table 2.10**. In the 1990s, this contribution decreased slightly to 4.5%, then increased to 7% in the second half of the 2000s. South Africa was particularly important in the 1990s, since it contributed a share of 10.4% to tourist arrivals out of 15% for all African non-Arab countries, but its contribution declined dramatically in the 2000s. Not only was the number of arrivals from the other African countries very small over the study period, but they decreased over time (except in the case of Nigeria) to the first half of the 2000s. The second half of the 2000s witnessed a strong improvement in numbers with increasing share for most of these countries. The small contribution of African countries can be attributed to the low per capita income of these African countries.

Table 2.10: Tourist arrivals and shares of tourists of other regions (1980s-2000s)

	1980s		1990s		First 2000s		Second 2000s	
Country	Amount ('000)	Share (%)	Amount ('000)	Share (%)	Amount ('000)	Share (%)	Amount ('000)	Share (%)
Japan	30.53	24.30	57.99	23.90	67.13	19.40	98.52	14.80
Australia	18.26	14.50	32.23	13.30	39.70	11.50	59.73	8.90
Korea	NA	NA	23.22	9.60	31.49	9.10	48.74	7.30
India	12.18	9.70	18.24	7.50	34.97	10.10	74.69	11.20
Philippines	8.30	6.60	16.92	7.00	31.89	9.20	39.54	5.90
Pakistan	5.08	4.00	5.90	2.40	7.10	2.10	14.72	2.20
China	1.82	1.50	5.23	2.20	20.06	5.80	49.55	7.40
S. Africa	NA	NA	25.31	10.40	17.86	5.20	30.48	4.60
Nigeria	2.73	2.20	5.07	2.10	11.60	3.40	35.22	5.30
Ethiopia	1.79	1.40	3.37	1.40	3.44	1.00	4.97	0.70
Ghana	1.21	0.97	1.49	0.61	1.77	0.51	4.45	0.67
Tanzania	0.77	0.61	0.87	0.36	0.84	0.24	2.04	0.31
Others	42.9	34.20	46.60	19.20	77.80	22.50	204.70	30.70

Source: Calculated from Egypt Tourism in Figures, various issues.

Tourist arrivals from East Asia and the Pacific region were greater than the number of arrivals from Africa, and this is possibly attributed to the difference in per capita incomes. As reported in **Figure 2.27,** Japan is the most important source of tourists from this region, with an increasing number of arrivals from this group to Egypt, albeit with a decreasing share over time from 24.3% in the 1980s to 14.8% in the second half of the 2000s. Following the same pattern as Japan, Australia is a considerable market; it accounted for 14.5% of total tourists from this group in the 1980s, but its share decreased continually to 8.9% in the second half of the 2000s. The same trend was applicable to both Korea and Pakistan, with smaller numbers of arrivals. In contrast, arrivals from both India and China increased in both absolute values and as a share of regional arrivals over time.

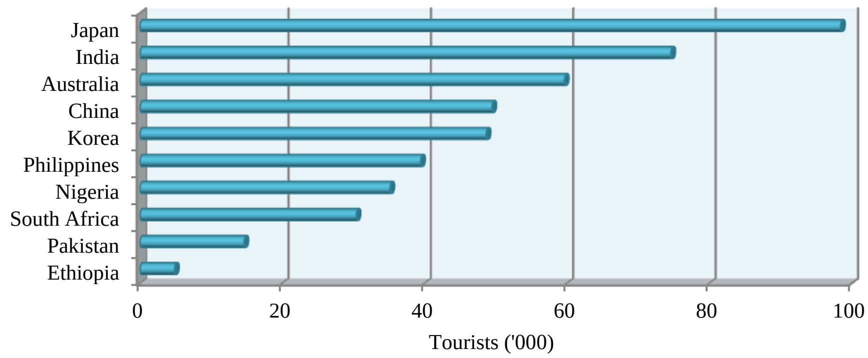


Figure 2.27: Top other generating countries to Egypt in the second half of the 2000s
Source: Calculated from Egypt Tourism in Figures, various issues

2.5.4 The Impact of Terrorism on Tourism Inflows from Different Regions

As illustrated in **Table 2.11**, tourists from the Americas were the group most sensitive to political instability and acts of terrorism in Egypt over the period of the study.

Table 2.11: The effect of the instability events on tourists (annual growth rates %)

Years and instability events	Total tourists	Arab	Europe	Americas	Others
1957, Tripartite Aggression	-24.8	8.1	-45.3	-54.2	-3.2
1967, Six Day War	-40.4	-34.8	-43.1	-56.2	-35.8
1968, Six Day War	-7.8	10.2	-26.8	-28.1	-14.7
1973, Middle East War	-1.1	6.1	-9.8	-6.8	-17.6
1986, political violence in Egypt	-13.6	-1.8	-10.1	-55.3	-14.4
1990, the second Gulf War	3.9	19.7	-5.5	-10.7	-2.7
1991, the second Gulf War	-14.8	-5.1	-20.8	-33.1	-22.5
1993, political violence in Egypt	-21.8	-16.4	-27.6	-16.5	-10.5
1998, political violence in Egypt	-12.8	10.6	-18.3	-15.3	-38.9
2001, 11 September 2001event	-15.6	-2.2	-17.7	-26.2	-20.1

Source: Calculated from CAPMAS, various issues and Egypt Tourism in Figures, various issues.

The year of the Six Day War of 1967 witnessed the most dramatic fall in the Americas arrivals to Egypt in this year. Both the Tripartite Aggression against Egypt in 1956 and the successive riots in Egypt in 1985-1986 affected tourists from the Americas strongly (see **Figure 2.28**). Europe was very sensitive region to political instability, especially in the case of riots and violence in Egypt. The Tripartite Aggression and the Six Day War were events with most impact on this group. With regard to tourists from other regions, the growth rate of tourists from this group reached its trough in 1998 as a result of the Luxor attack of November 1997 (along with the Asian financial crises in the same year). The Six Day War in 1967 was the second strongest shock for this group. In contrast, the Arab region was less sensitive to such political shocks possibly because tourists in this region might be better informed about the real conditions in Egypt after the unfavourable events, and they do not consider themselves a potential target. As in the case of the other regions, the Six Day War registered the greatest decrease in Arab tourists in the same year.

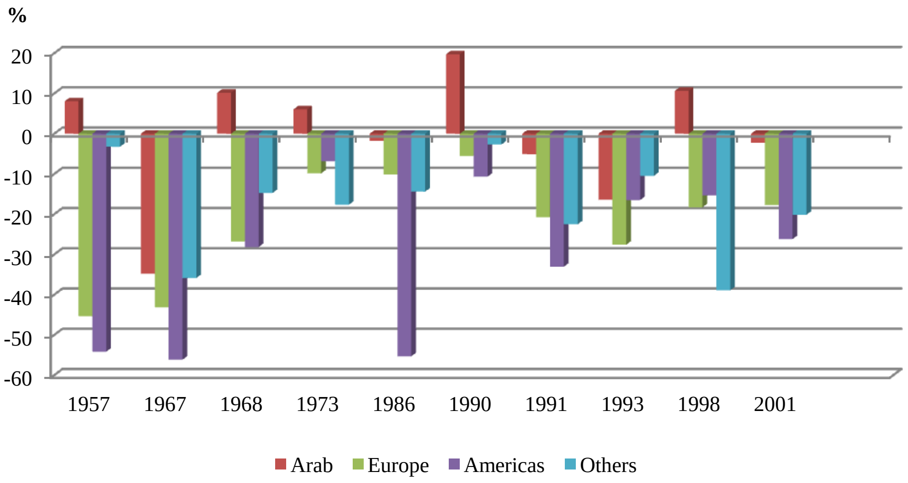


Figure 2.28: Important political instability incidents in Egypt (1950s-2000s).
Source: Calculated from Table 2.11.

2.5.5 Other Tourist Indicators

2.5.5.1 Growth of Tourist Receipts in Egypt

Nominal tourist receipts in Egypt increased dramatically from US$ 94.6 million in 1970 to US$ 10.8 billion in 2009. Taking into consideration the effect of inflation throughout the period of the study, real receipts (2005 base) witnessed a smaller change. They increased from US$ 476 million in 1970 to US$ 9.8 billion in 2009, as illustrated in **Figure 2.29**.

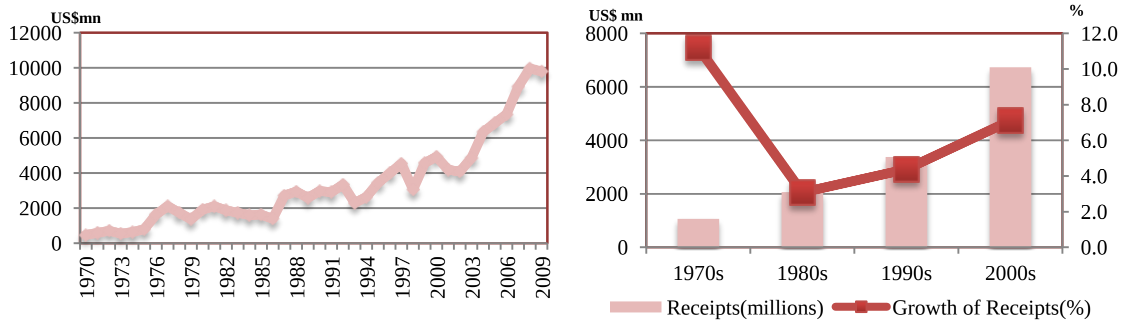


Figure 2.29: Real tourist receipts and their growth in Egypt (1970-2009)
Source: CAPMAS, various issues and Egypt Tourism in Figures, various issues.

The same pattern of growth for both tourist arrivals and tourism receipts has been witnessed since the 1970s, but with more growth of tourist arrivals than the growth of real receipts over the four decades, indicating that tourists spend less in Egypt (in real terms) over time. The 2000s witnessed the highest growth since the 1970s, with higher growth rates of both arrivals and receipts than their counterparts in both the 1980s and the 1990s as can be noted from Figure 2.21 and Figure 2.29, panel 2.

The Ministry of Tourism performed a survey in 1996 to estimate tourist expenditure per night for each originating region in Egypt. American tourists spent in Egypt more than other nationalities per night whether in the case of individual tourists or group tourists, whereas tourists from the Middle East spent the least as illustrated in **Figure 2.30**. Tourists travelling in groups from Europe spent a little less than individuals because most group tourists stay in accommodation with inclusive terms, including transportations, marine resorts and others, where prices are more competitive. In contrast, individual visitors from the Americas and other nationalities, including Asia, spend less than group visitors, since most of them are young backpackers (Rady, 2002).

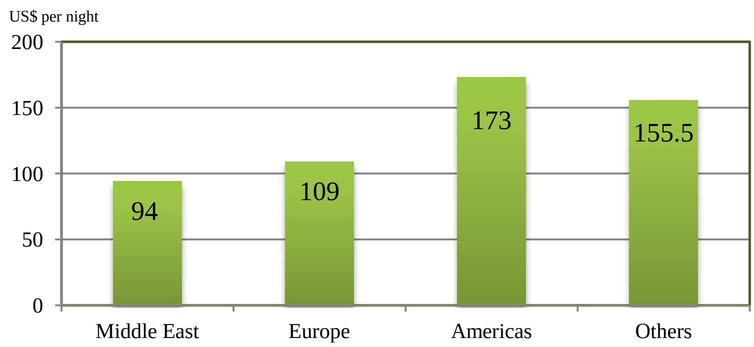


Figure 2.30: Tourist expenditure per night by originating region (Unit: US$) in 1996
Source: Calculated from Rady, 2002: 13.

2.5.5.2 Tourist Nights and Length of Stay in Egypt

Tourist nights in Egypt increased significantly from the 1950s to the present as illustrated in **Figure 2.31**. From 790,000 nights in 1952, tourist nights increased to more than 127 million nights in 2009, with annual growth rates of 9.8%, 4.5% and 14.5% on average in the 1980s, 1990s and the 2000s respectively.

Data about tourist arrivals and tourist nights can be used to estimate the average length of stay for tourists from different regions and from different countries to Egypt. The length of stay is one of the important indicators of tourism demand.

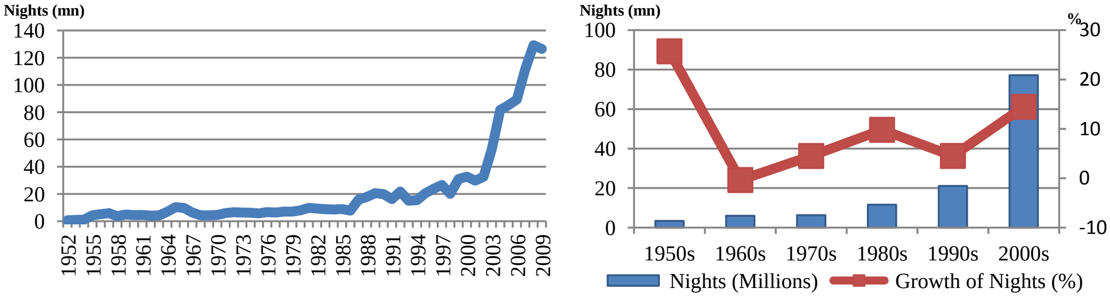


Figure 2.31: Tourist nights and their growth in Egypt over the period 1952-2009
Source: CAPMAS, various issues and Tourism in Figures, various issues

As reported in **Table 2.12**, average length of stay decreased considerably over time from 16 nights in the 1950s to 12.7 nights in the 1970s, to 9.2 nights in the 2000s. The decline in length of stay over time is a common trend worldwide not just in Egypt.

Table 2.12: Length of stay (night) in Egypt (1950s-2000s)

Decades	Arab	Europe	American	Others	Average
1950s	19.7	19.6	10.9	14.0	16.0
1960s	20.0	12.5	7.3	10.9	12.7
1970s	11.4	7.1	5.7	6.7	7.7
1980s	8.3	6.3	5.9	5.5	6.6
1990s	7.1	6.3	6.0	5.7	6.3
2000s	10.9	8.3	10.7	7.0	9.2

Source: Calculated from CAPMAS, various issues and Tourism in Figures, various issues.

Alegre and Pou (2006) indicated that the length of stay of European tourists in the Balearic Islands fell by over 3 days (from 13.1 to 9.9 days) between 1989 and 2003. Lee (2005) indicated that average length of stay in Hong Kong declined from 3.6 days on average in 1992 to 2.9 days in 2000. Finally, De Mello (2001) estimated that the average length of stay for British tourists in all European destinations during the period 1975-1997 declined continuously to France from 7 to 5 days, to Germany from 12 to 6 days, and to Italy from 14 to 9 days. De Mello (2001) explained the reduction of length of stay over time by greater mobility of tourists between preferred destinations rather than spending the entire journey in one destination.

Whereas length of stay of Arab tourists in Egypt decreased over time from about 20 nights in both the 1950s and the 1960s to 10.9 nights in the 2000s, they typically spent more time in Egypt than other nationalities in all six decades. This may be a result of several reasons: first, Arab tourists prefer to stay in private accommodation, which costs less than hotels, in addition, they travel to friends; therefore they can afford to stay longer. Moreover, the purpose of tourism for some Arab tourists is education and medical tourism, which involve longer visit than does recreational tourism, which is the main reason of tourism for non-Arab tourists. Tourists from Yemen, Sudan and Oman spent more time in Egypt than others, as illustrated in **Figure 2.32**, which can be explained by the purposes of their tourism, which was education, health, and training.

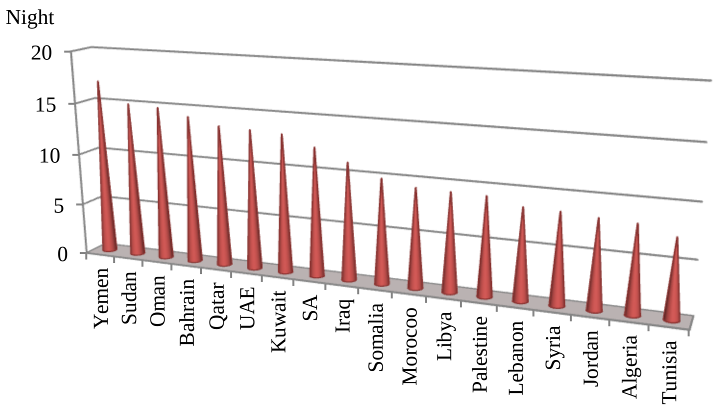


Figure 2.32: Length of stay (night) of Arab countries in Egypt in the 2000s
Source: Calculated from Egypt Tourism in Figures, various issues

With respect to European tourists, length of stay declined over time from 19.6 nights in the 1950s to 8.3 nights in the 2000s. Regarding the different countries within this region as illustrated in **Figure 2.33**, German tourists stayed the longest time in Egypt, followed by Austrian, Benelux and Spanish. In contrast, Israel had the shortest length of stay in Egypt. Finally, it is noted that Eastern European countries in general spent less time in Egypt (with 7 nights on average in the 2000s) than Western and Southern European countries (8.1 nights on average). A possible explanation is that Western European countries have more per capita income than Eastern Europe countries, therefore the former countries can afford to stay longer in Egypt than the latter countries.

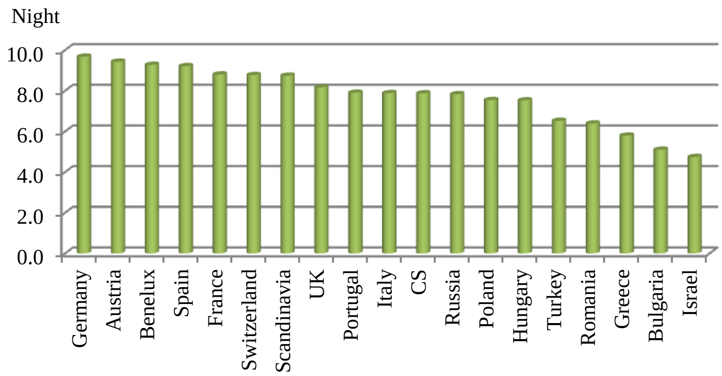


Figure 2.33: Length of stay (night) for Europe countries in Egypt in the 2000s
Source: Calculated from Egypt Tourism in Figures, various issues

Turning to the Americas, their average length of stay decreased from 10.9 nights in the 1950s to 5.7 nights in the 1970s. Thereafter, the length of stay for this region increased gradually over time to reach 10.7 nights in the 2000s. As illustrated in **Figure 2.34**, US tourists stayed an average of 11.3 days in Egypt, which was the longest length of visit for the Americas countries, followed by Canada with approximately the same length of stay on average in the 2000s, then countries from Latin America, with shorter length of stay. This pattern can be attributed to the positive relationship between the length of stay and the per capita income of each American country.

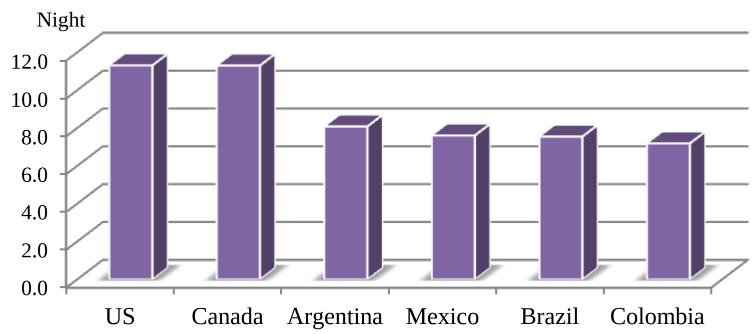


Figure 2.34: Length of stay (night) of American countries in Egypt in the 2000s
Source: Calculated from Egypt Tourism in Figures, various issues

Finally, the same pattern applied for the length of stay for the other regions, non-Arab African and Asian tourists, since the length of stay in Egypt decreased over time from two weeks in the 1950s as a maximum length of stay to one week in the 2000s. Ethiopian tourists spent the longest time (11.5 nights) in Egypt in the 2000s, followed by Australian tourists, with 10.8 nights. In contrast, Korean and Nigerian tourists stayed the shortest time in the same decade, as illustrated in **Figure 2.35**.

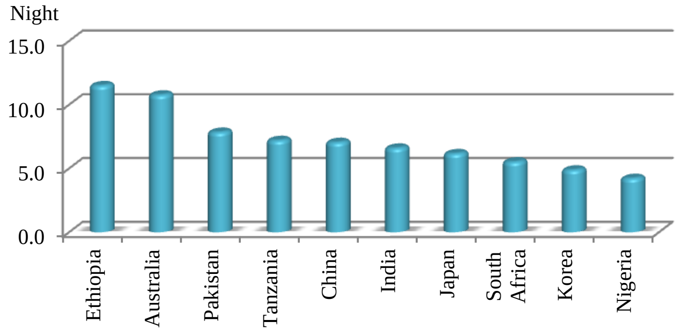


Figure 2.35: Length of stay (night) of other countries in Egypt in the 2000s
Source: Calculated from Egypt Tourism in Figures, various issues

2.5.6 Important Tourist Generating Countries to Egypt

In the last sections, we analysed tourism inflows from the main originating regions to Egypt, and from the important countries within each region. In this section, our interest is in the top countries worldwide in terms of generating tourism demand for Egypt in the 2000s, taking into consideration three different tourist indicators: tourist arrivals, tourist nights and length of stay.

As illustrated in **Table 2.13**, European countries occupied eight places out of the ten top generating arrivals to Egypt over the 2000s, with the other two positions occupied by Arab countries. German visitors contributed the largest number of arrivals, followed by Russia.

Table 2.13: Tourist indicators for top tourists in Egypt in the 2000s.

Top Tourist Arrivals			Top Tourist Nights			Top Length of Stay	
Country	('000)	(%)	Country	('000)	(%)	Country	(Night)
Germany	935.5	11.2	Germany	9318.0	12.1	Yemen	17.0
Russia	916.0	11.0	Russia	7790.1	10.1	Sudan	15.0
Italy	856.8	10.2	Italy	6885.9	8.9	Oman	14.8
UK	745.9	8.9	UK	6636.1	8.6	Bahrain	14.2
France	419.7	5.0	SA	4083.9	5.3	Qatar	13.5
Libya	334.4	4.0	France	3789.1	4.9	UAE	13.4
Benelux	330.3	3.9	Libya	3482.1	4.5	Kuwait	13.2
SA	320.6	3.8	Benelux	3208.8	4.2	SA	12.7
Scandinavia	237.9	2.84	US	2499.4	3.2	Ethiopia	11.5
Israel	236.1	2.82	Scandinavia	2248.8	2.9	US - Canada	11.3

Source: Egypt Tourism in Figures, several issues.

As far as tourist nights are concerned, there is little difference to the arrivals ranking. SA and American tourists moved forward in tourist nights ranking, indicating longer stay in Egypt than other nationalities. Finally, Arab tourists stayed the longest in Egypt, ranging from more than two weeks in the case of Yemen, Sudan, Oman and Bahrain, to 12 nights in case of SA. Although non-Arab African tourists stayed the least number of nights in Egypt on average in the 2000s, Ethiopia was the sole exception, with 11.5 nights. Tourists from North America registered large length of stay in Egypt in the 2000s, with 11.3 nights for American and Canadian tourists. European tourists stayed less than 10 days on average in the 2000s, with a maximum of 9.7 nights for German tourists.

2.5.7 Competitive Status of Egyptian Tourism in Terms of the Main Generating Countries

This section aims to investigate the position of Egypt relative to its important rivals in the Middle East and North Africa region in terms of arrivals from the main generating countries to Egypt. Turkey, Israel, Tunisia, Morocco, Syria and Jordan are important alternatives to Egypt in the region, since they have some characteristics in common and they provide similar tourist products and services. In this section, the importance of tourism in Egypt relative to tourism in these alternative destinations from the perspective of each main generating country to Egypt (Germany, Russia, Italy, UK, France, Libya, SA and US) will be investigated and explained.

Germany: In the 1980s, 35% of tourists from Germany to all the specified destinations visited Turkey, and 33% visited Tunisia, as the most important tourist destinations relative to the other five substitute countries, since there is a geographical proximity between Germany and these two destinations, as illustrated in **Figure 2.36.** In the 1990s, German outbound arrivals to Turkey increased dramatically, which may result from being a member of the Western European Union since 1992. The number of German tourists visiting Tunisia doubled, with a small decline in its share. German arrivals to Egypt more than doubled, but Egypt’s share declined slightly in the 1990s. Despite the absolute increase in German tourists to all the other destinations, the share of Syria remained the same and the shares of Morocco, Israel and Jordan declined over this decade.

In the 2000s[9], considerable changes in the structure of outbound German arrivals have been witnessed. Because of economic reforms adopted by Turkey since 2001, and the

[9] Data about this decade covered the period from 2000 to 2007 for all generating countries, due to lack of subsequent data for some destinations.

economic and other relationships with the EU, including the removal of visa requirements travel for tourism purpose to the EU member nation, Turkey succeeded again in attracting more German arrivals to increase its share dramatically to 64%, whereas the number of German tourists to Tunisia decreased strongly; therefore, Tunisia's share of outbound German arrivals decreased by half in this decade (14%). German arrivals to Egypt increased by 2.7-fold and exceeded German arrivals to Tunisia for the first time. On the other hand, arrivals to Israel decreased dramatically in absolute value. The same trend was repeated in the cases of Morocco and Jordan, whereas the share of Syria still constant over the period of the study.

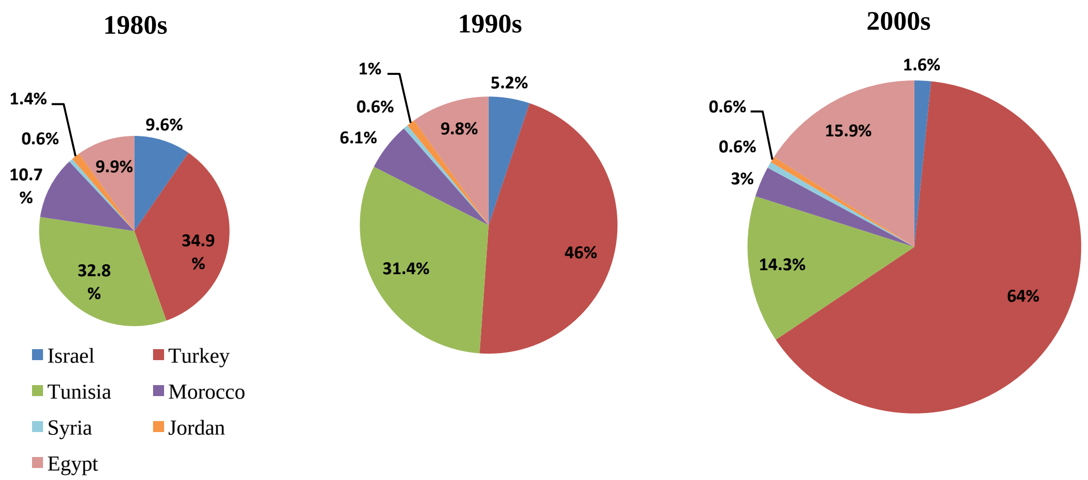


Figure 2.36: Outbound tourist arrivals from Germany to Egypt and its substitutes (1980s-2000s).
Source: Calculated from Yearbook of Tourism Statistics, UNWTO, various issues. Note: the area of each pie represents the average annual arrivals (millions) from Germany to these competing destinations over each decade. Therefore the areas of different pies reflect the differences in arrivals (in absolute numbers) of the same origin over time on the one hand and the differences between arrivals from different origin countries to these destinations on the other.

Thus, over three decades Egypt was able to increase its share of outbound German tourists from 9.9% in the 1980s to 15.9% in the 2000s, to move forward from the 4th position after Turkey, Tunisia and Morocco to 2nd position after Turkey by the 2000s. It is worth mentioning that the contribution of all the seven destinations accounted for 4.7 million arrivals, equivalent to just 6.4% of the total number of German departures[10] in 2000. This contribution improved over time to reach 8.6% (6 million tourists) in 2007, which may indicate the success of these destinations in attracting more German tourists than others.

[10] German tourists registered the largest number of tourist departures worldwide in the 2000s.

Russia: In the 1980s, outbound arrivals from Russia to all the seven alternative destinations were just 59,500 tourists, most of them directed to Turkey as illustrated in **Figure 2.37**. In the 1990s, Russia underwent considerable changes following the collapse of the Soviet system, to transfer from a centrally planned economy to a market-based and globally more integrated economy. These changes removed restrictions on the movements of tourists. As a result, outbound Russian arrivals to these destinations increased strongly through the 1990s to reach 1.3 million arrivals per annum to these seven destinations over this decade. The number of Russian tourists increased to all the destinations, except for Morocco, but the great majority of them went to Turkey, 84.2%. Turkey is geographically close to Russia, therefore; the ease of travel was a significant factor.

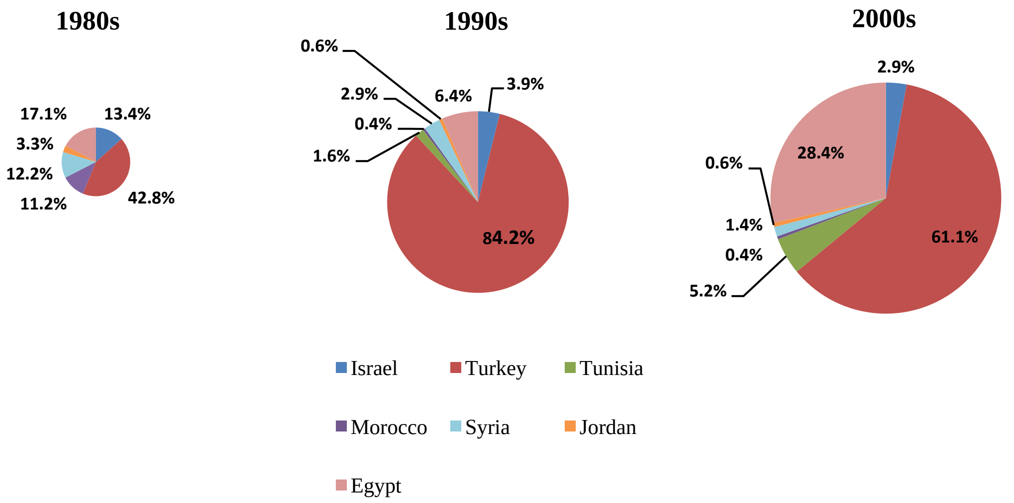


Figure 2.37: Outbound tourist arrivals from Russia to Egypt and its substitutes (1980s-2000s)
Source: Yearbook of Tourism Statistics, UNWTO, various issues. Note: the area of each pie represents the average annual arrivals (Millions) from Russia to these competing destinations over each decade.

In the 2000s, the number of Russian departures doubled to 2.3 million, with the share of Egypt increased to 28.4% in the 2000s. The share of Tunisia increased slightly in the same period. In contrast, the share of Turkey decreased by 23%, the share of Israel and Syria declined slightly, and the share of other destinations remained the same.

To conclude, Egypt attracted an increasing number of Russian tourists over time from the 1980s to date, and it succeeded in increasing its contribution from 17.1% of Russian arrivals in the 1980s to 28.4% in the 2000s, occupying the second position after Turkey in this decade. Regarding the share of all the seven destinations of total Russian departures, they increased strongly from 5.5% (1 million tourists) in 2000 to 12.6% in 2007 (4.3 million tourists).

Italy: In the 1980s, 509,000 Italian tourists travelled to these seven destinations, most of them directed toward Tunisia, then Turkey, since there is a geographical proximity between Italy and these two destinations, followed by Egypt, Morocco, and Israel as reported in **Figure 2.38**.

The number of Italian departures to these destinations doubled on average over the 1990s to reach more than one million tourists. It increased to all the destinations, but especially to Tunisia where it more than doubled. Moreover a substantial increase to Egypt, from 100,000 tourists in the 1980s to 267,000 tourists in the 1990s, saw its share increase to 26%. The shares of Morocco and Israel decreased slightly, whereas the shares of both Jordan and Syria increased slightly in the same decade.

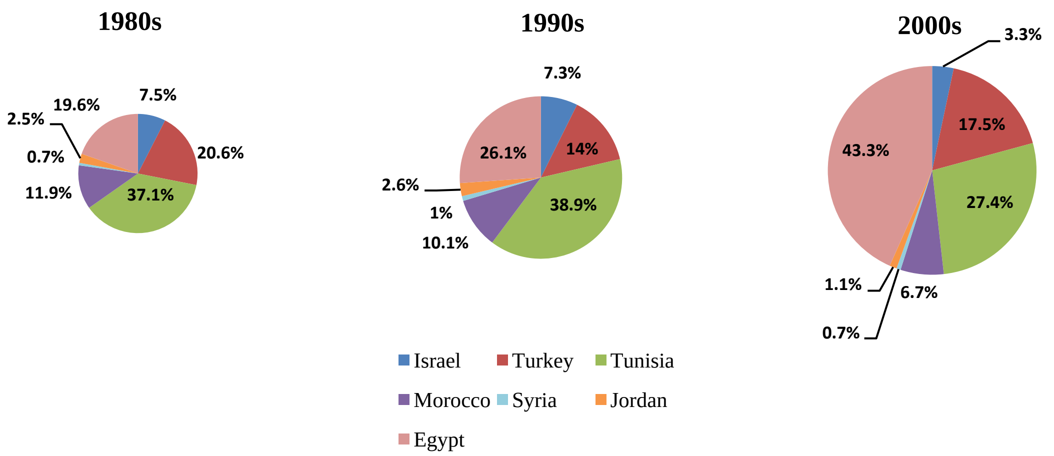


Figure 2.38: Outbound tourist arrivals from Italy to Egypt and its substitutes (1980s-2000s)
Source: Yearbook of Tourism Statistics, UNWTO, various issues. Note: the area of each pie represents the average annual arrivals (Millions) from Italy to these competing destinations over each decade.

In the 2000s, the number of Italian tourists increased to all the destinations, except for Israel and Jordan. The share of Egypt soared to 43.3% in this decade, the share of Turkey increased to 17.5%, but the contribution of all other destinations decreased. Consequently, Egypt attracted the biggest number of Italian tourists in the 2000s to improve its position from 3rd in the 1980s, after Tunisia and Turkey, to second in the 1990s, after Tunisia, to first in the 2000s.

In general, Italian departures to all the seven destinations increased only slightly from 1.9 million in 2000 to 2.2 million in 2007. As a result, the shares of these destinations in total outbound tourists decreased from 8.5% in the former year to 8.1% in the latter year.

United Kingdom: 833,000 British tourists travelled in the 1980s to these alternative destinations, 30% of British departures visited Turkey on average in this decade, followed by Tunisia with 22%. Regarding the economic relationships between the UK and Turkey, Turkey attracted more British tourists in the 1990s. Except for Morocco, the number of British departures increased to all the destinations, but with a higher growth rate in Egypt; therefore the share of Egypt increased to 18.6%, whereas the shares of others, except Syria, decreased as reported in **Figure 2.39**.

In the 2000s, the number of British tourists who visited Turkey and visited Egypt more than doubled to occupy the first and second positions of total British departures respectively, whereas the shares of other destinations declined again.

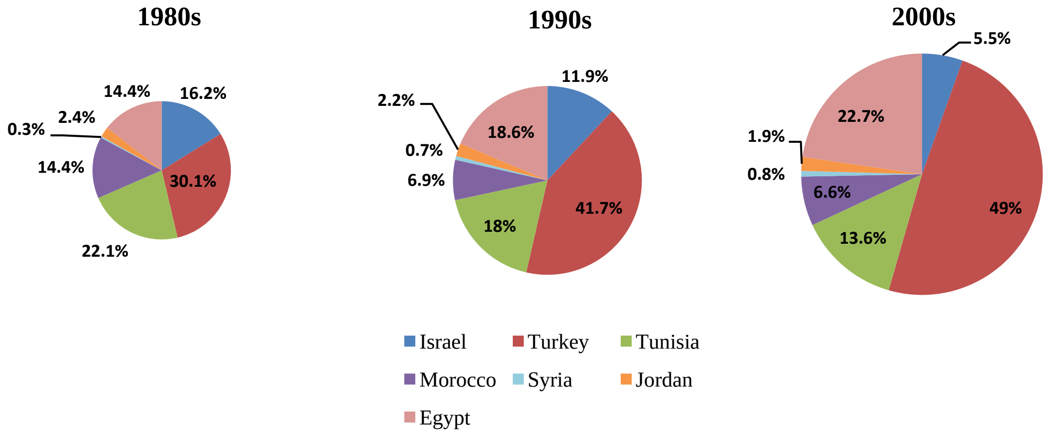


Figure 2.39: Outbound tourist arrivals from UK to Egypt and its substitutes (1980s-2000s)
Source: Yearbook of Tourism Statistics, UNWTO, various issues. Note: the area of each pie represents the average annual arrivals (Millions) from UK to these competing destinations over each decade.

To sum up, the share of Egypt in the outbound tourism in the UK increased continuously over time, to improve its position among its substitutes from number four after Turkey, Tunisia, Israel, and approximately equivalent to Morocco in the 1980s, to 3rd position after Turkey and Tunisia in the 1990s, and finally to 2nd position after Turkey in the 2000s. It is noted that the share of these destinations together constituted a smaller percentage of the British departures than was the case for other European countries, accounting for just 3.6% (2.1 million tourists) of total British departures in 2000, which increased by 2% to reach 5.6% (3.9 million tourists) in 2007.

France: Both Tunisia and Morocco accounted for a substantial part of outbound French tourism to the Middle East and North Africa region, with approximately the same share from the 1980s to date. The share of both countries of total French tourists to the seven destinations, was 69.4% in the 1980s, but decreased slightly in both the 1990s and the

2000s as illustrated in **Figure 2.40**. The historical and cultural relationships between France and both countries (colonial relationships), in addition to the geographical proximity and the language, since French is usually the language of commerce in both Tunisia and Morocco, are the main reasons of this considerable share. The share of Turkey increased gradually in the 1990s and the 2000s. The share of Egypt remained the same in the 1990s, but increased in the 2000s. On the other hand, the contribution of Israel decreased continuously over the study period. Both Jordan and Syria occupied a very small share along the study period.

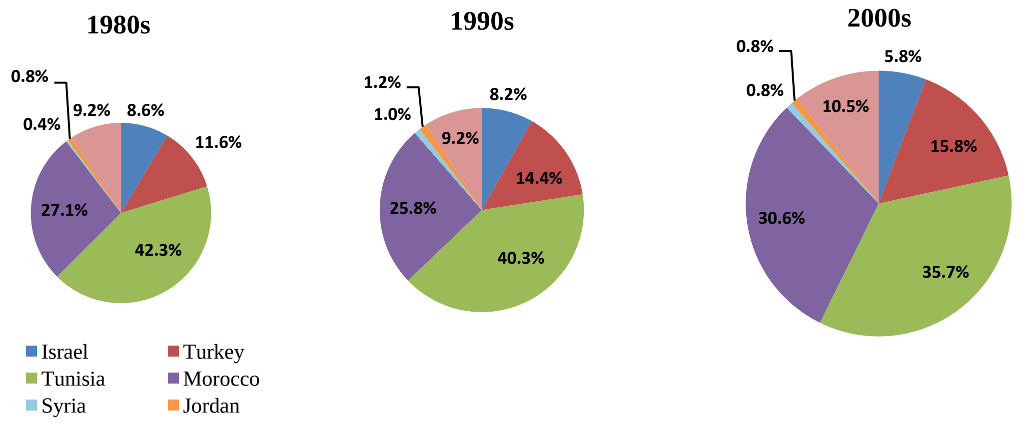


Figure 2.40: Outbound tourist arrivals from France to Egypt and its substitutes (1980s-2000s)
Source: Yearbook of Tourism Statistics, UNWTO, various issues. Note: the area of each pie represents the average annual arrivals (Millions) from France to these competing destinations over each decade.

To conclude, Egypt's contribution to outbound tourism from France increased over time relative to its substitutes, but without strong development to improve its position relative to others, since it still occupies the fourth position from the 1980s up to the 2000s. In contrast to the case of British tourists, these seven destinations together had the biggest contribution to French departures relative to other European tourists, accounting for 16.8% (3.3 million tourists) in 2000, increasing to 17.5% (4.4 million tourists) in 2007. This big contribution is attributed to the historical and geographical links between France and North African countries.

Libya: The structure of outbound tourist arrivals from Libya changed strongly over the last three decades. In the 1980s, Tunisia alone accounted for more than three quarters of total Libyan departures to these seven alternative destinations, followed by Egypt, with a share of 9.4%, both are bordering countries to Libya. Due to the tense political relationship between Israel and most of the Arab countries, including Libya, no tourism movements between Libya and Israel were recorded in either direction, as illustrated in **Figure 2.41**.

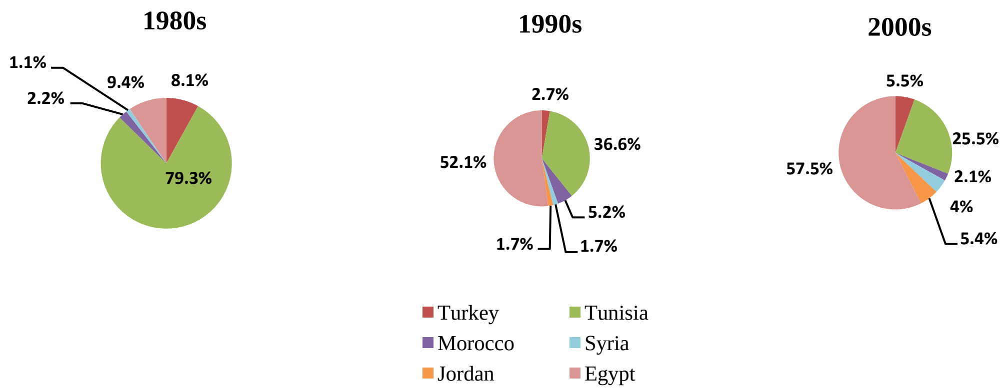


Figure 2.41: Outbound tourist arrivals from Libya to Egypt and its substitutes (1980s-2000s)
Source: Yearbook of Tourism Statistics, UNWTO, various issues. Note: the area of each pie represents the average annual arrivals from Libya to these competing destinations over each decade.

Whereas the number of outbound Libyan arrivals to Tunisia and Turkey decreased, these numbers increased slightly to Morocco, but sharply to Egypt in the 1990s[11]. Therefore the share of Egypt improved to more than half Libyan departures in this decade (52.1%), after the end of the political tension between the two countries which was in the 1980s.

In the 2000s, the number of Libyan tourists in Egypt continued to increase and in Tunisia continued to decrease, consequently, Egypt dominated Libyan departures with 57.5%, against 25.5% as a share of Tunisia in the same decade. The shares of Turkey, Syria and Jordan increased, but the share of Morocco decreased back to the same level as in the 1980s.

To sum up, whereas just 9.4% of total Libyan departures were directed to Egypt in the 1980s, and Tunisia accounted for 79% of these arrivals in the same decade, this pattern inverted over time. The contribution of Egypt increased considerably to reach 57.5% in the 2000s, whereas the share of Tunisia decreased sharply to become 25.5% in the 2000s. Tourism from Libya to these destinations is considered an intra-regional tourism, therefore more than 57% of total Libyan outbound arrivals travelled for tourism to these seven destinations in 1995.

[11] It can be noted that Libyan outbound tourism decreased strongly from 694,900 tourists on average in the 1980s to 396,200 tourists on average in the 1990s because of the political isolation from 1992 to 1998 after Lockerbie Air Disaster in 1988.

Saudi Arabia: Jordan is the main tourist destination for tourists from SA as illustrated in **Figure 2.42**, since more than half of the Saudi Arabian arrivals travelled to Jordan since the 1980s. This result can be attributed to many reasons; first of all SA is bordered by Jordan to the north, second, the ease of travel since SA arrivals are granted a free visa to Jordan, in addition to the possibility and ease of travel by road, finally, the strong cultural and political relations between the two counties. More than a quarter of tourist arrivals from SA visited Egypt in this decade, followed by Syria, Turkey and Morocco with a small ratio. Tunisia did not attract Saudi Arabian tourists throughout the period of the study. According to the SA, both Morocco and Tunisia are farther than other competing destinations, in addition to the weak historical relationship between the countries of the Arabian Peninsula[12] and the Arabian Maghreb countries (Tunisia, Morocco and Algeria).

In the 1990s, the shares of Jordan and Syria increased, whereas the shares of Egypt, Morocco and Turkey decreased. The same trend continued in the 2000s, since the contributions of Jordan and Syria increased at the expense of the rest of the destinations.

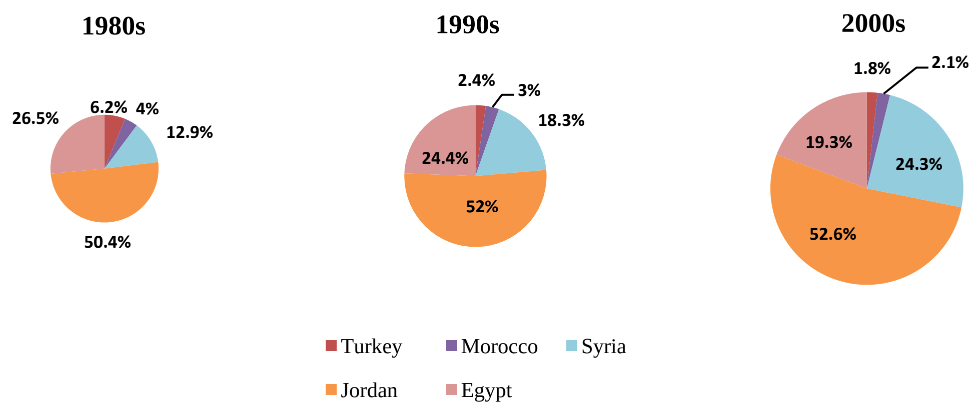


Figure 2.42: Outbound tourist arrivals from SA to Egypt and its substitutes (1980s-2000s)
Source: Yearbook of Tourism Statistics, UNWTO, various issues. Note: the area of each pie represents the average annual arrivals (Millions) from SA to these competing destinations over each decade.

From the above discussion, although the arrivals from SA to Egypt increased over time from 154,000 in the 1980s to 306,900 in the 2000s, Egypt's share of these arrivals decreased over time relative to Jordan, which maintained its dominance throughout the period with more than half the Saudi Arabian arrivals, and Syria, which successfully extended its share to almost a quarter of total arrivals in the 2000s. As in the case of Libya, there was no tourism movement between SA and Israel across the period of the

[12] The Arabian Peninsula countries are Bahrain, Kuwait, Oman, Qatar, SA, UAE and Yemen.

study. As expected, tourist departures from SA to these seven destinations, as intra-regional tourism, constituted 18.3% of total SA departures in 2000, increasing dramatically to more than half the Saudi Arabian departures (50.6%) in 2007.

United States: Although there was a continuous increase in the number of tourist arrivals from the US to all the seven alternative destinations from the 1980s to date, the growth rates of these arrivals differed strongly from one destination to another. In the 1980s, most Americans preferred to travel to Israel because of the strong political and economic relationships between the two countries, followed by Turkey and Egypt as illustrated in **Figure 2.43**. The share of Israel decreased over decades, moving backwards to the second position after Turkey in the 2000s.

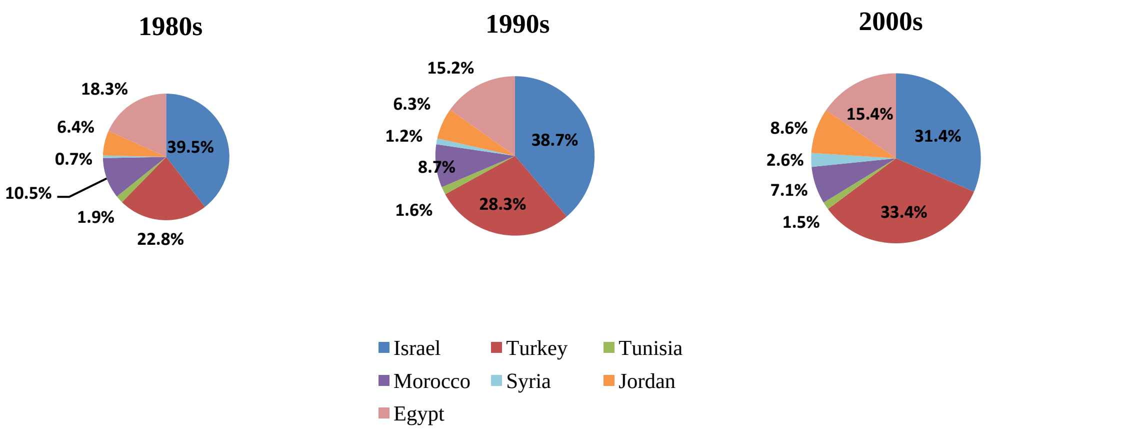


Figure 2.43: Outbound tourist arrivals from US to Egypt and its substitutes (1980s-2000s)
Source: Yearbook of Tourism Statistics, UNWTO, various issues. Note: the area of each pie represents the average annual arrivals (Millions) from US to these competing destinations over each decade.

To conclude, Egypt was the third important tourist destination from the perspective of the American tourists after Turkey and Israel in the 1980s. Whereas Israel occupied the first position in the 1980s, its share declined over time to move back to the second position after Turkey in the 2000s. Just 2.5% (1.5 million tourists) of total American departures travelled to these seven destinations in 2000, increasing slightly to 2.7% (1.7 million tourists) in 2007. This small share may be attributed to the long distance between the US and these seven destinations compared to Europe, in addition to the political tension between most Arab Middle East countries and the US.

2.5.8 Seasonality

Tourism in Egypt, like most service industries, suffers from the problem of seasonality within the year.

> Tourism seasonality is the most common example of short-term cycles with peaks, troughs, and points between these two extremes. These peaks, troughs and shoulder seasons vary according to location, type and characteristics of the destination (Murphy, 1985 in Soybali, 2005: 37).

In peak periods, tourist facilities, such as accommodation, restaurants, museums, historical places and beaches are used intensively and often to full capacity, whereas in trough periods, these facilities are underused. Overutilization of tourism capacity causes environmental damage, infrastructural problems, increased risk of road accidents and inflationary problems, whereas underutilization of tourism capacity causes temporary unemployment, lower tourism receipts, and lower returns to investment; consequently reducing the quality of the tourism product (ibid, 2005).

2.5.8.1 Seasonality of International Visitor Arrivals in Egypt (1950-2009)

Demand for tourism in Egypt is seasonal in general, since tourist arrivals increase especially in summer months, and decrease especially in winter months. To analyse the seasonality of tourism in Egypt, a seasonality index of total tourist arrivals from worldwide destinations to Egypt is calculated for different decades from the 1950s to the 2000s as shown in **Table 2.14**. To enhance this index, tourist arrivals for each month are expressed as a percentage of the average arrivals for the year, and then the percentages for corresponding months are averaged to obtain the numbers of the seasonal index of each month over the decade. The seasonal index takes different values for each month: it may be equal to 100, which means there is no seasonality, while values greater than 100 mean seasonal factors push arrivals above the average level, while values of less than 100 indicate that seasonal factors push the series below the average level.

The results indicate that the main peak season in Egypt in the 1950s was the summer season from August to November (4 months) as illustrated in **Figure 2.44**. Tourist arrivals to Egypt peaked in September with a seasonal index of 202%, whereas it registered the minimum point in January with a seasonal index of 65%. Therefore the range between the maximum and the minimum month in the 1950s was 137%, which reflects a relatively high degree of seasonality.

Table 2.14: Tourist arrivals and seasonal indices in Egypt (1950s-2000s)

Mon.	1950s		1960s		1970s		1980s		1990s		2000s	
	Arrivals	Index	Arrivals	Index	Arrivals	Index	Arrivals	Index	Arrivals	Index	Arrival	Index
	('000)	(%)	('000)	(%)	('000)	(%)	('000)	(%)	('000)	(%)	('000)	(%)
Jan.	6	65	26	82	45	72	109	80	208	77	573	82
Feb.	6.5	65	28	87	52	83	111	82	202	73	606	88
Mar.	8	82	31	96	59	92	138	102	254	92	735	106
Apr.	8	85	32	99	57	90	136	101	269	98	773	110
May	6.5	73	30	92	54	85	121	91	250	92	617	88
June	7.5	77	32	100	65	109	130	98	235	88	592	85
July	9	94	42	133	88	147	171	126	333	125	768	112
Aug.	9	101	41	127	74	123	162	120	366	138	800	118
Sept.	17.5	202	38	115	66	107	142	105	300	113	672	98
Oct.	14.5	162	34	104	69	107	148	108	315	116	798	112
Nov.	9	101	23	67	57	89	123	90	260	95	742	103
Dec.	8.5	93	31	98	59	97	130	95	243	91	689	98
Ave.	9.2	100	32	100	62	100	135	100	270	100	697	100

Source: Calculated from Egypt Tourism in Figures, several issues.

In the 1960s, the peak summer season extended to 5 months from June to October. July was the peak month, and the trough point was in November. The range between the peak and trough points is 66%, indicates less seasonality than in the previous decade. The same results were obtained in the 1970s. In the 1980s, there were four peak months in the summer season (July-October), in addition to two new peak months in the spring season (March and April). July had the most arrivals, whereas January had the lowest number, and the range between them decreased to only 46%. In the 1990s, whereas the peak months decreased again to 4 summer months (July- October), another 5 months achieved a seasonal index of more than 90%, and the minimum number of arrivals obtained in February with seasonal index of 73%. Finally, the 2000s achieved the lowest seasonality since the 1950s with 6 peak months: four months in summer in addition to two months in the spring. The range between August (the peak month) and January (the trough month) was just 36%.

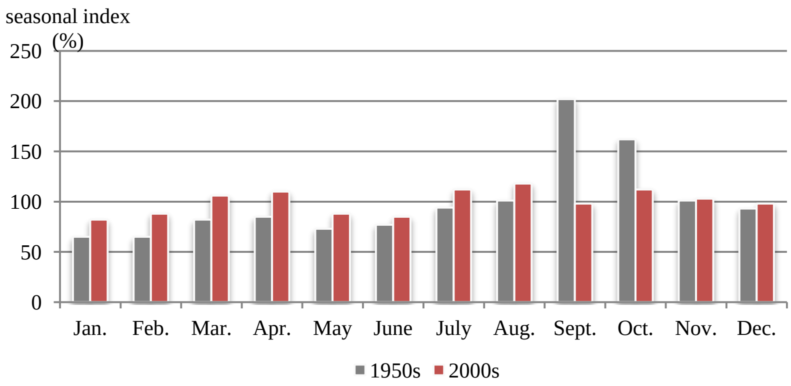


Figure 2.44: Seasonal indices of total tourist arrivals from worldwide to Egypt (1950s, 2000s)
Source: Calculated from Table 2.14.

Since the 1980s, the Egyptian authorities realized the importance of diversifying the tourist product to attract different tourist markets and alleviate the problem of seasonality. That was achieved by developing and promoting the international recreational tourism market of the Red Sea, especially in Hurghada, followed by the Sinai Peninsula, along with the traditional cultural heritage tourism of Upper Egypt and Giza (Helmy, 1999). Therefore, tourists visit the Mediterranean beaches in summer and spring; the Red Sea beaches in the autumn; the historical monuments and cultural sites in Cairo and Upper Egypt in the winter. These governmental policies succeeded in controlling the problem of seasonality of tourism in Egypt over time, since the peak months extended from 4 months in the 1950s to 6 months in the 2000s, and the difference between the trough month and the peak month decreased dramatically from 137% in the 1950s to just 36% in the 2000s.

2.5.8.3 Seasonality of Tourism in Alternative Mediterranean Destinations in the 2000s

Comparing the degree of seasonality in Egypt with its counterparts in other alternative Mediterranean destinations (Turkey, Israel, Syria, Tunisia and Morocco) is important to determine if this problem is serious in Egypt relative to others or not.

The same procedure was used to calculate the seasonality index in those destinations, and a comparison made between the values of the tourism seasonal indices in the 2000s. The results, reported in **Table 2.15**, indicate that Tunisia had the highest degree of seasonality, since it has the biggest difference between the peak month of March (244%), and the trough month of August (39%) in the 2000s. Turkey had the second largest degree of seasonality among these destinations, since the range of seasonality in Turkey between July (peak month) and January (trough month) was 145%. Syria and Morocco also had high seasonality, but with a lower degree.

In contrast, Egypt had the lowest degree of seasonality (36%), expressed by the small difference in arrivals between August (peak) and January (trough) in this decade. Israel also had relatively stable arrival numbers with a small degree of seasonality (38%) similar to the pattern of Egypt: approximately the same peak and trough months, distributed in three seasons, spring, summer and autumn along 6 peak months for each country. A similar pattern of seasonality can be discerned in the cases of Tunisia and Morocco: the high season was just 4 peak months in the spring and autumn. March had the maximum arrivals in both countries, whereas the summer was not a peak season, in contrast to all other Mediterranean destinations. The summer season is of great importance for both Turkey and Syria, since the three summer months were peak months, but Turkey had a longer high season (6 months) than Syria (4 months).

Table 2.15: Seasonal index of tourist arrivals in alternative Mediterranean countries in the 2000s

Month	Egypt	Turkey	Israel	Syria	Tunisia	Morocco
January	82	34	79	56	63	81
February	88	41	82	54	95	91
March	106	53	101	63	244	165
April	110	77	113	68	176	148
May	88	115	105	98	92	132
June	85	132	98	142	64	98
July	112	178	113	171	55	86
August	118	174	117	144	39	69
September	98	157	97	187	85	90
October	112	129	108	78	135	110
November	103	62	90	65	102	76
December	98	49	99	72	49	55

Sources: Calculated from Egypt Tourism in Figures, several issues; Bulletin of Tourism Statistics, Turkey, several issues; Central Bureau of Statistics (2010), Israel [Online Data]; and Statistical Bulletin for Tourism in Arab Countries (2007), Arab League.

To sum up, because of the diversity of the composition of tourist arrivals and the purposes of tourism in Egypt, the degree of seasonality is low in Egypt relative to other Mediterranean destinations. Finally, placing additional emphasis upon cultural and historical tourism in Egypt on the one hand, and following effective promotional programmes, reducing prices, introducing new festivals, conferences and sport events in the off-season on the other hand are recommended as effective policies to alleviate the problem of seasonality in Egypt (Mohammed, 1977).

2.5.9 Mode of Transportation in Egypt

Three types of transportation from generating countries to Egypt can be distinguished: air, sea and road transport. In general, there were upward trends in all these modes of transport over the period of the study as illustrated in **Table 2.16**.

Table 2.16: Tourist arrivals by means of transportation (1960s-2000s)

decades	By Air		By Sea		By Road		Total
	('000)	%	('000)	%	('000)	%	('000)
1960s	222.4	53.6	106.9	25.7	85.9	20.7	415.1
1970s	599.8	78.2	93.3	12.2	73.9	9.6	767.0
1980s	1199.4	73.1	174.9	10.7	267.1	16.3	1641.4
1990s	1947.1	64.5	358.4	11.9	712.5	23.6	3017.9
2000s	7795.0	86.5	415.3	4.6	799.1	8.9	9283.3

Source: Egypt Tourism in Figures, several issues

Air transport has been the most important means of transportation in Egypt since the 1960s; it always constitutes more than half of total arrivals to Egypt as illustrated in **Figure 2.45**. This fact can be attributed to the global expansion in air transport from the 1970s onwards, reflecting improvement in aircraft including the introduction of wide-bodied jets, combined with the availability of charter flights and all inclusive package holidays, which made travel by air convenient and affordable for more people worldwide (Sharpley, 2005). Moreover, numerous advances in airport infrastructure in Egypt from the 1960s have been made, from just one international airport, Cairo International Airport, in the 1970s to 12 international airports in the 2000s. Given the relatively long distance from most generating countries to Egypt, the limited vacation periods, in addition to the convenience and affordability of air travel relative to other types of transport, air travel has become the common means of transportation for all tourists from different regions, especially in the 2000s.

However the increasing importance of cruising holidays in the Mediterranean countries, including Egypt, in addition to developing regular car-ferries between Egypt on the one hand and both SA and Jordan on the other, the importance of sea transportation decreased continuously since the 1970s to fell back to the last position from the 1980s onward.

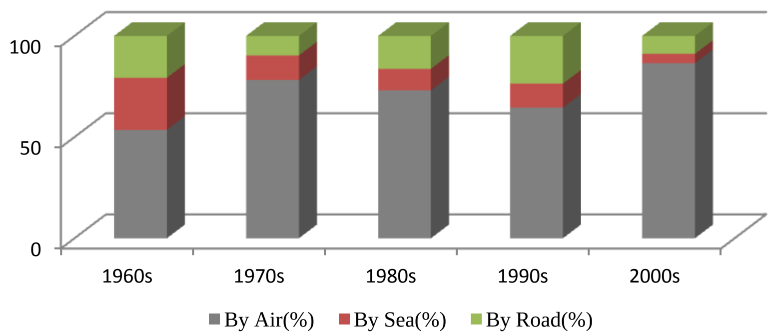


Figure 2.45: Shares of modes of transportation to Egypt (1960s-2000s).
Source: Calculated from Egypt Tourism in Figures, several issues

Tourists to Egypt travelled by land are typically from neighbouring countries (such as Sudan, Libya, Palestine and Israel), or tourists from other countries, who have visited Egypt as a part of a trip along with other neighbouring destinations. The contribution of travel by road to all types of transportation fluctuated considerably throughout the period of the study, decreasing strongly in the 1970s following the political tension between Egypt and Arab countries, most important arrivals by road. A lack of efficient networks, good roads, roads services and railway transport, which connect Egypt with neighbouring countries, are main deterrents to improve this mode of transport (Mohammed, 1977).

2.6 Summary and Conclusion

International tourism is substantially important, since it contributes considerably to the world economy: it generates GDP, creates numerous jobs in many sectors, and moreover it is an important source of exports worldwide. However, since tourism touches all sectors of the economy, its total effect is ever greater.

International tourism indicators worldwide reflect strong and continuous growth over the period (1950s-2000s), but the rate of growth has slowed over decades as the market has matured. The economic growth of most European and North American economies, reasonable and cheap transport, and changing social patterns of work and leisure were important stimuli for international tourism worldwide in the past decades. The 1950s recorded the highest growth rate of arrivals, whereas the 1970s recorded the highest growth rate of receipts worldwide. Adverse economic and political events occurred throughout the study period, and negatively affected global tourist arrivals and receipts strongly, of only temporarily. The most important negative deterrents over the period (1960-2009) were the global economic slowdown of 1968, the first oil crisis of 1974 following the Middle East War, a global economic recession in 1982 due to the second oil crisis, the Gulf War in 1991, the Asian financial crisis in 1998, the 11 September crisis in 2001 and subsequent global recession (2001-2003), then global recession which commenced in 2008, and the Swine Flu epidemic in April 2009. This latter year (2009) recorded the worst growth rates for both tourist arrivals and real receipts. Consequently, the 2000s recorded the lowest growth rates of arrivals.

The high growth rates of both tourist arrivals and receipts worldwide hide variation in the distribution of tourism among different world regions. Since the 1950s, international tourism worldwide has been dominated by two regions: Europe and the Americas, but the last sixty years witnessed a shift of tourist arrivals and receipts towards the developing countries, especially in the EAP region. The high growth rates of tourist arrivals and receipts in the latter region were associated with the remarkable economic growth of EAP's countries.

The Middle East region registered high growth rates in both inbound arrivals and receipts over the period (1950s-2000s), except the 1980s, to record the highest growth rates worldwide in recent two decades (1990s and 2000s). The erratic performance of this region is due to political unrest in this region throughout the period of study; therefore, ensuring safety for international tourists is a prerequisite for improving the tourism performance of this region. SA and Egypt are the main destinations in the Middle East region, achieving the largest arrivals and receipts in the 2000s. Intra-regional tourism is very considerable for most countries in the Middle East, generating more than half the visitor arrivals to the region, especially to Syria and Bahrain, whereas it is less important for Egypt. Europe is the major origin region for the Middle East countries, contributing a quarter of total visitors.

Tourism contributes strongly to the Egyptian economy through generating foreign currency, reducing the balance of payments deficit, generating income and creating employment opportunities. Leisure tourism was the main purpose of tourism in Egypt over the study period, with more than 92.8% of total arrivals in 2009, and its share increased over time at the expense of the share of other purposes.

Tourist arrivals and nights increased strongly by 165-fold for tourist arrivals, and 160-fold for tourist nights over the period 1952-2009. In addition, tourist receipts (in real terms) increased by almost 21-fold for the period 1970-2009. Europe is the most important source of tourist arrivals to Egypt from the 1980s to date, with an increasing share. Germany, UK, and Italy from Western Europe and Russia from Eastern Europe were the main originating countries to Egypt over the period of the study. The Arab contribution to total arrivals varied considerably throughout the study period, taking a downward trend from the mid of 1970s to the end of the period. SA, Libya, and Palestine were the main generators over the study period. Tourists from the Americas had a smaller contribution than other regions, with a decreasing market share over the study period. The US and Canada are the most significant source of tourists.

The political stability in Egypt, especially after the Middle East War in 1973, the economic circumstances in the generating countries, the economic and political relationships between Egypt and originating countries, and finally the geographical proximity between them were noted to be the main determinants of tourism demand for Egypt through the period of the study. Germany and Russia were the most important generating countries to Egypt in the 2000s, in terms of tourist arrivals and tourist nights as well. As far as the length of stay is concerned, Arab tourists are of great importance, especially those from Yemen, Sudan, Oman and Bahrain.

Over the three decades from the 1980s to 2000s, Egypt succeeded in improving its share in all the main generating countries, except for the SA and US markets. With respect to the closely competing destinations to Egypt, in the case of European generating countries, Egypt accounted for the largest number of Italian departures in the 2000s; in addition, it improved its contribution substantially in the German, British and Russian markets to occupy the second position in these three markets after Turkey. Regarding Arab generating countries, Egypt improved its position dramatically in Libyan departures to take the first position in the 2000s. In contrast, Egypt's share in the SA market decreased over time to fall back to the third position after both Jordan and Syria in the 2000s. Finally, the share of Egypt in American departures decreased throughout the period of the study, to occupy the third position after Turkey and Israel in the 2000s.

The problem of seasonality is not as serious in Egypt as it is in other Mediterranean destinations, especially Tunisia and Turkey. This may be attributed to the diversity of the structure of tourist arrivals and the different purposes of tourism in Egypt. The peak seasons have been extended in recent decades to include 6 months in the summer, autumn and spring, and demand has tended to be smoothed out over the year.

Travelling by air was the most important means of transportation to Egypt. This fact can be explained by the global improvement in air transport from the 1970s onwards, in addition to limited vacation periods, convenience, and the affordability of air travel relative to other types of transport in Egypt.

Chapter 3: Literature Review

3.1 Introduction

This chapter aims to build up theoretical and empirical foundations of tourism demand. The review of related economic theory and tourism demand literature can be used as a basis to inform the econometric models undertaken in the thesis. The chapter consists of three sections. First, the economic theories, which can be applied to tourism demand models, are introduced. Moreover, new applications of Lancaster theory on tourism sector are discussed to provide more understanding of the theoretical aspects of this sector. Some issues, related to the supply-side of tourism and the identification problem, are also discussed briefly. Then, two sets of empirical literature are reviewed. The first is the general literature related to international tourism demand models, examining determinants of international tourism flows, econometric methods used in this field and the key findings of these studies. This literature will be classified by decade beginning from the 1960s. Important features in each decade will be discussed in detail. In this way, the development in the tourism demand literature will be investigated. The second set of empirical literature relates to the international tourism inflows to Egypt and allows an investigation of the gaps in tourism demand literature on Egypt.

3.2 A Theoretical Framework for Tourism Demand

According to economic theory, three sets of theories can be applied to the tourism industry: traditional consumer theory; international trade theory; and Lancaster's consumer demand theory 'Characteristic Approach'.

3.2.1 Traditional Consumer Theory

The majority of tourism demand models are driven from the traditional consumer theory as the most appropriate modelling framework to estimate the international tourist flows among countries. The consumer theory aims to explain the way that a consumer allocates his total expenditure (budget) to a specific bundle of goods and services in order to maximize his satisfaction or utility. Let q is a vector of quantities of n goods and services, p is a vector of the prices per unit of these goods and services, x is consumer's budget or expenditure. Defining the utility function as u(q), the consumer aims to maximize his utility subject to his budget constraint as follows.

max $u(q)$ subject to $\sum_{i=1}^{n} p_i q_i = x$

Solving this maximization problem represents the Marshallian (uncompensated) demand function:

$$q_i = g_i(p, x) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.1)$$

Therefore, the optimal choice depends on prices and income.

The same functions can be represented differently as a cost minimization function using the duality concept. 'Duality refers to the two equivalent consumer's problems: either utility maximization for a given cost or cost minimization to reach certain utility level' (Syriopoulos, 1990: 159). In this case, the consumer's objective is to minimize total expenditure necessary to attain a specific level of utility u^*, at given prices P.

min $\sum_{i=1}^{n} p_i q_i = x$ subject to $u(q) = u^*$

Solving this minimization problem represents the Hicksian (compensated) demand function:

$$q_i = h_i(p, u) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.2)$$

Therefore, the optimal choice depends on prices and utility, rather than income as in Marshallian demand function.

A simultaneous solution of the two problems; maximization of the utility and minimization of the cost can be introduced and defined as a cost function (De Mello, 2001):

$$c(p, u) = \sum_{i=1}^{n} p_i h_i(p, u) = x \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.3)$$

By solving Equation (3.3) for u, an indirect utility function is derived: $u = \psi(p, x)$, where $\psi(p, x)$ is the maximum attainable utility function, given the price p and the cost x, $[\psi(p, x) = \max_q [u(q); pq = x]$, where c(p, u) is the minimum cost of the attainable utility at price p $[c(p, u) = \max_q [pq;\ u(q) = u^*]$.

> Important contribution of the duality concept in the theory of demand is that any function c(p, u) that satisfies certain properties can be regarded as a cost function that represents some underlying preference ordering; therefore, it is not necessary to be able to express u(q) explicitly. This convenience is of great importance for empirical work in particular, since, fairly easily specified c(p, u)

and $\psi(p, x)$ functions can be converted into demand functions by differentiation or use of 'Roy's identity[13]' (Syriopoulos, 1990: 161).

It is worth noting that a well-behaved Hicksian and Marshallian demand functions should satisfy the following conditions.

1- Budget balancedness or adding up (Walras' law): Demands must lie within the budget set or expenditure constraint. Consumer spending exhausts the total budget; this holds as an equality, which is known as adding up or budget balancedness (Preston, 2006). Hence, the sum of the individual expenditures is equal to total expenditures, as represented in Equation (3.4). Whereas this assumption is related to the expenditure, it is not necessarily applied on income (Syriopoulos, 1990).

$$\sum_{i=1}^{n} p_i h_i(p,u) = \sum_{i=1}^{n} p_i g_i(p,x) = x \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.4)$$

2- Homogeneity: the Marshallian consumer demand function is homogenous of degree zero in prices and income, whereas the Hicksian demand function is homogeneous of degree zero in prices. For Marshallian demand function, demands depend on income and prices, as these determine the budget set. Consequently, values of income and prices providing the same budget set should provide the same demands. Therefore, a proportional change in all prices and expenditure has no effect on the purchased quantity, since the consumer is not affected by money illusion (Preston, 2006). The same argument can be applied on the prices in the case of Hicksian demand function, which means demand should be homogeneous of degree zero.

$$h_i(p,u) = h_i(\theta p,u) = g_i(p,x) = g_i(\theta p,\theta x) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.5)$$

where $\theta>0$. The adding up and the homogeneity are consequences of the specification of a linear budget constraint.

3- Negativity: The Weak Axiom of Revealed Preference (WARP) indicates that if a budget set B_0, includes two bundles of goods and services; q_0 and q_1, and the consumer chose q_0, there should exist no budget set B_1 containing q_0 and q_1 from which q_1 is preferable on q_0. This is due to the consistency in choice behaviour. If the price of the bundle p_1 increases at the same time as total budget increases by exactly enough to keep the initial choice affordable, any alternative choice within the new budget set which involves more quantity of q_1 must previously have been available and the consumer

[13] It represents the relation between Marshallian demand function and indirect utility function.

cannot now choose it without violating WARP. The consumer must therefore decrease demand for this bundle (Preston, 2006). This condition simply refers to the law of demand, the increase in compensated own-price leads to lower demanded quantity of the commodity.

4- Symmetry (Slutsky condition): The compensated demand function is said to be symmetry if the cross-price derivatives of that function are symmetric as follows.

$$\frac{\partial h_i(p,u)}{\partial p_j} = \frac{\partial h_j(p,u)}{\partial p_i} \quad \ldots \ldots \ldots (3.6)$$

for all i # j. In other words, the matrix of the compensated price derivatives, or substitution matrix, must be symmetric. Similar to the negativity condition, symmetry is emerged from the assumption of the consistency of the consumer's choice (Syriopoulos, 1990). Worth mentioning that the implication of complementarity and substitutability concepts are consistent between demand equations if using compensated, rather than uncompensated demands because income effects are not symmetric. Therefore, it is better to base definitions of complements and substitutes on compensated demands (Preston, 2006).

In the context of tourism, income, relative tourism prices in a specific destination, and prices of other destinations are potentially the main determinants for tourism demand according to the Marshallian consumer theory. Deriving tourism demand equations from the consumer theory has some advantages. First, a number of theoretical restrictions (symmetry, homogeneity, and budget balancedness) can be imposed on the estimated parameters, which may produce more parsimonious and efficient models. Second, it obtains consistency between each equation and the total expenditure, in the case of aggregated models. Moreover, the interdependence of related destinations can be tested through imposing restrictions across equations (De Mello, 2001). Almost Ideal Demand System (AIDS) model was developed directly from the theoretical principles of the consumer utility theory, and it has been widely used in tourism demand models since the 1980s (Hagan and Harrison, 1984; White, 1985; Papatheodorou, 1999; and De Mello et al, 2001). However, this model, as well as other system of equations models based on consumer theory, is appropriate to be applied on outbound tourism demand models, which aim to allocate the expenditure of tourists from a specific origin country to many destinations. In contrast, our aim of this thesis is to analyze inbound tourism from different origin countries to just one destination (Egypt). Inbound tourism is more important for the economy of any country (export) than outbound tourism (import), so, it is mostly the main aim of the majority of tourism demand literature.

Moreover, the application of traditional consumer theory on tourism sector has some disadvantages. It does not consider the specific characteristics and uniqueness of the destination's product. In addition quality differentiation between destinations is not considered although it has an important role in tourism product (Papatheodorou, 2001).

> The demand model ignores the comparative advantage of the countries of destination and the active role that these countries often play in attracting tourism flows. Moreover, the demand model is static; it treats all destinations as equals and ignores their stages of development. However, histories of tourism in individual countries give a more dynamic picture of arrivals; over time some popular destinations may decline while new ones emerge. The historical development of competitiveness among them should be considered when analyzing these flows (Zhang and Jensen, 2007: 225).

3.2.2 International Trade Theory

According to this theory, international trade flows of goods and services have been caused by supply-side factors. Ricardo (1817), Heckscher (1919) and Ohlin (1933) explain flows in terms of relative productive efficiency, which refers to the difference in endowments (sun, sand, sea and culture heritage) according to Heckscher-Ohlin, and difference in technology as well as the price of tourism at the underlying destination relative to other rival destinations according to Ricardo. The latter dimension shows a clear link between demand models and Ricardian trade theory. An analysis of the theory of Ricardian comparative advantage indicates that a country will specialize in producing particular goods or services that can be produced at a lower marginal cost and opportunity cost than in the other countries. In contrast, the absolute advantage theory reflects the ability of a country to produce a particular goods or services at a lower cost than others. In tourism context, some countries have unique tourism resources which give that country a monopoly position, such as the pyramids in Egypt, the Taj Mahal in India, and the great wall in China (Burke and Resnick, 1991).

Porter (1990) introduced a new theory of competitive advantage that goes beyond the limited types of factor-based comparative advantage to incorporate spatial differences in the ability to make effective use of these factors. Porter (1990) identifies five categories: human resources, physical resources, knowledge resources, capital resources, and infrastructure. From tourism perspective, it is appropriate to add historical and cultural resources as an important resource category and to expand the infrastructure category to include tourism superstructure (Crouch and Ritchie, 1999).

Moreover, the new trade theories of Krugman (1979) and others explain efficiency differences by increasing returns. Whereas one research direction emphasizes the role of multinational firms, another focuses on the role of the Neo-technology in enhancing the destination's efficiency. Another approach discusses the role of agglomeration economies or industry clusters in building long-run competitiveness through enhancing the role of superior learning, thick factor markets, and infrastructural improvements, which lead to improved technology (Zhang and Jensen, 2007).

To conclude, international trade theories focus main attention to supply-side factors, which is of great importance for tourism activity to reflect the unique attractions in the destinations. However, tourism is a complex industry, which has many commodities and services, which make it is unpractical to specify supply-side accurately. In addition, international tourism is not only affected by supply-side factors, and demand-side factors are also important.

3.2.3 Lancaster's Consumer Theory

In contrast to the traditional consumer theory, which hypothesized that consumers obtain utility directly from goods, Lancaster (1966, 1971) argued differently that the consumer utility is not related to the good as such but to its attributes and characteristics. Same goods with different characteristics can be considered as different goods and priced accordingly (Syriopoulos, 1990). Preferences are assumed to be well behaved, which indicates a hypothetical optimal choice along the efficiency frontier. In addition, the constraints side includes both budget constraint (as would the traditional consumer theory) and the consumption technology constraints. This technology describes a transformation process with goods as inputs and characteristics as outputs. The characteristic function is given by Equation 3.7 as follows.

$$z_i = \sum_{j=1}^{N} b_{ij} x_j \quad \text{(3.7)}$$

where z_i is total amount of characteristics i, which includes both attractions and facilities, these characteristic are provided by some combinations (x_1, x_2, ..., x_N) of goods j, b_{ij} is the consumption technology coefficient (Papatheodorou, 2001).

Lancaster's theory represents an important improvement upon the traditional consumer theory as in addition to all the traditional determinants of demand, it incorporates technical efficiency or destinations' characteristics into Marshallian demand theory. Destinations' characteristics consist of attractions (natural and historical features of the destination) and facilities (human action such as tourism infrastructures and entertainment services) which reflect the uniqueness and the comparative advantage of the destination. Whereas the traditional consumer theory assumes the homogeneity of goods (countries of destination), which is inadequate to provide a comprehensive explanation of the tourism choice process, Lancaster's consumer theory considers the heterogeneity effects of countries of destination (Giacomelli, 2006).

Some economists applied the Lancaster (1966, 1971) theory on the tourism activity; mainly Rugg (1973), Morely (1992), and Papatheodorou (2001). First, Rugg (1973) developed a model of an individual maximizing utility. Following Lancaster's (1966) theory of utility, the destination characteristics are expressed as a function of the time spent at the destinations. Rugg's model hypothesized that the consumer's choice of travel to a specific destination is constrained by consumption technology, the income budget for travel, and the available time. Introducing consumption technology coefficient takes into consideration the destinations' heterogeneity.

Rugg introduced the following model in a system of N destinations.

$$\max \ \mathrm{U} = f(\mathrm{z_{tour}}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.8)$$

subject to: $\mathrm{z_{tour}} = \mathrm{Gx_{tour}}$

$\mathrm{Y} \geq \mathrm{p_{tour}x_{tour}} + \mathrm{p_{trans}c}, \ \mathrm{T} \geq \mathrm{c'x_{tour}} + \mathrm{d_{trans}c}$

$\mathrm{z, x, p, d} \geq 0 \quad \mathrm{Y, T} \geq 0$

where U is the consumer's utility function, z_{tour} is a vector of tourist characteristics in each destination (attractions and facilities), G is a matrix of consumption technology coefficients, x_{tour} is a column vector of the composite tourism product, represented by the number of days spent in each destination, p_{tour} is a vector of composite prices, p_{trans} is a vector of transport costs, d_{trans} is a vector of transport time between the origin and various destinations, c is a column vector whose elements are all one, Y is an available expenditure, and T is time available for tourism. All the variables are assumed to be positive (Papatheodorou 2001).

Figure 3.1 illustrates Rugg's model more easily and efficiently. The quantities of facilities in three alternative destinations (A, B, and C) are measured on the horizontal axis, whereas attractions are measured on the vertical axis. The OA, OB, and OC are characteristic rays, which represent the characteristics of the three destinations. Considering the tourist's expenditure constraint, the number of days spent in the A, B, and C destinations is illustrated by the points K, L, and M respectively. For the time constraint, the number of days spent by tourists in destinations A, B, and C is presented by points F, G, and H respectively. The two constraints may be disjoint, so that the tighter (more restrictive) one dominates. Therefore, tourists will choose points F, G, and M for destinations A, B, and C respectively, as the most efficient bundle. The point that corresponds to the highest attainable indifference curve 'vertex optimum' provides the maximum constrained utility. Hence, destination B is the optimal choice, since OB ray intersects with the indifference curve U_0 at point G. (Papatheodorou 2001).

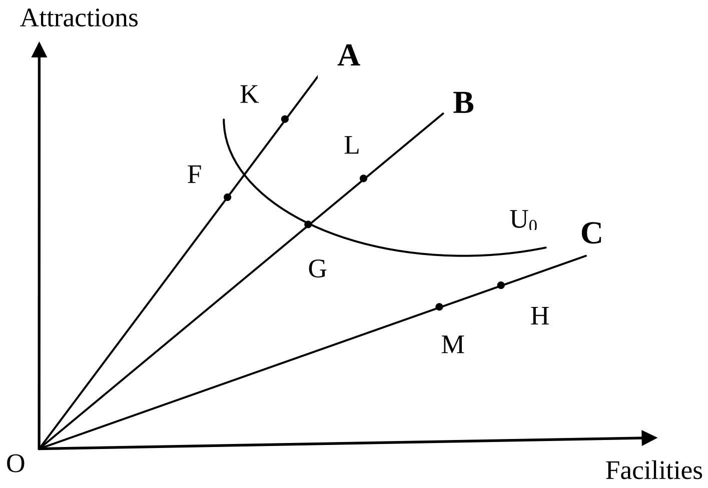


Figure 3.1: Characteristic model within tourism framework

Moreover, Papatheodorou (2001) sufficiently discussed some important dynamic issues in tourism demand related to prices, consumer preferences, quality, advertising, agglomeration, and emerging new destinations as follows.

Prices: the price of tourism product is given by the weighted composite index of prices of different tourist activities, such as accommodation, catering, and entertainment. In addition, the transport price includes prices of all transport modes used during the trip. In both cases, each industry can determine its prices as in Equation 3.9.

$$\frac{P - MC}{P} = -\frac{\theta}{e}, \quad P \geq ATC \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3.9)$$

where P is prices, MC marginal cost, e is the price elasticity of demand, θ is a measure of industry's competitive conduct, and ATC is average total cost. Price has to be more than ATC to ensure the sustainability of the industry. Price ranges between the levels determined by perfect competition (P= MC for θ= 0) and the levels determined by monopoly (maximum profit, P=e MC/(1+e) for θ=1). Hence, a large value of θ, close to 1, represents high market cartelization, and vice versa. It is argued that the industry's competitive conduct depends on industry concentration, entry barrier measures, and other industry characteristics.

Different prices among different destinations or tourist products can be attributed to many reasons. First, the role of competitive conduct affects prices considerably. The suppliers, which work in a perfect competition market, cannot increase their prices. In contrast, producers in a monopoly market may require more prices to maximize their profits. Second, tourist activities in different places may involve technologies associated with different cost structure. For example, whereas some resorts consist of small hotels with low fixed costs but high unit costs, others have huge hotels depend on economies of scale. Third, the demand elasticity to price may differ across resorts due to uniqueness.

Due to the negative relationship between the price of a destination and the number of days spent in it, an increase in the price of a specific destination (Figure 3.1) shifts the choice set points to the left, and may transfer lots of tourists to other destinations, and vice versa.

Consumer preferences: preferences can be reflected by the utility function, and the slope of the utility curve (U_0) indicates the relative importance of the two characteristics. For consumers which prefer facilities more than attractions, they choose destination C instead of B in Figure 3.1, all other factors held constant. Spatial and environmental considerations have an effective role in this context.

Quality, information, and advertising: whereas quality of tourist activity cannot be analyzed within the traditional consumer theory, it is considered appropriately by the Lancaster theory. According to Lancaster theory, a product is better qualified than another if it offers a larger bundle of characteristics for the same quantity. Moreover, in the case of incremental differences, better quality is associated with higher price so that all goods may remain on the efficient choice set. In contrast, as a result of severe quality difference between products, a number of products may offer a dominated bundle of characteristics and consequently drop out of the market. Quality differences exist widely in tourism products, which can be reflected by different hotel star classification and various classes of airplane's service. Quality innovations can be used as a strategic factor in the competitive process; for example business magazines may justify the higher price of some brand tourist goods or services and persuade consumers about their value for money. The interpretation of high prices as indication of quality is closely related to the experience nature of tourism and may be reflected by repeat-visitation.

Mostly wealthier consumers are able to pay for high quality than others, as they have a lower marginal utility of income and a higher taste coefficient. Due to the continuous development of world disposal income and leisure expenditure, high quality tourist destinations are likely to flourish in the future on the expense of other cheaper and less quality destinations. Advertising are expected to increase the popularity of tourism products. Information is a dynamic feature, which is also affected by reputation and endogenous preferences.

Agglomeration: the assumptions of linearity and additivity may not be suitable for tourism activities, which have more interdependence of characteristics. Although ray slope may be constant at a single point in time, it is expected to change dynamically due to the interaction between characteristics at an aggregate level. Tourism urbanization usually enhances the available facilities for a given level of natural attractions; as a result, the ray of characteristics becomes flatter over time. This transformation towards facilities can appear if tourism receipts are not directed to enhance and protect the attraction areas. However, tourism urbanization can be associated with building more attractions; therefore the overall relation between facilities and attractions is inconclusive.

Emergence of a new destination: in the case of emerging new destination D to the market, first, assume that the new destination dominates only partially the existing ones. As illustrated in **Figure 3.2**, the characteristics ray for the new destination D is represented by OD, the expenditure constraint is associated with point X, and the time constraint is associated with point T. In this case, destination C remains efficient according to the expenditure constraint, but it is dominated by D with respect to the time constraint. Hence, all the four destinations remain on the efficient choice set, which includes bundles corresponding to points F, G, H, and X. However, if the expenditure constraint in the new destination moves sufficiently upwards (to the right), so that there is no notional crossing between the two constraints, C disappears completely from the market. Taking into consideration the increasing trend of tourism expenditure on the one side, and the relative rigidity of the time constraint on the other, this result can interpret the domination of the Mediterranean and Caribbean regions over the British sunlust resorts.

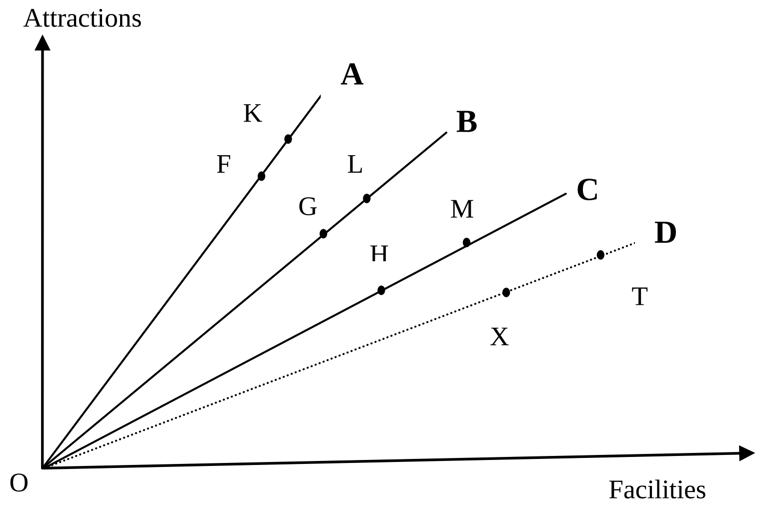


Figure 3.2: Introduction of new destination

Finally, the effect of tourism uncertainty has been analyzed within Lancaster framework by Gravelle and Rees (2004) and Giacomelli (2006). Rugg (1973) assumed that destinations' characteristics per day of stay are known in advance due to availability of knowledge, therefore tourists are able to maximize their tourism utility. In contrast, other authors argued differently that tourists can only evaluate their utility of tourism products after consuming these products, so they obtain information by real experience. Hence, tourism choice is an uncertain process. Giacomelli (2006) discussed that less information available about a specific destination causes more tourism uncertainty, therefore lower probability of this destination to be chosen. In addition, lack of information, political instability and natural disasters in the destination are other important sources of uncertainty. Consequently, factors affecting destinations' uncertainty are more likely to affect tourism choice as well.

If the characteristics provided by destination are uncertain, the 'Expected Utility Theory', introduced by Gravelle and Rees (2004), is of great importance. An adaptation of this theory to the tourism is introduced by Giacomelli (2006), using both mathematical and graphical approaches. The author defined tourism risk as ‘the whole factors making individuals uncertain about the possibility of enjoying a good tourism experience’ (P. 31). He identified two kinds of risks; false and real risks. False risks are the wrong beliefs about a given destination due to lack of information, which may increase the perception of that destination’s dangers. Real risks are the beliefs about the destination, which supported by perfect information. Collecting good information about the destinations, and/or purchasing package tours are suggested to deal with these two kinds of risk.

Therefore, the ‘Expected Utility Theory’ complements Lancaster’s analytical framework in a useful way. On the one hand, the uncertainty analysis introduces tourism choice theory in a more realistic way, and focuses on new tourism determinants. On the other, it provides some useful strategies adopted by tourists to reduce destination’s risk.

3.2.4 Tourism Supply and Identification Problem

It is argued that it may not be sufficient to estimate tourism demand model solely and ignore tourism supply side, since the supply side of the market is expected to affect the prices of tourism. So, demand and supply should theoretically be estimated simultaneously to avoid the potential bias in the estimates of demand elasticities due to the identification problem. ‘The identification problem is associated with the question of whether any specific equation, in a system of equations, has a unique mathematical representation within this system or not’ (Syriopoulos, 1990: 123). Consequently, biased parameters can be estimated as a result of inappropriate model formulation.

To overcome the identification problem, economic theory and prior information should be used to impose restrictions on the model. These restrictions can take various forms, such as the use of extraneous estimates of parameters, knowledge of exact relationships among parameters, knowledge of relative variances of disturbances, or knowledge of zero correlation between disturbances in different equations (Ibid, 1990). The most used restrictions are the zero restrictions to exclude specific variables from each equation in the system. Therefore it is more likely to a specific model to identify all its possible structures and yield more meaningful and reliable estimates. For example to identify tourism demand vector, in a system of equations, it is recommended to include important determinants of tourism supply (wage, price of land or capital prices) into the supply equation and exclude these variables (imposing zero restrictions) from the demand equation. These supply determinants have to be exogenous to the system and changing over the period of the study.

Very few tourism demand models considered the supply of tourism (Sinclair and Stabler 1997; and Zhou et al., 2007), whereas most studies of consumer demand in general and tourism demand literature in particular ignore the identification problem and estimate only tourism demand equation. This situation is adopted for many reasons. First, tourism sector consists of variety of products and services; therefore it is rather difficult to give a precise definition of tourism supply. Phlips (1974) stated that:

> Indeed it is entirely unpractical to specify supply equations for a number of commodities, the more as a solid theoretical underpinning as well as appropriate data are often lacking on the supply side..... Relevant econometric applications in the field have indicated that the gain to be expected from empirical work on the identification-problem area is likely to be small and identification problems are usually ignored in practice (in Syriopoulos, 1990: 127).

Second, data about tourism are still scarce and inappropriate, especially in the case of developing countries such as Egypt. Moreover, tourism supply is assumed to be infinitely elastic or exogenous of the system, and not constraint on the demand in most tourism demand studies. This assumption is more likely to be realistic since the total amount of goods and services consumed by international tourists is small compared with the quantity of the same goods and services consumed by the resident population. Furthermore, there may be excess capacity, since investment in the tourism sector is undertaken with the purpose of satisfying both current and future demand (Ibid, 1990).

Eilat and Einav (2004) argued that there are a few reasons why tourism supply side can be infinitely elastic. In the tourism sector, the most important factors of production are non-substitutable or non-rival. The Pyramids are good example for a non-substitutable good, which cannot be used to produce other goods. In addition, weather is a non-rival tourist product, since tourists can enjoy good weather without wasting this resource for others. Hence, these factors determine the level of demand, but their supply does not respond to prices. In addition, tourists usually consume non-tourist goods and services, so the supply of these commodities is elastic with respect to the tourism sector. Tourism prices, therefore, cannot be completely separated from the general price level of the destination country.

Hence, it seems that demand is the driving force in the tourism market and supply adjusts to the demand levels. Consequently, concentration on and estimation only the demand for tourism is justifiable and does not produce biased estimates, since identification problem is not held. For the above reasons, in the present thesis, it is assumed that the supply side of tourism in Egypt is perfectly elastic and pre-determinant. The empirical results of Chapter 6 (VECM estimation) support this assumption, since accommodation capacity has been tested and found to be exogenous variable in most of the models.

3.3 International Tourism Demand Literature

International tourism has grown rapidly since the end of the Second World War. While Harrop (1973) noted that this high growth has resulted from both high income elasticity and high price elasticity of demand for tourism, Askari and Jud (1974) attributed the growth to other factors:

> Many factors common to modern industrial societies have contributed to the growth of foreign tourism. Increasing urbanisation, population, education, and leisure time have all stimulated the desire of individuals in the developed countries for foreign travel. Rising income and declining costs of international travel have also contributed significantly to the rapid expansion of international tourism (in Crouch, 1995: 103).

Since the 1960s, researchers have carried out many studies, associated with a number of destinations, to identify the most relevant determinants of tourism demand using different methodologies (see **Appendix 3, Tables 1→3**).

3.3.1 Tourism Demand Literature in the 1960s

The earliest studies in this field were by Gerakis (1965) and Gray (1966). Gerakis (1965) examined the effect of the changes of exchange rate in seven countries on their receipts from tourism for the period (1954-1963). Whereas Canada, France, Spain and Yugoslavia devalued their exchange rate, Finland, Germany and Netherlands revalued their rates[14]. Gerakis computed elasticities of tourist receipts of both the devaluing and revaluing countries. The results showed that the devaluations were followed by increasing gains in tourist earnings and the revaluations by smaller losses; and that the elasticity of tourist receipts was in general quite high. For the devaluers, the elasticities

[14] Whereas French franc was devaluated in 1957 and 1958, the spanish peseta in 1959, the Canadian dollar in 1960 and the Yugoslav dinar in 1961 and 1962, the Finnish markka revaluated in 1957 and the deutsche mark and the Netherlands guilder in 1961 (Gerakis, 1965).

were 4.2, 6.9, 3 and 3.1 for France, Spain, Canada and Yugoslavia respectively, compared with mainly smaller values in the revaluers, 0.7, 1.5 and 3.3 in Finland, Germany and Netherlands respectively. As Gerakis argued this sensitivity was due to an extensive substitution, which took place between the country of origin and the country undertaking exchange rate reform, and between the country undertaking reform and other competing countries.

Gray (1966) supported Gerakis' findings on the exchange rate as a main determinant of foreign travel flows and added income as another important determinant. Gray assumed that, over the sample period, tastes were constant, and the supply of travel exports was perfectly elastic. The study used multiple regression analysis (double log form function) to estimate the price, cost of transportation and income elasticities of four types of imports: Canadian imports from the US; Canadian imports from worldwide; US imports from Canada; and US imports from worldwide, based on annual data for the period 1951-1963.

$$M_{ij} = a_1 Y_i^{b1} R^{c1} T^{d1} e^{u} \quad (3.10)$$

where M_{ij} is the actual travel imports by country *i* from area *j* in constant dollars, Y_i is disposable income per capita in country *i*, R the exchange rate, T is the cheapest round-trip air passage from Montreal to London, or from New York to Paris, and u is an error term. The research concluded that Canadian imports were very elastic to both income and rate of exchange with the expected signs, especially income elasticity of the rest of the world. US travel imports were also elastic to the rate of exchange and very elastic to income. The transportation cost was insignificant in both cases; this may have been caused in part by the negative correlation between transport cost and income.

3.3.2 Tourism Demand Literature in the 1970s

More than 20 studies were published in the 1970s. Firstly, Artus (1970) presented an econometric analysis of German tourism expenditure as well as German tourism receipts, using annual data for 15 years (1955 to 1969) and Ordinary Least Squares (OLS) estimation with two explanatory variables; income and relative prices. Tourism expenditure was estimated as:

$$\frac{M_{G,t}}{P_{F,t}} = A\, Y_{G,t}^{a} \left(\frac{P_{G,t}}{P_{F,t}}\right)^{\beta} e_t^{\varepsilon} \quad (3.11)$$

where $M_{G,t}$ is an index of German spending on tourism at time *t*, $Y_{G,t}$ is an index of real disposable income in Germany at time *t*, $P_{G,t}$ is the consumer price index (CPI) in Germany at time *t*, and $P_{F,t}$ is a weighted average of the indices of consumer prices in foreign countries at time *t* (the weight of each country being the share of that country in German tourist expenditure in 1965), e is a base of natural logarithms, ε is a stochastic disturbance term at time *t*. Tourism receipts were estimated as:

$$\frac{X_{G,t}}{P_{G,t}} = A\, W_t^{a} \left(\frac{P_{G,t}}{P_{C,t}}\right)^{\beta} e_t^{\varepsilon} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.12)$$

where X_G is an index of the German tourism receipts, W_t is a weighted average of the indices of total expenditure on foreign travel by other countries, P_C is weighted average of the indices of consumer prices in foreign countries (the weight of each country is its share in the total receipts from tourism by European countries in 1965). The price elasticity of tourism expenditure and receipts was found to be high at 3.4 and 2.2 respectively. The income elasticity of expenditure was also relatively high, with a value of 1.74.

Although previous studies of international tourism had focused primarily on the international travel in developed areas, Jud and Joseph (1974) focused directly on the travel industry in 17 developing countries of Latin America. It examined the effects of changes in income, relative prices and transportation costs on the total tourism exports of Latin America. Earlier studies excluded the travel costs variable from the regression because of the strong negative correlation between the level of income and this variable. This study was the first one which included international transportation and solved the problem of multicollinearity by pooling time-series and cross-sectional data to obtain more variability in the explanatory variables. The demand equations were estimated using OLS over the period (1958-1968) in two ways. First: a time series model for each of the 17 Latin America countries without including the cost of transportation was estimated with the following equation:

$$\log X_i = A_1 + A_2 \log Y + A_3 \log\left(\frac{P_i}{P_L}\right) + U_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.13)$$

where X_i is tourist receipts in the *i*th country, Y is a real per capita Gross National Product (GNP) in the origins, P_i is the CPI in the *i*th countries adjusted by exchange rates, and P_L is a composite CPI in the 17 Latin American countries.

Second; by using a pooled regression equation as follows:

$$\log X_i = B_1 + B_2 \log Y + B_3 \log\left(\frac{P_i}{P_L}\right) + B_4 \log\left(\frac{F_i}{P_L}\right) + U_i \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.14)$$

where F_i is an economy class air fare from New York to the capital of each country. It was found that tourist receipts in Latin America were very sensitive to change in income. Consequently, in contrast to traditional Latin American exports, tourism had a distinctive long-run growth potential. The study also showed that relative prices strongly affected total tourism receipts of Latin American countries. Therefore it was recommended that the governments of Latin America adopt suitable price policies that increase the competitive ability of these countries. American tourists travelling to Latin America appeared very sensitive to travel costs. A 1% decrease in travel costs caused more than 1% increase in the American travellers to Latin America countries. Moreover, the omission of travel cost variable from the regression equation would result in increase of 10% to 18% in the value of income elasticity.

We can critically summarize the common characteristics of the literature from the 1960s and 1970s.

- Traditional consumer theory is the theoretical base of tourism demand models in this decade.
- The typical sample period was short, approximately 14 years with annual data (Crouch, 1994).
- The most common dependent variables specified were tourism exports (tourism receipts) or tourism imports (expenditure), in some cases deflated by the CPI. The explanatory variables were income, relative prices and sometimes cost of transportation, with no attempt to examine the effect of other variables on the tourism demand.
- Countries from Western Europe and North America dominated tourism research literature in this period due to their considerable share of international tourism development over these two decades (Li et al., 2005).
- Most studies of the tourism demand in these decades used double-log linear regression functional form.
- The lack of diagnostic tests was a serious deficiency of the research - limited to statistics such as goodness of fit (R^2), the significance of the regression (F-statistic), and the Durbin-Watson (DW) autocorrelation statistic.

3.3.3 Tourism Demand Literature in the 1980s

In the 1980s, studies of demand for tourism remained few in number. Stronge and Redman (1982) followed the earlier literature on tourism by analysing the determinants of US tourist expenditures in Mexico using the OLS multiple regression model for annual time series data from 1954 to 1978, while Hagan and Harrison (1984), White (1985), and Fujii et al. (1985) each used a system of demand equations, especially AIDS. In addition to being more comprehensive and precise than a single equation specification, AIDS can identify interrelationships among alternative destinations through cross-price elasticities (Li et al., 2005).

White (1985) estimated a tourism expenditure allocation model to examine how American consumers distributed their tourist expenditure among different Western Europe destinations for the period 1954-1981. A complete system of demand equations AIDS was estimated to obtain expenditure and price elasticities. Assuming that consumers spend on two goods, namely, travel and transportation, a model of a system of budget share equations was defined for each of n goods as follows:

$$W_i = a_1 + \sum \gamma_{ij} \log p_j + \beta_1 \log \left(\frac{X}{P^*}\right) + u_i \quad \ldots\ldots (3.15)$$

where W_i is the budget share of country *i* (European countries) in US tourist expenditure, p_j is the price facing US tourists in country *i*, X is total US expenditure in Europe, and P* is the aggregate price index. In addition, the 1968 disturbances in France were included as a dummy variable to reflect political disruptions. The results classified countries of Western Europe into substitutes or complements according to American tourists' preferences. France and the UK were substitutes, as were France and Germany. Most other countries were found to be complements with respect to France and substitutes with respect to the UK. Moreover, some countries were regarded as complements in the long run but substitutes in the short run. Whereas changes in prices in most popular destinations, such as France, Germany and the UK, affected travel to the less famous destinations, the inverse is not true. Regarding American tourists, Norway, Sweden, Denmark, Spain and Portugal have an elastic demand with respect to income. Finally, the 1968 political disruptions in Paris affected travel expenditures in France strongly in that year and resulted in a small decrease in travel to nearby unaffected areas.

While the cited papers used time series analysis, Tremblay (1989) adopted pooling analysis, including individual time series of international travel receipts over the period 1968-1979 for 18 European countries. Income YI_j, exchange rates EX_{ij}, relative prices RP_{ij}, transport costs TC_{ij}, and number of terrorism events TER_i were specified as explanatory variables as follows.

$$RT_{ij} = f\left(YI_j, EX_{ij}, RP_{ij}, TC_{ij}, TER_i\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.16)$$

where RT_{ij} is the export of tourism by country j from country i. According to the aggregation methods, unlike Artus (1970) who used the Laspeyres index, this study, following White (1985), used the Divisia index because it had the advantages of being relatively consistent in aggregation. The results showed that the effect of these variables were very different across countries. As far as the total receipts were concerned, all the variables were statistically significant. Tourism receipts were inelastic with respect to exchange rates (0.39) and transport costs (-0.92), but elastic with respect to relative prices (-1.42) and income (1.48). While terrorism was insignificant to European tourists, it was significant and more important to North American tourists.

In sum, continuing the trend of the 1960s-1970s literature, North American and Western European countries dominated tourism research studies in the 1980s. However, most of the literature included cost of transportation as an important explanatory variable and substitute prices were of particular interest. In addition, dummy variables were introduced for the first time to reflect non-economic events.

3.3.4 Tourism Demand Literature in the 1990s

A main feature of the tourism demand studies of the 1990s was the inclusion of developing countries. Three studies examined the tourism demand for Turkey and adopted OLS techniques to estimate single equation models. Whereas, Var et al. (1990) analysed tourist inflows from 20 countries to Turkey using annual data for the period 1979-1987, Akis (1998) developed a small, compact econometric model of tourism demand for Turkey from 18 countries for the period 1980-1993, and Icoz et al. (1998) examined the effects of supply-side variables on the tourism demand from 10 main European countries to Turkey over the period from 1982 to 1993. The number of government licensed hotel beds and the number of travel agencies were included in the tourism demand function as supply-side variables. In addition, they included the conventional demand-side determinants, such as CPI and exchange rates between Turkish currency and the currency of originating countries.

Carey (1991) estimated a demand equation for five Caribbean islands for the period 1976-85 using pooled data based on the Generalized Least Square (GLS) estimation procedure. The main contribution of this study was focusing on the governmental promotional expenditures, a variable which had not been included in previous demand studies. The study estimated two equations with different dependent variables using the following formula:

$$\log\left(A_{ij}\right) = a + b\log\left(Y_j\right) + c\log\left(PE_{ij}\right) + d\log\left(D_{ij}\right) + g\log\left(E_i\right) + h\log\left(PO_j\right) + u_{ij} \ldots\ldots (3.17)$$

where A_{ij} in the first equation is the number of hotel arrivals at a particular island *i* from origin *j*, whereas its counterpart in the second equation is tourist arrivals, including visitors not staying in hotels. The explanatory variables are the same in both equations. Y_i is real GNP per capita in the origin, PE_{ij} is the relative price variable deflated by the exchange rate, D_{ij} is the distance in miles from *j* to *i*, E_i is the promotional expenditure, and PO_j is the population of the country of origin. Whilst the results indicated that income was significant and elastic, as in previous studies, the elasticity of prices unexpectedly was not significant. The distance variable was very significant. Finally, promotion was very important in enhancing tourism demand in these islands over the period of the study. By including non-hotel arrivals in the second equation, the elasticity of income and promotional expenditure became lower. This means that promotional spending is more effective for hotel tourism.

Gonzalez and Moral (1995) employed a Structural Time Series Model (STSM) to model and forecast the demand for Spain using monthly data from 1979:1 to 1991:12. In addition, they used the period from January to December 1992 to examine the ex-post forecasting performance. The study contributed to the field of knowledge for many reasons. Firstly, this was the first use of STSM to model and forecast tourism demand. It included explanatory variables such as income, and two price indices (own price and substitute price), in addition to stochastic trend and seasonal components which captured the effects of all the unobservable variables. The model was introduced as follows:

$$\ln TE_t = \mu_t + y_t + \delta_1 \ln PRC_{t-1} + \delta_2 \ln PRM_t + \delta_3 \ln INC_{t-2} + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.18)$$

where μ_t and y_t represent trend and seasonal components respectively, TE_t is tourist arrivals in Spain, PRC_{t-1} is the relative price index, PRM_t is the substitute price index, which measures the Spanish tourist cost compared with the cost of tourism in Spain's competitors (Portugal, France, Italy, Greece, Turkey, Egypt, Tunisia and Morocco), and INC_{t-2} is the income index measured by adjusted Industrial Production Index (IPI).

Secondly, rather than using weighted average aggregation, Gonzalez and Moral aggregated the data using a weighted geometric average following Padilla (1988). Moving weights were used instead of constant weights. Thirdly, the researchers compared the ex-post forecasting performance of the STSM with the forecasting performance of Autoregressive Integrated Moving Average (ARIMA), the Transfer Function model, and Error Correction Model (ECM). The results indicated that income's effect was inelastic, and both price indices were the key factors. In addition, the contribution of the trend components for achieving high tourism growth was very important. The forecasting results indicated that all the models gave similar forecasts, except ECM which produced the poorest forecasting performance.

The EAP region attracted more attention in the literature over the 1990s due to the high rates of tourism growth achieved over this decade. In particular, Li et al. (2005) reviewed 30 Japanese outbound tourism studies, 23 studies on Australian tourism, and 8 others on Hong Kong and Korea in the 1990s. Vogt and Wittayakorn's (1998) study estimated the world income and relative price elasticities of demand of ten origin countries for tourism in Thailand, based on annual data over the period 1960-1993, using co-integration analysis (CI) and ECM in one equation. This econometric technique was developed in the 1980s and introduced to the tourism studies in the mid 1990s. Vogt and Wittayakorn first examined the stationarity of the series in the model using Augmented Dickey Fuller (ADF) unit root test. All the variables were found to be non-stationary in level. The researchers then tested for the co-integration between tourism in Thailand, income and prices using Engle and Granger (EG) (1987) procedure. The results concluded that all the variables were co-integrated. Therefore, they proceeded by estimating the ECM as:

$$\Delta \ln X_t = c_1 \Delta + c_2 \Delta \ln (PX/PW)_t + c_3 \ln E_t + c_4 \Delta \ln YW_t + c_5 \ln (PX/PW)_{t-1} + c_6 \ln E_{t-1} + c_7 \ln YW_{t-1} + c_8 \ln X_{t-1} + \gamma \varepsilon_t \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3.19)$$

where X_t is the nominal tourism expenditures divided by the CPI, PX_t is the price of tourism in Thailand measured by Thailand's CPI, PW_t is the price of tourism in the ten origin countries in this study, E_t is the exchange rate, measured by an effective exchange rate index, and YW_t Index is the weighted aggregate income measured as in the following equation (1985 is the base year).

$$YW_t = \sum_{i=1}^{10} w_i \left[(\text{Real GDP}_{i,t}) \, 100 / \text{Real GDP}_{i,1985}\right] \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3.20)$$

The error correction equation included first differences and lagged levels of the variables. Short-run elasticities were represented by the coefficients of the first differences of the variables; long-run elasticities were obtained by the coefficients of the lagged levels of the variables. The results concluded that the price elasticity was -1.2 in the short run and -0.9 in the long run, and the income elasticity was 1.9 in the short run and 2.3 in the long run. However, only the short-run price elasticity of demand was significantly different from zero.

Finally, Li et al. (2005) analysed the recent development in the tourism demand literature. They reviewed 42 studies in the 1990s, and in comparison with the earlier studies reviewed by Crouch (1994) and Lim (1997), some differences regarding the 1990s were identified.

- Because of the increasing importance of seasonality in tourism demand in the 1990s, quarterly data had been used more frequently than in the past, whereas annual data still dominated the tourism literature. The average sample periods increased from only 14 years in the 1960s and 1970s to 25 years in the 1990s.
- Although most tourism demand studies concentrated on Western European and North American countries as the trend in the last decades, developing countries were included in the 1990s. International tourism in the EAP region has dominated the tourism literature of the developing countries.
- Tourist arrivals became the most common measure of tourism demand in the 1990s, followed by tourist expenditure, which dominated the tourism demand studies prior to the 1990s. Consistent with previous research, income, relative prices, exchange rates, substitute prices and dummies were the most common explanatory variables. In the 1990s, travel costs did not attract as much attention as before. The lack of good proxies resulted in insignificant coefficients in most studies.

- Continuing the previous trend, log-linear regression was still the dominant functional form in the tourism demand studies in the 1990s. In addition, a semi-log form appeared in some studies which used AIDS models.
- In the early 1990s, static models were still more frequent in the econometric modelling and forecasting of tourism demand. Since the mid-1990s, dynamic models have appeared in the tourism demand literature, such as CI/ECM in single equation. As far as the system approaches were concerned, the STSM was very useful for the seasonal data analysis. Moreover, a Time Varying Parameter (TVP) model - introduced to the tourism literature in 1999 by Riddington - considers the possibility of coefficient changes over time, unlike the other fixed elasticities methods.
- In addition to the traditional diagnostic tests (DW), tests for unit roots, serial autocorrelation, structural break, heteroscedasticity, non-normality, misspecification and forecasting failure have been performed.

3.3.5 Tourism Demand Literature in the 2000s

As a result of the great advances in econometric methodology in the 2000s, considerable improvements have been made in tourism demand estimation and forecasting techniques. In addition, new explanatory variables have been added to explain tourism demand during this decade. Therefore, the post-2000 literature can be categorized into four groups.

3.3.5.1 Advanced Time Series Data Methods

All the applications of the co-integration analysis in the 1990s used this technique in just single equation models based on Engle Granger two-stage (EG2S) procedure (1987). Recently, CI/ECM as system equations within the Vector Autoregressive (VAR) framework was a distinctive improvement that has been made in the post-2000s literature.

Algieri (2006) used CI to estimate the long-run relationships between tourism revenue in Russia (REV), and world per capita income (WGDP), cost of living (CL), and air transport prices (CT) based on VAR methodology for the period 1993:12 to 2002:10 using monthly data. The tourism demand equation can be written as:

$$\log \mathrm{REV}_t = \eta_0 + \eta_{cl} \log \mathrm{CL}_t + \eta_{wgdp} \log \mathrm{WGDP}_t + \eta_{ct} \log \mathrm{CT}_t + \varepsilon \ldots\ldots\ldots\ldots\ldots (3.21)$$

First, unit root tests were implemented to determine the order of integration in the variables using both ADF and Phillips-Perron (PP) tests. The results indicated that all the variables were integrated of order one *I*(1). Second, both series and the co-integrating equation were found to have linear trend. Third, the Johansen test was used to determine the number of co-integrated vectors in the system. One co-integration relationship was captured and the long-run elasticities were estimated. The results suggested that cost of living and international airfares indices were highly significant with the expected signs. Income was the most important factor in determining the tourism demand in Russia; a 1% increase in world GDP led to a 7.8% rise in Russian revenues.

Narayan (2004) used another co-integration technique to identify both long-run and short-run relationships between tourist arrivals in Fiji from its main source markets, Australia, New Zealand and the US, and income and prices during 1970-2000. Narayan used the bounds test developed within an Autoregressive Distributed Lag (ARDL) approach of co-integration, which had not been used previously in the tourism demand literature. This new co-integration approach avoids problems of serial correlation and endogeneity, and it avoids pre-testing of the variables for the presence of unit roots, which is a pre-requisite in other co-integration techniques. The tourism demand model in Fiji was specified with suitable lag lengths. The following equation was estimated using the following ARDL (m, n, p, q, r):

$$\mathrm{lnVA}_{ij,t} = \alpha_0 + \sum_{p=1}^{m} \alpha_1 \,\mathrm{lnVA}_{ij,t-p} + \sum_{p=0}^{n} \alpha_2 \,\mathrm{lnGDI}_{i,t-p} + \sum_{p=0}^{p} \alpha 3 \,\mathrm{lnHPI}_{ij,t-p} + \sum_{p=0}^{q} \sum \alpha_4 \mathrm{lnPFB}_{t-p} + \sum_{p=0}^{r} \alpha_5 \,\mathrm{lnTC}_{ij,t-p} + w_t \quad \ldots\ldots\ldots (3.22)$$

where $VA_{ij,t}$ is the tourist arrivals in Fiji in time *t*; GDI_i is the per capita real gross disposable income of the origin country *i*; HPI_{ij} is the hotel prices in Fiji relative to hotel prices in origin country *i*; PFB is the total cost of holidaying in Fiji relative to Bali (substitute island); TC_{ij} is the real airfares between Sydney, Auckland and Los Angeles to Nadi (Fiji).

Narayan identified one co-integrating relationship among the variables; hence, he continued by constructing an ECM to identify the short-run relationships among the variables. The effects of *coups d'état* was captured in the short run as a dummy variable. In the long run, the co-integration results revealed that a 1% increase in per capita income in Australia, New Zealand and the US resulted in an increase in tourist arrivals from these countries to Fiji of 3.6%, 3.1% and 4.3% respectively. Moreover, tourism prices were also significant and had negative effects on tourist arrivals in Fiji. Concerning substitute prices, the results confirmed that Bali was an important substitute destination for Fiji tourists. Finally, transport costs were also a very important factor in the tourism demand model over the period of the study. The short-term results were not as good as the long-run results. It was shown that the growth in income in origin countries had a positive impact on visitor arrivals; however, this result was only significant in the case of tourists from the US. The transport cost variable was insignificant in all cases. Finally, as expected, tourist arrivals in Fiji decreased dramatically: from Australia by 20%, from New Zealand by 25%, and from the US by 47% in the year of the coup.

As noted by Song and Li (2008), while the earlier studies which used the AIDS model adopted static versions, the versions of the AIDS for tourism demand analysis of Durbarry and Sinclair (2003), Li et al. (2004), Mangion et al. (2005), and De Mello and Fortuna (2005), all combined ECM with the linear AIDS (EC-LAIDS) model.

Li et al. (2004) applied Linear AIDS to model and forecast outbound tourism demand by using the CI/ECM approaches for a data set on the expenditure of UK tourists in five Western European destinations over the period 1972-2000. The elasticities of tourism demand with respect to prices and expenditure in the long run and short run were estimated simultaneously. First, the ADF test for unit root indicated that all the variables were $I(1)$. Second, the EG2S approach identified long-run equilibrium relationships at the 5% significance level. Then, the unrestricted long-run static LAIDS elasticities were estimated using the Seeming Unrelated Regression (SUR) method. Finally, the residuals of the long-run equilibrium were stored and incorporated into the dynamic equation as an error correction term to estimate the unrestricted EC-LAIDS.

The results of the estimated elasticities suggested that income elasticity of tourism in France, Greece, Portugal and Spain was more than unity with respect to UK tourists in the long run, with different elasticities for each destination. Portugal and Greece were more sensitive to UK tourists’ expenditure than others. UK tourists were most sensitive to price changes in Greece, suggesting it must control its tourist prices carefully regarding to its competitors’ prices. As far as the cross-price elasticities were concerned, France and Spain were likely to be substitutes with respect to UK tourists, as were Italy and Portugal, and France and Greece. In contrast, Italy and Greece were found to be complementary countries. However, the values of the cross-price elasticities were relatively small, indicating that reducing prices is not an effective policy to attract more tourist expenditure from substitutes.

Shan and Wilson (2001) estimated the causal relationship between international tourism and international trade flows using the Granger causality procedure within a VAR model. The researchers used five variables within a VAR to estimate the tourism inflows to China from four origins (US, Japan, Australia and the UK) in double log and real forms using monthly data for the period 1987:1-1998:1.

$$V_t = A_0 + \sum_{i=1}^{k} A_i V_{t-i} + \varepsilon_t \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots .. (3.23)$$

$$V_t = (TA_{CHN}, GDP_{ORIG}, TB_{CHN}, COST_{CHN}, ER_{CHN}) \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots .. (3.24)$$

where TA_{CHN} is total tourist arrivals to China, GDP_{ORIG} is income of origin countries, TB_{CHN} is total trade (imports and exports) in China, $COST_{CHN}$ is the living cost, and ER_{CHN} is the exchange rate in China. First, the researchers established the order of integration using ADF unit root test. Then, they proceeded by selecting the appropriate lag order in VAR, using Akaike Information Criterion (AIC) and Schwartz Criterion (SC), to estimate the different parameters of tourism demand in China. Finally, a Granger causality test was performed. All the variables were found to be $I(1)$, so the traditional causality test (using F-statistic to test that parameters of the model are jointly zero) is not valid. Instead, a Toda and Yamamoto (1995) procedure was applied. As this has two advantages; it can be applied even if there is no co-integration among the variables in the model, and it can be performed when the stability and rank conditions are not satisfied. The study found a bilateral Granger causality between international tourism and international trade in China which indicated a dual feedback effect between them. Consequently, estimating the tourism demand in China by using single equation regression ignores this endogeneity and creates unreliable parameters. Moreover, the omission of the trade variable from the tourism demand regression was proved to generate biased forecasting results.

3.3.5.2 Tourism Demand Forecasting Methods

Time series forecasting methodologies have improved in the 2000s. Two different methods for forecasting tourism demand have been identified in the literature; non-causal time series methods and causal econometric methods. In the former method, forecasting of tourism demand series only depends on the historical values of this series, whereas in the econometric method causal relationships between tourism demand and its determinants are included (Song and Li, 2008).

Time series methods dominated tourism demand forecasting in the past four decades, especially the ARMA model proposed by Box and Jenkins (1970). Veloce's (2004) study is a comprehensive study which employed both a time series and econometric methods to forecast inbound Canadian tourists from four major markets: US, UK, Germany and Japan. Quarterly time series data from 1972Q1 to 1999Q3 were used. The main aim of this study was to compute and evaluate the forecasting accuracy of the different forecast methods. The forecasting accuracy was measured by the Generalized Forecast Error Second Moment criterion (GFESM) and the Adjusted Mean Absolute Percentage Error (AMAPE) criterion. Veloce began by forecasting the future tourist arrivals to Canada using a time series methods including naive, Seasonal ARIMA (SARIMA), Autoregressive (AR) in level and difference, and Exponential Smoothing (ESMOOTH) methods. The econometric methods of CI/ECM and VAR analysis, both in level and in difference, were estimated to determine the relationship between tourist arrivals from the four main groups to Canada and the main determinants of them as follows:

$$X_t\,(I) = \beta_0 + \beta_1\,X\,(I)_{t-1} + \beta_2\,PRICE\,(I)_t + \beta_3\,INCOME\,(I)_t + \beta_4 t + \beta_5\,DMOLY_t + \beta_6\,DQ2 + \beta_7\,DQ3 + \beta_8\,DQ4 + error \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.25)$$

where for country I, X_t is the log of per capita tourist flows, PRICE is the log of the real exchange rate, INCOME is the log of real personal disposable income per capita, DMOLY is a dummy variable for the Montreal summer Olympic games in the third quarter of 1976, *t* is the log of time trend and DQ2, DQ3 and DQ4 are the seasonal dummy variables for the second, third and fourth quarters. Using the long-run relation and the Likelihood Ratio (LR) test for lag lengths, the ECM was specified and estimated to identify the short-run relations. VAR models in both levels and differences were also estimated. The estimated ECM and VAR models were used to forecast tourism demand for Canada from its four major origin markets. The results indicated that forecasting with different methods gave reasonable forecasts for the number of tourists for the one year ahead forecast. More specifically, the ECM forecasts performed best for different forecasting horizons, whereas the traditional regression forecasts performed poorly. Therefore, the development of an ECM with co-integration analysis provided an improvement in forecast accuracy.

3.3.5.3 Advanced Panel Data Methods

Until the 2000s, panel data methods depended on static analysis, which used OLS or GLS estimators and assumed a long-run equilibrium relationship between tourism demand and its determinants. Examining this long-run relationship through the panel unit root and panel co-integration tests is a new technique in panel data analysis. Both Eugenio-Martin et al. (2008) and Chaitip et al. (2008) examined the stationarity and co-integration in panel tourism data to eliminate the potential sources of bias in the results. The dynamic panel tourism data is also new improvement in the 2000s. Habibi et al. (2009) employed a dynamic panel data model of demand for tourism in Malaysia using the generalized method of moments (GMM) estimator. Garin-Munoz and Montero-Martin (2007) undertook dynamic panel data analysis of tourist flows from 14 most important generating countries to Balearic Islands also using the GMM. Moreover, Seetaram (2009) used dynamic panel co-integration to analyse tourist arrivals from ten main markets to Australia using the Corrected Least Square Dummy Variable (CLSDV) technique.

Chaitip et al. (2008) examined the long-run equilibrium relationship between tourist arrivals from ten major markets to India and GDP, exchange rate and transportation cost over the period from 2002 to 2006 using quarterly data. Five first generation panel unit root tests were applied to study the stationarity characteristics of the data. Both ADF and PP statistics were used to test for co-integration between tourist arrivals to India and the economic variables. Whereas ADF statistic rejected the null of no co-integration at the 10% level of significance, the PP statistic rejected this hypothesis at the 5% level. Finally, both the OLS and the dynamic OLS (DOLS) estimators[15] were used for estimating panel co-integration of the international tourism demand in India as follows:

$$\mathrm{Y_{it}} = \alpha_\mathrm{i} + \beta_\mathrm{i}\mathrm{X_{it}} + \varepsilon_\mathrm{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.26)$$

where the panel OLS estimator for $\beta_i$is measured by:

[15] DOLS estimator is proposed by Pedroni (2000, 2001) to correct for endogeneity and serial correlation by adding lead and lag dynamics in the panel OLS equation.

$$\hat{\beta}_{i,OLS} = \left[\sum_{i=1}^{N}\sum_{t=1}^{T}(X_{it} - X_i^*)^2\right]^{-1} \sum_{i=1}^{N}\sum_{t=1}^{T}(X_{it} - X_i^*)\ (Y_{it} - Y_i^*) \dots\dots\dots\dots\dots\dots\dots\dots\dots.. (3.27)$$

where X_{it} is exogenous variables in the model, X_i^* is average of X_{it}, Y_{it} is an endogenous variable in the model (tourist arrivals), Y_i^* is average of Y_{it}. The results confirmed a positive relationship between tourist arrivals to India and the income of origin countries with long-run elasticities more than unity, ranging from 3.32 to 4.43. Unexpectedly, a 1% increase in transportation costs in the origin countries increased international tourism to India from 0.29% to 0.55%. Finally, a 1% revaluation of the currency of India decreased tourist arrivals to India by 0.003% to 0.006%.

In contrast to Chaitip et al. (2008), who estimated the long-run co-integrating relationship between tourism to India and important economic variables, Habibi et al. (2009) measured the short-run dynamics relationship between the international tourist inflows to Malaysia and their main determinants from 15 main markets over the period from 1995 to 2005. They first differenced all the variables to remove the individual effects and then estimated the model using the GMM procedure of Arellano and Bond (AB) (1991) as follow:

$$\Delta lnTA_{i,t} = \beta_1 \Delta lnTA_{i,t-1} + \beta_2 \Delta lnGDP_{i,t} + \beta_3 \Delta lnTP_{i,t} + \beta_4 \Delta lnTO_{i,t} + \beta_5 \Delta D_{1997} + \beta_6 \Delta D_{2003} + \Delta\varepsilon_{i,t} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.28)$$

where $\Delta lnTA_{i,t}$, $\Delta lnTA_{i,t-1}$, $\Delta lnGDP_{i,t}$, $\Delta lnTP_{i,t}$, $\Delta lnTO_{i,t}$, ΔD_{1997}, and ΔD_{2003} are the first differences of : tourist arrivals, lagged tourist arrivals, income in origin countries, cost of living of tourists in Malaysia, trade volume between Malaysia and each origin country, and dummy variables to capture the effect of Asian financial crisis in 1997 and the Severe Acute Respiratory Syndrome (SARS) crisis in 2003 respectively. A test for autocorrelation and the Sargan test for over-identifying restrictions, proposed by AB (1991), were conducted and suggested that the model performed statistically well. Whereas the estimated parameters are the short-run elasticities, the researchers calculated the long-run elasticities by dividing short-run elasticities by $(1 - \beta_1)$. The results indicated that word of mouth was the most important determinant for tourism in Malaysia, since 91% of total international arrivals were attributed to the word of mouth effect. The estimated short-run price elasticity was significant and had the expected negative sign, implying that a 1% increase in prices reduced tourist arrivals to Malaysia by 0.6%; the calculated long-run elasticity was -6.67. In contrast, both the per capita income and trade openness were not significant. Finally, both the Asian financial crisis and the SARS had the expected negative effect on tourism in Malaysia.

Proenca and Soukiazis (2005) used both the static and dynamic panel data approach to estimate the demand function of tourism in Portugal from its main markets (Spain, Germany, France and the UK) for annual data over the period from 1977 to 2001. Both demand determinants [income ($Y_{i,t}$) and relative prices ($P_{i,t}$)] and supply determinants [accommodation capacity (A_t) and public investments in infrastructure (IP_t)] were taken into consideration in this study. In addition, a dummy variable, which reflects the effect of the Portuguese integration in the EU since 1986 ($D86_t$) was also included. Long-run static estimation was obtained from Equation (3.20) using three alternative methods: Pooled OLS, fixed effect using LSDV and random effect using GLS. The researchers used the Maximum Likelihood (ML) method of estimation to remove the detected first order serial autocorrelation from the data. The model was estimated as follows:

$$\ln w_{i,t} = \alpha_i + \beta_1 \ln Y_{i,t} + \beta_2 \ln P_{i,t} + \beta_3 \ln A_t + \beta_4 \ln IP_t + \beta_5 D86_t + u_{i,t} \dots \dots \dots \dots \dots \dots (3.29)$$

where $w_{i,t}$ is the tourism demand for Portugal, measured by the spending ratio (the share of the expenditures of each originating country to the total expenditures on tourism in Portugal). Moreover, the researchers estimated the short-run elasticities of the tourism demand for Portugal using the GMM dynamic estimation, proposed by Arellano and Bover (1995), as in Equation (3.21).

$$\ln \Delta w_{i,t} = \alpha_i + \beta_1 \Delta \ln Y_{i,t} + \beta_2 \Delta \ln P_{i,t} + \beta_3 \Delta \ln A_t + \beta_4 \Delta \ln IP_t + \beta_5 D86_t + \beta_6 \Delta \ln w_{i,t-1} + u_{i,t} \dots \dots (3.30)$$

where $u_{i,t} = \varepsilon_i + \upsilon_{i,t}$. The inclusion of the lagged dependent variable ($w_{i,t-1}$) as an explanatory variable captures the effect of word of mouth on the one hand, and allows explanation of the speed of adjustment coefficient on the other.

The results of the long-run estimation indicated that both income and accommodation capacity had significant effects exceeding unity. In contrast, relative prices, public investment and the dummy were insignificant in all cases. The short-run dynamic results suggested that the word of mouth was the most significant variable with the expected positive effect on the tourism demand for Portugal. In addition, the elasticity of the accommodation capacity remained significant, but less than unity. In contrast, short-run income elasticity was not significant. The other factors were insignificant as in the static model. Finally, the speed of adjustment was 22%, implying some kind of rigidity in the tourism inflows to Portugal.

3.3.5.4 New Factors Included in Tourism Demand

Apart from some limited studies in the 1990s, no serious effort was made to examine the effect of tourism supply on tourism demand in the research before the 2000s (Li et al., 2005). However, post-2000 saw the introduction of various proxies for the supply of tourism at the destination into model of tourism demand. Along with these supply side considerations, new determinants were introduced by Phakdisoth and Kim (2007), Eugenio-Martin et al. (2008) and others to improve the results of the estimation, especially factors related to the destination countries and factors related to the relationships between the origin and destination countries, as illustrated by the next studies.

Naude and Saayman (2005) tried to prove that the most important determinants of tourism inflows in most developing countries are different to their counterparts in the developed countries. Both cross-sectional data and panel data over the period 1996-2000 were used to identify the various determinants of tourism arrivals in 43 African countries, including Egypt, from the European Union, the Americas (the US and Canada), and from within Africa. Two important groups of explanatory factors were specified. Firstly, factors that affect tourism demand in general (developed country determinants): real GDP per capita in originating countries, the CPI of the destination adjusted by the exchange rate, and the distance between the destination and country of origin. Secondly, factors that influence tourism to Africa in particular were specified: index of lack of violence as a proxy for political stability, the prevalence of malaria measured by the malaria index and the disease burden measured by the number of frost days on average over a year as a proxy for health risks, the number of hotel rooms, as a proxy for tourism infrastructure, the number of internet users to reflect tourism marketing efforts, and finally urbanization rate as a proxy for the level of development in a country. The findings showed that country specific factors played a crucial role in attracting tourists worldwide to Africa. More specifically: tourism infrastructure, political stability and development levels were major factors encouraging American tourists; tourism infrastructure, cost of travel and health problems were more important for tourists from Europe; and tourism infrastructure and a border with South Africa were important determinants for African tourists. In contrast, the conventional determinants of tourism demand, such as income, relative prices and travel cost were not key determinants of the tourism demand for Africa by tourists from all origins.

3.4 International Tourism Demand Literature in Egypt

Although tourism in Egypt is a very significant industry for boosting its economic development, there are few attempts to quantify, model, and forecast the tourism demand in Egypt.

Mohammed (1977) aimed to examine the effectiveness of tourism for economic development in Egypt, and to predict the future value of the international inflow of tourism from different regions to Egypt (Arabs, Europeans, Americans and others), as a bases for informing the allocation of investment resources. The relationship between tourist inflow to Egypt and its important determinants was estimated using a static multiple regression analysis for annual data on the period 1952-1974. Tourist arrivals were used as a proxy for the tourist demand in Egypt as a dependent variable. Assuming that the supply of tourist services in Egypt is infinitely elastic in the short run, three explanatory variables were selected, namely, real per capita product as a proxy for the income in the main origin groupings (Y_i), CPI of Egypt adjusted by the exchange rates as a proxy for the price of tourist services (P_i), and a dummy variable was used to capture the political unrest in the Middle East region (D)[16].

The researcher estimated three regression equations for each group of origin. The first equation used income, price and the dummy as explanatory variables. The second equation excluded the price variable. The third equation excluded both price and the dummy, focusing only on the effect of per capita income on tourist arrivals to Egypt. Based on double log form function, the following three equations were estimated.

$$\log A_i = \beta_1 + \beta_2 \log Y_i + \beta_3 \log P_i + \beta_4 D + U_i \quad (3.31)$$

$$\log A_i = \beta_1 + \beta_2 \log Y_i + \beta_3 D + U_i \quad (3.32)$$

$$\log A_i = \beta_1 + \beta_2 \log Y_i + U_i \quad (3.33)$$

The results following estimation of Equation (3.31) showed that the income and price elasticities of demand had the correct signs in all groups; however, they were statistically insignificant, except in the case of the Arab group. The dummy variable had

[16] The three wars in Egypt in 1956, 1967, and 1973 and the year following the first two wars represented this variable.

negative signs except in the case of the Arab group, and was insignificant in the case of Arab and European groups. Estimating Equation (3.32) generated income elasticities with positive signs, with a range from 1.34 in the case of the European group to 2.24 in the case of the others group, and all statistically significant. The same results as in Equation (3.31) with respect to the dummy variables were found. Therefore, the third equation with just one explanatory variable (Y_i) was estimated. Reasonable results were obtained with satisfactory R^2, especially in the case of the Arab group (R^2= 89%) which represented more than 60% of the tourist inflows to Egypt in that time, and consequently provided a good basis for forecasting tourist arrivals in Egypt.

Projections of the tourist arrivals from different groups were made for two years, 1975 and 1980, on the basis of different assumptions about annual growth rates of per capita income, from pessimistic growth (3%) to optimistic growth (6%) in all four tourist nationality groups. The researcher predicted that the tourist arrivals in Egypt would grow annually between 7.3% and 8.6% at the end of the 1970s. Moreover, it was expected that the Arab region would continue as the most important tourist market to Egypt in the coming years with a share of 63% in 1980, growing from 61% in 1974. In contrast, the share of Europe was expected to decline from 23% in 1974 to 20% in 1980, and the Americans' share also was expected to decline from 8% in 1974 to 7% in 1980. It was concluded that despite the bright future of tourism in Egypt, it was not expected that tourism would occupy a key position in the Egyptian economy, as is the case in some Mediterranean countries like Spain, Yugoslavia and Italy, at least in the near future.

Mohammed's predictions have proved to be poor. Actual growth rate of 11% has been achieved over the period (1974-1980), which is higher than Mohammed's most optimistic predicted growth (8.6%). In addition, very big changes in the structure of inbound tourist arrivals to Egypt occurred over that period. The share of Arab tourists decreased markedly from 61% in 1974 to 38% in 1980, whereas the share of Europe increased dramatically from 23% to 39% to be the highest share to date, and the American's share increased also from 8% to 14% over the same period. The limited specification of the model may explain its poor prediction power.

Ibrahim (1980)[17] estimated the tourism demand for Egypt based on annual time series data over the period 1952-1976, and quarterly data over the same period, using multiple regression analysis. Forty tourism demand models in Egypt were constructed and estimated according to the per capita income of the origin countries. The first group included tourists coming from North America (US and Canada) and Australia. The second group consisted of European tourists coming from Greece, Italy, Spain and Malta. The third group included the remaining European tourists. The fourth group included tourists from Latin America. Four further groups included Arab tourists (Kuwait and SA, the rest of the Arab, Kuwait alone, and all the Arab excluding Kuwait). Hence, 8 annual time series models were estimated, in addition to 4 seasonal models for each group to examine the effect of the seasonality on tourism demand from each group.

The study selected the number of tourist nights (Y) as a proxy for tourism demand in Egypt, rather than the number of arrivals as in the previous study. Moreover, per capita disposable income in countries of origin (X_1), average cost of accommodation for tourist in Alexandria and Cairo (X_2), transportation cost (X_3) and finally marketing budget (X_4) were specified as important explanatory variables as in the following equation.

$$Y = A + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon_i \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots .. (3.34)$$

T-statistics, P-values, or confidence intervals are not reported in the study to can evaluate the significance of the estimated parameters. The only provided diagnostic test of the estimated models was the R^2, which ranged from 21% in the case of North American and Australian group to 71% in the case of Latin American group.

Ibrahim calculated the tourism demand elasticities from the estimated parameters, and the results indicated that tourist nights of Latin American tourists were more sensitive to changes in their income (3.9) compared to other tourists, followed by North American and Australian tourists (2.7), European tourists (2.0), whereas the income elasticities of all Arab groups (0.3) were inelastic and less than others. In terms of prices elasticity, it was found that the price elasticity of North American and Australian tourists (-2.5) was bigger than others, followed by Arab tourists (-1.7), European tourists (-0.88), and Latin American tourists (-0.86). Tourist nights from Latin America were more responsive to

[17] This study is written in Arabic Language.

cost of transportation, followed by North American and Australian nights, European tourist nights, and Arab nights. Marketing budget was very important for all, except Arab tourists.

Although the focus of Mohammed's and Ibrahim's work was to model tourism demand in Egypt, lack of advanced econometric techniques and diagnostic checking in these early attempts were serious weaknesses. More recent tourism demand literature has addressed some of these concerns.

Zaki (2008) aimed to forecast tourist revenues and arrivals in Egypt through 2017. Using annual time series data, he constructed an international tourism demand function in Egypt, based on the ARIMA, over the period 1982-2006. Population, income, marketing budgets, transportation costs, prices, exchange rates and dummy variables to reflect terrorism[18] in Egypt were selected as explanatory variables. Logarithmic transformation was firstly applied to all the series, unit root tests implemented, the series differenced to stationary, and the ARIMA (p, d, q) model was developed and represented as:

$$y_t = \mu + p_1 y_{t-1} + p_2 y_{t-2} + \ldots + p_p y_{t-p} + \beta_0 X_t + \beta_1 X_{t-1} + \ldots + \beta_k X_{t-k} + \varepsilon_t - q_1 \varepsilon_{t-1} - q_2 \varepsilon_{t-2} - \cdots - q_q \varepsilon_{t-q} \ldots \ldots \ldots (3.35)$$

where y_t represents the dependent variable (total tourist arrivals to Egypt in one equation and total tourist revenues in another equation), μ is a constant, p_s are autoregressive parameters for lagged dependent variables, β_S are parameters for lagged distributed independent variables, q_s are moving average parameters for lagged stochastic variables, and ε_t is the value of the error term. The forecasting model was constructed using data of tourist arrivals, tourist revenues, and the explanatory variables over the period of the study.

The results suggested that the current tourist arrivals (revenues) were affected by seven years of past tourist arrivals (revenues). 88% (86.2%) of the variations in tourist arrivals (revenues) could be attributed to earlier arrivals (revenues). Three other explanatory variables were found to be significant: dummy variables at lag 1, marketing expenses at lag 1, and exchange rates at lag 3. Comparing the actual data from 1995 to 2006 with those forecast (out of sample) in the model allowed checking for the accuracy of this

[18] Zaki chose the Gulf War, Luxor attacks, and September 11 to reflect terrorism in Egypt through the period of the study.

model using several accuracy tests, namely, MAPE, Root Mean Squared Error (RMSE) and Theil's U. The future forecast results indicated that the number of tourist arrivals will increase in Egypt from 10.7 million arrivals in 2007 to 16.5 million arrivals in 2017, while tourist revenues are expected to increase from US$8.2 billion in 2007 to US$12.2 billion in 2017. Therefore, each tourist will spend approximately US$762 in Egypt in 2007, and this is predicted to decrease slightly to US$739 by 2017. Furthermore, it was found that enhancing the marketing budget of tourism is the key factor in enhancing the number of tourist arrivals and revenues in Egypt.

Although Zaki estimated the tourism demand model over a short time period, only 25 years, he forecast tourism arrivals and receipts for 11 years (2007-2017), which may affect the accuracy of the forecasts negatively, especially in the longer time horizons. By comparing the forecasting number of arrivals in Zaki's study to the actual number over the period 2007-2009, there is under-prediction by 3.4%, 11.7% and 4.2% for 2007, 2008 and 2009 respectively.

Ossman and Elsayed (2009)[19] analysed the implications of the global financial crisis (2008) on the tourism sector in Egypt. The study employed annual time series data from 1990/91 to 2007/08 to model tourism demand for Egypt from five main origin markets. They used the results to build a baseline scenario to reflect the situation in the absence of crisis and compare it with the results of the artificial scenarios under a decline in world income by 1% and 2% over the three coming years (2008/09-2010/11).

For estimation purposes, tourist arrivals (LT_{it}) and tourist nights (LN_{it}) were both used as proxies for the tourism demand (dependent variable); in addition, they selected the income of origin regions (LY_t), relative prices (LRP_t), and exchange rate ($LEEX_{it}$) as main determinants of tourism demand for Egypt. First, an ADF test was performed to examine the stationarity characteristics of all the series. The results indicated different integration orders for the series, so to avoid the problem of spurious regression; Ossman and Elsayed took the differences of all the variables and used multiple regression models in double log linear form as follows:

$$LT_{it} = \alpha_{i0} + \alpha_{i1} LY_t + \alpha_{i2} LRP_t + \alpha_{i3} LEEX_{it} + \varepsilon \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.36)$$

$$LN_{it} = \alpha_{i0} + \alpha_{i1} LY_t + \alpha_{i2} LRP_t + \alpha_{i3} LEEX_{it} + \eta \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.37)$$

[19] This study is written in Arabic Language.

The study estimated two equations (tourist arrivals LT_{it} and tourist nights LN_{it}), and each equation was applied to five different origin markets, namely Europe, Middle East, Africa, America, and A&P.

The study's findings indicated significant effects of income and relative prices on demand for tourism in Egypt, while there was no evidence on the impact of the exchange rate. In Equation (3.36), income elasticities were always significant with the expected positive effect, but it was inelastic in all cases; ranging from 0.4 in Europe to 0.8 in the Middle East. Relative prices were significant with respect to all regions except for the Middle East, with elasticity ranging from -0.23 in Europe to -1.4 in Africa. In contrast, exchange rate elasticities were insignificant for all regions, except the American region. The results for Equation (3.37) were similar. In light of these results, Ossman and Elsayed forecast arrivals and nights for the period (2008/09-2010/11), and found a decrease in average tourism expenditure by US$108 million annually when world income growth rate decreases by 1% and by US$212 million dollar with a more pessimistic scenario, when world income growth rate decreases by 2%[20].

Tourism demand for Egypt was estimated using a sample of 18 years of annual data. The short duration is problematic and may affect the accuracy of the estimated parameters and the forecasting results. Income and prices were specified as determinants of tourism demand, with no attempt to examine the effect of other variables such as country-specific factors, which proved to be important for tourism demand, especially in the case of developing destinations such as Egypt. Finally, the long-run effect of the variables is not considered in this paper.

Ibrahim (2011) constructed an international tourism demand model for Egypt over the period (1990-2008) using annual panel data analysis to measure the impact of the main determinants of international tourism inflows to Egypt from eight origin countries (France, Italy, UK, Germany, Switzerland, Spain, US and SA). Tourist arrivals was chosen as a measure of tourism demand, and population of the origin countries ($POP_{i,t}$), income [real per capita in origin countries ($RGDPP_{i,t}$)], prices [CPI in Egypt relative to CPI in origin countries ($TCPI_{i,t}$)], exchange rate [real effective exchange rate in Egypt

[20] It was assumed that the average expenditure of the tourist nights in Egypt is US$85 according to the data given by the Central Bank of Egypt.

relative to the real effective exchange rate in origin country ($RREER_{i,t}$)], substitute prices [CPI in Tunisia ($CPITUNIS_t$)], and trade openness [import + export/GDP in Egypt ($TO_{i,t}$)] were specified as determinants of tourism in Egypt as following:

$$\log TA_{i,t} = \beta_0 + \beta_1 \log POP_{i,t} + \beta_2 \log RGDPP_{i,t} + \beta_3 \log TCPI_{i,t} + \beta_4 \log RREER_{i,t} + \beta_5 \log TO_{i,t} + \beta_6 \log CPITUNIS_t + \varepsilon_{i,t} \dots \dots \dots \dots (3.38)$$

Ibrahim utilized the SUR method to obtain the fixed effects panel estimates for the model. The results indicated that all the explanatory variables were significant at the 1% level, and had the expected signs, except for the population which had a negative sign. The effect of income was inelastic (0.51), and tourism in Egypt was found to be sensitive to prices (-1.96). The exchange rate elasticity was found to be significant with a small value of (-0.25). The trade openness was positive with very small effect on tourism demand (0.10). A considerable effect of tourism prices in Tunisia on tourism demand in Egypt had been detected (5.2), reflecting a high substitution relationship between tourism in Egypt and tourism in Tunisia.

Unlike the previous studies, which used time series analysis, Ibrahim used panel data analysis to estimate tourism demand for Egypt. In addition, examining the effect of the trade openness on tourism demand for Egypt was also something new. However, the study utilized the fixed effect technique on the level of the variables without examining the integration status of the different series in the model, which may produce biased estimates.

3.5 Summary and Conclusion

This chapter has discussed first the theoretical tourism demand literature. Three set of theories has important implications on tourism demand models, mainly traditional demand theory, international trade theory, and Lancaster consumer theory. A few studies tried to build new theoretical models to be applied specifically on tourism sector within the framework of Lancaster consumer theory, taking into consideration the heterogeneity of tourism product and the uncertainty nature of this industry. Then, the empirical literature of tourism demand models since the 1960s has been reviewed. Emphasis has been placed on the main determinants of international tourism flows, the expected direction and magnitude of the relationship between these factors and tourist flows, the frequency of data, the regions or countries of interest, the econometric methods which have applied to model and forecast tourism demand, and the main findings of the empirical studies.

In this chapter, the tourism demand literature has been grouped by decades of publications. The first two decades (1960s-1970s) are associated with relatively similar theoretical frameworks and econometric analysis. Following the neoclassical consumer theory and assuming that supply-side of tourism is perfectly elastic, just three determinants appeared in the literature: income of origin countries, cost of the trip (prices and exchange rate) and, in some papers, transportation cost. These studies suffer from some problems related to the econometric approach. Static regression in single equation, especially in double log linear form, using the OLS estimation technique, was applied in most of these studies. Along with a lack of diagnostic checking, this approach is prone to spurious regression and, therefore, unreliable estimates and forecasts.

The main features of literature in the 1980s are to seek for a strong connection between empirical models and traditional consumer theory, which shift the analytical focus from destinations to origins. So, the aim of these studies is to determine how tourists from a specific origin country can allocate their budget (tourist expenditures) among some preferred destinations, which facilitate identifying the interrelationships among alternative destinations through cross-price elasticities. Such analysis produces a consequent shift from single equation to system of equations models. In addition, the used function form is often chosen according to the appropriate theoretical demand systems, such as in the case of the AIDS models (Giacomelli, 2006). Therefore substitute/complement prices are of great importance, as explanatory variables, for these studies. However, these empirical studies ignore the uniqueness or the characteristics of tourism product, since no destination-factors are included. Developed countries, especially US, Canada and European countries have dominated these studies whether as destinations or originating countries. Moreover, the aim of these studies, as illustrated above, is the outbound tourism rather than the inbound tourism, which is the objective of the present thesis.

Since the 1990s, there have been many changes in the literature. First, studies began to analyse the effect of the supply side, including tourism investment, infrastructure and number of agencies on tourism demand. Secondly, developing countries, especially from Asia and the Pacific, began to appear in the literature. Thirdly, more advanced econometric models and extensive diagnostics have been employed to investigate tourism demand, which improved the findings of these studies. In the 2000s, criticism of the traditional neoclassical tourism models has been raised by many authors, such as Papatheodorou (2001) and Zhang and Jensen (2007), who claimed that the neoclassical homogeneity assumption which ignores the particularities, represented in tourist attractions and facilities, of the destinations cannot be applied to the tourism demand. Therefore, many new factors related to the destination countries have been included in the tourism demand models (education, openness, health, length of coast, weather, safety index, common language, common frontier and others) in Naude and Saayman (2005), Phakdisoth and Kim (2007), and Eugenio-Martin et al. (2008). These authors have improved the literature; however, connecting these new determinants to the appropriate theoretical framework and finding good proxies to reflect these factors are the main challenge for these new empirical studies. Moreover, a great deal of improvement in the econometric models affected the results of these studies positively and strongly.

While the previous studies contributed considerably to knowledge in the area of tourism demand, there is limited coverage of the literature on:

1) Rigorous econometric analysis: although panel data analysis has been used in the tourism demand literature since the 1970s, few earlier studies of tourism demand used the CI/ECM to analyze the long-run static effects and the short-run dynamics simultaneously based on panel co-integration framework.
2) Globalization: no previous study connected globalization with tourism and investigated the cause-effect relationship between them.
3) Countries to consider: developed countries and some developing countries have dominated tourism research studies as focus areas.

The present study attempts to address these matters and provides a deeper understanding of tourism demand for Egypt. The role of increasing globalization in enhancing tourism, in addition to the causal relationship between them, is examined using advanced CI/ECM techniques, based on time series and panel data analysis, to improve the estimated parameters of tourism demand for Egypt and produce more accurate forecasting.

Appendix 3

Table 1: Summary of econometric studies of tourism demand modelling and forecasting (1960s-2000s)

Study	Data Frequency & Period	Region Focused	Dependent Variable	Explanatory Variables	Estimating & forecasting Methods	Tourism demand elasticities
Gerakis (1965)	(A) 1954- 63	Canada, France, Spain, Yugoslavia, Finland, Germany, Netherlands(I)	Tourist receipts	Exchange rates	-	exchange rate: 4.3 for devaluers, exchange rate: 1.8 for revaluers
Gray (1966)	(A) 1951-63	Canada-US (O)	Tourist expenditure	Income, exchange rate, transport cost	SR	income: 4.2 exchange rate: 2.1
Artus (1970)	(A) 1955-69	Germany (O, I)	Tourist expenditure-tourist receipts	Income, relative prices	SR	For expenditure: income: 1.7 price: -3.4 For receipts: price: -2.2
Jud & Joseph (1974)	(A) 1958-68	Latin America (I)	Tourism exports	Income, relative prices, transport costs	Pooled data regression	income: 2.6 price: -1.1 transport cost: -0.7
White (1985)	(A) 1954-81	US (O) Western Europe (I)	Budget share of expenditure	Real travel expenditure, prices, substitute prices, dummy (1968 disturbances in France)	LAIDS	expenditure: 1.05 price: -1.1 substitute prices: 0.43 dummy: -0.2
Tremblay (1989)	(A) 1968-79	18 European countries (I)	Tourist receipts	Income, relative prices, exchange rates, transport costs, dummy (terrorism)	Panel data regression	income: 1.48 price: -1.42 exchange rate: 0.39 transport cost: -0.92 dummy:-0.02
Carey (1991)	(A) 1976-85	Caribbean Islands (I)	Tourist arrivals	Promotional expenditures, income, relative prices, distance, population	Pooled data regression	income: 1.21 distance: -1.43 Promotion: 0.52 population: 0.30

Gonzalez and Moral (1995)	(M) 1979:01-1991:12	Spain (I)	Tourist arrivals	Income, own price index, substitute price index, stochastic trend, seasonal components	STSM Ex-post forecast 92:01-92:12 STSM, ARIMA, ECM, Transfer Function	income: 0.48 price:-0.55 substitute prices: -0.31
Vogt and Wittayakorn (1998)	(A) 1960-93	Thailand (I)	Nominal tourism receipts	Income, relative prices, exchange rate	CI/ECM	Short-run results: price: -1.2
Algieri (2006)	(M) 1993:12-2002:10	Russia (I)	Tourist receipts	Income, cost of living, air transport prices	CI/JML	income:7.88 price: -1.47 transport cost: -5.95
Narayan (2004)	(A) 1970-2000	Fiji (I)	Tourist arrivals	Income, prices, substitute prices, Coups d'état (dummy)	CI/ECM-ARDL	Long-run results: income: 3.67 prices: -1.17 substitute prices: -3.32 transport cost: -2.18 Short-run results: word of mouth: -0.30 income: 2.13 prices: -0.17 substitute prices:0.57 dummy: -0.31
Li, Song and Witt (2004)	(A) 1972-2000	UK (O) Five Western European countries (I)	Budget share of expenditure	Real tourism expenditure, prices, substitute prices	CI/ECM-LAIDS Ex-post forecast Static LAIDS - EC/LAIDS	Long-run results: expenditure: 1.10 prices: -1.51 substitute prices: 0.45 Short-run results: expenditure: 1.08 price: -1.09 substitute prices: 0.53
Shan and Wilson (2001)	(M) 1987: 01-1998: 01	China (I)	Tourist arrivals	Income, total trade, cost of living, exchange rate	Granger causality within VAR using Toda and Yamamoto	there is a two-way causality between tourism and trade in China

					technique	
Veloce (2004)	(Q) 1972:1- 94:3	Canada (I)	Tourist arrivals	Income per capita, Cost of living, dummy variable (Montreal summer Olympic games), seasonal dummies (DQ2, DQ3, DQ4)	CI/ECM Ex-post 1994:4-1999:3 Naive, SARIMA, AR, ESMOOTH, ECM, VAR	income: 1.12 price: -0.37 dummy: 0.31 seasonal dummies: DQ2: 1.25, DQ3: 1.41, DQ4: -0.29
Chaitip, Chaiboonsri, and Rangaswamy (2008)	(Q) 2002:1-2006:4	India (I)	Tourist arrivals	Income, cost of transportation, exchange rate	Panel co-integration (OLS, DOLS)	income: 4.43 transport cost: 0.29
Habibi, Abdul Rahim, Ramchandran, and Chin (2009)	(A) 1995-2005	Malaysia (I)	Tourist arrivals	lagged independent variable, Income, cost of living, trade, dummy variables: Asian finance crisis (D_{1997}); SARS (D_{2003})	Dynamic panel data (GMM-AB)	Short-run results: lagged arrivals: 0.91 price: -0.6 $dummy_{1997}$: -0.25 $dummy_{2003}$: -0.42
Proenca and Soukiazis (2005)	(A) 1977-2001	Portugal (I)	Tourism spending ratio	Income, relative price, hotel capacity, public investment in infrastructure, dummy variable (Portuguese integration in the EU) (D_{86}), lagged dependent variable	Static Panel: pooled OLS, FE(LSDV), RE(GLS) Dynamic Panel: GMM-Arellano and Bover	Long-run results: income: 1.31 hotel capacity: 1.38 Short-run results: word of mouth: 0.78 hotel capacity: 0.92
Naude and Saayman (2005)	(A) 1996-2000	43 African countries (I)	Tourist arrivals	Income, relative prices, transport costs, political stability, health risk, tourism infrastructure, marketing efforts, development level, landlocked	Static/ dynamic Panel data regression	Long-run results: African: border with Africa: 2.33 Europe: hotel capacity: 0.59 Americas: hotel capacity: 0.98 political stability: 0.89 landlocked: 1.05 Total arrivals:

						hotel capacity: 0.43 political stability: 0.86 health risk: -0.57 Short-run results Africa: word of mouth: 0.92 Europe: hotel capacity: 0.74 income: -45.14 Americas: hotel capacity: 1.11 Total tourists: hotel capacity: 0.39 political stability: 0.18

Note: A: annual, Q: quarterly, M: monthly, I: inbound tourism, O: outbound tourism, SR: Static Regression, Ex-ante: forecasting future demand, Ex-post: evaluating out of sample. Note: the reported results are the long-run elasticities unless specified differently.

Table 2: Summary of econometric studies of tourism demand in Egypt (1970s-2000s)

Study	Data Frequency & Period	Dependent Variable	Explanatory Variables	Estimating and forecasting methods	Tourism demand elasticities
Mohammed (1977)	(A) 1952-74	Tourist arrivals	Income, prices, dummy	Static multiple regression (OLS) Projections based on different scenarios of annual income growth rates	Arab: income: 0.98, price: -1.32 Europe: price: -1.14 Americas: income: 1.65, dummy: -0.21 Others: price: -1.41, dummy: -0.19
Ibrahim (1980)	(A) 1952-76	Tourist nights	Income, cost of accommodation, transportation cost, marketing budget	Static multiple regression (OLS)	Arab: income: 0.30, prices: -1.69 transport cost: 0.34 Europe: income: 1.98, prices: -0.89, transport cost: -0.56, marketing: 83.45 North American & Australian

					income: 2.7, prices: -2.52 transport cost: -1.27, marketing: 111.14 Latin America: income: 3.9, price: -0.86 transport cost: -2.08, marketing: 117.45
Zaki (2008)	(A) 1982-2006	Tourist arrivals Tourist receipts	income, prices and exchange rates, transportation costs, marketing budget, population, dummy (terrorism)	ARIMA (p, d, q) Ex-ante forecast 2007-2017 ARIMA estimation	Tourist arrivals will increase in Egypt from 10.7 million arrivals in 2007 to 16.5 million arrivals in 2017, while tourist revenues will increase from US$8.2 billion in 2007 to US$12.2 billion in 2017
Ossman and Elsayed (2009)	(A) 1990/91-2007/08	Tourist arrivals Tourist nights	Income, relative prices, exchange rate	Dynamic Multiple regression (OLS) Ex-ante 2008/09-2010/11	Short-run results: Middle East: income: 0.80 Africa: income: 0.51, price: -1.41 Europe: income: 0.44, price: -0.32 America: income: 0.75, price: -0.95 exchange rate: 0.84 Asia & Pacific: income: 0.66, price: -1.28 Total arrivals: income: 0.75, price: -1.96
Ibrahim (2011)	(A) 1990-2008	Tourist arrivals	income, prices, exchange rate, substitute prices, trade openness, population	Panel Fixed Effect (SUR)	income: 0.51 price: -1.96 exchange rate: -0.25 substitute price: 5.20 trade openness: 0.10 population: -3.02

Table 3: Range of tourism demand elasticities for 23 studies (1960-2011)

	Long-run elasticities		Short-run elasticities	
Variable	range	average	range	average
Lagged dependent	-	-	-0.30→0.91	0.46
Income	0.48→7.88	2.23	0.75→2.13	1.32
Price	-0.37→-3.4	-1.46	-0.17→-1.96	-1
Substitute prices (complements-substitutes)	-0.31→-3.32 0.43→5.2	-1.82 2.03	0.53→0.57	0.55
Political instability	-0.02→-0.86	-0.36	-0.18→-0.31	-0.25
Hotel capacity	0.43→1.38	0.91	0.39→0.92	0.66
Cost of transport	-0.70→-5.95	-1.68	-	-

Source: Calculated from Table 1 and Table 2.

Chapter 4: Univariate Time Series Analysis (1970-2009)

4.1 Introduction

The main aim of this chapter is to construct and develop time series models of tourism demand for Egypt from all origins, as well as three individual regions of origin (Europe, Arab, and the Americas) over the period 1970-2009. Moreover, this chapter presents a univariate investigation of all the variables in the different models separately to check the integration properties of each time series as a pre-requisite to specify the appropriate econometric methods of estimation and therefore to avoid biased results and spurious regression.

The chapter is structured as follows. First, the description of the adopted time series models is explained in Section 4.2. The specification of the variables, aggregation methods, data sources, and data transformation are specified in Section 4.3. Then, the unit root tests methodology and the empirical results of the integration status of each variable in the four different models are reported and discussed in Sections 4.4 and 4.5. Finally, Section 4.6 summarises the major findings of the chapter.

4.2 Specification of Models

To analyse tourism demand for Egypt, four different time series models have been developed. First, we specified a time series model to estimate international worldwide tourism demand for visiting Egypt. The other three models represent each of Egypt's three main originating regions, including Europe, Arab, and the Americas. The estimation period is 40 years from 1970 to 2009, for all the time series models, dependent to the availability of the data. All the models have the same dependent and explanatory variables as specified in the next section. Modelling at this disaggregated level captures differences in consumption patterns and thereby may inform tourism strategy and policy in their promotion of Egypt's tourism potential across the world.

It is preferable to disaggregate the data according to the purpose of tourism in Egypt, such as recreational, business, health and study, but unfortunately such disaggregated data are not available for a long time. More than 93% of total international tourists visited Egypt for recreational tourism on average of the second half of the 2000s, and the other 7% was distributed within the other purposes, so this aggregated data may not cause a significant bias in the results.

4.3 Specification of Variables

Following Lancaster consumer theory, tourism demand is a function of the traditional determinants of demand, in addition to destinations' characteristics. Therefore, our tourism demand model can be presented as a Marshallian demand function, including destination's characteristics vector as follows.

$$D_{ij} = f\left(Y_i, P_i, P_j, P_A, Z_j\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4.1)$$

where D_{ij} is the demand for a tourism product in destination j (Egypt) by tourists from origin country i; Y_i is the income of origin country i; P_i is the price of domestic tourism product in the origin country i; Pj is the price of tourism product in the destination j; P_A is the price of tourism in alternative destinations (substitutes or complements); and Z_j is a vector of destination's characteristics or destination-specific factors.

By dividing on prices of origin country, demand can be represented as a function of income in constant prices, and tourism prices in the destination and alternative destinations in relative terms as follows.

$$D_{ij} = f\left(\frac{Y_i}{P_i}, \frac{P_j}{P_i}, \frac{P_A}{P_i}, Z_j\right) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(4.2)$$

According to Lancaster theory, Z_j includes attractions and facilities in the destination. Taking into consideration the uncertainty nature of tourism product, risk in the destination is also included in this vector. Although it is difficult to find good proxy for attractions, two proxies for facilities in Egypt are specified and added to the tourism demand model. Hotel capacity is a proxy for tourism infrastructure in Egypt. This variable is expected to affect tourism demand positively in the long run, but it is assumed to be perfectly elastic or exogenous variable (see Chapter 3, Section 3.2.4). Globalization is also specified as an important facility, reflecting various economic, social, and political characteristics in Egypt. It is expected to affect tourism demand positively through increasing foreign direct investments, establishing more infrastructures, increasing the multinational hotels, bringing in skilled workers, decreasing costs of air travel, and facilitating the communication and reservation systems. However, an increase in the globalization will increase the long-run competition between Egypt and its rival destinations, which may not be in favour of Egypt in some cases. Finally, taking into consideration the risk nature of tourism industry, the Expected Utility Theory (2004) suggests new determinants to capture uncertainty in the destination, such as lack of information, political instability and natural disasters. Political instability is specified as the most important source of uncertainty in Egypt, and included as a short-run determinant of tourism demand.

4.3.1 Dependent Variable

While the dependent variable, namely, tourism inflows, can be classified as tourist arrivals, tourism receipts, length of stay, and tourist nights (Lim, 1997). Tourist arrivals data is the most common measure used to capture tourism demand in the literature, followed by tourist nights. The number of tourist arrivals (TO_t) and the number of tourist nights (TN_t) in a given period *t* are used to measure the demand for tourism to Egypt in this thesis. These data are available as an aggregate measure of tourist arrivals and tourist nights as well as for tourist arrivals/nights from different regions, and are typically available over a long period of time.

In the econometric models, the lagged values of tourist arrivals and tourist nights are included as an explanatory variable in the short run to capture the habit persistence effect, word of mouth, or the quality of experience of the tourists in Egypt.

4.3.2 Explanatory Variables

In previous tourism demand studies, income, relative prices, transportation costs and dummy variables were the most common explanatory variables (Li et al., 2005). However, in recent studies, some new variables related to the destination countries have proved to be more important than those conventional variables, especially for the developing countries. The new variables capture health, education, infrastructure, length of coast, weather, and economic development (Eugenio-Martin et al., 2008), in addition to communication, political stability of the destination, and some economic indicators (Phakdisoth and Kim, 2007). In this thesis, the following are identified as potential explanatory variables: income, relative prices, non-Egypt prices, hotel capacity, globalization and political instability.

1) Income of Origin Countries (Y_t)

The inclusion of an income index as an explanatory variable is connected with the idea that the rapid growth of international tourism is due to the economic

> development after the Second World War, and that demand comes from a small number of countries, the so-called 'rich countries' (Gonzalez and Moral, 1995: 235).

It is argued that discretionary income[21] in the originating country should be used as the proxy for income in the demand model. However, it is difficult to obtain data about this variable in practice. Therefore, alternative measures of income have been used in many empirical studies, including GDP, Gross National Product (GNP), National Disposable Income (NDI), and Gross National Income (GNI), all in real terms (Song and Witt, 2006). For current purposes, constant GDP per capita of the tourist's country of origin measured in US$ (Year 2000 =100) is used as a measure of discretionary income. Specifically the variable is defined as the annual weighted average of GDP per capita of the countries of origin within each region of tourists and for total tourists to Egypt for each year over the period 1970-2009 as follows:

$$Y_t = \sum_{i=1}^{n} \left(GDP_{O_{i,t}} * w_{i,t} \right) \quad \ldots\ldots (4.3)$$

where Y_t is the income of origin countries for each region in year *t*, $GDP_{O_{i,t}}$ is the income of each originating country *i* within the region at year *t*, $w_{i,t}$ is the weight given for each country as the country's contribution of tourist arrivals from this region of origin to Egypt each year, and *n* is the number of originating countries in this region.

2) Relative Tourism Prices (P_t)

According to Lim (1997), relative prices are costs of goods and services that tourists have to pay at the destination, including food and drink, accommodation, shopping, local transportation, and entertainment. It is the second most common used explanatory variable in the literature, after income. Two components should be included in this variable: the cost of living at the destination and the travel cost. Travel costs data are not available or not reliable in most cases, therefore, they are omitted in most studies (Song and Witt, 2006) and this is also the case in the current thesis.

In measuring the cost of living in the destination, it is preferred to use tourism prices index, including prices of a basket of goods and services purchased by tourists; unfortunately such an index is not available. Whereas many studies include the effect of exchange rate together with that of consumer price index (CPI) in one variable - to

[21] Discretionary income is the remaining disposable income (excluding income taxes) after spending on necessities.

measure the effective prices - such as Jud and Joseph (1974), Mohammed (1977), Stronge and Redman (1982), Carey (1991), Algieri (2006), Saayman and Saayman (2008), and Choyakh (2008), other studies consider exchange rates separately, including Gray (1966), Tremblay (1989), Vogt and Wittayakorn (1998), Shan and Wilson (2001), Ossman and Elsayed (2009), and Ibrahim (2011). Martin and Witt (1987) evaluated the performance of consumer price index and/or exchange rate as measures of tourists' cost of living, and concluded that:

> The empirical results do not provide evidence of clear superiority, but rather indicate that the consumer price index (either alone or together with the exchange rate) is a reasonable proxy for the cost of tourism. Exchange rate on its own, however, is not an acceptable proxy (Martin and Witt, 1987: 245).

In the present thesis, the CPI of Egypt divided by the CPI of the originating countries, adjusted by nominal exchange rates between the currencies of the origin and destination countries, will be used as a proxy to reflect the relative effective price of tourism in Egypt, on the basis that domestic tourism according to tourists is the major competitor for foreign tourism. Merging the CPI and exchange rate in one variable allows more degrees of freedom, therefore increases the reliability of the estimation. Hence, relative prices (P_t) of tourism in Egypt in year *t* are expressed as following:

$$P_t = \sum_{i=1}^{n} \left\{ \left(\frac{CPI_{E,t}}{CPI_{Oi,t}} * EX_{Oi/E,t} \right) * w_{i,t} \right\} \qquad (4.4)$$

where $CPI_{E,t}$ is the CPI in Egypt in the year *t*, $CPI_{Oi,t}$ is the CPI in the origin country *i* in the year *t*, and $EX_{Oi,t/E,t}$ is an index of the price of origin currency in terms of the Egyptian pound in the year *t*. The relative price index is a weighted variable, since the weight associate each country $w_{i,t}$ is that country's contribution of tourist arrivals from this region of origin to Egypt in each year. Finally, *n* is the number of countries in each originating region.

3) Non-Egypt Prices (NP_t)

In addition to income and relative prices, substitute prices in alternative destinations have also proved to be an important factor. The closest alternatives to Egyptian tourism are the countries which provide similar tourism products and services; when tourism price changes in these alternatives, there will be an impact on the demand for tourism in Egypt (Song and Wong, 2003). Tunisia, Morocco, Syria, Israel, Jordan and Turkey have been chosen as the main competitors in tourism for Egypt based on the following criteria: first, the competitor's market share rankings as the top destinations for outbound tourists from each originating group within the Middle East and North Africa region; second, countries that provide similar tourism products and services, or have some common characteristic with Egypt - for example, with the exception of Jordan these have Mediterranean coasts.

The literature identifies two types of substitute tourism prices: the first allows for the substitutability between an underlying destination and a number of substitute destinations separately, as used in Kim and Song (1998) and Song et al. (2000). The second considers the price of tourism in an underlying destination relative to a weighted price index in various substitute destinations, where the weight is the relative market share of each substitute destination (Song and Witt, 2006). The latter form is used more frequently to reduce the number of variables in the model and allow more degrees of freedom. In the current research, a composite non-Egypt tourism price index will be constructed to measure the substitutability/complementary effects of tourism prices in the competitive destinations on tourism demand for Egypt from each origin group using the following formula:

$$NP_{C/O,t} = \sum_{i=1}^{k} \left[\left(\frac{CPI_{Ci,t}}{CPI_{O,t}} * EX_{O/Ci,t} \right) * W_{Ci,t} \right] \quad \ldots \ldots \ldots \ldots \ldots \ldots (4.5)$$

where $NP_{C/O,t}$ is the non-Egypt tourism prices index for each origin country for the year *t*, CPI_{Ci} is the CPI of each competing country, $EX_{O/Ci}$ is an index of the price of the origin's currency in terms of the currency of the competitor, *i* = 1, 2, ..., *k* selected competitors for each origin country, and W_{Ci} is the market share weight of selected competitors, which equals the number of tourist arrivals of each competitor from a specific origin divided by the total sum of tourist arrivals in all selected substitute destinations from this origin country. The composite non-Egypt price index for each region is an annual weighted average which allows for possible changes in market shares throughout the period of study as in Equation (4.6). The weight given to each origin country ($w_{i,t}$) is its share of tourist arrivals relative to the total tourist arrivals to Egypt each year, where the total depend on whether the model is being conducted for all countries or a sub-group.

$$NP_t = \sum_{i=1}^{n} \left(NP_{C/Oi,t} * w_{i,t} \right) \quad \ldots \ldots \ldots \ldots \ldots \ldots (4.6)$$

where NP_t is the composite non-Egypt prices index for each region of origin in period *t*, $NP_{C/Oi,t}$ is the non-Egypt price of each origin country *i* within each region, *n* is the number of origin countries in each region.

4) Accommodation Capacity (R_t)

The capacity of accommodation such as the number of rooms or beds in the destination has been used as a proxy for tourism supply in some literature, and tourism investment or gross fixed investments has represented the supply variable in other literature. Here, the number of rooms available will be used as a proxy for the accommodation capacity in Egypt over the period of the study.

5) Globalization (G_t)

Although modest efforts have been made in the literature to measure the effect of economic integration on the tourism demand in some destinations (Zhang and Jensen, 2007; Turner and Witt, 2001), no attempt has been made to investigate the effect of globalization on tourism demand.

In recent years, initial attempts have been made to measure globalization numerically, although none of them has been widely preferred upon the others. These measures can be divided into partial and composite measures. Economic indicators dominate the partial measures of globalization. The most common indicators are based on trade openness i.e. international trade in goods and services/GDP, imports/GDP, exports/GDP, and a foreign direct investment/GDP. Regarding the composite measures, the G-index is one of the first serious attempts to measure globalization, developed by the World Market Research Centre (WMRC) in 2001. This index defines globalization largely in terms of economic measures, which represent 90% weight within the index (Putko, 2006). In 2001, the A.T. Kearney Institute published a composite globalization index. It is a more comprehensive index than G-index, and measures globalization according to four aspects: economic integration, technological connectivity, personal contact and political engagement (ibid, 2006). The KOF index of globalization, introduced by KOF Swiss Economic Institute, involves a larger number of indicators than those indices mentioned previously. It includes economic indicators, including trade, foreign investment, income payments and tariff, taxes and barriers on international trade, in addition to political indicators and social indicators (see **Appendix 4, Table 1**). Furthermore, the KOF index is available for a long time series, and it is updated each year along with the appropriate changes in the weights of the sub variables in the index. It is currently available for 208 countries for the period 1970-2009, including 23 variables (Dreher et al., 2008). The KOF index of globalization was selected as a measure of globalization in this thesis because of its comprehensive coverage for a long time series; in addition, it allows direct comparison of a specific country's degree of globalization over time.

6) Political Instability (TV_t)

The tourism industry as a service is very sensitive to terrorism or political instability. The absence of violence is an accepted pre-requisite for tourism at any destination. However, more recently, the world has been increasingly threatened by terrorism, and acts of violence have increased across the world, especially in the Middle East region. Political instability and terrorism in Egypt were introduced in the study as a 'timing variable'. We assume that the effect of any shock takes one year to vanish completely, so each month after the incident takes the value of 1/12. For example, after the Arab-Israel war in Oct 1973, three months of riot is taken into consideration in 1973 and this year takes the value of (3/12), and the following year (1974) takes the value of (9/12), since it is hoped that this will capture the negative effect of 9 month of this shock and so on. Therefore the 'timing variable' takes a value of 1 for a specific year when a shock occurs in the first month of the year (January) and it takes 0 if there is not any riot in the year[22].

4.3.3 Data Aggregation Methods

In this thesis, aggregate data about tourist arrivals/nights are available for each region and for Egypt, and aggregate data about hotel capacity and globalization are also available. However GDP per capita, CPI, and exchange rates are provided for each country, which need to be aggregated to represent income, relative prices, and non-Egypt prices of tourism from the whole region or from worldwide to Egypt. For All Countries model, the income and relative prices of 46 worldwide origin countries were aggregated, representing about 90% of total tourist arrivals to Egypt in 2009. For the

[22] Ten events were considered as representing political instability in Egypt and the Middle East region during the period of the study, including the Arab-Israel war (Oct 1973), successive riots for political reasons (Oct 1985-Feb 1986), the second Gulf war (Aug 1990), successive terrorist events (Oct 1992-Jun 1994), the deadly attack on tourists in Luxor (Nov 1997), political unrest in the Middle East region (Al Aksa-Entefada, Nov 2000), 11 September attacks by Al-Qaeda upon US (Sep 2001), the Taba attack (Oct 2004) and a series of terror attacks in Sharm El Sheikh (July 2005).

European model, 14 countries from Western Europe[23] were considered, representing 70% of total European tourists to Egypt in 2009. For the Arab model, the income and price data of 13 Arab countries, representing 85% of total Arab tourists to Egypt, were aggregated. Finally, income and prices data of 6 American countries (North and South America), 94% of total American arrivals to Egypt in 2009, were aggregated to represent the income and prices in the Americas model along the period of the study.

No general method of aggregation was found in the literature. For instance, Artus (1970) used a Laspeyres index to aggregate the data; Kwack (1972) used the average of the share distribution; Lin and Sung (1983) used a flexible weighting scheme allowing for changes in shares every year; White (1985) and Tremblay (1989) used a Divisia index; Gonzalez and Moral (1995) aggregated the data using a weighted geometric average following Padilla (1988); and Saayman and Saayman (2008) used fixed weights given for each country in year 2000. This study aggregated the data of these three variables (Y_t, P_t and NP_t) by taking an annual weighted arithmetical average of the countries of origin in each group. The weight given for each country is the annual country's contribution of tourist arrivals from this group of origin to Egypt, to adjust for tourism market changes each year.

4.3.4 Data Sources

As the current research requires macro economic data to explore the research questions and to test the research hypotheses, the research should depend on secondary data about the tourist arrivals/nights and tourism prices in Egypt as well as other economic variables about Egypt and about fifty countries which reflect the worldwide countries of origin. Two sources of secondary data are required, national and international data. Data on the number of tourist arrivals, tourist nights and the number of hotel rooms in Egypt are obtained from national sources, whereas data about other variables are obtained from international sources as illustrated in **Table 4.1**. The Globalization index data are provided by the KOF Swiss economic institute, Dreher et al. (2008). All the data are quantitative, except for one qualitative variable, reflecting the political instability in Egypt during the study period.

[23] Although the Eastern Europe tourist arrivals to Egypt, especially from Russia, represented 30% of total European arrivals to Egypt in 2009, we prefer not to include these countries when aggregating the income, prices and substitute prices of the Europe model since the data about GDP and CPI of these countries are not available for all the study period.

Table 4.1: Variables and sources

Variable	Measure	Description	Source
Tourism demand (TO_t)	Tourist arrivals	Annual tourist arrivals from worldwide and three regions	Egypt Tourism in Figures, various issues
Tourism demand (TN_t)	Tourist nights	Annual tourist nights from worldwide and three regions	Egypt Tourism in Figures, various issues
Income (Y_t)	GDP per capita	The GDP per capita in origin countries in US$ terms (constant 2000=100)	WB, WDI, Online Data
Relative Prices (P_t)	CPI, exchange rate	CPI_E/CPI_O, adjusted by nominal exchange rates between the currencies of the origin and destination	WB, WDI, Online Data IMF, IFS, Online Data
Non-Egypt Prices (NP_t)	CPI, exchange rate	CPI_C/CPI_O, adjusted by nominal exchange rates between the currencies of the origin and competitor	WB, WDI, Online Data IMF, IFS, Online Data UNWTO, Year Book of Tourism Statistics, various issues
Tourism Supply (R_t)	Hotel Capacity	Number of hotel rooms available	Egypt Tourism in Figures CAPMAS, Egypt, various issues
Globalization (G_t)	KOF-index	Composite globalization index (23 variables)	Dreher, 2006: Updated in Dreher et al. (2008)
Political instability (TV_t)	Timing Variable	Political instability in the Middle East , wars, and violence in Egypt	

4.3.5 The Transformation of the Data

All the variables in the four models, except for TV_t, are transformed to log form for several reasons. The natural logarithm transformation may be helpful to obtain the normal distribution of the data. The estimated coefficients in this form are the elasticities of the explanatory variables to the tourism demand and the difference in logs approximates the growth rates, so the results will be interesting and easy to interpret because elasticity is unit-free; it measures the effect of a one percent change in an explanatory variable on the dependent variable regardless the units of each variable (Pindyck and Rubinfeld, 1991).

4.4 Methodology

During the last few decades, the methods of estimation of economic relationships have changed considerably. The estimation method of the standard regression model, OLS, is based on the assumption that the mean and variance of each variable in the model are constant over time - that is stationary variables. However, most macroeconomic time series variables are found to be non-stationary, they exhibit stochastic trend behaviour and are highly auto-correlated over time, so the mean and variance of the series are in general non-constant through time. Therefore, incorporating non-stationary variables in the regression equation using the OLS method gives misleading results and spurious regression (Granger and Newbold, 1974): very high R^2 (bigger than DW) and significant coefficients can be obtained even where no meaningful relationship exists between the variables in the regression. The high level of correlation between the variables in this regression actually reflects the trend components existing in the non-stationary series rather than the true causal relationship between the variables in the model (Lee, 2005).

In order to avoid spurious regression, considerable attention has been given to the univariate investigation of the properties of each individual series before model specification. However graphical inspection may give a general picture of the trend behaviour of the series, and its difference, it cannot differentiate between the deterministic and the stochastic trend in the data. Therefore, looking at time series plots alone is not enough to tell whether a series is stationary or non-stationary. Autocorrelation tests may also give indications of the integration status of the series, but it is just correlation, and more sophisticated models to suggest the relationships between a variable and lags of itself through regression model are required. This can be achieved using unit root tests.

4.4.1 Unit Root Tests

Two unit root tests, the Augmented Dickey Fuller (ADF) test (1979) and the Phillips Perron (PP) test (1988), are performed for all the variables specified in the four models.

4.4.1.1 Augmented Dickey Fuller (1979) Test

The ADF test begins with an autoregressive AR (k) model, since the explanatory variables are the dependent variable lagged k periods. The test corrects for higher order correlation by introducing lags of first differences of the dependent variable as regressors in Equation (4.7).

$$\Delta Y_t = \alpha + \delta t + \rho Y_{t-1} + \sum_{i=1}^{k} \gamma_i \Delta Y_{t-i} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.7)$$

where Y_t is the time series variable in period *t*, *t* denotes the deterministic time trend, ΔY_{t-i} are the lagged first differences to accommodate serial correlation in the errors ε_t, and α, δ, ρ, γ_i are the parameters to be estimated. Using Equation (4.7), a test for existence of the null of a unit root $H_0: \rho = 0$ performed against the alternative of $H_1: \rho < 0$. The test is performed sequentially. First, in order to determine the appropriate number of lags, an initial maximum lag length is selected, and the maximum lag is tested for significance using the *t*-ratio. If it is insignificant, the lag length is reduced successively until a significant lag length is obtained, or the regression runs out of lags. If no lagged first difference is used, the ADF test reduces to the Dickey Fuller (DF) test. Second, the significance of the linear time trend determines whether this trend should be omitted from the regression or not. Then, the calculated ADF test statistics are compared with the critical values from the nonstandard Dickey-Fuller distribution at the 5% level of significance. If the calculated *t*-stat of ρ is greater than the critical value (in an absolute value), we can reject the null hypothesis (unit root exists). Otherwise, the null hypothesis cannot be rejected, indicating that the variable is non-stationary in its level and the first difference of the series should be tested by the unit root test again, and this process should be repeated until we arrive at a stationary series and determine the order of integration of the variable (Lim and Mcaleer, 2001).

4.4.1.2 Phillips-Perron (1988) Test

The Phillips-Perron test builds on the Dickey Fuller test of the null of unit root exists: $H_0: \alpha = 0$ in Equation (4.8), but it proposes a nonparametric approach. Therefore it is applicable on wider categories of time series, including ARMA models and moving average models (Phillips and Perron, 1988).

$$\Delta Y_t = \alpha Y_{t-1} + u_t \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (4.8)$$

where Y_t is a time series and u_t is a sequence of innovations. While the ADF test addresses the problem of a higher order of autocorrelation by adding lagged difference terms of the dependent variable ΔY_{t-i} as regressors in the test equation, the PP test modifies the test statistic of the α parameter, so serial correlation does not affect the asymptotic distribution of the test statistic (Waheed et al., 2006).

The disadvantage of using a time series unit root test is the low power of these tests given the available sample sizes and time spans in economics. In contrast, panel data unit root tests are preferable since the cross-section variation provides information to time series variability and more degrees of freedom; therefore these tests give more precise results (Tasseven and Teker, 2009).

4.5 Empirical Results

It is important to examine the integration status of each variable before proceeding to the estimation in later chapters, to avoid bias and spurious results. The stationarity of the variables is tested using graphical inspection followed by time series unit root tests.

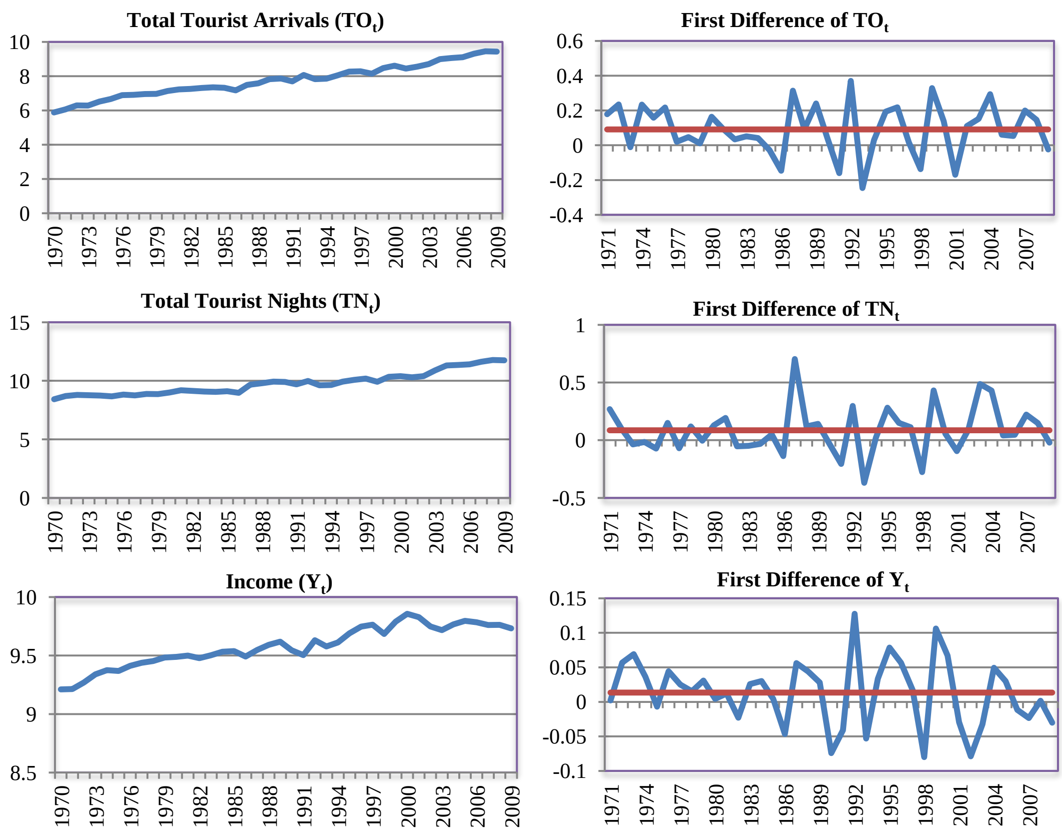
4.5.1 Univariate Results of the 'All Countries Model'

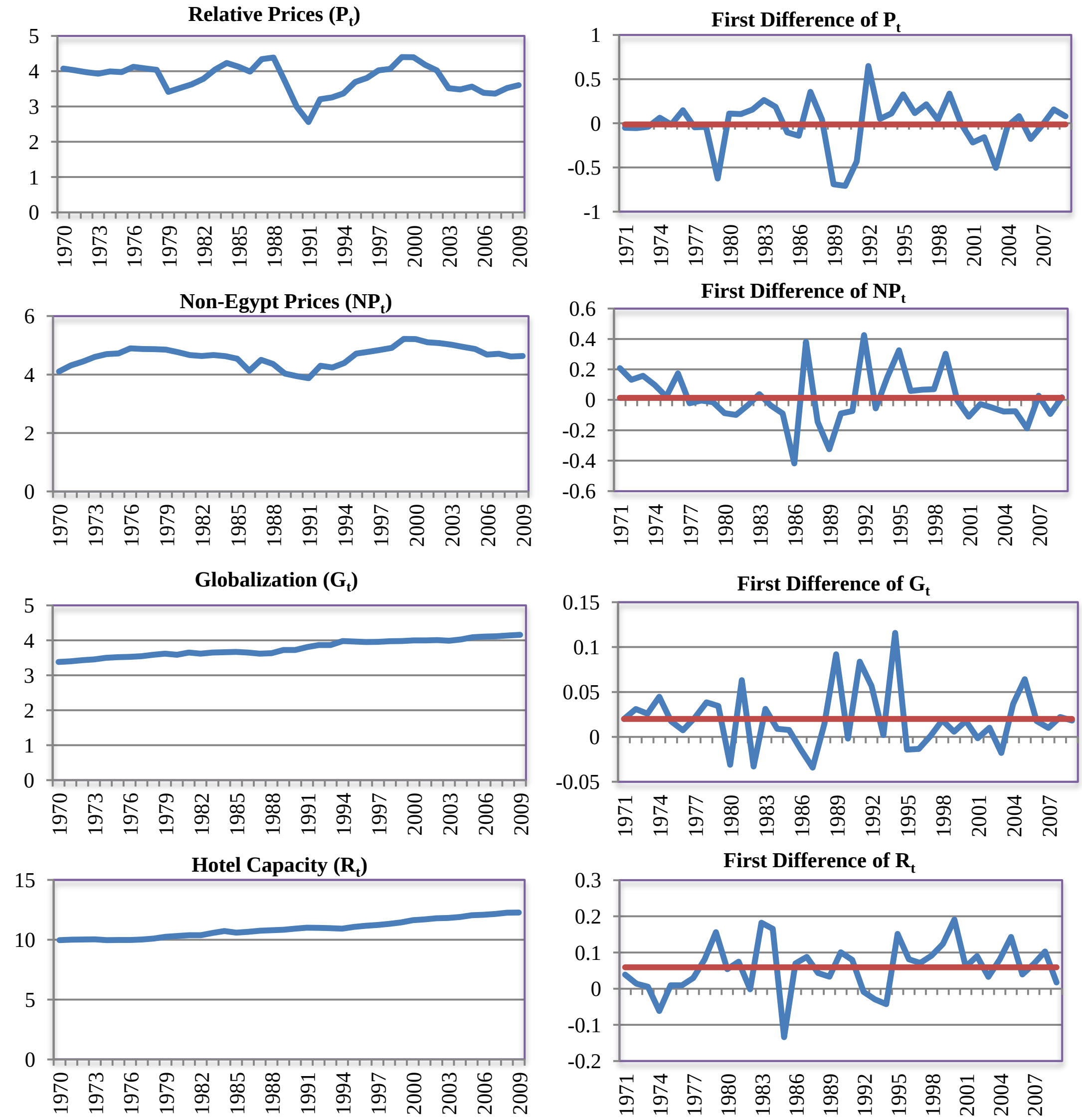
This model contains all countries of origin for tourism to Egypt through the period from 1970 to 2009. The sample period is from 1970 to 2009, including 40 observations. Detailed summary statistics about all the variables in the model are displayed in Appendix 4, **Table 2.**

4.5.1.1 Graphical Investigation

Graphical investigation of all the variables, in levels and first differences, across time is provided in **Figure 4.1** to discover the stationarity of the different series in the model.

Figure 4.1: Natural logarithm of the economic series and their first differences in 'All Countries' model





As can be observed in the left-hand panel of Figure 4.1, all the series in levels seem to have a trend (deterministic or stochastic), increasing or decreasing over time. In contrast, the right-hand panel of the figure shows the first differences of the different series which measure the percentage change or growth in the variables over time. These first differences of all the variables look very different from the series in levels since they do not reflect any trend behaviour over time and they fluctuate around the mean of this series (the red lines). This information may suggest that all the variables have unit root in levels, but are stationary in their first differences.

4.5.1.2 Time Series Unit Root Tests

Following the graphical investigation, time series unit root tests are applied on all the time series of the model as well as their first differences as a formal inspection of the integration status of these series. Both the ADF and the PP unit root tests are performed and the results are reported in **Table 4.2**.

Table 4.2: Unit root tests for 'All Countries' variables according to the appropriate deterministic trend

Variables in levels	Specification	ADF	PP	Variables in differences	Specification	ADF	PP
TO_t	constant+ trend	-3.6057 (0.042)	-3.6057 (0.042)	ΔTO_t	constant	-7.7696 (0.005)	-8.7433 (0.000)
TN_t	constant+ trend	-1.9706 (0.599)	-1.9050 (0.633)	ΔTN_t	constant	-6.8370 (0.000)	-6.9598 (0.000)
Y_t	constant+ trend	-2.2372 (0.454)	-2.4329 (0.358)	ΔY_t	constant	-6.2646 (0.000)	-6.6311 (0.000)
P_t	constant	-2.2301 (0.199)	-2.5031 (0.123)	ΔP_t	none	-4.6309 (0.000)	-4.4403 (0.000)
NP_t	constant	-2.0404 (0.269)	-2.2995 (0.178)	ΔNP_t	none	-5.9947 (0.000)	-6.0020 (0.000)
G_t	constant+ trend	-2.4297 (0.360)	-2.6077 (0.279)	ΔG_t	constant	-7.1215 (0.000)	-7.0640 (0.000)
R_t	constant+ trend	-2.2693 (0.440)	-2.2416 (0.454)	ΔR_t	constant	-5.3948 (0.000)	-5.3948 (0.000)

Source: Author's own calculations using EViews. P-values are reported in parentheses. The null hypothesis of these tests is that the time series has a unit root.

Regarding the ADF test, first, we followed Hall's general to specific approach (1994) and began from the model with constant and trend as well as maximum lag length[24] of 9. Then, we dropped the insignificant lags sequentially and repeatedly estimated lower orders of AR models until we obtained a model with significant lags or ran out of lags (DF test). In addition, we tested for the significance of the deterministic trend in the model through its p-value to determine whether this trend should be retained or omitted from the series.

At the 5% level of significance, the results of both tests indicate that TO_t is found to be a stationary variable around a linear trend, whereas the rest of the variables in the model are non-stationary in levels, but stationary in first differences, $I(1)$ variables, according to the appropriate specification of each series.

Based on these results, the co-integration relationship between tourist nights as a dependent variable and all the independent variables can be examined, in the next chapters, in the case of Engle Granger (EG), the Autoregressive Distributed Lag (ARDL) and Johansen Maximum Likelihood (JML) co-integration approaches, since all the variables are $I(1)$. However, we will use TO_t and TN_t as dependent variables in two

[24]As a rule of thumb for determining the maximum number of lags in the ADF test, $P_{max} = \left[12 * \left(\frac{T}{100}\right)^{\frac{1}{4}}\right]$, where T is the number of observations (T=40).

models in the case of JML approach without including trend, and in the case of the ARDL approach as it does not require that all the variables have the same integration order.

4.5.2 Univariate Results of the 'Europe Model'

The European region is the most important region for tourism in Egypt since it occupied 48% and 45% of total tourist arrivals and tourist nights to Egypt on average over the study period (1970-2009), increasing from 18% of total arrivals and 12% of total nights in 1970 to 75% of total arrivals and 71% of total nights in 2009. Summary Statistics of the variables in this model are displayed in Appendix 4, **Table 3**.

4.5.2.1 Graphical Investigation

The variables in their levels, as well as in their first differences, were plotted to show the stationarity characteristics for the different variables as reported in **Figure 4.2**.

The series in levels seem to have a trend, deterministic or stochastic. On the other hand, the first differences of the series reflect no trend behaviour over time and they fluctuate around the mean of these series. Whereas these series have positive means in the case of ΔTO_t, ΔTN_t, and ΔY_t, other series such as ΔP_t and ΔNP_t grow around the zero up and down (have no constant). This information may give us a general suggestion of the integration status of the variables, and then a formal inspection by unit root tests is required to determine these integration characteristics of the different series in the model.

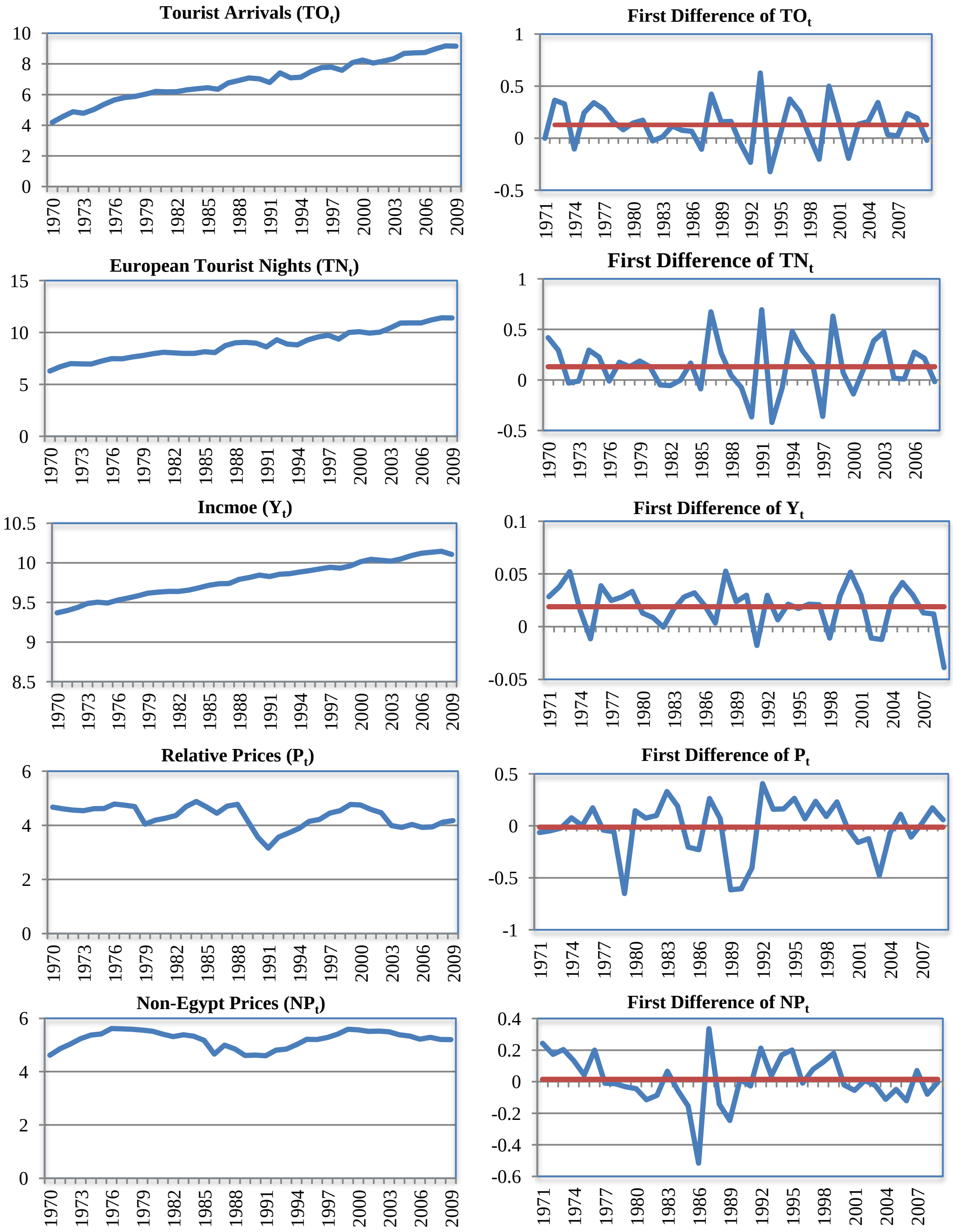


Figure 4.2: Natural logarithm of the economic series and their first differences in Europe Model

4.5.2.2 Time Series Unit Root Tests

The results of ADF and PP tests for all the variables are reported in **Table 4.3** according to the appropriate deterministic trend in each series. At the 5% level of significance, the results indicate that the two alternative dependent variables are $I(0)$, or stationary variables around a linear trend. However all the other variables are $I(1)$. The results indicate that the variables of this model have different integrated order, consequently, we cannot perform the EG co-integration test for this model, but the JML and the ARDL co-integration tests can be performed.

Table 4.3: Unit root tests for 'Europe Model' variables according to the appropriate deterministic trend

variables in levels	Specification	ADF	PP	differenced variables	Specification	ADF	PP
TO_t	Constant& trend	-4.4302 (0.006)	-4.4162 (0.006)	ΔTO_t	constant	-7.8979 (0.000)	-9.7005 (0.000)
TN_t	Constant& trend	-3.7643 (0.030)	-3.7643 (0.030)	ΔTN_t	constant	-7.6682 (0.000)	-13.2964 (0.000)
Y_t	Constant& trend	-3.0323 (0.137)	-1.6898 (0.737)	ΔY_t	constant	-4.8535 (0.000)	-4.3795 (0.000)
P_t	constant	-2.0656 (0.259)	-2.3287 (0.168)	ΔP_t	none	-4.4629 (0.000)	-4.2557 (0.000)
NP_t	constant	-2.1830 (0.215)	-2.4877 (0.126)	ΔNP_t	none	-5.6975 (0.000)	-5.7147 (0.000)

Source: Author's own calculations using EViews. P-values are reported in parentheses. The null hypothesis of these tests is that the time series has a unit root.

4.5.3 Univariate Results of the 'Arab Model'

The Arab region is the second most important region for tourism in Egypt, after the European region. It attained 36.2% and 42.5% of total tourist arrivals and tourist nights to Egypt on average over the study period (1970-2009), but its share has decreased dramatically over the study period from 64.5% of total arrivals and 80.4% of total nights in 1970 to 15% of total arrivals and 19.8% of total nights in 2009. Summary Statistics of the variables are reported in Appendix 4, **Table 4.**

4.5.3.1 Graphical Investigation

Graphical inspection of all the variables in their levels, as well as in their first differences is required before performing unit root tests to show the stationarity characteristics for these variables. All the series in levels seem to have a trend, increasing or decreasing over time. In contrast, the first differences of the different series reflect no trend behaviour over time and they fluctuate around the mean of this series. This can suggest that the variables in this model are *I*(1) variables as illustrated in **Figure 4.3**.

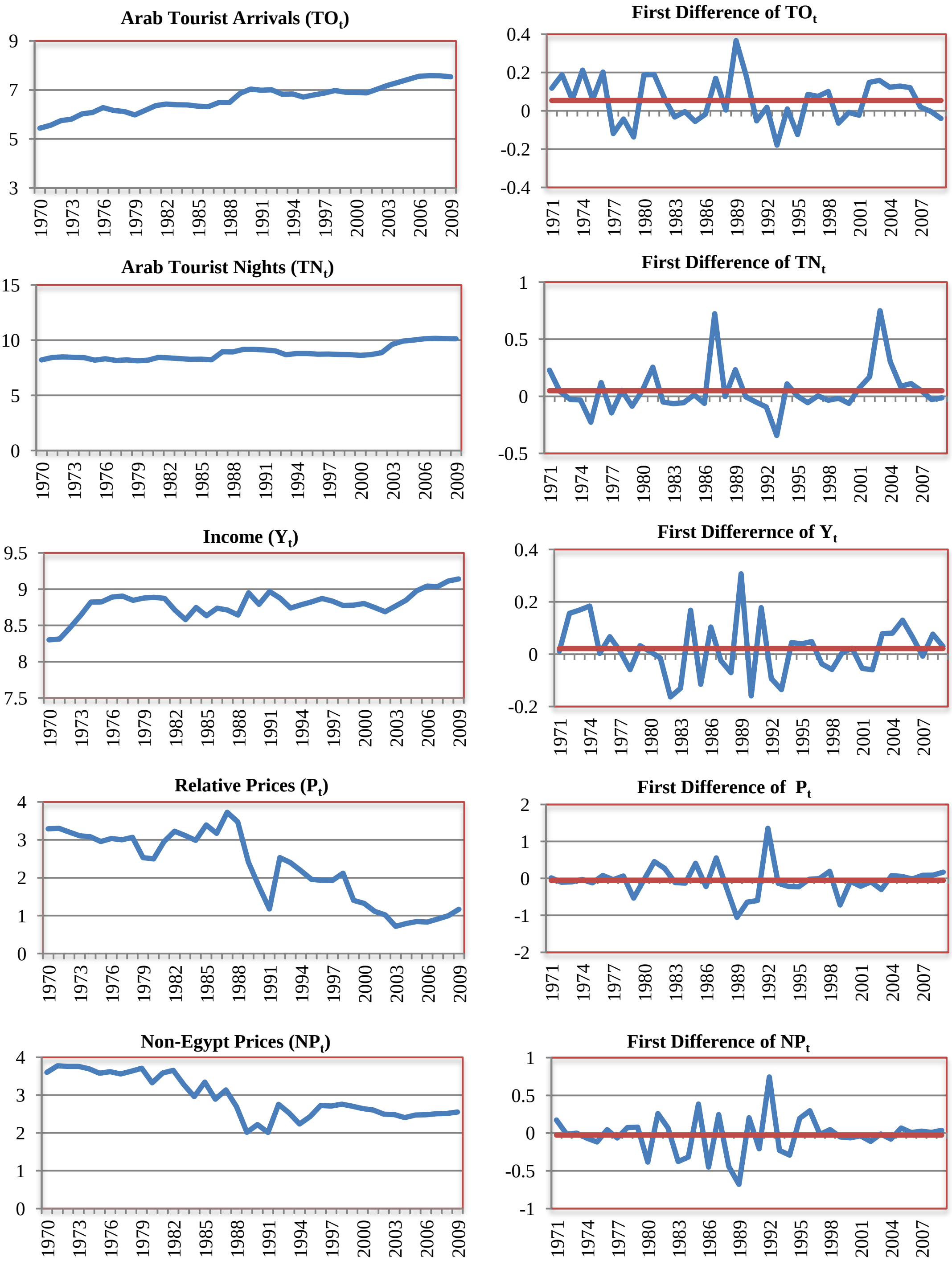


Figure 4.3: Natural logarithm of the economic series and their first differences in Arab Model

4.5.3.2 Time Series Unit Root Tests

By conducting the ADF and PP unit root tests on all the time series of the model as well as their first differences as illustrated in **Table 4.4**, the results suggest that the variables are found to be integrated of order one for both tests at the 5% level of significance. As a result, we can continue by performing the EG, ARDL and JML co-integration tests on all the variables in the model, using TO_t as a dependent variable in one model and TN_t as a dependent variable in the other.

Table 4.4: Unit root tests for 'Arab Model' variables according to the appropriate deterministic trend

Variables in levels	Specification	ADF	PP	Variables in difference	Specification	ADF	PP
TO_t	constant+ trend	-2.7470 (0.225)	-2.9713 (0.153)	ΔTO_t	constant	-5.0103 (0.000)	-4.9717 (0.000)
TN_t	constant+ trend	-2.7465 (0.225)	-1.7990 (0.686)	ΔTN_t	none	-5.1034 (0.000)	-5.1479 (0.000)
Y_t	constant	-2.6545 (0.091)	-2.6628 (0.090)	ΔY_t	constant	-6.8779 (0.000)	-6.8364 (0.000)
P_t	constant+ trend	-2.7488 (0.224)	-2.6141 (0.277)	ΔP_t	none	-5.9884 (0.000)	-6.1231 (0.000)
NP_t	constant+ trend	-2.5273 (0.314)	-2.4361 (0.356)	ΔNP_t	none	-8.0367 (0.000)	-8.2598 (0.000)

Source: Author's own calculations using EViews. P-values are reported in parentheses. The null hypothesis of these tests is that the time series has a unit root.

4.5.4 Univariate Results of the 'Americas Model'

The Americas region is one of the main sources of tourism to Egypt over the period of the study (1970-2009). It held 8% of total tourist arrivals to Egypt on average of the study period, its share doubling from 7% in 1970 to 14% in 1985, then decreasing gradually up to the end of the study to reach just 3.9% in 2009. The same trend occurred in the case of tourist nights, since its contribution to total tourist nights increased sharply from 2.8% in 1970 to 12.9% in 1985, and then decreased gradually to reach 4.6% in 2009. Summary Statistics of all the variables in this model are provided in Appendix 4, **Table 5**.

4.5.4.1 Graphical Investigation

Figure 4.4 introduces time series plots of all the variables in their levels, as well as in their first differences from 1970 to 2009. A growth trend can be observed in almost all of the levels of the series, which may lead to the suspicion that these series seem to have a trend (deterministic or stochastic). In contrast, the first differences of the different series reflect no trend behaviour over time and they fluctuate around the mean of these series.

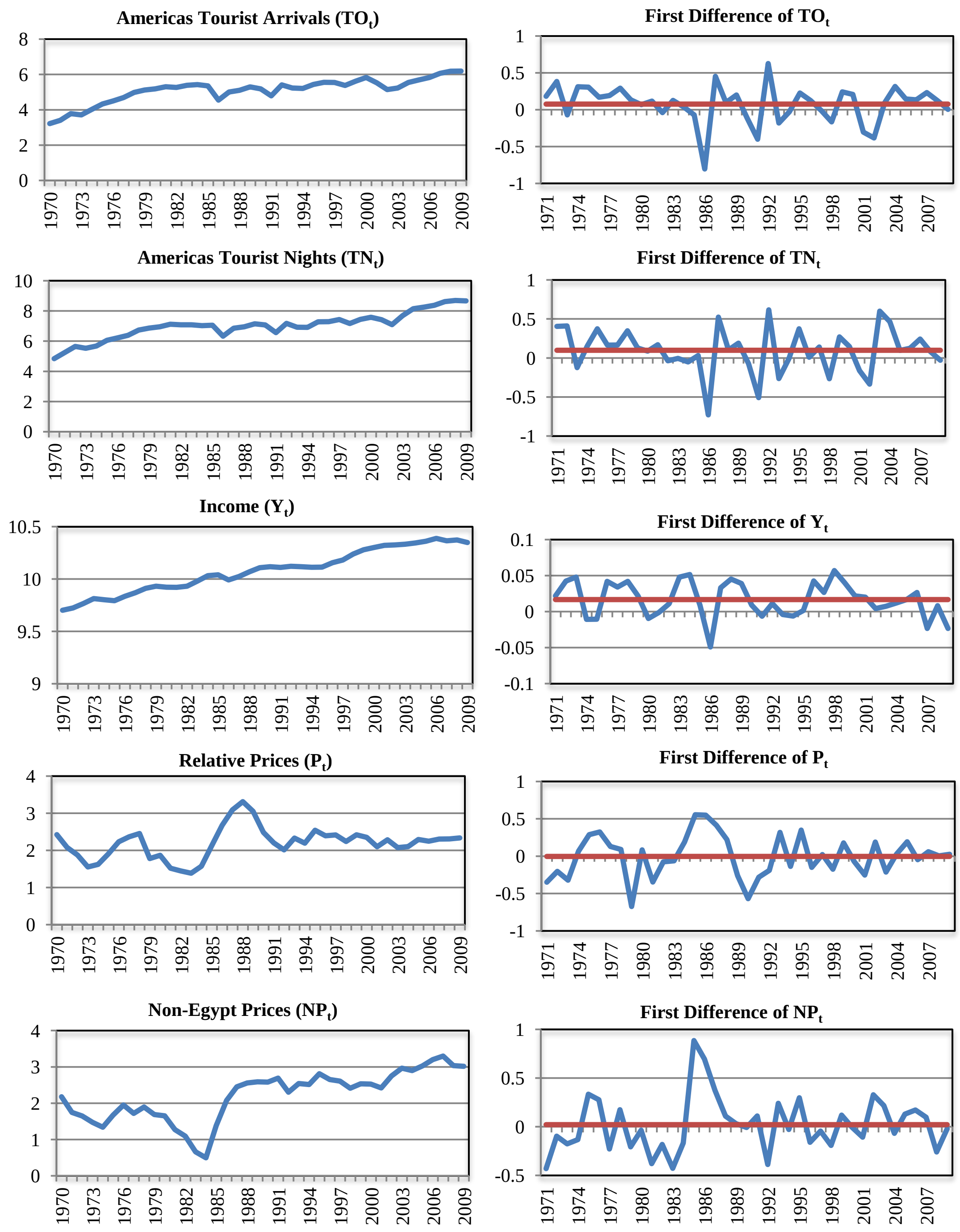


Figure 4.4: Natural logarithm of the economic series and their first differences in the Americas Model

4.5.4.2 Time Series Unit Root Tests

The degree of integration of the model's variables is checked by performing both the ADF and PP unit root tests on the levels as well as the first differences of all the variables as illustrated in **Table 4.5**. The results of both tests indicate that the variables are non-stationary in level, but stationary in their first differences, or *I*(1) variables. Consequently, we can perform the EG, ARDL and JML co-integration approaches on all the variables in the model, using both TO_t and TN_t as dependent variables.

Table 4.5: Unit root tests for 'Americas' variables according to the appropriate deterministic trend

Variables in levels	Specification	ADF	PP	Variables in difference	Specification	ADF	PP
TO_t	constant+ trend	-2.9691 (0.154)	-2.9081 (0.171)	ΔTO_t	constant	-6.7473 (0.000)	-6.8427 (0.000)
TN_t	constant+ trend	-2.9345 (0.163)	-2.8876 (0.177)	ΔTN_t	constant	-7.4811 (0.000)	-7.4811 (0.000)
Y_t	constant+ trend	-2.2069 (0.473)	-1.8515 (0.660)	ΔY_t	constant	-4.3744 (0.001)	-4.0691 (0.003)
P_t	constant	-2.1279 (0.235)	-2.4120 (0.145)	ΔP_t	none	-4.6362 (0.000)	-4.6503 (0.000)
NP_t	constant+ trend	-2.6403 (0.266)	-2.6403 (0.266)	ΔNP_t	none	-4.7681 (0.000)	-4.7250 (0.000)

Source: Author's own calculations using EViews. P-values are reported in parentheses. The null hypothesis of these tests is that the time series has a unit root.

These results are consistent with earlier tourism demand literature in most cases. Whereas worldwide tourist arrivals and European tourist arrivals and nights are trend stationary variables, both tourism demand's proxies are $I(1)$ variables in the other models. No consensus about the integration status of such variables has been found in the literature. Algieri (2006) tested the order of integration of tourism revenue in Russia, using both the ADF and PP tests, and suggested that this series is $I(1)$. Mervar and Payne (2007) indicated that the series of European tourist nights in Croatia is also integrated of order one. In contrast, Brida et al. (2008) performed unit root tests on tourist expenditure and tourist arrivals from US to Mexico, and the results indicated that both variables are trend stationary. Saayman and Saayman (2008) performed both the ADF and PP tests to examine the unit root of tourist arrivals from different regions to South Africa, and the results revealed that arrivals from America are $I(1)$; arrivals from Europe are $I(0)$ according to the PP but $I(1)$ according to the ADF; arrivals from Africa are $I(0)$; arrivals from Asia and Australia are $I(0)$ according to the ADF but $I(1)$ according to the PP test. Finally, Choyakh (2008) performed the ADF and Zivot & Andrews (1992) unit root tests for European tourist nights in Tunisia. The results of the ADF test indicated that tourist nights from France and Germany are stationary variables in levels with constant, but non-stationary with constant and trend, tourist nights from UK are $I(0)$, and tourist nights from Italy are $I(1)$. However, the Zivot & Andrews unit root test indicated that all the series are non-stationary in levels, but stationary in first differences.

According to the present models, income series is $I(1)$ in the case of all the models, including the appropriate deterministic trend. The literature supports this result, since Algieri (2006) and Mervar and Payne (2007) revealed that world income and European income are $I(1)$ variables according to both the ADF and PP unit root tests. Brida et al. (2008) suggested that US income is trend stationary variable, whereas Choyakh (2008) found that French, German and Italian income series are $I(0)$ with constant but $I(1)$ with trend and constant, and the UK income is $I(1)$ series.

In the present models, relative prices, relative non-Egypt prices and hotel capacity series are always $I(1)$ whether including constant only or including both constant and trend. Algieri (2006) and Brida et al. (2008) suggested that relative prices are $I(1)$ series. Choyakh (2008) also revealed that this variable as well as substitute prices are $I(1)$ variables. As a proxy for tourism supply, Brida et al. (2008) indicated that public investment is trend stationary variable, however, Saayman and Saayman (2008) and Choyakh (2008) suggested that hotel rooms and tourism investment are $I(1)$ variables.

4.6 Summary and Conclusion

Four different time series models of tourism demand for Egypt were constructed: All Countries model, Europe model, Arab model and the Americas model representing all origins, as well as three individual regions of origin in Egypt. The same variables were specified for all the models for the period 1970-2009. Tourist arrivals and tourist nights were specified as dependent variables in two different models for each region, whereas the income, relative prices, non-Egypt prices, globalization, hotel capacity and political instability were specified as the most important determinants of tourism in Egypt. The definitions of these variables, the adopted proxies, and data sources were explained in detail. The data of income, relative prices and non-Egypt prices were aggregated using the annual weighted average of the countries of origin in each group. The weight given for each country is country's contribution of tourist arrivals from this group of origin to Egypt, to reflect tourism market's changes each year. All the variables, except political instability, were transformed to natural logarithms, so that the estimated parameters are elasticities.

The properties and the stationarity status of the different time series of all the models were examined through graphical inspection, and two time series unit root tests (ADF and PP tests). The same results for both the ADF and the PP unit root tests were obtained for all the series, which gave us more confidence in these results.

For All Countries model, including the appropriate deterministic trend of each series, all the variables are integrated of order one, except for TO_t, which is found to be $I(0)$

variable around a linear trend. Therefore for this model, co-integration analysis can be performed, based on the EG, ARDL and JML, between tourist nights and all the explanatory variables. In addition, the co-integration relationship between tourist arrivals and the explanatory variables can be examined using both the ARDL and JML co-integration approaches.

Regarding the Europe model, the unit root results indicate that both TO_t and TN_t are stationary variables around deterministic trends, whereas the rest of the variables are $I(1)$ according to the appropriate deterministic components of each variable. Different integration orders for the variables have been proved, therefore we cannot perform the EG, but the other two approaches can be performed to examine the co-integration relationship between tourism demand for Egypt from Europe and its main determinants.

Finally, for both Arab model and the Americas model, all the variables are found to be $I(1)$ with the appropriate deterministic trend, so there are no limitations on performing the co-integration tests between tourist arrivals or tourist nights and all the explanatory variables. Hence, two models for each group will be performed, and three co-integration approaches will be applied on each model.

Appendix 4

Table 1: 2011 KOF index of globalization: variables and weights

Indices	Sub-Indices	Variables Definition	Weights	Sub-Indices Weight	Indices Weight
Economic globalization	Actual Flows	Trade (percent of GDP)	(22%)	(50%)	[36%]
		Foreign Direct Investment, stocks (percent of GDP)	(29%)		
		Portfolio Investment (percent of GDP)	(22%)		
		Income Payments to Foreign Nationals (percent of GDP)	(27%)		
	Restrictions	Hidden Import Barriers	(22%)	(50%)	
		Mean Tariff Rate	(28%)		
		Taxes on International Trade (percent of current revenue)	(27%)		
		Capital Account Restrictions	(23%)		
Social Globalization	Data on Personal Contact	Telephone Traffic	(26%)	(33%)	[38%]
		Transfers (percent of GDP)	(2%)		
		International Tourism	(26%)		
		Foreign Population (percent of total population)	(20%)		
		International letters (per capita)	(25%)		
	Data on Information Flows	Internet Users (per 1000 people)	(36%)	(36%)	
		Television (per 1000 people)	(37%)		
		Trade in Newspapers (percent of GDP)	(28%)		
	Data on Cultural Proximity	Number of McDonald's Restaurants (per capita)	(43%)	(31%)	
		Number of Ikea (per capita)	(44%)		
		Trade in books (percent of GDP)	(13%)		
Political Globalization		Embassies in Country	(25%)		[26%]
		Membership in International Organizations	(28%)		
		Participation in U.N. Security Council Missions	(22%)		
		International Treaties	(25%)		

Source: Dreher, 2006, Updated in Dreher et al., 2008. Notes: The number in parentheses indicates the weight used to derive the indices. Weights may not sum to 100 because of rounding.

Table 2: Summary statistics for variables of All Countries Model (1970-2009)

variables	TO_t	TN_t	Y_t	P_t	NP_t	G_t	R_t
Mean	2286.09	17518.28	14457.95	44.49	103.08	43.71	55759.33
Maximum	12835.88	129236.59	19102.99	81.54	184.14	63.85	214528.96
Minimum	357.99	4573.80	10006.60	12.90	48.09	29.34	21366.94
Skewness	0.04	0.66	-0.32	-0.75	-0.48	0.02	0.32
Kurtosis	2.21	2.40	2.27	3.45	2.70	1.67	1.92
JB Test	1.04 (0.59)	3.49 (0.17)	1.59 (0.45)	4.07 (0.13)	1.67 (0.43)	2.94 (0.23)	2.61 (0.27)
Q(20)	164.60 (0.00)	154.84 (0.00)	163.99 (0.00)	125.54 (0.00)	173.41 (0.00)	203.05 (0.00)	189.71 (0.00)

Source: Author's own calculations using EViews. P-values are reported in parentheses, JB is the Jarque-Bera (1980) test and Q is the Ljung-Box (1978) statistic of autocorrelation.

Table 3: Summary statistics for the variables in Europe Model (1970-2009)

Variables	TO_t	TN_t	Y_t	P_t	NP_t
Mean	1026.70	7039.30	17908.27	75.50	183.38
Maximum	9621.70	90870.40	25482.83	131.85	274.71
Minimum	66.00	538.00	11726.93	23.46	98.94
Skewness	-0.13	0.19	-0.14	-0.81	-0.65
Kurtosis	2.17	2.08	1.88	3.08	2.28
JB Test	1.25 (0.54)	1.64 (0.44)	2.21 (0.33)	4.33 (0.11)	3.72 (0.16)
Q(20)	168.25 (0.00)	168.26 (0.00)	196.70 (0.00)	99.33 (0.00)	207.65 (0.00)
Observations	40	40	40	40	40

Source: Author's own calculations using EViews. P-values are reported in parentheses.

Table 4: Summary statistics for the variables in Arab Model (1970-2009)

Variables	TO_t	TN_t	Y_t	P_t	NP_t
Mean	761.70	6800.80	6592.30	9.60	19.00
Maximum	1959.90	26141.50	9319.10	41.50	43.60
Minimum	231.00	3408.00	4025.80	2.00	7.50
Skewness	-0.12	1.03	-0.77	-0.31	0.18
Kurtosis	2.30	2.90	4.31	1.63	1.64
Jarque-Bera	0.90 (0.64)	7.14 (0.03)	6.85 (0.03)	3.75 (0.15)	3.31 (0.19)
Q(20)	145.60 (0.00)	92.57 (0.00)	50.40 (0.00)	174.03 (0.00)	173.50 (0.00)
Observations	40	40	40	40	40

Source: Author's own calculations using EViews. P-values are reported in parentheses.

Table 5: Summary statistics for variables in the Americas Model (1970-2009)

Variables	TO_t	TN_t	Y_t	P_t	NP_t
Mean	165.20	1112.70	23849.80	9.00	9.10
Maximum	488.80	5988.40	32472.50	27.50	27.00
Minimum	25.00	126.00	16345.70	3.99	1.60
Skewness	-1.04	-0.23	-0.09	0.27	-0.61
Kurtosis	3.71	3.17	1.87	3.51	2.65
Jarque-Bera	8.06 (0.02)	0.40 (0.82)	2.19 (0.34)	0.900 (0.64)	2.71 (0.26)
Q(20)	72.76 (0.00)	86.34 (0.00)	189.69 (0.00)	81.35 (0.00)	122.75 (0.00)
Observations	40	40	40	40	40

Source: Author's own calculations using EViews. Note: Numbers between parentheses refer to the probability of the test statistics.

Chapter 5: Co-Integration and Error Correction Estimation 'The Single Equation Approach'

5.1 Introduction

The aim of this chapter is to estimate the international tourism demand for Egypt for the period 1970-2009 in order to analyse the effects of various determinants, considering the long-run equilibrium and the short-run dynamics simultaneously. The co-integration approach associated with the error correction mechanism (ECM) has been selected for this purpose. Two alternative econometric approaches of co-integration: the Engle Granger two-step (EG2S) and Auto Regressive Distributed Lag (ARDL) are utilized in this chapter, as a single equation approache to co-integration, whereas the Johansen Maximum Likelihood procedures (JML) will be applied in Chapter 6, as a system of equations approach.

The rest of the chapter is organized as follows. Section 5.2 justifies the selection of the co-integration approach to model tourism demand for Egypt, involving the definition of co-integration and the ECM. The procedures of the EG2S approach and the empirical results of tourism demand models in Egypt, including the estimated long-run and short-run elasticities of tourism demand for the period 1970-2009, are provided in Section 5.3. Section 5.4 explains the procedures of the ARDL co-integration approach and considers the empirical results of the international tourism demand models for Egypt from its source markets. Finally some concluding remarks are provided in Section 5.5.

5.2 Selection of Co-Integration Approach

Until the beginning of the 1990s, static regression dominated tourism demand literature. That approach suffers from various statistical problems, such as spurious regression, since it assumes that all the variables in the model are stationary. It has been proved from the literature that the data on tourism demand, income and prices are mostly non-stationary variables; therefore the mean is not zero and the variance is infinite. Consequently, the assumptions of the OLS estimator are violated and it does not produce reliable estimates and the regression tends to be spurious. Moreover, the forecasting performance of these models has been found to be poor and cannot compete with the simplest time series models as suggested by Martin and Witt (1988) and Witt and Witt (1995).

In an attempt to solve the problem of spurious regression, researchers use differenced variables in the model to obtain stationary variables, but in this case very important information related to the long-run analysis is lost. The co-integration approach is very attractive since it retains the long-run relations and obtains highly consistent parameters in the long run (Stock and Watson, 1988). Moreover, the associated ECM estimates the short-run dynamics relations; in addition the speed of adjustment toward the log-run equilibrium can be measured. However, there are some restrictions (integration and co-integration tests) that the model has to overcome in order to apply this approach.

In practice, our univariate investigation in Chapter 4 ascertains that time series variables on the tourism demand for Egypt are mostly non-stationary, $I(1)$. Therefore we consider the co-integration and ECM approach in this study to account for the possibility of spurious regression and estimate the long-run equilibrium relations, coupled with the short-run dynamics relations using a single equation approach and a system of equations approach.

5.2.1 The Concepts of Co-Integration and Error Correction

> If each element of a vector of time series x_t first achieves stationarity after differencing, but a linear combination $\acute{\alpha} x_t$ is already stationary, the time series x_t are said to be co-integrated with co-integrating vector α. There may be several such co-integrating vectors so that α becomes a matrix. Interpreting $\acute{\alpha} x_t = 0$ as a long-run equilibrium, co-integration implies that deviations from equilibrium are stationary, with finite variance, even though the series themselves are nonstationary and have infinite variance (Engle and Granger, 1987: 251).

According to that definition, for some non-stationary variables that belong to the same economic system, there may be an attractor which prevents these variables from going away from each other. This power of equilibrium, which forces the variables to move together in the long run, is called a co-integration relation. Two conditions are required for a co-integration relation to exist between set of variables; the economic variables are non-stationary, and the residuals of the static regression of these variables are stationary. If there are n variables in the model, there may exist more than one co-integrating relation and up to $(n-1)$ relations.

The co-integrating regression considers only the long-run property of the model, rather than the short-run dynamics. According to the Granger representation theorem of Engle and Granger (1987), co-integrated variables can be transformed to ECM[25] and *vice versa*. So, the co-integration and ECM together describe both the long-run equilibrium and short-run dynamics simultaneously. Whereas the long-run equilibrium behaviour of tourists is of major importance for policy makers and planners, the short-run dynamics are also very important for short-run business forecasting and managerial decisions (Song et al., 2009).

Two principal co-integration and error correction approaches have been applied to model and forecast tourism demand since the mid 1990s: the two step residual-based approach of Engle and Granger (1987) and the system-based reduced rank regression approach or JML approach (Johansen, 1988, 1991, 1995; Johansen and Juselius, 1990, 1992). Other procedures are also used, such as the auxiliary regression procedures of Park (1990) and the stochastic common trends approach by Stock and Watson (1988). All of these approaches require that all the underlying variables are $I(1)$. However, Pesaran and Shin (1998) and Pesaran et al. (2001) developed the ARDL modelling approach of co-integration analysis, which permits a co-integration relation to exist whether the underlying variables are $I(1)$, or a combination of both $I(1)$ and $I(0)$ variables. All are alternative approaches that can be effectively used to model and forecast tourism demand, but due to their different modelling strategies, these models are more likely to produce demand parameters with large discrepancies for the same data set (Song et al., 2009).

5.3 The Engle Granger Approach

Engle and Granger (1987) proposed a technique for testing and estimating the potentially co-integrated variables. They first estimate the parameters of a static relationship between $I(1)$ variables using the OLS technique and then apply the unit root tests to the residuals. If the null hypothesis of a unit root exists is rejected, the null hypothesis of no co-integration between a set of $I(1)$ variables can be also rejected, indicating that the concerning series are co-integrated (The Royal Swedish Academy of Sciences, 2003). One of the best features of the EG approach is that it is the first attempt to formalize the concept of co-integration to be applied empirically. In addition, it is easy to understand and to implement as illustrated in the next section.

[25] The ECM has been introduced by Sargan in 1964.

5.3.1 The Engle Granger Approach's Procedures

The order of integration of the underlying variables has to be identified as a prerequisite for testing for a co-integration relation among these variables. Then, the EG approach involves two different steps. The first step is to estimate the static regression between the underlying variables, using the OLS, and retain the residuals (ε_t) of this regression.

$$TO_t = \beta_0 + \beta_1 Y_t + \beta_2 P_t + \beta_3 NP_t + \beta_4 G_t + \beta_5 R_t + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots .. (5.1)$$

where the left hand side of the equation is the demand for tourism reflected by tourist arrivals (TO_t). The right hand side of the equation represents the explanatory variables: income (Y_t), relative prices (P_t), relative non-Egypt prices (NP_t), globalization (G_t) and hotel capacity (R_t), all in the natural logarithm form. β_0 is a drift term, $\beta_1, \beta_2, \beta_3, \beta_4$ and β_5 are the long-run elasticities to be estimated; ε_t is random errors. Another equation for each region is also estimated using tourist nights (TN_t) as a dependent variable.

Engle and Granger (1987) suggested an informal test of co-integration using the DW statistic after the long-run regression, which is called the Co-Integration Durbin Watson (CIDW). If the DW after the regression approaches zero, the test cannot reject non-co-integration; if the DW is big, specifically bigger than R^2, we can reject the null and suggest that the variables are co-integrated. The CIDW test might be used as a quick approximate result before performing the ADF test.

The second step in the EG approach is to test the co-integration relation by employing the ADF or PP unit root tests on the residuals of Equation (5.1) (without including trend or constant) to test whether the estimated residuals are stationary or not as in Equation (5.2).

$$\Delta\hat{\varepsilon}_t = \vartheta^* \hat{\varepsilon}_{t-1} + \sum_{i=1}^{p} \gamma_i^* \Delta\hat{\varepsilon}_{t-i} + \omega_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (5.2)$$

The null hypothesis of this test is that the residuals are non-stationary or have a unit root. The calculated *t*-value of the estimated coefficient ϑ^* cannot be compared with the critical values of the ADF test as in the case of the unit root test for any variable for two reasons. The OLS estimator minimizes the sum of the squared residuals; therefore residuals may appear stationary even if the variables are not co-integrated. Moreover, the number of variables in the regression affects the *t*-statistics. Therefore the use of the critical values of ADF tends to over reject the null of no-co-integration. To solve this problem, MacKinnon (1991) re-calculated the ADF critical values taking into account the number of $I(1)$ variables in the long run at different sample sizes (Song et al., 2009). If the computed t-value is smaller than (more negative than) the MacKinnon critical value, we can reject the null of residuals' non-stationarity (no co-integration exists). Whenever we can prove the co-integration relation among the variables in the model, we can interpret the long-run static regression in Equation (5.1) as a long-run equilibrium relation. Otherwise the regression is prone to be spurious and the estimated elasticities in this case do not reflect any real or meaningful relation.

After confirming the co-integration relation among the underlying variables, an ECM can be constructed. Starting from Equation (5.1), the error correction term can be defined by Equation (5.3).

$$\varepsilon_t = TO_t - (\beta_0 + \beta_1 Y_t + \beta_2 P_t + \beta_3 NP_t + \beta_4 G_t + \beta_5 R_t) \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (5.3)$$

where βs are co-integrating coefficients, and ε_t is the equilibrium errors. Then an ECM of tourist arrivals model is simply defined as in Equation (5.4).

$$\Delta TO_t = \alpha_0 + \sum_{i=1}^{p-1} \alpha_{1i} \Delta TO_{t-i} + \sum_{i=0}^{p-1} \alpha_{2i} \Delta Y_{t-i} + \sum_{i=0}^{p-1} \alpha_{3i} \Delta P_{t-i} + \sum_{i=0}^{p-1} \alpha_{4i} \Delta NP_{t-i} + \sum_{i=0}^{p-1} \alpha_{5i} \Delta G_{t-i} + \sum_{i=0}^{p-1} \alpha_{6i} \Delta R_{t-i} + \alpha_7 TV_t - \varphi EC_{t-1} + \omega_t \dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (5.4)$$

where Δ is the first difference operator, p is the optimal lag order in levels of all the variables, αs are the short-run parameters, EC_{t-1} is equilibrium errors occurred in the previous period, φ is the speed of adjustment toward the long-run steady state equilibrium, which is expected to be negative and significant and ω_t is independent and identically distributed (IID) errors.

The ECM in Equation (5.4) simply says that ΔTO_t can be explained by lagged differenced dependent and explanatory variables with an appropriate number of lags (according to the information criteria; AIC, SC and HQ), political instability, and one lag of the residuals obtained from the long-run static regression. Thus the ECM has both long-run and short-run properties. The long-run behaviour is included in the error correction term EC_{t-1} and the short-run property is captured by the short-run coefficients. All the variables in the ECM are stationary, and therefore, the ECM is not prone to the problem of spurious regression. Using the Hendry (1995) general to specific approach, the initial model with all the variables as in Equation (5.4) is estimated, then the test-down procedure is employed by dropping the more insignificant parameters and re-estimating the model. This process is repeated until the most parsimonious specification with all significant parameters is obtained.

Finally, the models have to be checked statistically to ascertain their statistical reliability. Many forms of diagnostic tests can be performed; the Lagrange multiplier (LM) test (Breusch-Godfrey, 1988) is used to detect the higher order autocorrelation. The Jarque and Bera (JB) 1980 test is used to examine the normality of the residuals. The Ramsey (1969) Regression Specification Test (RESET) is used to detect function misspecification due to either variable omission bias or incorrect choice of functional form. Moreover, testing for heteroscedasticity is performed using the Autoregressive Conditional Heteroscedasticity (ARCH) test (Engle, 1982). Following Pesaran and Pesaran (1997), the structural instability of the long-run relation and the error correction parameters can be examined by the Cumulative Sum of Recursive Residuals (CUSUM) and Cumulative Sum of Square of Recursive Residuals (CUSUMQ) tests (Brown et al., 1975).

5.3.2 Empirical Results of the EG Approach

According to the unit root results in Chapter 4, the All Countries (TN_t), Arab and Americas models can be examined for EG co-integration, since all the variables in these models are *I*(1). In contrast, the EG approach cannot be applied to the other models, since they have some variables integrated of order one and others integrated of order zero.

As a first step toward testing the co-integration relations in our models, a static OLS regression in level variables was performed, to retain the residuals, but the results cannot be interpreted unless the co-integration relation between the variables in each model is confirmed.

5.3.2.1 Testing for Co-integration

As a quick test of co-integration, the CIDW test suggests that co-integration may exist in the All Countries (TN_t) and Arab (TO_t) models, since DW > R^2 in both models. To confirm the results of the CIDW test, both the ADF and PP tests of unit root were performed on the residuals of the long-run regression of All Countries (TN_t), Arab and the Americas models. The values of *t*-statistics were compared to the MacKinnon critical values, and the results are reported in **Table 5.1**.

Table 5.1: Results of unit root tests of residuals

	All Countries		Arab Model		American Model	
statistics	(TN Y P NP G R)	(TN_t, Y_t, P_t, R_t)	(TO_t)	(TN_t)	(TO_t)	(TN_t)
ADF	-3.9045	-3.8906**	-4.9989*	-2.6576	-3.1176	-2.9373
PP	-3.9209	-3.9554**	-5.8361**	-2.9532	-3.1214	-2.9914

Source: Author's own calculations using EViews. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

A co-integration relation among the variables in the Arab (TO_t) model was detected, while no co-integration relations were found in the other models. By dropping both the globalization and non-Egypt prices (irrelevant variables to the long-run estimation) from the All Countries model, co-integration relations appeared between tourist nights and income, relative prices and hotel capacity at the 5% level of significance.

5.3.2.2 Estimating the Long-Run Equilibrium Relationships

Once the co-integration behaviour of the variables in the All Countries (TN_t) and Arab models (TO_t) is confirmed, the long-run equilibrium elasticities can be explained. The static regression of All Countries model with income, relative prices and hotel capacity, and Arab model with all the variables is displayed in **Table 5.2**. The DW statistic suggests the presence of autocorrelation in All Countries model; therefore, the Cochrane-Orcutt iterative procedure was employed as a remedial measure.

Table 5.2: Long-run results of EG2S approach

variables	All Countries TN corrected for autocorrelation	Arab TO
Y	2.2718***	0.8454***
P	-0.0449	0.0595
NP	-	-0.2408***
G	-	0.2756
R	0.8587***	0.4481***
Constant	-21.1952***	-6.1620***
R^2	0.50	0.9516
DW	1.6838	1.5236

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Although the OLS estimates are still consistent under the assumption of co-integration, the standard errors are non-standard normal, since all the variables are $I(1)$. Therefore inferences cannot be calculated to confirm the significance of the elasticities of the static long-run regression. Also, diagnostic tests, apart from DW and R^2, are not relevant in the estimation of the long-run model. However *t*-ratios are an approximate level of significance.

The income of tourists is an important variable in both models, and affects tourism demand positively with an elastic demand with respect to all countries but inelastic demand in Arab countries. Salman (2003) supports this result, using the EG2S approach to model tourism demand for Sweden from the US, UK, Germany and Scandinavia, the estimated income elasticities ranged from 0.7 to 2.6. The lower income elasticity was obtained in Denmark and Germany, leading to the conclusion that more distant destinations generally have higher income elasticity. Non-Egypt prices affect tourist arrivals in Arab model negatively, indicating that tourism in alternative destinations is regarded as complementary in the perspective of Arab tourists. Hotel capacity is a significant factor in both models, indicating that investment in tourism supply supports tourism demand in the long run. Choyakh (2008), based on the EG approach, found that tourism supply is positive and inelastic with regard to demand for Tunisia from both Germany and the UK. The constant is always negative, indicating that other factors affect tourism demand in Egypt negatively, and are not included in the model. Finally, the explanatory power of the Arab model is very high, implying that more than 95% of the variation in tourist arrivals in Egypt can be explained by the variation of the explanatory variables.

5.3.2.3 Estimating the Short-Run Dynamics Relationships (ECMs)

After identifying the co-integration relations and estimating the long-run elasticities of tourism demand of All Countries and Arab models, the final step in EG procedures is to construct and estimate the associated ECMs to obtain the short-run dynamics elasticities as well. According to the SC, AIC, HQ and Final prediction error (FPE) criteria, 4 lags in levels were specified as the optimal lag order of the two models. The initial ECM, with all the differenced variables and their lags, the political instability, and the error correction term, was estimated and the insignificant parameters were dropped one by one until all the parameters in the final ECM become statistically significant as introduced in **Table 5.3**, along with the appropriate diagnostic statistics.

The estimated parameters are short-run demand elasticities. In contrast to the case in EG co-integration estimation, all the variables in the ECM are stationary; therefore the standard errors of the estimated elasticities are standard normal and can be used in significance testing and the diagnostic statistics as well. Consequently, we can evaluate the statistical performance of this model.

Table 5.3: Short-run results of EG2S approach

	All Countries TN_t	Arab TO_t
ΔTO_{t-1}	0.4908***	0.6803***
ΔTO_{t-2}	-	0.5197***
ΔY_t	2.1232***	0.5436***
ΔY_{t-1}	-1.8659***	-0.3000**
ΔP_{t-3}	-	-0.1470***
ΔNP_{t-1}	-0.4568***	-0.1897***
ΔNP_{t-2}	-	0.2316***
ΔG_t	-1.4325**	-1.3606***
ΔR_t	-	-0.3054**
TV_t	-0.109*	-
Constant	0.1012***	0.0540**
EC_{t-1}	-0.2755**	-0.8640***
Adjusted R^2	0.7492	0.8339
DW	1.6118	1.9406
χ^2_{Arch} (1)	3.047*	0.115
F_{RESET} (1)	1.21	0.72
Normality JB	1.1728	0.6546
AIC	-53.9946	-106.1341
BIC	-39.4964	-85.5484

Source: Author’s own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

The two models pass all the diagnostics at the 5% level of significance, since there is no evidence of autocorrelation or heteroscedasticity in the residuals. Residuals are normally distributed. The model is correctly specified in terms of functional form, and there is no omitted variables bias. Moreover, CUSUM and CUSUMQ tests of stability were performed, and the plotted estimates converge to a constant value within their 95% confidence level, suggesting that the estimated short-run parameters are all stable as illustrated in **Figure 5.1.** The explanatory power of the ECMs indicates that 75% and 83% of the variations in tourist nights in all countries and tourist arrivals from Arab region respectively can be explained by word of mouth, income growth, relative prices, non-Egypt prices, globalization, hotel capacity and political unrest.

The word of mouth effect is very significant and has a positive effect in both models, implying that tourists have a good experience in Egypt; therefore they decide to visit it again or recommend it to others. Growth of income has a significant and positive effect, and its value is smaller than its counterpart in the long run. Vogt and Wittayakorn (1998) estimated a tourism demand model for tourism in Thailand from worldwide using the EG2S approach. The long-run income elasticity was found to be 2.34, while the short run estimate was 1.93, which is close to the estimates of the present study. The effect of lagged prices is significant only in the Arab model and has the expected negative sign with a small value of -0.14. Non-Egypt prices elasticities are also significant and negative in both models.

Growth of globalization in Egypt affects tourism demand significantly and negatively, with an elastic demand. Globalization increases the degree of competition among destinations through market extension and the emergence of new destinations, which may not be in favour of Egypt. The effect of hotel capacity is significant and negative with an inelastic demand in the Arab model. The ECM's result of Choyakh's (2008) study suggested that tourism supply is inelastic with a negative effect, -0.26 in the case of French tourists and -0.19 in the case of German tourists and insignificant for both British and Italian tourists. The year of riots in Egypt induces a fall in tourist nights of all tourists in that year of 10%, but at just the 10% level of significance. Finally, the speed of adjustment coefficients are significant and has the expected negative sign, implying that 28% and 86% of the disequilibrium in the short run in the All Countries and Arab models respectively can be corrected yearly. This may imply that Arab tourists' loyalty to Egypt as a tourist destination is greater than that of other tourists.

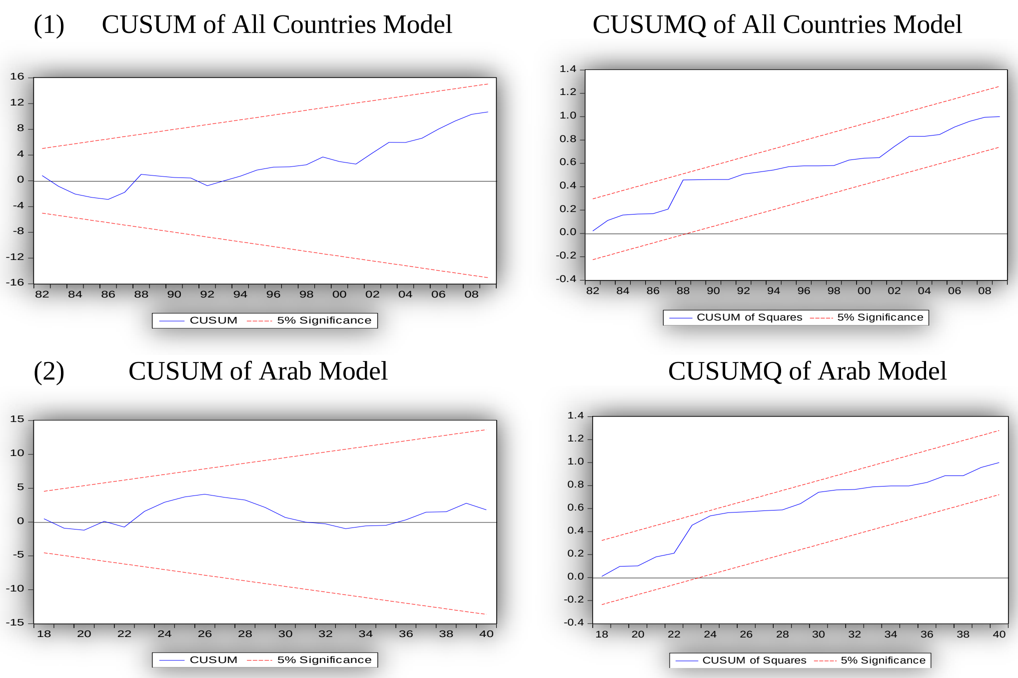


Figure 5.1: Plots of CUSUM and CUSUMQ in the short run for All Countries and Arab models

Despite the reasonable results obtained by EG2S approach of co-integration, especially in the ECM analysis, there are some disadvantages of this approach as general and other problems related to applying this approach on the present study. In general, the statistical performance of the long-run static parameters in the co-integrating relation cannot be examined, since the standard errors of the co-integration parameters are not standard normal as illustrated above. Secondly, the EG approach is based on a two-stage procedure; therefore any error obtained in the first stage will be transferred to the second. Finally, the static OLS co-integrating regressions might have bias in some small sample estimations (Lee, 2005).

Moreover, there are two reasons why the use of the EG2S approach is not the best choice for the models of the present study. First, the OLS estimator is not efficient unless all the explanatory variables are exogenous. Exogeneity tests in a single equation have been performed, using the Hausman test (1978) for the All Countries and Arab models and the results are reported in **Appendix 5.1**. For both models, income and prices are found to be endogenous variables at the 5% level of significance. Therefore, the OLS estimator is not efficient to estimate the demand elasticities of these models. The second reason is that for some models not all the variables are integrated of order one, so it is not possible to apply this approach. From the above discussion, other alternative co-integration approaches are required to improve the estimation results of our models.

5.4 The ARDL Co-Integration Approach

Although the same integration order, specifically $I(1)$, for all the variables in an underlying model is a prerequisite for all co-integration approaches, Pesaran et al. (2001) proposed a new approach of co-integration which can be applied and yields consistent estimates of the long-run parameters irrespective of whether the underlying variables are $I(0)$, or $I(1)$, or a combination of them. Given the low power of the time series unit root tests, especially in small size samples, the ARDL approach of co-integration does not require a prior unit root investigation. In addition, the ARDL approach permits different number of lags for each regressor to capture the DGP in a general to specific framework (Feridun, 2009). This approach can be applied to a small sample, in contrast to the JML approach, which typically requires a large sample size for the results to be valid. The Monte Carlo results indicate that the ARDL approach works properly even when the model has endogenous regressors. Finally, unlike the EG approach, the error terms in the co-integration equation are IID; the standard errors of the estimated elasticities are standard normal, therefore the standard critical values can be used and the diagnostic tests can be performed to evaluate the statistical performance of the models (Song et al., 2009).

5.4.1 The ARDL Approach's Procedures

The ARDL approach to co-integration involves several steps. The first step is the bounds test, which involves estimating the conditional unrestricted error correction model (UECM) to test for the existence of a long-run steady state relationship between the dependent variable and all the explanatory variables.

$$\Delta TO_t = \sigma_0 + \sum_{i=1}^{k-1} \sigma_{1i}\Delta TO_{t-i} + \sum_{i=0}^{k-1} \sigma_{2i}\Delta Y_{t-i} + \sum_{i=0}^{k-1} \sigma_{3i}\Delta P_{t-i} + \sum_{i=0}^{k-1} \sigma_{4i}\Delta NP_{t-i} + \sum_{i=0}^{k-1} \sigma_{5i}\Delta G_{t-i} + \sum_{i=0}^{k-1} \sigma_{6i}\Delta R_{t-i} + \sigma_7 TV_t + \gamma_1 TO_{t-1} + \gamma_2 Y_{t-1} + \gamma_3 P_{t-1} + \gamma_4 NP_{t-1} + \gamma_5 G_{t-1} + \gamma_6 R_{t-1} + \epsilon_t \ldots\ldots\ldots (5.5)$$

where k is the maximum number of lags in levels of the variables[26], Δ is the first difference operator; and σ_0 is a drift component. The left hand side of Equation (5.5) is the demand for tourism reflected by tourist arrivals (TO_t) in one model and tourist nights (TN_t) in the second model. The right hand side of the equation represents the explanatory variables in one lag in level, and in differences with k-1 lags for each variable, the parameters σ_s correspond to the short-run relations, whereas γ_s correspond to the long-run relations; ϵ_t is random errors.

The Wald or F-statistic is used to test the joint significance of lagged levels of the variables in the UECM, and determine the existence of the long-run equilibrium under the null hypothesis of no co-integration ($H_0: \gamma_1 = \gamma_2 = \gamma_3 = \gamma_4 = \gamma_5 = \gamma_6 = 0$) against the alternative that a long-run relation exists ($H_1: \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq \gamma_4 \neq \gamma_5 \neq \gamma_6 \neq 0$) in Equation (5.5). However, as discussed by Pesaran et al. (2001), both statistics have no standard distribution, irrespective of whether the regressors are purely *I*(0), purely *I*(1) or mutually co-integrated. Therefore, Pesaran et al. (2001) computed two types of asymptotic critical values for a given significance level in the case of including and excluding trend. The first type assumes that all the variables are *I*(1), and the other assumes that all the variables are *I*(0). If the computed Wald or F-statistics exceed the upper critical value, the null hypothesis is rejected and the underlying variables are co-integrated. If the Wald or F-statistics are below the lower critical value, the null cannot be rejected and the variables are not co-integrated. Finally, if the Wald or F-statistic values lies between the two bounds, the test is inconclusive, and further investigation on the integration order of all the variables is required to determine whether the variables are *I*(0) or *I*(1). The value of these critical values depends on the number of regressors

[26] However we assume the same number of lags for all the variables in the bound test, we permit for different lag length for each variable in the ARDL estimation.

and whether the ARDL model contains intercept or intercept and trend (Pesaran et al., 2001).

Once a long-run relationship has been established in the first step using the bounds test, the long-run and the associated short-run relationships can be estimated in the next stage. First, the optimal number of lags for all level variables in the ARDL model is selected using the appropriate information criteria. Then, we can proceed to estimate the ARDL (p, q, m, n, s, v) as in Equation (5.6).

$$TO_t = \gamma_0 + \sum_{i=1}^{p} \gamma_{1i} TO_{t-i} + \sum_{i=0}^{q} \gamma_{2i} Y_{t-i} + \sum_{i=0}^{m} \gamma_{3i} P_{t-i} + \sum_{i=0}^{n} \gamma_{4i} NP_{t-i} + \sum_{i=0}^{S} \gamma_{5i} G_{t-i} + \sum_{t=i}^{v} \gamma_{6i} R_{t-i} + \vartheta_t \dots \dots \dots (5.6)$$

where p, q, m, n, s, v are the optimal lags of level of the regressors TO_t, Y_t, P_t, NP_t, G_t, and R_t respectively, γ_0 is a drift term, and $\gamma_{1i}, \gamma_{2i}, \gamma_{3i}, \gamma_{4i}, \gamma_{5i}$, and γ_{6i} are the long-run elasticities in the tourist arrivals model to be estimated using the general to specific approach (Hendry, 1995).

By normalizing Equation (5.6) on tourist arrivals, the static long-run parameters can be obtained as in Equations (5.7).

$$TO_t = \tau_0 + \tau_1 Y_t + \tau_2 P_t + \tau_3 NP_t + \tau_4 G_t + \tau_5 R_t + \epsilon_t \dots \dots \dots . (5.7)$$

where $\tau_0 = \frac{\gamma_0}{1-\gamma_{1i}(L)}$, $\tau_1 = \frac{\gamma_{2i}(L)}{1-\gamma_{1i}(L)}$, $\tau_2 = \frac{\gamma_{3i}(L)}{1-\gamma_{1i}(L)}$, $\tau_3 = \frac{\gamma_{4i}(L)}{1-\gamma_{1i}(L)}$, $\tau_4 = \frac{\gamma_{5i}(L)}{1-\gamma_{1i}(L)}$, $\tau_5 = \frac{\gamma_{6i}(L)}{1-\gamma_{1i}(L)}$.
$\tau_0, \tau_1, \tau_2, \tau_3, \tau_4, \tau_5$ are the static long-run parameters, (L) are the lag operators for the different variables.

The next step in the ARDL approach is estimating the associated error correction model including the error correction of the long-run estimation lagged one period, the first differences of all the variables and their lags, and the 'timing variable' as in Equation (5.8). This ECM is also performed using the Hendry general to specific approach.

$$\Delta TO_t = \sigma_0 + \sum_{i=1}^{p-1} \sigma_{1i} \Delta TO_{t-i} + \sum_{i=0}^{q-1} \sigma_{2i} \Delta Y_{t-i} + \sum_{i=0}^{m-1} \sigma_{3i} \Delta P_{t-i} + \sum_{i=0}^{n-1} \sigma_{4i} \Delta NP_{t-i} + \sum_{i=0}^{s-1} \sigma_{5i} \Delta G_{t-i} + \sum_{i=0}^{v-1} \sigma_{6i} \Delta R_{t-1} + \sigma_7 TV_t + \varphi EC_{t-1} \dots \dots \dots . (5.8)$$

where Δ is the first difference operator, σ_s are the short-run parameters, and φ is the speed of adjustment toward the long-run steady state equilibrium. Finally, the models have to undergo several statistical checking in order to ascertain their statistical reliability as illustrated in the EG approach.

5.4.2 Empirical Results of the ARDL Approach

Annual data over the period 1970-2009 are used to estimate four tourism demand models for Egypt from the main generating markets using the Pesaran et al. (2001) approach (ARDL approach). Each model has been estimated twice using two different dependent variables, tourist arrivals and tourist nights.

Most of the variables in our models, as suggested by unit root tests (see Chapter 4), are found to be integrated of order one, $I(1)$, but some limited series are integrated of order zero, $I(0)$. Therefore we can apply ARDL co-integration procedures on all the models even if the variables in the same model are a combination of $I(0)$ and $I(1)$ series.

5.4.2.1 Estimating the UECM (Bounds Tests)

In the first stage, we performed bound testing procedures on the conditional unrestricted error correction models (Equation 5.10) to ascertain the existence of a long-run relationship between tourism demand for Egypt and its important determinants. We initially set k (lag length) = 1, 2, 3, and 4 lags with constant, and with constant and trend for each lag order. Then, we performed the joint significance test (F-statistic) for the long-run parameters as illustrated before. The results of bounds tests (computed F-statistics) for each order of lags for all the models are presented in **Table 5.4** with TO_t as the dependent variable, and **Table 5.5** with TN_t as the dependent variable.

Table 5.4: The results of F-statistics for co-integration relationship, TO_t is the dependent variable

Order of lag	All Countries		Europe		Arab		America	
	Constant	Constant& trend	Constant	Constant & trend	Constant	Constant & trend	Constant	Constant & trend
4	0.93	1.91	1.94	0.58	5.64***	5.60***	(3.26)	(2.68)
3	6.95***	4.67***	2.17	0.75	12.37***	11.11***	(3.39)	(3.59)
2	(3.43)	1.82	3.62**	(3.21)	(2.70)	(2.68)	6.25***	6.32***
1	4.21**	(3.43)	3.91**	4.44***	4.23**	4.37**	(3.56)	(3.46)

***, ** indicate that F-statistics falls above the upper bound at the 1% and 5% level of significance respectively. F-statistics in parentheses indicate that the result is inconclusive at the 5% level of significance. Note that the asymptotic critical value bounds for the F-statistics with 6 regressors at the 5% level of significance are 2.45-3.61 with intercept and 2.63-3.62 with both intercept & trend (Pesaran et al., 2001: 300-301).

Comparing the computed F-statistics for our different models (TO_t) with the critical value bounds in Pesaran et al. (2001), the results indicate that all the models are co-integrated at different lag lengths, according to different deterministic components.

Whereas the EG co-integration results are more restrictive, which indicate that only the variables of Arab model (TO_t) are co-integrated at the 5% level of significance, the ARDL co-integration results prove an existence of long-run relations among the variables of all the models.

Considering TN_t as the dependent variable, more co-integration relations than the case of TO_t models have been detected, except for the Arab model, implying that at the 5% level of significance all the models have long-run relationships between TN_t and its determinants with intercept only.

Table 5.5: The results of F-statistics for co-integration relationship, TN_t is the dependent variable

Order of lag	All Countries		Europe		Arab		Americas	
	Constant	Constant & trend	Constant	Constant & trend	Constant	Constant & trend	Constant	Constant & trend
4	(2.53)	0.63	6.07***	0.45	4.63***	5.37***	5.78***	5.16***
3	5.47***	1.11	4.16**	0.41	1.88	1.66	5.09***	6.29***
2	4.09**	1.01	4.91***	(2.86)	1.37	(2.66)	7.18***	8.59***
1	5.18***	(3.45)	4.49***	3.79**	3.68**	4.09**	5.47***	5.10***

***, ** indicate that F-statistics falls above the upper bound at the 1% and 5% level of significance respectively. F-statistics in parentheses indicate that the result is inconclusive at the 5% level of significance.

5.4.2.2 Selecting Orders of the ARDL Models

After establishing the long-run relationship among the variables in the different models, we can proceed by estimating the long-run and short-run elasticities. As the first step of estimating the long-run relation among the variables, we have selected the optimal number of lags for all level variables in the ARDL models based on both AIC and SC, taking into consideration the results of the bounds tests (Tables 5.3 and 5.4). For the All Countries models, the maximum order of lag was set to 1. The ARDL (1, 1, 1, 1, 1, 1) with intercept has been selected as the best specification. A maximum lag order of 1 was set for the European model (TO_t) and 3 when TN_t is the dependent variable; therefore ARDL (1, 1, 1, 1, 1, 1) and ARDL (1, 1, 3, 1, 3, 3) with intercept have been chosen for the two models respectively. For the Arab models, the maximum lag was set at 4, ARDL (4, 1, 2, 4, 3, 4) for the first model and ARDL (3, 2, 1, 4, 4, 4) for the second model were selected with intercept in each. Finally, for the Americas models with a maximum lag of 2 in both models, ARDL (2, 2, 1, 2, 1, 1) and ARDL (2, 2, 1, 2, 1, 1) with intercept were chosen as optimal lag order[27].

[27] Note that we specify all ARDL models with intercept only because including the trend causes problems with the income variable, since there is a high correlation between the two variables.

5.4.2.3 Estimating the Long-Run Equilibrium Relationships

Having determined the best ARDL specification for all the models, long-run parameters were estimated. By normalizing on tourism demand (TO_t or TN_t), the static long-run steady state parameters were obtained, and examined statistically.

5.4.2.3.1 Tourist Arrivals (TO_t) is the Dependent Variable

Specifying TO_t as a proxy for the tourism demand models, the long-run ARDL parameters were estimated (Equation 5.6) based on the general to specific approach. Then, the ARDL parameters were normalized on the tourist arrivals to obtain the long-run steady state parameters (Equation 5.7), which are presented in **Table 5.6**; hence the standard errors are not related directly to the reported elasticities. The diagnostic tests of long-run estimations are also presented.

The models perform reasonably, the adjusted R^2 is higher than 90% in all the models, and the long-run diagnostic tests indicate no statistical problem in all models and they are stable, since all the CUSUM, CUSUMSQ statistics and their plots fell consistently within their 95% confidence level, suggesting that the estimated long-run parameters are all stable as illustrated in **Figure 5.2**. Moreover, most of the long-run estimated elasticities display the expected signs.

Table 5.6: Long-run results of ARDL co-integration approach; dependent variable is TO

Regions	All Countries	Europe	Arab	Americas
ARDL specification	(1,1,1,1,1,1) With constant	(1,1,1,1,1,1) With constant	(4,1,2,4,3,4) With constant	(2,2,1,2,1,1) With constant
Y	3.9746***	5.7230***	0.6869***	1.8790**
P	-0.3183***	-	-0.0061**	-
NP	-	0.3298**	-0.3828***	1.7190***
G	-1.6229**	-	-0.8362***	-
R	0.4407**	-	0.5794**	-
Constant	-27.9491***	-50.7539***	-1.4605	-12.4935*
Goodness of fit & diagnostic tests				
R^2	0.9898	0.9838	0.9939	0.8789
Adj. R^2	0.9882	0.9824	0.9894	0.8682
χ^2_{LM} (1)	0.8110	0.0020	1.8820	0.5030
χ^2_{Arch} (1)	2.2590	0.2230	0.2020	0.3770
F_{RESET} (1)	1.1100	2.3200*	0.7100	2.0400
JB	2.1177	1.2750	0.3767	3.4429
AIC	-63.8694	-23.8875	-103.9255	-6.7172
BIC	-53.8880	-17.2332	-78.5892	-0.1669

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively. Note: χ^2_{LM}, χ^2_{Arch}, F_{RESET}, JB, and BIC are respective Lagrange Multiplier statistics for residual autocorrelation, ARCH test of heteroscedasticity, functional form misspecification, Jarque-Bera of non normality test, and Bayesian information criterion for model selection.

Per capita income has a significant and positive effect on tourist arrivals from all countries, Europe, Arab and the Americas. A 1% increase of European, Arab and American income tends to increase tourist arrivals from these regions by 5.7%, 0.7% and 1.8% respectively. A 1 % increase of per capita income of all tourists coming to Egypt increases tourist arrivals by approximately 4%. This result is in line with economic theory and tourism demand literature, since the income elasticity of international tourism has to be positive and more than unity. Moreover, tourism in Egypt may benefit strongly from economic growth, especially in European countries, and suffer strongly from the economic crisis in these countries.

Tourism demand literature is consistent with our findings. Salleh et al. (2008) estimated tourism demand for Malaysia from the Asian7 countries based on the ARDL co-integration approach. The income elasticities of tourist arrivals were found to be significant and positive in three Asian countries, ranging from 2% to 5%, significant and negative for three countries, ranging from 0.8% to 1.4%, but insignificant in Hong Kong. Narayan (2004) estimated tourism demand elasticities for tourism in Fiji, using the ARDL co-integration approach, and concluded that the long-run income elasticity is significant and positive, ranging from 3.1 to 4.4, according to different origin markets.

While a 1% increase in relative tourism prices in Egypt decreases tourist arrivals by a small percentage in the Arab and All Countries models, they are insignificant according to the other models. The small magnitude of tourism prices elasticities suggests a low degree of substitutability between tourism in Egypt and tourism in the originating countries. Using the ARDL co-integration approach, Muchapondwa and Pimhidzai (2008) found the long-run elasticity of prices to be insignificant in Zimbabwe; whereas Salleh et al. (2008) concluded that tourism prices elasticities for Malaysia are significant for all Asian7 countries, except Japan and elastic with negative and high values, ranging from 5% to 8% in five countries. These high price elasticities reflect the high substitutability of tourism in these destinations to tourism in Malaysia, which is not the case in our models. Moreover, Halicioglu (2004) applied the same methodology to estimate the world tourism demand for Turkey and found that the relative price elasticity is significant, negative and inelastic with a value of 0.9.

Non-Egypt prices are significant in all models (except All Countries), with a positive sign in the case of European and American tourists and a negative sign in the case of

Arab tourists. This result indicates that tourism in these alternative destinations can be regarded as substitutes to tourism in Egypt in the long-run for European and American tourists, whereas it is regarded as a complement for Arab tourists. The non-Egypt tourism prices elasticities are more than unity only in the American model.

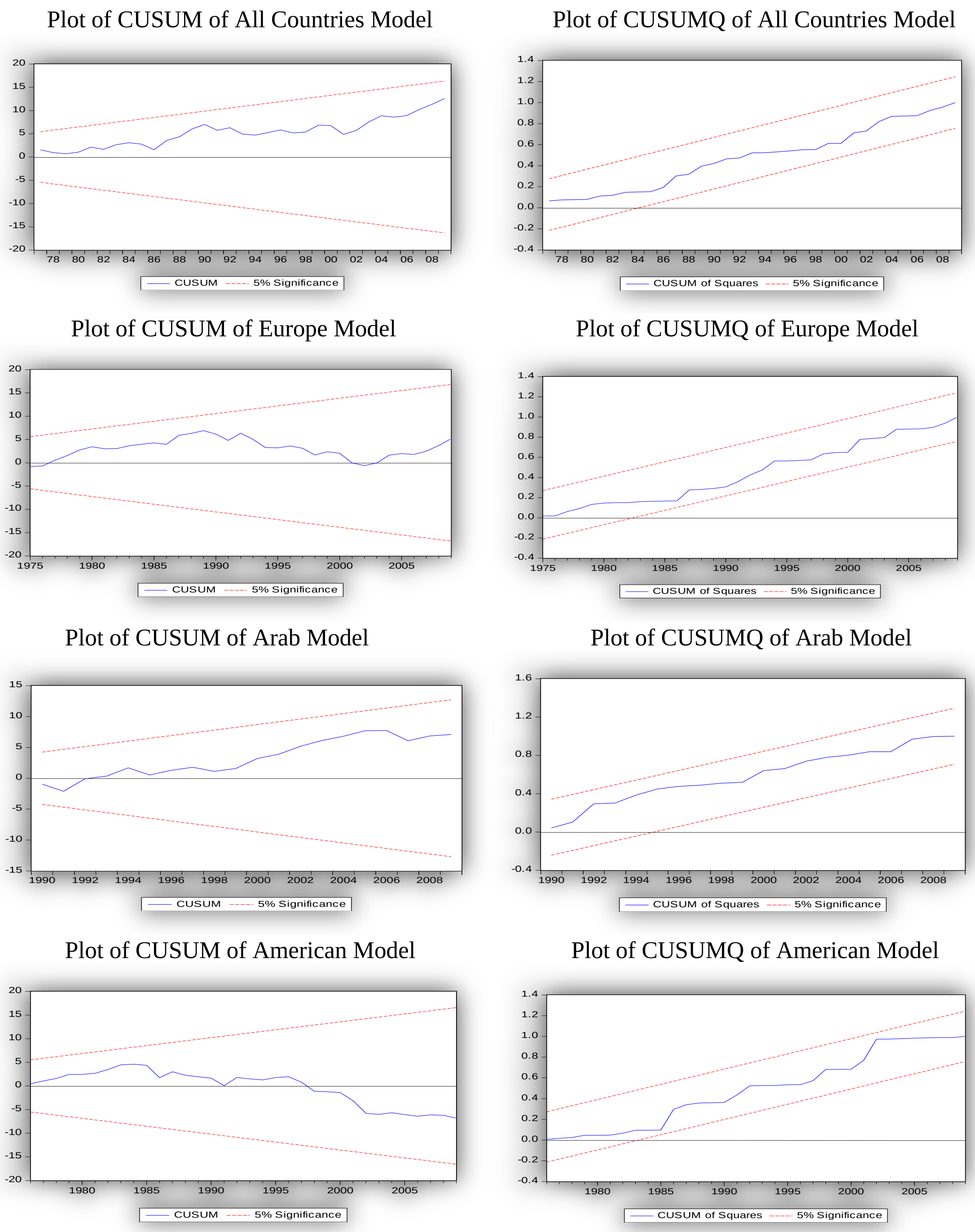


Figure 5.2: Plots of CUSUM and CUSUMQ in the long run of all the models (TO_t dependent variable)

Globalization is an effective factor in just two models (All Countries and Arab) and has a negative long-run effect on tourist arrivals to Egypt. The higher degree of competition between tourism in Egypt and other tourist destinations through market extension and the emergence of new destinations in the long run may explain the negative effect of globalization on tourist arrivals to Egypt.

Hotel capacity has a positive effect on All Countries and Arab tourists, which is in line with economic theory, indicating that expenditure on the Egypt tourism industry promotes its growth, but insignificant for the other models. The constant is significant and negative at the 1% level in the All Countries and European models, indicating that other variables, such as common culture, common language and distance are important in determining tourism inflows to Egypt and affect this demand negatively but are not included in the demand function.

5.4.2.3.2 Tourist Nights (TN_t) is the Dependent Variable

By specifying tourist nights as a proxy for tourism demand for Egypt, the results are more significant and all the long-run parameters become bigger than their counterparts in the case when specifying tourist arrivals to represent tourism demand. This result indicates that the effects of the determinants of tourism demand on tourist nights are stronger than their effect on tourist arrivals. After normalizing the results of the ARDL long-run estimation, the long-run elasticities are calculated and illustrated in **Table 5.7**, along with the results of diagnostic tests of these estimates.

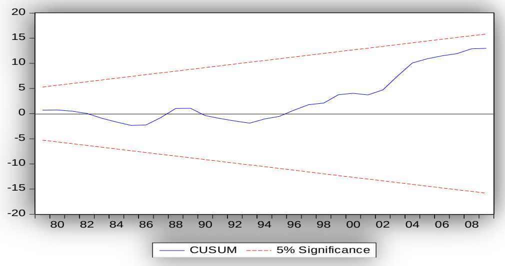
Table 5.7: Long-run results of ARDL co-integration approach; dependent variable is TN

Regions	All Countries	Europe	Arab	Americas
ARDL specifications	(1,1,1,1,1,1) with constant	(1,1,3,1,3,3) with constant	(3,2,1,4,4,4) with constant	(2,2,1,2,1,1) with constant
Y	8.2966***	6.8563***	0.7874**	3.1047***
P	-0.8113**	-0.3389*	-0.5104***	-
NP	0.3418***	0.7424***	-0.2682***	1.9678***
G	-9.9566***	-3.6491**	-6.4345**	-
R	1.7315**	0.9526**	2.0713***	-
Constant	-49.6259***	-57.1068***	6.5441	-22.9025***
Goodness of fit & diagnostic tests				
R^2	0.9810	0.9783	0.9821	0.9208
Adj. R^2	0.9768	0.9739	0.9701	0.9138
χ^2_{LM} (1)	1.1510	0.0020	0.2880	0.7880
χ^2_{Arch} (1)	0.3990	2.2260	0.9330	1.9930
F_{RESET} (1)	3.5400**	1.4800	1.1600	0.7600
JB	0.4312	1.2992	1.8808	2.4555
AIC	-33.0913	-4.2386	-44.9838	-0.3487
BIC	-19.7828	7.0378	-21.2310	6.2017

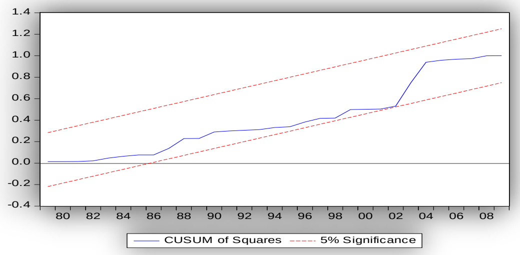
Source: Author’s own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Adjusted R^2 is slightly smaller than its counterparts in the tourist arrivals models, except the American model. The null hypothesis of misspecification in the All Countries model cannot be rejected at the 5% level of significance imply the existence of omitted variable bias in this model; otherwise, all the tests for all models implying the goodness of fit and the absence of any statistical problems. Moreover, the results of CUSUM and CUSUMQ plots indicate that all the models are stable at the 5% level of significance over the entire estimation period as reported in **Figure 5.3**.

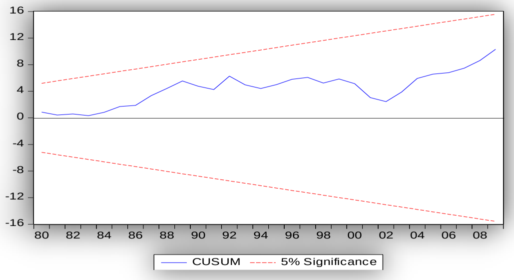
Plot of CUSUM of All Countries Model



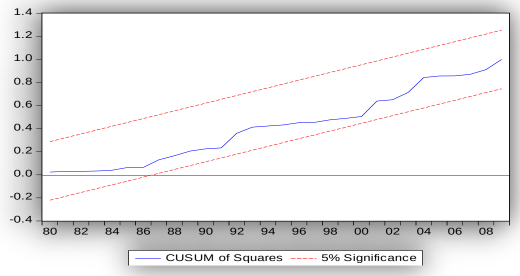
Plot of CUSUMQ of All Countries Model



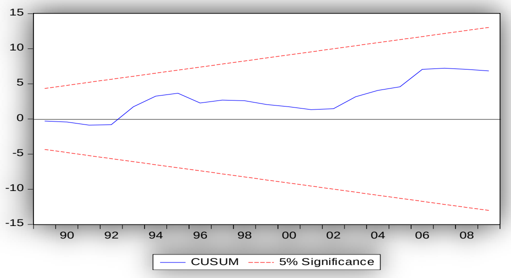
Plot of CUSUM of Europe Model



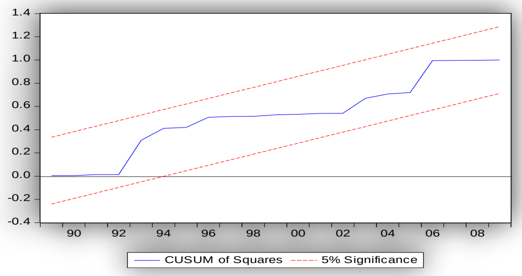
Plot of CUSUMQ of Europe Model



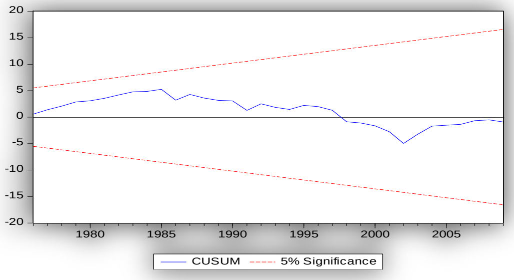
Plot of CUSUM of Arab Model



Plot of CUSUMQ of Arab Model



Plot of CUSUM of American Model



Plot of CUSUMQ of American Model

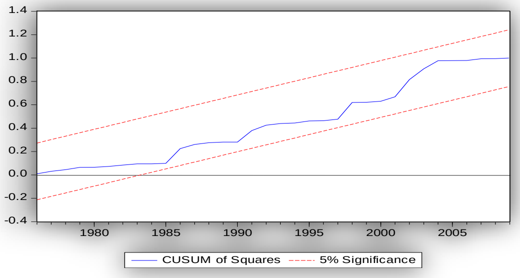


Figure 5.3: Plots of CUSUM and CUSUMQ in the long run of all the models (TN_t dependent variable)

A 1% increase in per capita income of total tourists, European, Arab and American tourists increases tourist nights in Egypt from these regions by 8.3%, 6.9%, 0.8% and 3.1% respectively. In a study of long-run tourism demand for Croatia, using the ARDL approach of co-integration, Mervar and Payne (2007) concluded that a 1% increase in income of 25 European Union members tends to increase tourist nights to Croatia from 4.4% to 5%, which are slightly less than our estimates for the Europe model.

Tourism prices have a negative effect on total tourist nights (-0.8), Arab tourist nights (-0.3) and European tourist nights (-0.5) at the 1%, 5% and 10% level of significance respectively. Mervar and Payne's (2007) findings imply that relative prices are not an influential factor in determining tourism demand for Croatia from the 25 European Union members. Non-Egypt prices have a very significant effect on tourist nights from all regions, with a positive effect in all models, except the Arab model, where the effect is negative. Globalization has a negative and significant effect on tourist nights of all models, except the American model, with very high elasticities in all cases. Hotel capacity elasticities are also significant and positive in all models, except in the American model.

5.4.2.4 Estimating the Associated Short-Run Dynamic Relationships (ECMs)

As a final step in the ARDL co-integration approach, the associated error correction models (Equation 5.8) have been constructed to obtain the short-run dynamic relationships between tourism demand for Egypt and its important determinants from different regions over the period 1970-2009.

5.4.2.4.1 Tourist Arrivals (TO_t) is the Dependent Variable

Table 5.8 reports the results of short-run elasticities for all the models. Word of mouth effect is significant in both Arab and American models, and indicates a good experience of Arab and American tourists in Egypt, who recommend tourism in Egypt to others. In the other models, this effect cannot be examined due to the ARDL specifications (no lags in differences of the dependent variables). Comparing this result with the estimates of Halicioglu (2004), the estimated word of mouth elasticity for Turkey from international tourists was 0.96, which exceeds the value of our estimates. Moreover, the study of Salleh et al. (2008) indicated that word of mouth elasticities for tourism demand in Malaysia were significant and positive in three markets - Japan (1.4), Indonesia (0.03) and Thailand (0.39) - out of seven Asian markets. These results imply that there is still possibility for improving the tourist experience in Egypt, which might induce a larger number of tourists to return to the country or recommend it to others. High quality infrastructure and good facilities are important to improve the effect of word of mouth for Egypt's tourism.

Table 5.8: Short-run results of ARDL co-integration approach; dependent variable is TO_t

Regions	All Countries		Europe	Arab	Americas
regressors	Original	Transformed [(1)]			
ΔTO_{t-1}	NA	NA	NA	0.5764***	0.3616**
ΔY_t	1.4997***	1.6251***	2.0078*	0.2814**	-
ΔP_t	-	-	0.2069**	-	0.3446**
ΔNP_{t-1}	-	-	-	-0.1565***	-
ΔNP_{t-3}	-	-	-	-0.1774***	-
ΔG_t	-	-	-	0.7617*	2.1571**
TV_t	-0.1687***	-0.1787***	-0.2842***	-	-0.3354***
EC_{t-1}	-0.4928***	-0.6555***	-0.6024***	-0.9383**	-0.8530***
Constant	0.1067***	0.1067***	0.1685***	0.0255	0.0907**
Goodness of fit & diagnostic tests					
R^2	0.6358	0.6554	0.6237	0.7415	0.6230
Adj R^2	0.6036	0.6123	0.5781	0.6620	0.5622
χ^2_{LM} (1)	3.2860*	0.0873	2.2220	0.0000	0.1600
χ^2_{Arch} (1)	0.0100	0.2138	0.1020	0.0590	0.1950
F_{RESET} (1)	0.1800	0.0280	1.9900	1.4900	2.9200*
JB	0.8552	0.6583	0.7447	0.2137	2.6071
AIC	-69.8511	-	-41.1163	-81.3606	-20.2396
BIC	-63.3008	-	-32.9284	-67.3625	-10.5741

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively. [(1)] Means transformed model after correcting for residuals autocorrelation.

Growth of income of all tourists, European and Arab tourists by 1% tends to increase tourist arrivals from these areas to Egypt by 1.5%, 2% and 0.28% respectively, which are less than their counterparts in the long run as expected. Halicoglu (2004) concluded that a 1% increase in world income tends to increase tourist arrivals to Turkey by just 0.39%, which is less than our estimates. Narayan's (2004) study concluded that a 1% increase of US income increases tourist arrivals to Fiji in the short run by 2.1%, but the income elasticity in two other markets were insignificant.

Changes in relative prices have significant effects on tourist arrivals from Europe and the Americas, with an unexpectedly positive sign for both. This can be attributed to the lack of information about the quality of the trip in the short run; therefore, tourism prices play an important role as an indicator of product quality in the short run, contrary to the long run when tourists as rational consumers have more information and time to make informed decisions. Halicoglu (2004) found negative and significant price elasticity to tourism demand in Turkey, whereas Narayan's (2004) study indicated that the short-run prices elasticity for tourism in Fiji is -0.84 for Australia, 0.50 for US, and insignificant for New Zealand. Non-Egypt prices have a negative effect on tourist arrivals from Arab countries in the short run, whereas they have no short-run effects for other nationalities.

The short-run effect of globalization in Egypt is only significant for American tourists at the 1% level of significance and for Arab tourists at 10% level of significance and it has positive effect in both cases. Hotel capacity has no short-run effect on tourist arrivals to Egypt from all regions. Terrorist incidents in Egypt and Middle East region affect tourist arrivals from all regions negatively and significantly, except the Arab region. A year of riot decreases worldwide arrivals to Egypt by 16%, from Europe by 28% and more strongly from the Americas by 34%, which is quite threatening to the tourism demand in Egypt. These results support Narayan's (2004) findings, since political instability in Fiji (small country located in the continent of Oceania) was found to be a significant variable at the 1% level. A year of riot reduced tourist arrivals from Australia by 20%, from New Zealand by 25% and from the US by 47%. Constant is significant and positive in all models, except the Arab.

Finally the error correction terms are significant and negative as expected, implying that the Arab model has a higher speed of adjustment, since 93.8% of the short-run disequilibrium is corrected annually, against 85.3% in the American model, 60.2% in Europe and 49.2% in the All Countries model. Therefore, it takes between slightly more than one to slightly more than two years to correct the deviation from the long-run steady state equilibrium. Comparing the speed of adjustment in Egypt with its counterpart of 78.2% in Zimbabwe (Muchapondwa and Pimhidzai, 2008), 87% in Turkey (Halicoglu, 2004) and from 17% to 29% in Fiji (Narayan, 2004) indicates that the number of tourists visiting Egypt each year differs reasonably from the previous year.

Adjusted R^2 in the ECMs are generally smaller than adjusted R^2 in the co-integration static long-run estimations, they range from 62.3% in the American model to 74.2% in the Arab model. At the 5% level of significance the estimated models perform well statistically. There is a residuals autocorrelation at the 10% level of significance in the All Countries model, and omitted variable bias in the American model also at the 10% level of significance. By correcting the residuals autocorrelation in All Countries model based on the Cochran-Orcutt technique, the DW statistic improved from 1.5 in the original model to 1.8 in the transformed model, and no residuals autocorrelation detected in the transformed model. The transformed model achieved higher R^2 and higher speed of adjustment per year. Moreover, the CUSUM and CUSUMQ tests appear to be stable within the 95% critical lines over the period of the study as reported in **Appendix 5.2**, **Figure 1**.

5.4.2.4.2 Tourist Nights (TN_t) is the Dependent Variable

Specifying tourist nights as a proxy for tourism demand rather that tourist arrivals, the results of the short-run dynamics elasticities have been represented in **Table 5.9** to examine the performance of the error correction models. Word of mouth affects tourist nights positively in both the Arab and American models, as is the case for tourist arrivals. Whereas growth of income has a positive significant effect in tourist arrivals from all markets (except for the Americas), it does not affect tourist nights from these markets, except in the All Countries model. A 1% increase in per capita income of tourists from worldwide tends to increase tourist nights by 1.8%. Tourism relative prices are significant and positive in two models: Europe and Americas, as is the case in the TO_t models.

Table 5.9: Short-run results (ARDL co-integration approach); dependent variable is TN_t

Regions	All Countries	Europe		Arab		Americas
		Original	Adjusted(1)	Original	Adjusted(2)	
ΔTN_{t-1}	NA	NA	NA	-	-	0.3705**
ΔTN_{t-2}	-	-	-	0.4166***	0.4194***	-
ΔY_t	1.8005***	-	2.6201*	-	-	-
ΔP_t	-	0.2669**	0.2766**	-	-	0.3829**
ΔP_{t-1}	-	-0.2228*	-0.2240*	-	-	-
ΔNP_{t-1}	-	-	-	-0.4117***	-0.4177***	0.5964*
ΔG_t	-	-	-	-2.6121***	-2.7145***	2.2432**
ΔG_{t-1}	-	-	-	-2.6059***	-2.4519***	-
TV_t	-0.1645**	-0.3880***	-0.4442***	-	-	-0.4262***
EC_{t-1}	-0.4262**	-0.5079***	-0.5616***	-0.7901**	-0.8231**	-0.9725***
Constant	0.0929**	0.2408***	0.2236***	0.1201***	0.1049**	0.1285***
Goodness of fit & diagnostic tests						
R^2	0.4565	0.6050	0.6720	0.5570	0.5681	0.7073
Adj R^2	0.4071	0.5541	0.6017	0.4779	0.4721	0.6468
χ^2_{LM} (1)	1.2040	3.4130*	0.3618	1.0740	1.7090	2.0050
χ^2_{Arch} (1)	0.7920	0.5300	0.1040	0.1080	0.0010	3.3850*
F_{RESET} (1)	0.4000	2.3500*	4.6719**	4.4600**	5.5400***	0.4700
JB	3.4368	2.2124	0.0256	6.4109**	2.0746	0.8146
AIC	-26.0850	-17.7302	-	-26.3216	-25.1857	-16.0316
BIC	-19.6413	-9.8126	-	-17.1634	-14.5012	-4.7551

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively. (1) Means transformed model after correcting for residuals autocorrelation, (2) means adjusted model for outliers.

Rise in non-Egypt prices affects Arab nights negatively and American nights positively, indicating that tourism in Egypt's alternative destinations is treated as a complement for Arabs at the 1% level of significance, but a substitute for the Americans at the 10% level of significance. Globalization and its lag affect tourist nights from Arab countries negatively at the 1% level, whereas it affects tourist nights from Americas positively, with an elastic effect in both cases. The political instability always has a negative expected effect on all nationalities, except Arab. Year of terrorist attack reduces total tourist nights by 16%, European nights by 38% and American nights by 43%. Constant is significant and positive with a small value in all models. The speed of adjustment coefficient is always significant and takes the expected negative signs in all models; however, the adjustment process in the case of tourist nights may take longer than its counterparts in tourist arrivals models, except in the American model.

The goodness of fit is also smaller than its counterpart in tourist arrivals' models, except in the American model. The results of the diagnostic test statistics indicate that the ECMs perform reasonably well. The only exception is the Arab model; there is evidence of misspecification (omitted variable bias) and non-normal residuals. The presence of outliers in the data, which results from exogenous shocks (wars, terrorism, oil prices chocks) may cause the problem of non-normal residuals. We follow the literature and use a pulse dummy variable to capture the one-off abnormal observations in the residuals of this model (Feridun, 2009). The estimated short-run parameters have not relatively changed after this adjustment, but the JB test cannot reject the null that the errors become normally distributed as illustrated in Table 5.8. At the 10% level of significance, residuals autocorrelation was detected in the Europe model. Correcting for autocorrelation, the Cochran-Orcutt technique was applied, therefore, the DW statistic improved from 1.4 in the original model to 1.8 in the transformed model and no sign of residual autocorrelation appeared in the new model. The transformed model recorded higher goodness of fit and higher speed of adjustment toward the long-run equilibrium.

Finally, the stability of the short-run ECMs is evaluated using the CUSUM and CUSUMQ test of structural stability, and the ECMs appear stable. The only exception is the American model based on the CUSUMQ, since a structure break occurred through the period from 2001-2003 at the 5% level, and caused parameters instability over this period as illustrated in Appendix 5.2, **Figure 2**. The incident of the 11 September 2001 may cause the structure break in this period.

5.5 Summary and Conclusion

The chapter estimated the long-run as well as the short-run relations between tourism demand for Egypt and its important determinants from the main source markets for the period from 1970-2009. The single equation approach of co-integration was applied in this chapter for that purpose. The results of the EG2S approach suggest the existence of a co-integration relation between tourist nights and their important determinants in the All Countries model, and between tourist arrivals and their determinants in the Arab model. In contrast, the results of the ARDL approach imply that a co-integration relation between tourism demand and their specified determinants exists in all generating markets at different lag lengths.

The long-run results indicate that income is the most important determinant of tourism in Egypt, since its parameters are always significant and in line with the economic theory in all models, whether in terms of the EG or the ARDL estimation. In general, the income elasticity is more sensitive to inter-regional tourism than intra-regional tourism. Moreover, the income elasticity of tourist nights is more than income elasticity of tourist arrivals in all models. Relative prices elasticities are significant at the 5% level in just two origin markets (All Countries and Arab) according to the ARDL estimation, but in only the All Countries model according to the EG, and take the expected negative sign according to both approaches. Non-Egypt prices elasticities are always significant in all models according to both approaches, indicating that Egypt's alternative destinations are substitutes for Egypt for all nationalities, but complements for Arab tourists. Globalization has a significant effect on tourism in Egypt in most cases according to the ARDL approach. Its effect is negative, indicating that tourism in Egypt cannot overcome the global challenge in the long run and improvement in the quality of the tourist product is essential. According to both approaches, hotel capacity is an important variable in the long run for most models with the expected positive effect, indicating that tourism supply supports tourism demand in Egypt.

In the short-run dynamics, word of mouth effect is significant and positive in the Arab and Americas models. While growth in income is significant in most cases, relative prices are important in the American and European models according to the ARDL approach, and for Arab markets, according to the EG approach. Non-Egypt prices elasticities are significant only in the Arab models (ARDL, EG) and for All Countries TN_t (EG) and takes negative effects in all cases. Change in globalization is significant and positive in the Americas models and significant and negative in both the Arab and the All Countries TN_t model. Hotel capacity has no effect on the demand for tourism in the short run according to the ARDL, but significant and negative for the Arab TO_t according to the EG. Terrorism is always significant, except in the Arab model. Finally the error correction terms are always significant, implying that the short-run disequilibrium can be corrected from slightly more than one year to slightly more than two years according to the ARDL approach. Less values of these adjustment parameters are obtained in case of the EG approach.

Appendix 5

Appendix 5.1: Exogeneity Test

Wu (1973) test for exogeneity in one single equation, modified by Hausman (1978), was performed as follows.

The OLS technique assumes that all the explanatory variables in Equation (1) are exogenous.

$$TO_t = \beta_0 + \beta_1 Y_t + \beta_2 P_t + \beta_3 NP_t + \beta_4 G_t + \beta_5 R_t + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (1)$$

If any variable in right hand side are endogenous, this variable will be correlated with the error term ε_t. Therefore the test of the exogeneity of this variable is testing the null hypothesis that no correlation between the underlying variable and ε_t.

First, we regressed each variable of the right hand side against a number of instrumental variables as in Equation (2).

$$Y_t = \gamma_0 + \sum_{i=1}^{p} \gamma_{1i} Y_{t-i} + \sum_{i=1}^{p} \gamma_{2i} TO_{t-i} + \sum_{i=1}^{p} \gamma_{3i} P_{t-i} + \sum_{i=1}^{p} \gamma_{4i} NP_{t-i} + \sum_{i=1}^{p} \gamma_{5i} G_{t-i} + \sum_{i=1}^{p} \gamma_{6i} R_{t-i} + \omega_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

Second, we retained the residuals of this regression. Third, we estimated Equation (3)

$$TO_t = \beta_0 + \beta_1 Y_t + \beta_2 P_t + \beta_3 NP_t + \beta_4 G_t + \beta_5 R_t + \beta_6 \omega_t + \varepsilon_t \dots\dots\dots\dots\dots\dots\dots (3)$$

The null hypothesis $\beta_6 = 0$ (Y_t is exogenous variable) was tested. If the null cannot be rejected, so the variable is exogenous and the OLS is efficient. We repeated the test for all the right hand side variables in Equation (2), and the results are reported in Table 1.

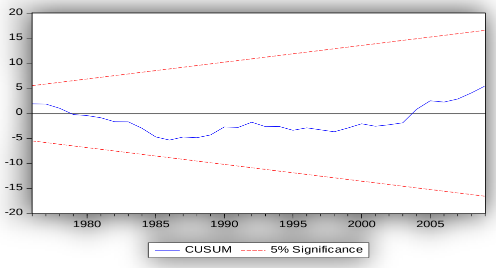
Table 1: Test of exogeneity for the explanatory variables

Models	All Countries (TN_t Y_t P_t R_t)	Arab (TO_t Y_t P_t NP_t G_t R_t)
Regressors	$\chi^2(1)$	$\chi^2(1)$
Y	18.7910 (0.000)	7.6839 (0.006)
P	4.3923 (0.036)	4.0116 (0.045)
NP	-	0.5810 (0.446)
G	-	0.8267 (0.363)
R	0.5364 (0.464)	2.0278 (0.154)

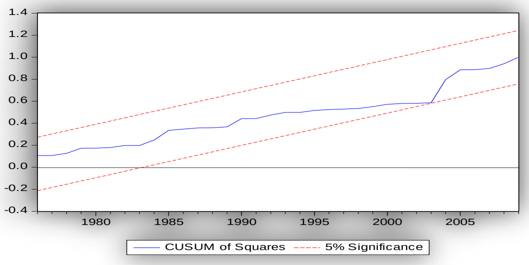
Source: Author's own calculations using PcGive 10, Numbers in parentheses are *t*-ratios.

Appendix 5.2

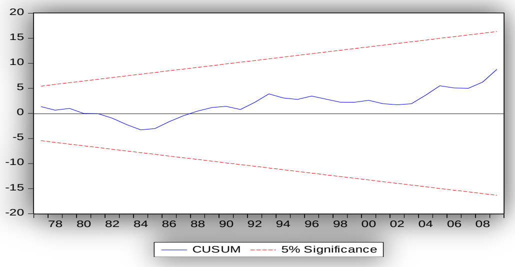
Plot of CUSUM of All Countries Model



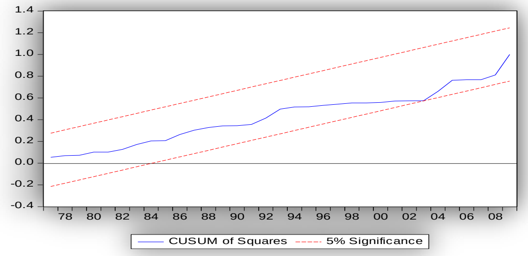
Plot of CUSUMQ of All Countries Model



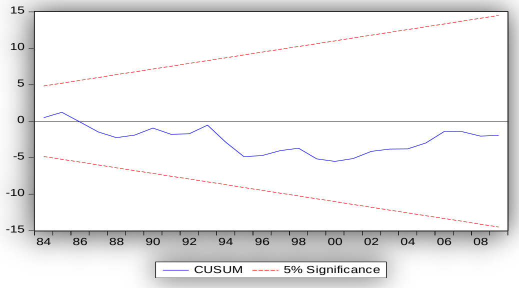
Plot of CUSUM of Europe Model



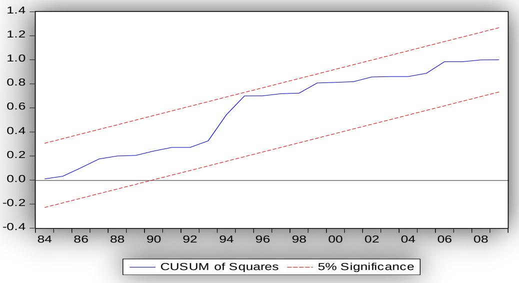
Plot of CUSUMQ of Europe Model



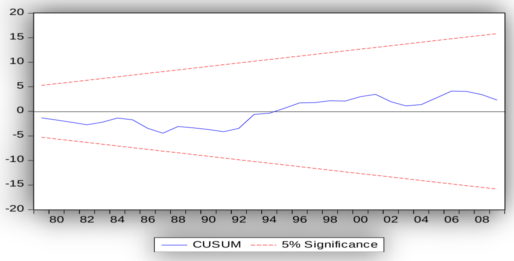
Plot of CUSUM of Arab Model



Plot of CUSUMQ of Arab Model



Plot of CUSUM of American Model



Plot of CUSUMQ of American Model

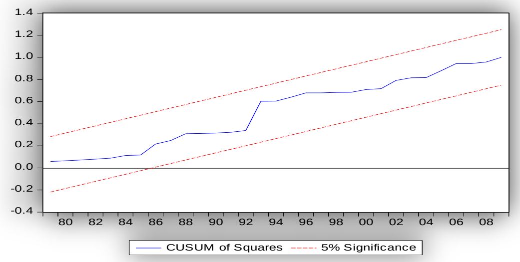


Figure 1: Plots of CUSUM and CUSUMQ in the short run of all the models (TO_t dependent variable)

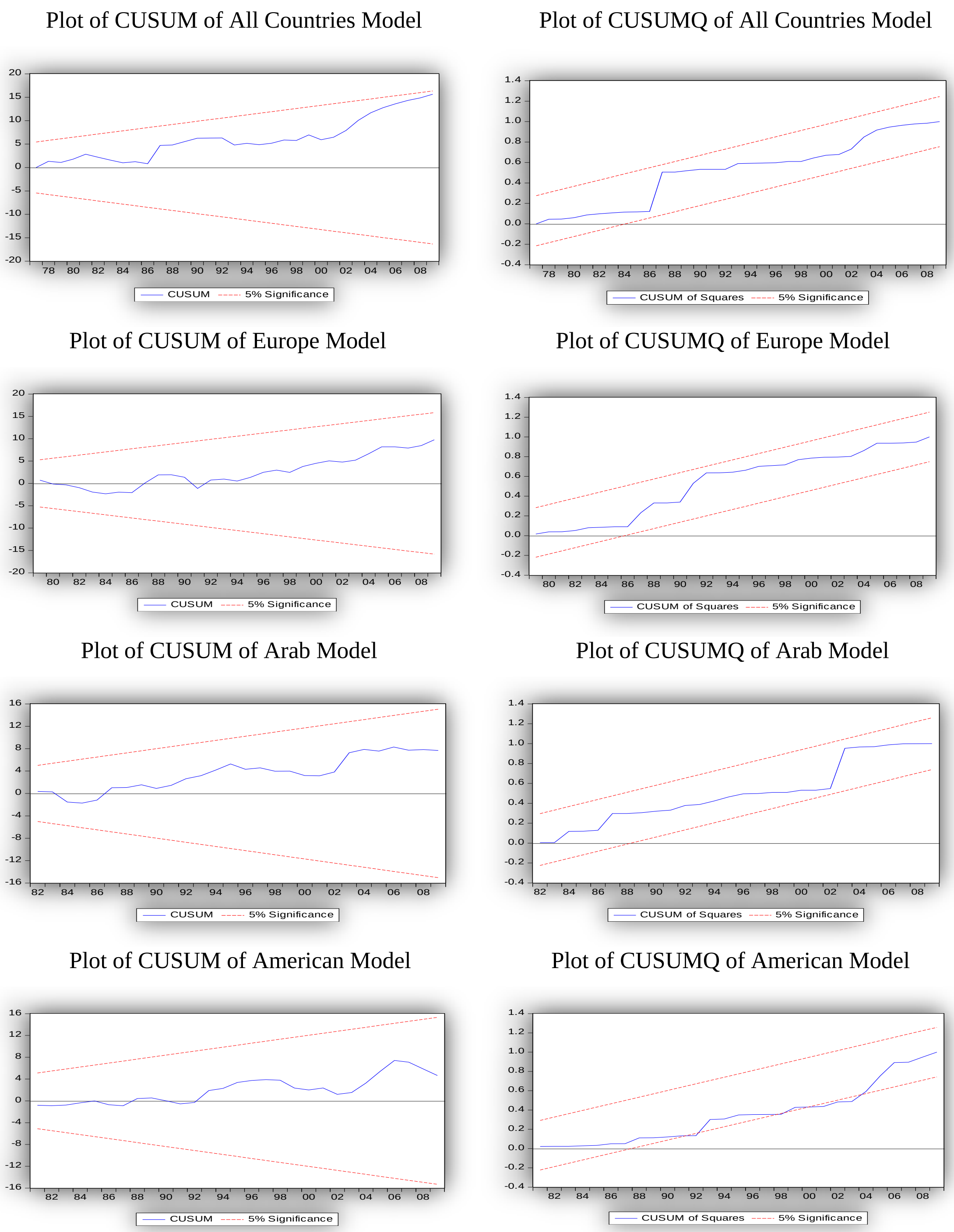


Figure 2: Plots of CUSUM and CUSUMQ in the short run of all models (TN_t dependent variable)

Chapter 6: Co-integration and Error Correction Estimation 'The System of Equations Approach'

6.1 Introduction

The aim of this chapter is to take an alternative approach for estimating tourism demand elasticities for Egypt in a system of equations context. Johansen's (1988) Maximum Likelihood (JML) procedure, developed within the Vector Autoregressive (VAR) modelling framework, can be used to relax the assumption of only one co-integrating relationship exists and test for and estimate multiple co-integrating relationships among the underlying variables (Song et al., 2009).

Modelling the demand for tourism in a system approach, using Vector Error Correction Model (VECM), reflects the important interrelationships among variables and reduces the risk of endogeneity bias (Zhou et al., 2007). This approach has been chosen in this study since each tourism demand model has six variables, so there is a possibility of having more than one co-integrating vector among these variables. Therefore, we can obtain estimates of all the possible co-integrating vectors. Moreover this approach treats each variable in the system as possibly endogenous, so there is no endogeneity bias in the case of including endogenous regressors. In addition, the VECM minimizes the problem of multicollinearity, since the regressors in the VECM are frequently almost orthogonal.

The rest of this chapter is organized as follows. Section 6.2 outlines briefly the JML and VECM methodology. More practical consideration surrounding the JML's procedures is explained in Section 6.3. In Section 6.4, the empirical results of the JML and VECM approach for eight different tourism demand models in Egypt are presented. Finally, the most important findings of the chapter are summarized in Section 6.5.

6.2 The JML and VECM Methodology

In order to present this approach, the single equation ECM has to be extended to a multivariate one as in Equation (6.1).

$$\mathrm{Z_t = A_1 Z_{t-1} + A_2 Z_{t-2} + \cdots . + A_k Z_{t-k} + u_t} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots . (6.1)$$

where Z_t is a vector of non stationary $I(1)$ variables which can be endogenous in the model, $Z_t = (TO_t, Y_t, P_t, NP_t, G_t, R_t)$, with k number of lags for each variable, u_t is IID errors. Equation (6.1) is an unrestricted VAR model, and it can be reformulated in a VECM as following:

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{t-2} + \cdots + \Gamma_{k-1} \Delta Z_{t-k-1} + \Pi Z_{t-k} + u_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots (6.2)$$

where $\Gamma_i = (I - A_1 - A_2 - \cdots - A_k), i = 1,2,3,..,k-1, \Pi = -(I - A_1 - A_2 - \cdots - A_k)$.

Π is a 6x6 matrix (due to our 6 endogenous variables in the system), which contains information about the long-run relationships. It can be decomposed to $\alpha\beta'$, where α is the speed of adjustment towards the steady state equilibrium, and β' contains the long-run coefficients (Asteriou and Hall, 2007). The equilibrium properties of Equation (6.2) are characterized by the rank of Π. Since Z_t is a matrix of $I(1)$ variables, then all the terms in Equation (6.2) involving ΔZ_t are $I(0)$, while ΠZ_{t-k} must also be stationary for $u_t \sim I(0)$ to be white noise. ΠZ_{t-k} is assumed to be $I(0)$ in three different cases:

First, all the variables in the system are stationary $I(0)$; therefore, there is no spurious regression and no need for co-integration analysis, since the long-run equilibrium parameters can be obtained by performing the VAR model with variables in levels. The Π matrix in this case has full rank $(n = r)$, where n is the number of variables in the system, and r is the number of the co-integrating vectors. Second, there is no co-integration at all, therefore no linear combinations of the Z_t that are $I(0)$, and consequently Π is a matrix of zeroes. In the latter case a VAR model with differenced variables can be performed to obtain the short-run relationships among the variables, but the long-run relationships are lost. Third, there exist up to $(n-1)$ co-integrating relations among the variables: $\beta' Z_{t-k} \sim I(0)$. In this case, β has $r \leq (n-1)$ co-integrating vectors and $(n-r)$ non stationary $I(1)$ vectors. Only the co-integrating vectors of β enter Equation (6.2), and the other $(n-r)$ vectors may not be $I(0)$, which implies that the last $(n-r)$ columns of α are insignificant. Therefore, the main problem is to determine how many $r \leq (n-1)$ co-integrating vectors exist in β, equivalently to test which columns of α are zero. Consequently testing for co-integration is testing the rank of Π or finding the number of r linearly independent columns in Π. Johansen (1988) and Johansen and Juselius (1990) developed a methodology to test the rank of Π, and detect the number of co-integrating vectors among the Z_t and provide estimates of α and β through a reduced rank regression, as will be explained in Section 6.3.3 (Harris, 1995).

6.3 The JML and VECM Approach's Procedures

Many steps have to be performed to estimate the co-integrating long-run elasticities using the JML procedure and the short-run elasticities of tourism demand using the VECM approach.

6.3.1 Selecting the Appropriate Lag Length

Selecting the optimal lag order is very important to ensure obtaining Gaussian error terms. To do that, the VAR model with maximum lag length has to be estimated and examined for non-normality, autocorrelation, and heteroscedasticity; the lag length is reduced by one lag less until we reach zero lags, and the VAR model re-estimated each time and the errors checked. Then, the optimal lag order for the VAR model is the one which has Gaussian error terms (Asteriou and Hall, 2007). In this study, AIC, SC, HQ and others are calculated for each lag in the VAR; the model that minimizes the values of those information criteria is selected as the one with the optimal lag length.

6.3.2 Selecting the Appropriate Deterministic Components

Another required aspect of the procedure that we have to determine before proceeding to the Johansen reducing rank test is to specify whether the model has an intercept only or both intercept and trend either in VAR or in the co-integrating equations (CE) or in both cases. Equation (6.3) displays the VECM with five different cases for the deterministic trend components that can be considered.

$$\Delta Z_t = \Gamma_1 \Delta Z_{t-1} + \Gamma_2 \Delta Z_{\mathrm{t-2}} + \cdots + \Gamma_{\mathrm{k-1}} \Delta Z_{\mathrm{t-k-1}} + \alpha \begin{pmatrix} \beta \\ \mu_1 \\ \delta_1 \end{pmatrix} (Z_{t-1} \;\; 1 \;\; t) + \mu_2 + \delta_2 t + u_t \ldots (6.3)$$

Case 1: there is no intercept or trend in the long run (CE) or in the short run (VAR); so this model is the most restrictive, where $\mu_1 = \mu_2 = \delta_1 = \delta_2 = 0$. This model implies that there is no deterministic component in the data, which is difficult to occur in practice.

Case 2: there is an intercept in the CE, but no intercept or trend in the VAR, where $\mu_2 = \delta_1 = \delta_2 = 0$. This implies no linear trend in the data.

Case 3: there is intercept, but no trend in both the CE and the VAR; where $\delta_1 = \delta_2 = 0$. This model implies that there are linear trends in the levels of the data, and allows the non stationary relationships in the model to drift. However it is assumed that the intercept in the CE is cancelled by the intercept in the VAR, leaving only an intercept in the short run (VAR).

Case 4: there is intercept in both the CE and the VAR, linear trend in the CE, but no trend in the VAR; where $\delta_2 = 0$. This case occurs when there are no quadratic trends in the levels of the data; therefore no trend in the VAR, but there is some long-run linear growth (e.g., change in tourists' preferences) which the model cannot account for. Then a linear trend in CE can be allowed to capture this unknown exogenous growth.

Case 5: there is an intercept and quadratic trend in the CE, and intercept and linear trend in the VAR; so, everything is unrestricted in this model. However this model is difficult to justify economically, especially as the variables are in natural logarithm form (Asteriou and Hall, 2007).

The question of which case is more appropriate to the data of this study is not straight forward. Graphing each series in level and first difference (as in Chapter 4) provides some useful information about the trend components in these series. For example, the relative prices series and the non-Egypt prices in most models show no indication of upward or downward drift over time, which would require the intercept to be restricted to lie in the CE (case 2). The other series exhibit a deterministic trend in levels, so we can allow the non-stationary relationships in the models to drift (case 3). However, from the plots of the data it is difficult to determine whether case 4 should be used or not, since the available data cannot indicate whether there are unmeasured factors reflecting exogenous growth in some or all the variables in the systems or not (Harris, 1995).

6.3.3 Determining the Number of Co-Integrating Vectors or the Rank of Π (Johansen Reduced Rank Regression)

According to Johansen and Juselius (1990), two methods can be used for determining the rank of Π, or the number of co-integrating vectors in the system.

6.3.3.1 Trace Test

The null hypothesis of this statistic is that the number of co-integrating vectors is less than or equal to *r*, where *r* is an indicator of reduced rank in (n-r), for *n* the number of variables. When all characteristic roots (eigenvalues) obtained from the estimation equal zero ($\hat{\lambda}_i = 0$), the trace statistic is equal to zero. In contrast, the closer the characteristic roots are to unity, the more negative is the $\ln(1 - \hat{\lambda}_i)$ term and consequently the larger the trace statistic, as illustrated in Equation (6.4).

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{n} \ln(1 - \hat{\lambda}_i) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6.4)$$

where $r = 0, 1, 2, \dots, n-2, n-1$. The number of co-integrating vectors is examined by working downwards up to the value of *r*, corresponding to a test statistic bigger than the critical values provided by Johansen and Juselius (1990).

6.3.3.2 Maximal-Eigenvalue Test

Under the second test, the null hypothesis is that rank Π = *r*, or there are up to *r* co-integrating vectors against the alternative that the rank is *r + 1*, or there are *r + 1* co-integrating vectors. Therefore, the null hypothesis of *r = 0* is tested against the alternative that *r = 1; r = 1* against the alternative of *r = 2* and so forth. To test how many numbers of characteristic roots are significantly different from zero, the following statistic is used:

$$\lambda_{max}(r, r+1) = -T ln(1 - \hat{\lambda}_{r+1}) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (6.5)$$

The number of co-integrating vectors can be detected by comparing the calculated values of this statistic with the critical values provided by Johansen and Juselius (1990).

6.3.4 Imposing Restrictions on βs to Identify the Co-Integration Vectors

After formulating the dynamic model in terms of selecting the optimal lag length of the VAR, specifying the most appropriate deterministic components, and determining the number of co-integrating vectors among the variables in the system, the unrestricted estimates of β_s can be obtained. However these unrestricted estimates are often difficult to interpret economically. A problem of identification arises since the matrices α and β are not uniquely identified without additional restrictions (Zhou et al., 2007). For this reason, testing for identification to formulate unique co-integrating vectors is required. Prior economic information about the relations among the variables in the system forms the basis for imposing restrictions. However, that is not straightforward since the numbers of variables that can enter the model have to be limited to simplify the co-integrating relationships whereas economic theory suggests numerous relevant variables.

To identify a system with co-integrating rank *r*, Pesaran et al. (2001) indicate that r^2 restrictions for all the system or *r* number of restrictions for each co-integrating vector are needed for exact identification. Johansen (1988, 1991 and 1995) proposed a statistical method to impose exact identification restrictions, but Pesaran and Shin (1998) criticize this approach as a pure mathematical convenience that ignores the theoretical and empirical relationships between variables in the model, and instead they recommend the use of economic theory and relevant prior information to choose long-run exact or over identifying restrictions, which called a theory-based approach (Zhou et al., 2007).

6.3.5 Testing and Imposing Weak Exogeneity on Loading Parameters (α_s)

A variable Y_t is called weakly exogenous if it is only a function of lagged variables, in addition the parameters of the equation generating Y_t are independent of the parameters generating the other variables in the system. If a variable is found to be weakly exogenous, it can be dropped as an endogenous variable from the left-hand side of the system, so its short-run behaviour is not modelled and the whole equation for that variable will be dropped, although it will remain in the right-hand side of the other equations (Asteriou and Hall, 2007).

In $\Pi = \alpha\beta'$, the matrix α represents the speed of adjustment to the long-run equilibrium or the feedback mechanisms in VAR models, and β' is the matrix of long-run coefficients. Therefore, when there are $r \leq n-1$ co-integrating vectors in β, this automatically means that at least $(n-r)$ columns of α are equal to zero. Tests for the significance of these feedbacks or loading parameters are often called weak exogeneity tests, because these zero restrictions indicate long-run weak exogeneity with respect to the co-integrating parameters (Ibid, 2007).

To test for weak exogeneity in the system, the null hypothesis that $H_0\colon \alpha_{ij} = 0$, for $j=1,\ldots,r$ has to be tested. The likelihood ratio (LR) test is used to ensure the validity of these restrictions. It is worth mentioning that if all but one variable in a system are weakly exogenous, a single equation framework can be appropriate to estimate the co-integration parameters (Břuggemann, 2002), and may produce the same results as in the case of the system approach. Estimating the VECM model taking into consideration weakly exogenous variables ensures that the rest of the system has better stochastic properties in terms of having short-run residuals free of diagnostic problems.

6.3.6 Estimating the VECM and Evaluating the System of Equations

After imposing the relevant restrictions on the long-run co-integrating vectors (β) to identify the system exactly, and imposing weak exogeneity restrictions on the loading parameters (α), the complete dynamic VECM model can be estimated by including the first difference of all the variables with their optimal lags, the exogenous variables like the political instability, and first lag of the long-run equilibrium errors (retained from the co-integration equation). Therefore, the VECM model as in Equation (6.2) can be expressed for each endogenous variable in the system as in tourist arrivals' Equation (6.6). By putting the other variables as dependent variables (in the left hand sides) each in one equation, six VECM equations can be obtained.

$$\Delta TO_t = \lambda_0 + \sum_{i=1}^{k-1} \tau_{1i}\Delta TO_{t-i} + \sum_{i=1}^{k-1} \tau_{2i}\Delta Y_{t-i} + \sum_{i=1}^{k-1} \tau_{3i}\Delta P_{t-i} + \sum_{i=1}^{k-1} \tau_{4i}\Delta NP_{t-i} + \sum_{i=1}^{k-1} \tau_{5i}\Delta G_{t-i} + \sum_{i=1}^{k-1} \tau_{6i}\Delta R_{t-i} + \lambda_7 TV_t + \varphi EC_{t-1} + \eta_t \quad \ldots (6.6)$$

Diagnostic checking for the performance of the system is required before interpreting the results. Normality test, serial autocorrelation and heteroscedasticity tests of the residuals are evaluated to ensure the statistical reliability of the system. Stability test is also performed by computing the inverse roots of the characteristic AR polynomial of the models. The estimated VECM is stable if $(k-r)$ numbers of roots are equal to unity, whereas the rest of roots $[kp-(k-r)]$ have modulus less than one and lie inside the unit circle; k is the number of endogenous variables, p is lag length and r is the number of co-integrating relations in the model (Lütkepohl, 1991).

6.4 Empirical Results

The supply side of tourism is assumed to be perfectly elastic. It affects tourism demand but it is pre-determinant and does not affect prices. A vector of six variables (TO_t (TN_t), Y_t, P_t, NP_t, G_t, R_t) was tested for co-integration and estimated for eight different models represent tourism demand for Egypt from all origins as well as different regions of origin over the period 1970-2009 by using co-integration and the VECM approach.

When using the JML approach, it is preferable that all the variables are $I(1)$ or non-stationary; however unit root tests often suffer from low power. Therefore, in practical work, it is common for co-integration among variables to be tested even when some variables are not $I(1)$. Moreover, Enders (2004) suggested that Johansen's co-integration test can be applied to variables with different orders of integration, and it is valid even in the case of mixed integration order of the estimated variables (Tang, 2010).

6.4.1 Selecting the appropriate lag order, deterministic components and rank of Π

Two lags in levels of the variables were selected as a maximum lag length in VAR for each of the models in order to save the degrees of freedom. Using the appropriate information criteria, we have chosen an optimal lag equal to two in the case of All Countries, Europe and the Americas models, but equal to one in the Arab models (see **Appendix 6**, **Tables 1 and 2)**. Deterministic component 3 (linear trend in data, but intercept in CEs) was selected as the most appropriate trend for all the models, except for two models. Deterministic component 2 was chosen for Europe (TN_t) model, and deterministic component 4 for Arab (TN_t) model, since they produce the best results. Including trend in the CE (case 4) sometimes affects the accuracy of the estimation negatively, and produces very big income elasticity of demand, as the case in the ARDL approach (Chapter 5) and as indicated by some demand literature (Song et al., 2009). Moreover, it is recommended not to include trend in the CE in the case of Europe and All Countries models to retain the stochastic trend in tourism demand variables (trend stationary series).

Using the available information about the optimal lag length and the appropriate deterministic component for each model, Johansen's max-eigenvalue test[28] cannot reject that there is one co-integrating relation between tourism demand and income, relative prices, non-Egypt prices, globalization and hotel capacity for all the models, but two relations in the Americas (TO_t) model as illustrated in Appendix 6, **Tables 3** and **4**.

6.4.2 Identifying the Co-Integration Vectors

First, we tested and imposed restrictions on the loading parameters (α_s) of the different variables, using the LR test, to examine the weakly exogenous variables and exclude them from the left-hand side of the system. The results of the LR test for binding

[28] Trace test is also performed, but we report the result of only max-eigenvalue test to save space.

restrictions are reported in Appendix 6, **Tables 5 and 6**. The results confirm that the problem of identification does not hold in our models, since the hotel capacity is found to be exogenous variable in all the models when tourist arrivals is the dependent variable. When tourist nights is the dependent variable, hotel capacity is exogenous in the All Countries and Americas models, in addition, relative prices is exogenous variable in the Europe models, All Countries, and the Americas models. Therefore since the supply of tourism and/or relative prices are considered to be exogenous, estimation of only the demand for tourism will be valid and overcome the problem of identification or simultaneity.

Only one co-integrating vector exists between tourist arrivals or tourist nights and their explanatory variables in the All Countries models, Europe models, Arab models, and the Americas (TN_t) models, therefore, normalization on the tourist demand variable is the only required restriction for identifying this unique vector as illustrated in Equation 6.7.

$$TO_t = C_1 + \beta_{12}\, Y_t + \beta_{13} P_t + \beta_{14} NP_t + \beta_{15} G_t + \beta_{16} R_t + \varepsilon_{TO} \dots\dots\dots\dots\dots\dots\dots\dots\dots. (6.7)$$

In contrast, in the case of the Americas (TO_t) model, r^2 restrictions (4 restrictions) are required to identify a system with two co-integrating vectors. For the first vector, we normalized on tourist arrivals. Given that the demand function is proved to be homogenous of degree zero in prices ($\beta_{13}+\beta_{14}=0$), we tested and imposed this restriction as the second required restriction. For the second vector, we normalized on tourist arrivals and excluded hotel capacity, since the later variable was found to be insignificant for this region according to the results of the ARDL approach. The first vector has been chosen since the error correction term is found to be significant at the 1% level of significance and the speed of adjustment takes the correct negative sign. For the second vector, the speed of adjustment is also significant, but has the wrong positive sign. Hence, we selected the first vector to represent tourism demand from this region to Egypt.

6.4.3 Estimating the Long-Run Equilibrium Relationships

Having identified the co-integrating vectors and imposing weakly exogenous restrictions, the results of the co-integration estimation of all the models are estimated and reported in **Table 6.1** and **Table 6.2**. Mostly elasticities of tourist nights with respect to different explanatory variables take a bigger value than elasticities of tourist arrivals. This is because if income, prices, or other determinants changed, tourists would probably change their length of stay first, then they can respond fully to positive or negative changes by increasing the number of arrivals.

Table 6.1: Johansen estimation of long-run results for all the models, (TO) is the dependent variable

variables	All Countries	Europe	Arab	Americas	
				Vector 1	Vector 2
Y	7.7455***	3.9769***	0.8272***	3.5398***	1.5732*
P	-0.2493**	0.5857***	-0.1535***	0.9228***	1.4030***
NP	0.1142	-0.0727	-0.4425***	-0.9228***	-1.6464***
G	-4.5180***	2.3419***	-0.6956**	2.2606***	4.4215***
R	0.2538*	-0.0076	0.4076***	-0.3666*	0
Constant	-52.1480	-42.9237	-0.8137	-35.1019	-26.9103
EC_{t-1}	-0.4165***	-0.3010***	-0.3434***	-0.9878***	0.9135***

Source: Author's own calculations using EViews. Note: ***, **, * indicate significance at the 1%, 5% and 10% levels respectively. Note that for deterministic components case 3, *t*-statistic for the constant is not provided.

Table 6.2: Johansen estimation of long-run results for all the models, (TN) is the dependent variable

Variables	All Countries	Europe	Arab	Americas
Y	7.7201***	2.9814**	2.2146***	8.2046***
P	-0.7236**	0.7086***	0.0117	-1.1916***
NP	0.4861*	-0.0579	-1.5358***	1.6181***
G	-5.6999**	1.9627**	4.8299***	-6.5395***
R	0.9791**	0.6842***	4.3413***	-1.4579
Constant	-53.2548	-37.7107***	-63.4890	-51.91596
trend	-	-	-0.4049***	-
EC_{t-1}	-0.2034***	-0.4213***	-0.4733***	-0.2616***

Source: Author's own calculations using EViews. Note: ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

In the long run, income elasticity is of great importance for all regions. It is always significant and has a positive elastic value, but inelastic in the case of the Arab (TO_t) model, ranging from 0.83 in Arab (TO_t) to 8.2 in the Americas (TN_t) model. Therefore, the values of income elasticities suggest that income elasticities for long-haul tourism (American and European tourists) have bigger values than for regional tourism (Arab tourists). This result may reflect that the regional or short- haul tourism is a poor substitute for inter-regional or long- haul tourism in the consumer's choice set.

These findings are consistent with Kulendran and Witt's (2001) study, which examined the UK outbound tourism demand for eight major destinations using the JML approach. The income coefficients for Portugal and the US are found to be more than unity due to the nature of tourism to the US as it is a long-haul trip with high airfare, and the relatively expensive accommodation in Portugal. In contrast, the income coefficients for the rest of European destinations were less than unity. In addition, Kulendran and King (1997) estimated tourism demand for Australia from US, UK, Japan and New Zealand applying the JML procedure. The results indicated that the long-run income elasticities accounted for 1.30 in New Zealand (short-haul trip) to 4.65 in Japan. Algieri (2006) examined the determinants of tourism revenues in Russia from worldwide using JML procedures and found income elasticity of 7.9.

Relative tourism prices elasticities are significant for all the models at the 5% level, except for Arab (TN_t), and they take the expected negative signs in the All Countries and Arab models, but mostly positive sign in the case of non-Arab tourists. The values of these elasticities are less than unity with respect to all models, except the Americas (TN_t), indicating that tourism in Egypt is not a competitor to domestic tourism in most cases. Toh, et al.'s (2006) study suggested that tourism demand decreases by 4.3% for every percentage increase in relative prices in Singapore over Japan, which is high elasticity reflecting intense competition between the two countries. Moreover, Saayman and Saayman (2008) analysed inbound tourism demand for South Africa from different regions using JML procedures. The results indicated that the long-run relative prices elasticity of demand for tourism in South Africa from Asia is significant and negative, whereas it is significant and positive in the case of Australia, and North and South America, but positive and insignificant in case of Europe. Algieri (2006) found the relative prices elasticity of tourism demand for Russia is -1.5 with a significant effect, and Kulendran and King (1997) found this elasticity is significant and negative, ranging from -0.95 in Japan to -3.02 in US.

Prices of tourism in Egypt's alternative destinations are found to be significant factor for the Arab and American tourists. The signs of this factor suggest that these alternative destinations are considered as complements to Egypt in the long run from the perspective of these tourists. Globalization elasticity is also a significant determinant, which is more than unity in most cases. It affects tourism positively in the long run with respect to American and European tourists, but negatively with regard to Arab tourists at the 5% level of significance.

Hotel capacity is also an important factor; it affects tourist nights of all regions significantly (except for the Americas) and positively, but insignificantly affects tourist arrivals in all models (except for the Arab). Saayman and Saayman (2008) reported hotel capacity elasticities of between -2.6 in Asia to -8.6 in South America, but positive and insignificant in case of Australia in the long run. Choyakh (2008) concluded that tourism supply elasticities of tourism demand for Tunisia are always positive and inelastic, ranging from 0.05 in France to 0.84 in Germany.

Constant is mostly significant and takes very big negative values, suggesting that if income of tourists, prices of tourism, globalization, hotel rooms in Egypt equal zero, the international tourism in Egypt will be negative (outbound tourism).

Under the assumption that Egypt's tourism demand does not react instantaneously to changes in economic conditions (income, prices, hotel capacity...e.g.), the speeds of adjustment coefficients are always significant at the 1% level with the expected negative signs and indicate that 30%, 34% and 99% of the desired tourist arrivals from Europe, Arab and the Americas respectively adjust within the first year. However about 42%, 47% and 26% of the desired long-run tourist nights from Europe, Arab and the Americas respectively occur within the first year.

Tourism demand literature records different speeds of adjustment for different origin and host countries. For example, Toh, et al. (2006) found that 49% of the desired long-run tourist arrivals from Japan to Singapore occur within the first year. Dritsakis (2004) suggested that 51% and 30% of disequilibrium in the tourist arrivals from Germany and UK respectively to Greece can be adjusted each year. Lim and Mcaleer (2001) concluded that the error correction term of tourism for Australia from Hong Kong is insignificant whereas it is significant and negative in the case of Singapore, suggesting that 17% of the disequilibrium in tourism demand is adjusted each year. In addition, Saayman and Saayman (2008) found speed of adjustment coefficients of South Africa arrivals are 34% for tourists from South America, 101% for Asian tourists and 24% for Australian tourists, whereas they are insignificant in the case of European and North American tourists. Therefore, from the above literature, it can be concluded that the speed of adjustment process in tourism demand in Egypt occurs with a reasonable speed in almost all the models.

6.4.4 Estimating the Short-Run Dynamics Elasticities and Diagnostic Checking

The short-run elasticities are estimated using VECM and the results are reported in **Tables 6.3** and **6.4,** along with some diagnostic checking of the statistical performance of these models.

Table 6.3: VECM estimation of short-run results for all Countries, ΔTN_t is the dependent variable

Variables	All Countries	Europe	Arab	Americas
ΔTN_{t-1}	-	-	0.6696**	-0.1712*
ΔY_{t-1}	-	-	-0.7527*	-2.4062**
ΔP_{t-1}	-	-0.3451**	-	0.6157***
ΔNP_{t-1}	-	-	-	-0.5294***
ΔG_{t-1}	-	2.1524**	-2.9820**	1.7988**
ΔR_{t-1}	-	-	-0.8985*	-
Constant	0.2171***	-	0.2004**	0.2567***
TV_t	-0.3250***	-0.2563***	-0.0301	-0.5127***
EC_{t-1}	-0.2034***	-0.4213***	-0.4733***	-0.2616***
Goodness of fit & diagnostic tests				
R^2	0.5160	0.4574	0.5686	0.7714
Adj. R^2	0.3825	0.3308	0.2941	0.7084
Hetero	365.4209	364.5370	605.3098	351.7472
JB	2.2120	0.2722	20.2924*	6.0618

Source: Author's own calculations using EViews, ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Although economic theory is a good guide for evaluating the results in the long run, it tells less about the short-run results. The lagged dependent variables can be regarded as the effects of changes in tastes and preference, habit persistence, destination loyalty, and word of mouth effects (Croes and Vanegas, 2005). This factor is a significant determinant of tourism demand from the perspective of Arab tourists (0.66), with a positive effect, indicating a good experience and loyalty to tourism in Egypt. However it is significant and negative with respect to American tourist arrivals, since American tourists may prefer travelling to safer destinations. The results are consistent with earlier studies. Toh, et al. (2006) concluded that word of mouth effect of tourism demand from Japan to Singapore is negative and insignificant. Dritsakis (2004) found that word of mouth effect of tourism in Greece is insignificant for both German and British tourists. Lim and Mcaleer (2001) suggested that word of mouth effect of tourism in Australia is significant and negative in Hong Kong (-0.57) and Singapore (-0.41). In contrast, Brida, et al. (2008) analysed tourism demand from the US to Mexico and suggested a significant and positive word of mouth effect with an elasticity of 0.60.

Table 6.4: VECM estimation of short-run results for all the models, ΔTO_t is the dependent variable

variables	All Countries	Europe	Arab	Americas
ΔTO_{t-1}	-0.4293**	-	NA	-0.3380**
ΔY_{t-1}	-2.0798***	-3.6074**	NA	-
ΔP_{t-1}	-	-	NA	0.7583***
ΔNP_{t-1}	0.4194***	-	NA	-0.7292***
ΔG_{t-1}	-	-	NA	1.8274**
ΔR_{t-1}	-0.6010**	-	NA	0.8065*
Constant	0.2583***	0.2825***	0.0664***	0.1676***
TV_t	-0.2266***	-0.2599***	-0.0430	-0.3640***
EC_{t-1}	-0.4165***	-0.3010***	-0.3434***	-0.9878***
Goodness of fit & diagnostic tests				
R^2	0.7191	0.5954	0.2660	0.7360
Adj. R^2	0.5403	0.4838	0.2252	0.6511
Hetero	622.193	359.6066	101.7988	371.0002
JB	1.4299	0.2264	1.6954	0.16135

Source: Author's own calculations using EViews. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively. Note that the specification of VECM for the Arab model with 0 lag in difference does not permit estimate short-run elasticities.

For all regions, change in lagged income mostly has a negative effect on demand for tourism in Egypt, suggesting that an increase in income of tourists in the short run tends to reduce tourism directed to Egypt in favour of travel to other destinations, but in the long run, increase in income tends to increase demand for tourism in all destinations including Egypt. This result supports Dritsakis' (2004) study, which indicated that although long-run income elasticity is significant and positive with elastic demand with respect to Germany and UK, the short-run income elasticity is negative in all cases, but insignificant in the case of Germany. Lim and Mcaleer's (2001) study of the demand for travel to Australia indicated that income of Hong Kong and Singapore is a significant variable for tourism in Australia with elasticities of 2.26 and 1.59 respectively in the long run, whereas the short-run income elasticities are significant and negative (-4.55) in the case of Hong Kong, but insignificant in the case of Singapore. Kulendran and King (1997) reported that lagged income elasticities are insignificant in the short run for all the origin countries.

Lagged relative prices are insignificant in most cases, but significant and positive for American tourists, indicating that tourism prices in Egypt in the short run are a good indication of the quality of the trip because of the lack of information. This result is consistent with Toh, et al. (2006), since lagged relative prices of Singapore relative to Japan are found to be significant and positive in the short run. Moreover, Lim and

Mcaleer (2001) suggested that short-run prices elasticities for Australia relative to both Hong Kong and Singapore are always insignificant, although the same elasticities in the long run are significant, negative, and elastic. Kulendran and King (1997) indicated that lagged relative prices elasticity has the expected negative effect in the cases of both Japan and New Zealand, positive effect in the case of the US, and insignificant effect in the case of the UK.

Lagged non-Egypt prices are significant and positive in the All Countries, indicating that tourism in Egypt's alternative destinations is considered as substitute to tourism in Egypt. In contrast, NP_t is significant and negative for American tourists, indicating that tourism in these alternative destinations are considered as complements with respect to American tourists. Lagged globalization is significant and positive in the Americas and Europe models, but significant and negative for Arab model, with more than unity elasticities in all cases. Lagged hotel capacity elasticities are mostly insignificant, indicating that hotel capacity is a long-run investment and tourism demand takes time to react to it. Brida, et al. (2008) indicated that short-run elasticity of lagged hotel capacity is significant and negative in Mexico, whereas the long-run elasticity of the same variable is positive but insignificant.

Finally, political instability is a very significant factor in the short run for all regions, except for the Arab region. American tourists are very safety conscious, since they are the most affected by terrorism or riots in Egypt; a year of riots tends to decrease American tourist arrivals by 34% and American tourist nights by 51%. The effect of riots is slightly less on European arrivals and nights, accounting for 26% in both cases.

The determination coefficients in the tourism demand vectors indicate that more than 73%, 59%, 26%, and 71% of the variation of tourist arrivals from the Americas, Europe, Arab, and All Countries respectively can be explained by the variables in the model. In addition, 77%, 46%, 57%, and 52% of the variation of tourist nights from the Americas, Europe, Arab, and All Countries respectively can be explained by the variables in the model. Finally, diagnostic tests results indicate statistically reasonable estimates. All the models are stable and their roots lie within the unit circle; in addition, there is no serial correlation up to 12 lags, except in very limited number of lags (Appendix 6, **Tables 7 and 8**). The residuals are homoscedastic and normally distributed for all the models at the 5% level of significant.

6.5 Summary and Conclusion

This chapter uses the JML procedure as a system approach of co-integration to estimate the long-run elasticities of demand for tourism in Egypt from all origins as well as the main markets using time series data for the period 1970-2009. The associated short-run elasticities were also estimated based on the VECM. To establish the long-run relationships between tourist arrivals/ nights and their main determinants, a sequence of procedures have to be followed. First, the optimal lag length of the VAR is set using the appropriate information criteria; second the most appropriate deterministic components are specified for each model, then all that information is used in testing the number of co-integrating vectors in the system based on Johansen's rank tests. The unrestricted estimates of β_s were obtained until we identified the system by imposing r^2 restrictions to formulate unique co-integrating vectors using the economic theory and prior information about the relations among the variables in the system. Moreover, tests for the weak exogeneity were carried out to exclude exogenous variables from the left hand side of the system. Following these steps for all the models, the long-run estimates were obtained and analysed. The associated short-run estimates were also estimated in the VECM.

The results of all the models infer one co-integrating relations exists between tourist arrivals or tourist nights and their fundamental determinants, but two relations in just one model (Americas TO_t). The findings of the long-run estimation indicate that income elasticity is of great importance for tourism demand from all originating regions. It is always significant, positive and elastic, which is in line with the economic theory, indicating that income elasticities for long-haul tourism have bigger values than regional tourism as proved by earlier studies. Relative tourism price is another effective and significant factor in determining the demand for tourism in Egypt, with the expected negative signs in most cases. Tourism demand in Egypt is price inelastic, except in the case of the Americas TN_t. Therefore, the government or tourist providers can impose taxes or increase the prices of tourist services in order to maximize tourist expenditures and increase the yield of the industry, especially as high prices may be interpreted as a signal of high quality.

Non-Egypt tourism prices are found to be a significant factor for the Arab and Americas tourists. The signs of this factor suggest that these alternative destinations are considered as complements for Egypt with respect to these tourists. Globalization is a significant determinant, with elastic demand in most cases. It affects tourist arrivals positively with respect to American and European tourists, but negatively with regard to Arab tourists. Hotel capacity is also a considerable factor; it affects tourist nights of all the models significantly and positively, except the American model, but it has no effect on tourist arrivals from different regions, except the Arab tourists.

In the short-run dynamics, word of mouth effect is found to be significant and positive in the Arab and significant and negative in the Americas models, indicating good experience and loyalty to tourism in Egypt only according to the Arab. Therefore more efforts have to be made to improve the quality of tourism services in Egypt and more promotion efforts are required. Short-run lagged income, lagged relative prices, lagged non-Egypt prices, lagged globalization, and lagged hotel capacity have significant effects on tourism demand for Egypt in some cases. Terrorism is always significant, except in the Arab model, and its effect is maximized in the case of American tourists. Finally the error correction terms are always significant and take reasonable values, implying that the short-run disequilibrium between tourism demand in Egypt and its determinants can be corrected from nearly one year to slightly less than five years.

Appendix 6

Table 1: Optimal lag order for all the models (TO_t), maximum lag is 2

	All Countries (TO_t)			Europe (TO_t)			Arab (TO_t)			Americas (TO_t)		
Lag	0	1	2	0	1	2	0	1	2	0	1	2
Log L	108.42	315.17	350.21	91.49	292.90	330.98	32.19	233.59	276.71	69.89	286.56	327.31
LR	NA	326.4534*	44.26	NA	328.6203*	50.10	NA	328.60	56.73456*	NA	342.10	51.4842*
FPE	0.00	3.27e-14*	0.00	0.00	7.61e-14*	0.00	0.00	0.00	1.37e-12*	0.00	0.00	1.37e-13*
AIC	-5.07	-14.010	-14.016*	-4.50	-13.21	-13.3147*	-1.38	-10.08	-10.45845*	-3.05	-12.56	-12.8060*
SC	-4.56	-11.9931*	-10.39	-4.24	-11.3955*	-9.95	-1.12	-8.273841*	-7.10	-2.53	-10.4870*	-9.19
HQ	-4.89	-13.3256*	-12.72	-4.41	-12.5615*	-12.12	-1.29	-9.439833*	-9.26	-2.86	-11.8196*	-11.52

Source: Author's own calculations using EViews.* indicates selected lag order at the 5% level, LR: sequential modified LR test statistic, FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

Table 2: Optimal lag order for all the models (TN_t), maximum lag is 2

	All Countries (TN_t)			Europe (TN_t)			Arab (TN_t)			Americas (TN_t)		
Lag	0	1	2	0	1	2	0	1	2	0	1	2
Log L	72.29	280.24	329.35	81.93	281.19	320.52	0.29	206.92	260.68	50.75	257.73	292.53
LR	NA	339.29	64.61*	NA	325.11	51.74*	NA	337.14	70.73*	NA	337.69*	45.79
FPE	0.00	0.00	8.61e-14*	0.00	0.00	1.37e-13*	0.00	0.00	3.19e-12*	0.00	4.84e-13*	0.00
AIC	-3.49	-12.54	-13.23*	-4.00	-12.59	-12.76*	0.30	-8.68	-9.61*	-2.36	-11.35*	-11.29
SC	-3.23	-10.73*	-9.87	-3.74	-10.78*	-9.40	0.56	-6.87*	-6.25	-2.10	-9.54*	-7.93
HQ	-3.40	-11.90	-12.03*	-3.90	-11.95*	-11.57	0.39	-8.04	-8.42*	-2.26	-10.71*	-10.09

Source: Author's own calculations using EViews.* indicates selected lag order at the 5% level, LR: sequential modified LR test statistic, FPE: Final prediction error, AIC: Akaike information criterion, SC: Schwarz information criterion, HQ: Hannan-Quinn information criterion.

Table 3: Co-integration test based on Johansen's max-Eigen statistic, deterministic component case 3, TO_t is the dependent variable

		All Countries (TO_t)		Europe (TO_t)		Arab (TO_t)		Americas (TO_t)	
No. of CE(s)	5% Critical Value	Max-Eigen Statistic	Prob.	Max-Eigen Statistic	Prob.	Max-Eigen Statistic	Prob.	Max-Eigen Statistic	Prob.
None	40.078	41.446	0.035	47.753	0.006	42.599	0.025	48.559	0.004
At most 1	33.877	32.590	0.071	32.132	0.080	29.521	0.152	34.493	0.042
At most 2	27.584	18.178	0.480	15.941	0.671	21.841	0.229	21.184	0.265
At most 3	21.132	16.707	0.186	14.416	0.332	9.080	0.826	8.763	0.851
At most 4	14.265	3.664	0.893	3.240	0.930	5.097	0.730	3.998	0.860
At most 5	3.842	0.445	0.505	0.000	0.991	1.096	0.295	0.216	0.642

Table 4: Co-integration test based on Johansen's max-Eigen statistic, deterministic component case 3, TN_t is the dependent variable

	All Countries (TN_t)			Europe (TN_t)			Arab (TN_t)			Americas (TN_t)		
No. of CE(s)	Max-Eigen Statistic	5% CV of case 3	Prob.	Max-Eigen Statistic	5% CV of case 2	Prob.	Max-Eigen Statistic	5% CV of case 4	Prob.	Max-Eigen Statistic	5% CV of case 3	Prob.
None	43.316	40.078	0.021	53.175	40.957	0.001	49.2444	44.497	0.014	41.039	40.078	0.039
At most 1	16.444	33.877	0.941	27.384	34.806	0.292	25.114	38.331	0.664	30.181	33.877	0.130
At most 2	12.071	27.584	0.930	26.542	28.588	0.089	19.056	32.118	0.725	19.703	27.584	0.362
At most 3	10.171	21.132	0.728	15.579	22.299	0.329	14.384	25.823	0.689	10.265	21.132	0.719
At most 4	3.677	14.265	0.892	12.356	15.892	0.166	7.5146	19.387	0.863	3.084	14.265	0.941
At most 5	1.380	3.842	0.240	2.251	9.165	0.727	6.098	12.518	0.448	0.315	3.842	0.575

Table 5: Tests for weak exogeneity for all the models (TO_t)

variables	TO_t	Y_t	P_t	NP_t	G_t	R_t	Jointly
All Countries	8.3345 (0.0039)	2.1169 (0.1457)	4.8468 (0.0277)	0.9779 (0.3227)	0.0058 (0.9395)	0.0141 (0.9055)	2.5389 (0.6377)
Europe	4.5159 (0.0336)	0.0694 (0.7922)	0.7938 (0.3729)	0.5233 (0.4694)	12.1122 (0.0005)	0.5648 (0.4523)	4.5092 (0.3415)
Arab	8.1514 (0.0043)	0.0117 (0.9139)	4.2820 (0.0385)	13.0456 (0.0003)	0.0488 (0.8251)	1.1017 (0.2939)	1.1450 (0.7662)
Americas	22.9999 (0.0000)	5.6164 (0.0603)	7.1344 (0.0282)	19.1530 (0.0001)	13.2034 (0.0014)	1.6559 (0.4369)	8.3708 (0.0789)

Source: Author's own calculation using EViews, depending on LR test for binding restrictions, Numbers between parentheses refer to the probability of the χ^2 test statistics.

Table 6: Tests for weak exogeneity for all the models (TN_t)

variables	TN_t	Y_t	P_t	NP_t	G_t	R_t	Jointly
All Countries	3.5395 (0.0500)	0.4350 (0.5096)	0.0094 (0.9229)	0.7258 (0.3942)	2.5354 (0.1113)	0.7502 (0.3864)	10.7742 (0.0560)
Europe	11.1626 (0.0008)	1.2891 (0.2562)	0.2653 (0.6065)	0.0240 (0.8768)	2.3673 (0.1239)	3.8526 (0.0497)	7.5755 (0.1084)
Arab	3.9314 (0.0474)	2.5221 (0.1123)	13.5815 (0.0002)	5.8801 (0.0153)	0.6394 (0.4239)	15.8511 (0.0001)	4.0122 (0.1345)
Americas	16.0514 (0.0001)	2.0356 (0.1537)	3.3452 (0.0674)	2.1135 (0.1460)	7.4953 (0.0062)	1.2751 (0.2588)	6.7504 (0.1497)

Source: Author's own calculation using EViews, depending on LR test for binding restrictions, Numbers between parentheses refer to the probability of the χ^2 test statistics.

Table 7: LM test of residuals autocorrelation for all the models (TO_t)

	All Countries		Europe		Arab		Americas	
Lags	LM-Stat	Prob.	LM-Stat	Prob.	LM-Stat	Prob.	LM-Stat	Prob.
1	41.8974	0.2303	39.4484	0.3184	40.0400	0.2955	38.6128	0.3523
2	38.4209	0.3604	50.1507	0.0588	36.7416	0.4343	37.1103	0.4176
3	41.4714	0.2443	41.8604	0.2315	56.2651	0.0169	49.9517	0.0610
4	37.9629	0.3800	40.0158	0.2964	41.5277	0.2424	47.6982	0.0919
5	43.1279	0.1928	31.9151	0.6633	65.5528	0.0019	39.6840	0.3092
6	40.7224	0.2703	47.6520	0.0926	31.3719	0.6884	36.9211	0.4262
7	51.5853	0.0446	32.6595	0.6283	43.8255	0.1736	51.2216	0.0479
8	41.8185	0.2328	50.0688	0.0597	40.4833	0.2790	35.2619	0.5035
9	37.4523	0.4023	52.2170	0.0394	36.7452	0.4342	52.3593	0.0383
10	30.7130	0.7180	38.0446	0.3764	48.3591	0.0817	41.4430	0.2453
11	43.9469	0.1704	34.8143	0.5249	37.2563	0.4111	43.8361	0.1733
12	34.9078	0.5204	57.5569	0.0127	34.4541	0.5422	45.7763	0.1274

Table 8: LM test of residuals autocorrelation for all the models (TN_t)

	All Countries		Europe		Arab		Americas	
Lags	LM-Stat	Prob.	LM-Stat	Prob.	LM-Stat	Prob.	LM-Stat	Prob.
1	35.8362	0.4763	47.5055	0.0950	45.4237	0.1349	36.5838	0.4416
2	52.7240	0.0356	45.9983	0.1228	39.4773	0.3173	35.7302	0.4813
3	36.5604	0.4426	48.2510	0.0833	34.0972	0.5593	44.5867	0.1543
4	22.4564	0.9620	43.8390	0.1732	44.1668	0.1647	28.8272	0.7964
5	45.6584	0.1299	39.9615	0.2985	68.2469	0.0009	33.2742	0.5989
6	38.7873	0.3451	45.3183	0.1373	47.3630	0.0974	31.3512	0.6893
7	44.0877	0.1667	56.8568	0.0149	46.2215	0.1183	48.3407	0.0820
8	37.1047	0.4179	57.0261	0.0143	46.7241	0.1087	38.4191	0.3605
9	31.9472	0.6618	53.7289	0.0290	42.2878	0.2179	46.8187	0.1070
10	25.5802	0.9016	40.2306	0.2883	37.4096	0.4042	45.0780	0.1427
11	31.2064	0.6959	29.2926	0.7781	44.4644	0.1572	41.9507	0.2285
12	43.5915	0.1799	49.7950	0.0628	41.7374	0.2355	42.6034	0.2082

Chapter 7: Tourism Demand Forecasting

7.1 Introduction

Reliable forecasts of tourism demand are important for planning purposes, especially due to the perishable nature of the tourist product, including hotel room, airline seats and cruise-ship lines (Song et al., 2009). Tourism forecasting also plays a critical role in public and private investments in tourism industries.

Tourism demand forecasting can be divided into two categories: non-causal time series methods and causal econometric methods. Whereas time series non-causal methods are useful in providing an easy and relatively accurate forecast of the dependent variable depending on its historical values, causal econometric methods have empirical significance in interpreting the change of tourism demand and exploring the consequences of alternative future policies; thereby enabling evaluation of the existing tourism policies and provision of policy recommendations (Song and Li, 2008).

In the last few decades, much tourism demand literature has been interested in ex-post forecasting to evaluate the performance of different methods, based on time series forecasting and econometric forecasting. Witt and Witt (1992) indicated that in terms of forecasting ability, the naive no-change method tends to perform as well as, if not better than other more complicated types of forecasting methods including Autoregressive Integrated Moving Average (ARIMA) and econometric approaches. Witt and Witt (1995) suggested that the poor forecasting performance of the econometric methods based on traditional approach results from the problem of spurious regression, since most tourism time series are non-stationary. In addition, Kulendruni and King (1997), based on application on Australian data, concluded that univariate time series methods outperform the Error Correction Models (ECMs) specifications. In contrast, Kim and Song (1998), using data on tourism flows to South Korea, found that ECMs are able to produce better forecasts than univariate time series methods. Veloce (2004) forecasted tourism demand for Canada, and concluded that the CI/ECMs forecasts performed more accurately than others. Moreover, Song et al. (2000) generated ex-post forecasting of UK demand for outbound tourism models to 12 destinations and concluded that if causal econometric methods are correctly specified, they should generate better forecasts than univariate time series methods. Finally, De Mello (2001) concluded that:

> In cases for which the behaviour of a time series variable is likely to depend on the behaviour of other time series and economic theory plays a major role in explaining the nature of their interrelated behaviour, it is advisable to move away from a-theoretic naive univariate models and embrace the theory-based, multivariate econometric specifications for forecasting purposes (p.257).

Therefore, the results of various researches are not conclusive and more ex-post forecasting in tourism demand is recommended.

This chapter aims to achieve two goals; first, it evaluates the forecasting accuracy of the alternative econometric methods utilized in Chapters 5 and 6, in addition to comparing the forecasting accuracy of these econometric methods with time series forecasting methods such as ARIMA, and naive no change methods through ex-post forecasting using different forecasting error measures. In this way we can investigate whether the recent advances in the co-integration approach and ECMs can improve the forecasting performance of tourism demand models. Second, ex-ante forecasting of future tourism demand in Egypt is generated for five years from 2010 to 2014 for each tourism demand model using the econometric method which produces the least forecast errors in the ex-post forecasting.

This chapter is structured as follows. In Section 7.2, the ex-post forecasting procedures are explained, and the measures of forecasting error magnitude used to evaluate the forecasting performance of tourism demand methods are introduced. The ex-ante forecasting procedures are provided in Section 7.3. Empirical results of ex-post forecasting of the alternative econometric and time series methods for estimating tourism demand for Egypt from each originating region over different time horizons are given in Section 7.4. Section 7.5 displays the future forecasting of tourism demand for Egypt based on the preferred econometric methods for the period 2010-2014. Finally, Section 7.6 summarizes and draws conclusions.

7.2 Ex-Post Forecasting Procedures

An ex-post forecast (after the event forecast) is a forecast that is run in past periods for which actual values of the tourism demand variables and the explanatory variables are available. The comparison of ex-post forecasts between different methods allows researchers to decide which method generates the best forecast, and therefore it can be used to produce ex-ante (before the event) forecasts.

Ex-post forecasting in the present study aims to evaluate the forecasting performance of our alternative co-integration and the associated ECMs econometric methods. Two univariate time series methods, ARIMA (*p d q*) and naive no change methods are also included in the evaluation for comparison and as benchmarks following Lee (2005), Song et al. (2003), Li et al. (2006) and Veloce (2004). ARIMA (*p d q*) is applied, where *p* and *q* are the autoregressive and moving average specification, *d* is the integrated status of the variables. The orders of ARIMA (*p d q*) models for tourism demand variables for different origin groups are specified by examining the autocorrelation function (ACF) and the partial autocorrelation function (PACF) as illustrated in Box and Jenkins (1970). In the naive no change method, the forecast value at time *t* is set to equal the actual value of last period *t-1*.

All the tourism demand models (All Countries, Europe, Arab and the Americas) are re-estimated using all the above methods using data for the period 1970-2004, and the estimated methods are used to generate 1 year, 2 years, 3 years, 4 years and 5 years ahead ex-post forecasting over the period 2005 to 2009. The sample period is re-estimated by adding one more year each time, and then the remaining observations are forecasted. This process is repeated until the observations are exhausted. Therefore, five 1 year-ahead forecasts, four 2 years-ahead forecasts, three 3 years-ahead forecasts, two 4 years-ahead forecasts, and finally one 5 years-ahead forecast are generated for all methods for all models as illustrated in **Table 7.1**.

Table 7.1: Ex-post forecasting schedules of all forecasting models based on all forecasting methods

Estimation Period	Number of Years Forecasting Ahead				
	1 Year	2 Years	3 Years	4 Years	5 Years
1970-2004	2005	2005-2006	2005-2007	2005-2008	2005-2009
1970-2005	2006	2006-2007	2006-2008	2006-2009	-
1970-2006	2007	2007-2008	2007-2009	-	-
1970-2007	2008	2008-2009	-	-	-
1970-2008	2009	-	-	-	-

7.2.1 Measures of Forecasting Error Magnitude

The accuracy of the forecasting methods can be measured by the forecasting errors - the differences between the actual and forecast value over the period of the forecasting horizon - which are defined as:

$$e_t = TO_t - TOF_t \quad \ldots \ldots (7.1)$$

where $\mathrm{TO_t}$ is the actual values of tourist arrivals in time *t*, $\mathrm{TOF_t}$ is forecast values of tourist arrivals in time *t*, e_t is the forecasting errors in time *t*. In theory, for a well specified model, it is expected that the forecasting errors have a mean of zero over a certain forecasting horizon. However, very small forecasting errors can be obtained even if the models are not well specified as a result of the existence of positive and negative forecasting error values, which cancel each other out. To solve this problem, measures of forecasting errors accuracy have been improved and the errors of Equation (7.1) transformed either to squared values (e_t^2) as in the Root Mean Square Errors (RMSE) in Equation (7.2), or to absolute values $|e_t|$ as in the Mean Absolute Errors (MAE) in Equation (7.3) (Song et al., 2009).

$$\mathrm{RMSE} = \sqrt{\sum \frac{\mathrm{e_t^2}}{\mathrm{n}}} \quad \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .. \ldots \ldots . (7.2)$$

$$\mathrm{MAE} = \frac{\sum |\mathrm{e_t}|}{\mathrm{n}} \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots .. \ldots \ldots \ldots (7.3)$$

where *n* is the number of forecasts. The main difference between the two forecasting error measures is that the MAE gives equal weight to all errors, whereas the RMSE gives more weight to larger errors. Therefore, the RMSE is more sensitive to one extremely bad forecast (Li et al., 2005). The Mean Absolute Percentage Errors (MAPE) is another error forecast measure in which the errors of the forecast are divided by the actual values of tourism demand, as in Equation (7.4), to produce unit independent measures (percentage errors), so one can compare the errors of fitted models that differ in level.

$$\mathrm{MAPE} = \left(\frac{1}{\mathrm{n}} \sum \frac{|\mathrm{e_t}|}{\mathrm{TO_t}}\right) * 100 \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . \ldots .. (7.4)$$

In the present study, the three measures are used to compare forecasting accuracy between different methods for the same origin group, whereas the MAPE is used to compare forecasting accuracy across groups.

7.3 Ex-Ante Forecasting Procedures

Generating accurate and valid forecasts requires well specified, theoretically consistent, and statistically robust econometric methods. In the present study, statistical diagnostics and stability tests have been performed and indicated the validity of our methods to forecast the tourism demand for Egypt from its main originating markets. Moreover, ex-post forecasting comparison is implemented to select the preferred econometric method for each region. This preferred method is applied to produce ex-ante forecasting for tourism demand for all models over a period of 5 years (2010-2014). A longer forecast horizon would result in increasing errors of the forecast variables, resulting in lack of robustness and accuracy of the econometric forecast (Lee, 2005).

7.4 Empirical Results of Ex-Post Forecasting

All the models of tourism demand for Egypt are re-estimated over the period 1970-2004 based on five alternative econometric methods (EG, EG-ECM, ARDL, ARDL-ECM and JML-ECM); in addition to estimating two univariate time series methods (ARIMA and naive no change) as illustrated before. The remaining data up to 2009 are used for multi-step, out of sample forecasting and tests of accuracy for all methods. In this section, we compare the forecasting performance of these alternative methods for all origin regions over five different time horizons, except for the EG and EG-ECM, which are estimated and forecast for only 2 models - All Countries(TN_t) and Arab (TO_t).

Table 7.2 and **Table 7.3** summarize the forecast errors and the rankings (in parentheses) of all forecasting methods in terms of the MAPE. The results in terms of the RMSE are also calculated and reported in **Appendix 7**, **Table 1** and **Table 2**[29].

[29] The MAE are also calculated, but we preferred not to display the results since it is close to the results of the MAPE.

Table 7.2: Forecasting accuracy (2005-2009) in terms of MAPE (%); TO_t is the dependent variable

Forecast Horizon	Forecast Method	Origin Regions				
		All Countries	Europe	Arab	Americas	Overall
1 Year	EG	-	-	1.02(7)	-	1.02(-)
	EG-ECM	-	-	0.66(2)	-	0.66(-)
	ARDL	1.15(3)	1.96(4)	0.84(6)	1.35(1)	1.33(2)
	ARDL-ECM	1.13(2)	2.36(5)	0.84(5)	3.13(3)	1.87(5)
	JML-ECM	1.52(5)	1.55(3)	0.71(3)	3.61(5)	1.85(4)
	ARIMA	1.24(4)	1.22(2)	0.65(1)	3.27(4)	1.59(3)
	Naive 1	1.04(1)	1.12(1)	0.83(4)	2.16(2)	1.29(1)
2 Years	EG	-	-	1.03(2)	-	1.03(-)
	EG-ECM	-	-	0.95(1)	-	0.95(-)
	ARDL	1.48(3)	1.79(3)	1.26(4)	1.29(1)	1.45(1)
	ARDL-ECM	1.38(2)	2.55(5)	1.54(7)	4.12(3)	2.40(4)
	JML-ECM	0.95(1)	1.22(1)	1.29(5)	2.74(2)	1.55(2)
	ARIMA	1.55(4)	1.65(2)	1.04(3)	5.15(5)	2.35(3)
	Naive	2.23(5)	2.52(4)	1.49(6)	4.67(4)	2.73(5)
3 Years	EG	-	-	0.95(1)	-	0.95(-)
	EG-ECM	-	-	1.28(2)	-	1.28(-)
	ARDL	1.72(3)	1.74(2)	1.75(4)	1.20(1)	1.60(1)
	ARDL-ECM	1.58(2)	2.47(4)	2.54(7)	5.21(3)	2.95(3)
	JML-ECM	1.13(1)	1.29(1)	2.11(6)	2.66(2)	1.80(2)
	ARIMA	2.05(4)	2.02(3)	1.38(3)	6.92(4)	3.09(4)
	Naive	3.67(5)	4.22(5)	1.90(5)	7.41(5)	4.30(5)
4 Years	EG	-	-	0.94(1)	-	0.94(-)
	EG-ECM	-	-	1.41(3)	-	1.41(-)
	ARDL	1.66(1)	1.82(1)	2.15(4)	1.43(1)	1.77(1)
	ARDL-ECM	1.90(3)	3.02(4)	4.10(7)	7.32(3)	4.09(4)
	JML-ECM	1.68(2)	1.91(2)	2.38(5)	4.65(2)	2.65(2)
	ARIMA	2.37(4)	2.20(3)	1.39(2)	8.00(4)	3.49(3)
	Naive	4.42(5)	5.00(5)	2.42(6)	9.14(5)	5.25(5)
5 Years	EG	-	-	0.98(1)	-	0.98(-)
	EG-ECM	-	-	2.40(4)	-	2.40(-)
	ARDL	1.32(1)	2.06(1)	1.72(2)	2.15(1)	1.81(1)
	ARDL-ECM	3.12(4)	5.03(4)	4.87(7)	11.56(5)	6.14(5)
	JML-ECM	3.04(3)	3.37(3)	2.77(5)	8.01(2)	4.30(3)
	ARIMA	2.96(2)	2.63(2)	1.98(3)	8.88(3)	4.12(2)
	Naive	4.62(5)	5.07(5)	3.03(6)	10.36(4)	5.77(4)
Overall		2.04(2)	2.47(3)	1.67(1)	5.06(4)	

Source: Author's own calculation using EViews and Excel. Note: the ranking is included in parentheses, (-) means that general comparison with others cannot be drawn due to the few applications of this method.

Table 7.3: Forecasting accuracy (2005-2009) in terms of MAPE (%); TN_t is the dependent variable

Forecast Horizon	Forecast Method	Origin regions				
		All Countries	Europe	Arab	Americas	Overall
1 Year	EG	1.26(6)	-	-	-	1.26(-)
	EG-ECM	1.13(5)	-	-	-	1.13(-)
	ARDL	0.81(1)	2.54(5)	0.69(3)	1.06(1)	1.27(2)
	ARDL-ECM	1.08(4)	2.17(3)	1.01(4)	2.48(5)	1.69(4)
	JML-ECM	1.61(7)	2.05(2)	1.06(5)	2.29(3)	1.75(5)
	ARIMA	0.97(3)	2.32(4)	0.56(1)	2.34(4)	1.55(3)
	Naive 1	0.83(2)	0.94(1)	0.58(2)	1.35(2)	0.92(1)
2 Years	EG	1.55(4)	-	-	-	1.55(-)
	EG-ECM	1.94(7)	-	-	-	1.94(-)
	ARDL	1.29(1)	2.59(4)	0.85(2)	1.19(1)	1.48(1)
	ARDL-ECM	1.60(5)	2.37(3)	1.43(4)	3.27(4)	2.17(4)
	JML-ECM	1.33(2)	2.22(2)	2.14(5)	2.03(2)	1.93(2)
	ARIMA	1.33(3)	2.86(5)	0.85(1)	3.95(5)	2.25(5)
	Naive	1.83(6)	2.19(1)	1.04(3)	2.81(3)	1.97(3)
3 Years	EG	1.83(4)	-	-	-	1.83(-)
	EG-ECM	2.67(6)	-	-	-	2.67(-)
	ARDL	1.59(2)	2.76(3)	0.88(2)	1.54(2)	1.69(1)
	ARDL-ECM	2.19(5)	2.31(2)	1.63(4)	4.21(3)	2.59(3)
	JML-ECM	1.42(1)	2.28(1)	2.53(5)	1.11(1)	1.83(2)
	ARIMA	1.81(3)	3.54(4)	0.86(1)	5.70(5)	2.98(4)
	Naive	3.06(7)	3.73(5)	1.27(3)	4.65(4)	3.18(5)
4 Years	EG	1.78(1)	-	-	-	1.78(-)
	EG-ECM	3.42(6)	-	-	-	3.42(-)
	ARDL	2.01(2)	2.92(3)	0.76(2)	1.57(1)	1.82(1)
	ARDL-ECM	2.87(5)	2.65(1)	2.05(4)	5.98(4)	3.39(4)
	JML-ECM	2.60(4)	2.68(2)	3.17(5)	2.13(2)	2.64(2)
	ARIMA	2.23(3)	3.68(4)	0.73(1)	6.88(5)	3.38(3)
	Naive	3.63(7)	4.36(5)	1.67(3)	5.56(3)	3.81(5)
5 Years	EG	1.63(1)	-	-	-	1.63(-)
	EG-ECM	4.07(6)	-	-	-	4.07(-)
	ARDL	2.53(2)	3.36(1)	0.77(2)	1.54(1)	2.05(1)
	ARDL-ECM	3.78(5)	3.93(3)	3.55(4)	9.75(5)	5.25(4)
	JML-ECM	4.25(7)	4.59(5)	8.43(5)	6.01(3)	5.82(5)
	ARIMA	3.55(3)	3.88(2)	0.70(1)	7.87(4)	4.00(2)
	Naive	3.73(4)	4.37(4)	2.03(3)	5.96(2)	4.02(3)
Overall		2.15(2)	2.93(3)	1.65(1)	3.73(4)	

Source: Author's own calculation using EViews and Excel. Note: the ranking is included in parentheses, (-) means that general comparison with others cannot be drawn due to the few applications of this method.

7.4.1 Measures of Forecasting Performance

Comparing the different calculated measures of forecasting errors, the MAPE (or MAE) and RMSE give the same ranking in 169 cases out of a total of 220 cases[30]. It is noted that most of these differences were recorded in the European models (32 similar results out of 50), whereas much more similar results between the MAPE and the RMSE were obtained in the Arab region (50 similar results out of 60). This discrepancy seems smaller than its counterpart in other studies reviewed by Li et al. (2005), who reviewed 32 forecasting papers and indicated that the same ranking between the MAPE and the RMSE measures was obtained in only 32 out of 117 cases. Song et al. (2009) suggested that this discrepancy between the measures of forecast errors was evidence of large variations among individual forecast errors, since the RMSE are more sensitive to one extremely bad forecast.

7.4.2 Forecasting Performance over Different Time Horizons

Lewis (1982) suggested criteria to evaluate the forecasting performance of different models based on the MAPE measure as following:

> Less than 10% is highly accurate forecasts, 10%-20% is a good forecasting, 20%-25% is a reasonable forecasting, 50% or more is an inaccurate forecasting (Lewis 1982, quoted in Tideswell, et al., 2001).

Hence, according to the Lewis' (1982) interpretation, the forecasting performance of all our models, based on the MAPE, over the different time horizons is considered 'highly accurate' over the different time series and econometric methods of forecasting, except in the case of the Americas (TO_t) model, 5 years ahead forecasting based on the ARDL-ECM forecasting and the naive no change forecasting, which considered 'good forecasting'.

The forecasting performance of the different methods varies over time, since longer horizons are often accompanied by more forecasting errors due to the increase in uncertainty. This result has been noted for most methods in terms of the MAPE measure as illustrated in **Figure 7.1**. The same pattern holds for other measures of forecasting errors. However, the extent of discrepancy from one time horizon to another differs among different methods. In general, the naive no change method performs the least consistently (the largest standard deviation across different time horizons), and its rank

[30] We performed forecasting tests in 220 cases; (5 methods x 5 years x 8 models) + 2 methods (EG+EG-ECM) x 5 years x 2 models (All Countries TN_t and Arab TO_t).

varied from the top, in one year ahead forecasting, to the bottom, in 3 and 4 years ahead forecasting. However, the ARDL long-run technique performs the most consistently in different time horizon forecasting (records the least standard deviation across time horizons).

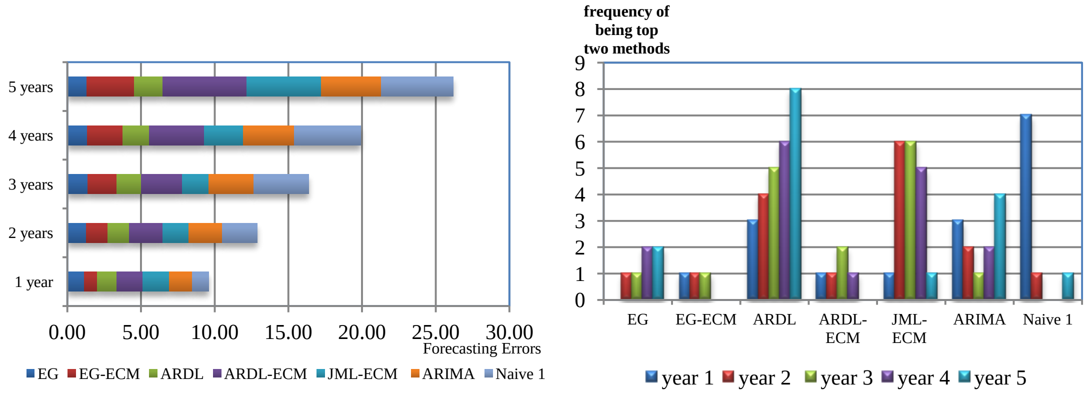


Figure 7.1: Forecasting accuracy according to time horizons in terms of the MAPE

Moreover, by calculating the frequency with which each method is ranked in the top two for each time horizon (panel 2 in Figure 7.1), the following notes can arise:

- The EG method performs better in long-run forecasting (4 and 5 years ahead), the inverse is true in case of the EG-ECM[31] method, which forecasts better in the short to medium terms (1, 2 and 3 years ahead).
- The ARDL method outperforms others along most time horizons. Although the absolute number of forecasting errors of the ARDL increases with longer time horizons, the forecasting performance of this method relative to others increases in the long-run forecasting horizon.
- The ARDL-ECM does not show satisfactory performance relative to others along all the time horizons, but it performs better in the middle term forecasting horizon.
- The JML-ECM performs well relative to others in middle-term forecasting (2, 3 and 4 years ahead). This result is consistent with earlier research; Kulendran and King (1997) found that the JML-ECM performs poorly in the short term and improves its accuracy as the lead time increases. In addition, Li et al. (2005) suggested that the JML-ECM forecasts more accurately in the medium to long run than in the short run.

[31] Both the EG and EG-ECM were applied only on 2 models out of a total of 8 models, so their frequency of being in the top two methods is out of two, rather than out of 8, as is the case in the rest of the methods.

- The ARIMA performs reasonably in the first and last time horizon. Lee (2005) found that the ARIMA method produces relatively accurate forecasts in a longer-term horizon, whereas Kulendran and King (1997) suggested that the ARIMA method tends to be less accurate than other procedures as the lead time increases.
- The naive no change method sometimes outperforms others only in the first year ahead, whereas it is not satisfactory at any other time horizon.

7.4.3 Forecasting Performance of All Methods

7.4.3.1 Most Accurate and Consistent Methods

No forecasting method outperforms the others in all cases, in different time horizons or different models, but often the econometric methods outperform the univariate time series methods. This result is consistent with those of Kim and Song (1998), Song et al. (2000) and Li et al. (2005). The latter study reviewed 23 forecasting papers, and found that there is no single method better than others in all cases, however non-causal methods did not perform satisfactory, especially in the case of annual data, since they outperformed causal methods in only 6 out of 16 studies. In addition, Lee (2005) forecast tourism demand for Hong Kong from different origin countries, and the results indicated that the CI-ECMs performed better than the ARIMA, naive and OLS methods over different time horizons based on different measures of forecasting error.

The ARDL method shows outstanding performance; it obtains the least overall forecasting errors across the 8 models, followed by the JML-ECM, whereas the naive no change method is the least accurate one for all the models, as illustrated in **Figure 7.2**. The performance of all the methods varies from one model to another. An extreme example is given by the ARIMA method, which has the best performance in the case of the Arab (TN_t) model, but the least accurate in the case of the Americas (TN_t) model. In general, the ARIMA method, followed by naive no change, obtained the largest standard deviation among different models, indicating that they perform least consistently; however the ARDL, followed by the JML-ECM, is the most consistent among the 8 models. Such discrepancies in methods' performance across different originating regions may be caused by the different data generating processes (DGPs) of these origins (Li et al., 2005). This result is consistent with Li et al. (2002), in which the ARIMA method generated the best forecasting performance for Japan and Singapore, but the second least performance in the case of Australia and the US. As reported by Li et al. (2005), similar cases were found in Kulendran and King (1997), Kim and Song (1998), and Kulendran and Wilson (2000).

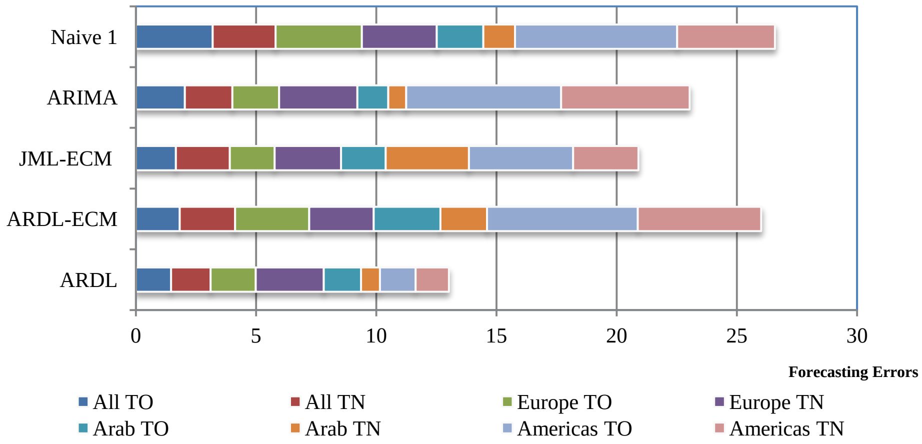


Figure 7.2: Forecasting accuracy of all the tourism demand models across all time horizons, using the alternative methods measured by the MAPE.

Moreover, alternative specifications for the same econometric technique were examined (when possible), and the most accurate specification for forecasting purposes is selected. It is found that the more parsimonious specification within the same method - involving a smaller number of unknown parameters - mostly produces more accurate forecasting than more complex specifications. For example, if there are two different ARDL specifications, the least lag length is included; the more accurate forecasting is produced. Thomas (1993) stated that the parsimony is an important criterion for model selection within the framework of the general to specific approach, since simple specifications are better than complex ones (Song et al., 2009). So, the present study is consistent with Thomas's result; moreover, it suggested that the more parsimonious specification, within the same econometric technique, can generate a more accurate forecast than more complex ones.

7.4.3.2 The Frequency of Achieving First Places

The frequency with which each method appears in the top two places across the 5 forecasting horizons in terms of both the MAPE and the RMSE is reported in **Table 7.4**. The ARDL is the most accurate method according to both forecasting error measures, since it ranks number one in 40% of all cases, and ranks number 1 or 2 in 65% of all cases in terms of the MAPE. This detected result is in line with the findings of Li et al. (2006), which suggested that the long-run ARDL outperforms all the ECMs in the overall evaluation and for all but two cases for different forecasting horizons of demand for tourism from the UK to five Western European destinations. In contrast, the ARDL-ECM is the least accurate method in terms of the MAPE. The bad performance of the ARDL-ECM method results partially from the detected diagnostic problems of this technique in some models (Arab TN_t and the Americas TN_t). Li et al. (2002) evaluated the forecasting performance of ARIMA and 7 econometric methods applied on tourist arrivals to Thailand, and found that the ARDL-ECM did not perform well across all time horizons, and the ARIMA and the other ECMs outperformed it in all cases. The EG method also performs well, being in the top position in 50% of all cases, to which it can be applied, and the first two positions in 60% of all cases which is double the percentage in case of EG-ECM method. The JML-ECM also performed reasonably well, being the best method in about 18%-28% of all cases, and the most or second most accurate method in about 45%-48% of all cases according to the two error measures.

Table 7.4: Frequency of which method is most or second most accurate in all horizons of all models

	Most Accurate		Most/Second Most Accurate	
Methods	MAPE	RMSE	MAPE	RMSE
EG	5	5	6	6
EG-ECM	1	1	3	3
ARDL	16	14	26	27
ARDL-ECM	1	1	5	7
JML-ECM	7	11	19	18
ARIMA	6	7	12	13
Naive 1	4	1	9	6
Total	40	40	80	80

Source: Calculated from Tables 7.2 and 7.3, and Tables 1 and 2 in Appendix 7.

7.4.4 Forecasting Performance of All Models

As can be illustrated from Tables 7.2 and 7.3, using tourist nights as a proxy for tourism demand instead of tourist arrivals yields more accurate forecasting in two out of four models, namely, Arab and the Americas models.

As illustrated in **Figure 7.3**, the Arab models outperform the others, recording the least forecast errors across the 8 models, whereas the Americas models are the least accurate ones. This result is expected, since the political unrest, which is difficult to be predicted and may be responsible for the inaccurate forecasting, is insignificant only in the Arab models, whereas the Americas models are the most affected ones by this factor. In addition, the ARIMA method suffers from some statistical problems in the Americas models; non-normality problem is detected in the Americas (TO_t), and a structure break over the period from 2002-2004 has been occurred in the Americas (TN_t) and caused parameter instability through this period at the 5% level.

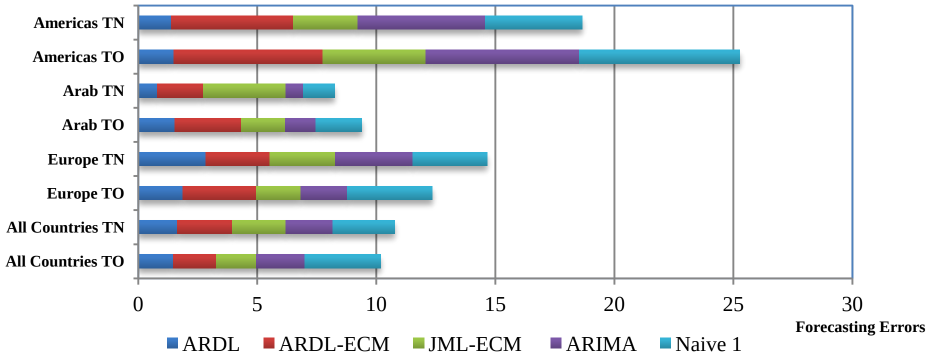


Figure 7.3: Forecasting accuracy of all models in terms of the MAPE measure

The EG method has been applied only on 2 models - All Countries (TN_t) and Arab (TO_t) - and outperforms the other methods in these two models. The ARDL method records the most accurate forecasting in case of All Countries (TO_t) and the Americas models (TO_t and TN_t). Accurate forecasting in the European model is achieved by the ECMs; the JML-ECM is the best for Europe (TO_t), and the ARDL-ECM is the best for Europe (TN_t), indicating that short-run dynamic changes are important for European tourists. It should be noted that in all the models, causal econometric methods are preferred to univariate time series methods, except in the case of the Arab (TN_t) model, since the ARIMA is the preferable method, which outperforms the ARDL by a very small margin. The above results are found in terms of the MAPE and the MAP measures; the same results are obtained by the RMSE, except that the ARDL model is the most accurate one for All Countries TN_t (instead of EG).

It is worth noting that aggregating the data from different regions to total arrivals or total nights, and adding up the other nationalities to construct the All Countries models, does not reduce the overall forecasting performance of these models relative to other disaggregated models, since the All Countries models perform well in forecasting comparison. It is evident from this study that aggregating the data may not affect the accuracy of forecasting. This result contradicts Santos's (2009) study, which indicated that slightly more accurate results were obtained from the disaggregated than aggregated approach of forecasting international tourist arrivals in Spain.

7.5 Empirical Results of Ex-Ante Forecasting

7.5.1 The Expected Tourist Arrivals and Nights from Different Regions (2010-2014)

The best-performing methods - in terms of diagnostic statistics, stability tests (Chapters 5 and 6) and ex-post performance - are employed to forecast tourist arrivals and tourist nights from worldwide, Europe, Arab and the Americas to Egypt for the period 2010-2014, with the ARIMA method acting as a benchmark. In addition, the ARIMA method is used to forecast all the explanatory variables (Y_t, P_t, NP_t, G_t and R_t) in all models up to 2014. Regarding the political instability in Egypt, we set 0, 1, 0.5, 0 and 0 for the years 2010, 2011, 2012, 2013 and 2014 respectively, since no political trouble occurred in 2010, whereas it is expected that not only the 25 January Revolution - in January/February 2011 - affects tourism to Egypt negatively in 2011, but also its negative effect may extend to the first half of 2012. Then we expect no political unrest in the following two years (2013-2014).

Figure 7.4 illustrates the forecasting values of both tourist arrivals and nights - based on the preferred econometric methods and ARIMA - in all regions for the period 2010-2014, along with historical values from 2000-2009, and ex-post forecasting for the period 2005-2009 for comparison. Since all the variables in the different tourism demand models are in natural logarithm form, the forecasted values are in natural logarithm as well. So, the anti-log of these values was calculated to obtain the actual values of tourist arrivals and nights.

By comparing the actual number of arrivals and nights to the forecasting number over the period 2005-2009, it can be noted a tendency to under-predict tourism demand (arrivals and nights) in the case of All Countries, Europe and the Americas (TN_t) models, but over-predict tendency in the Americas (TO_t) model. On the other hand, the actual tourism demand for the Arab models is higher than predicted up to 2008, but lower than predicted in 2009.

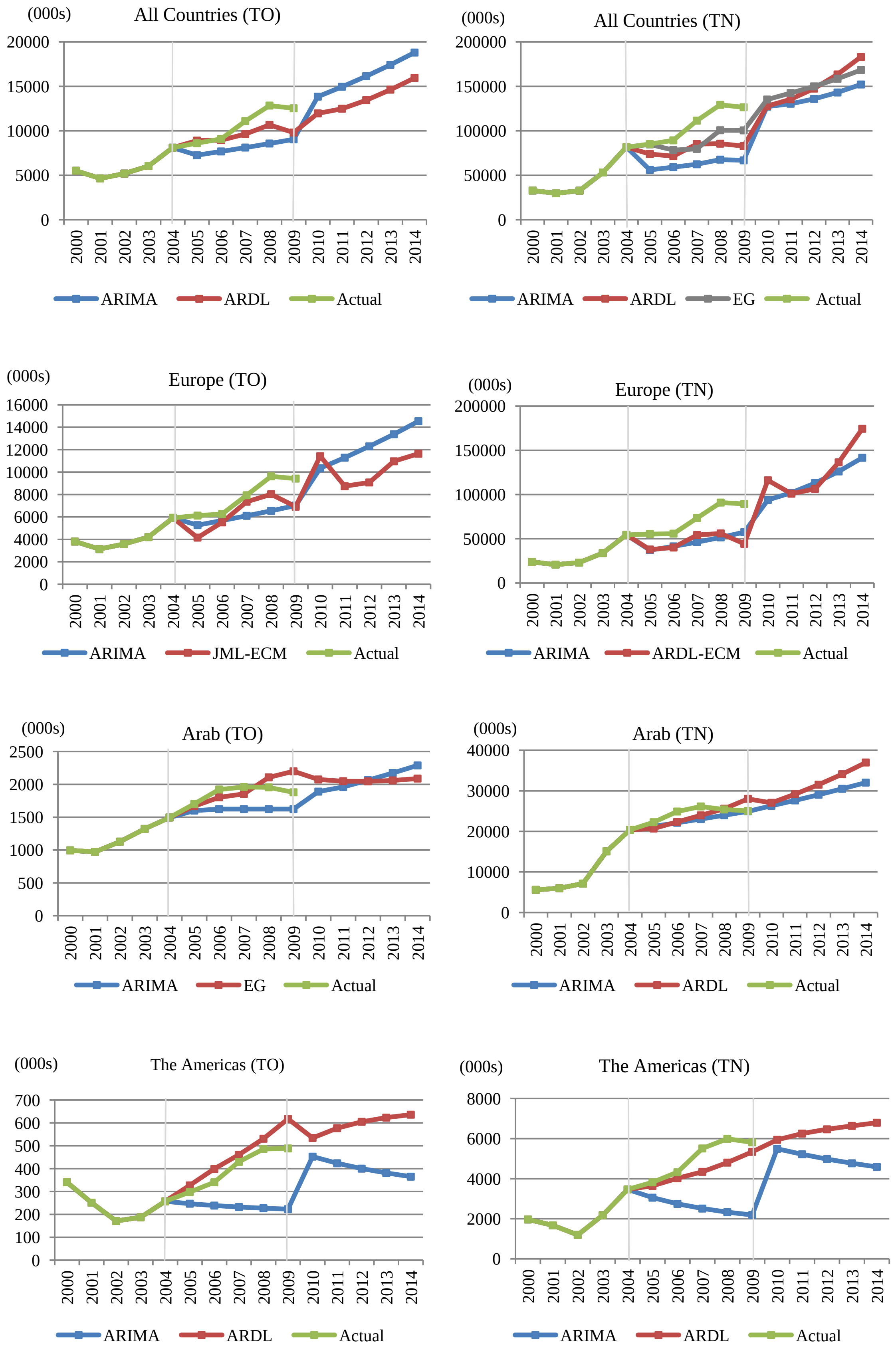


Figure 7.4: Forecast of tourist arrivals and nights in Egypt from different regions (2004-2014)
Source: **Table 3**, Appendix 7.

It is expected that about 12 million tourists will visit Egypt and stay more than 135 million nights in 2010, increasing to 15.9 million tourists and 168.4 million nights in 2014. It is forecast that European tourist arrivals increase in 2010, but decrease strongly in 2011 then increase steadily up to the end of the forecasting period, recording a peak in 2014 with more than 11.6 million tourist arrivals. Arab tourists to Egypt will increase strongly in 2010 then remain relatively constant until 2014, reaching 2.1 million tourist arrivals in the latter year (with a very small increase above the number of Arab arrivals in 2010). In contrast, it is expected that American tourist arrivals will increase continuously up to the end of the forecasting period to reach 636,000 tourist arrivals in 2014. The same pattern applies for tourist nights from different regions, although with larger increases in most cases.

7.5.2 The Expected Growth Rates and Shares of Different Regions (2010-2014)

As illustrated in **Table 7.5**, the historical data show that tourist arrivals and nights from all originating countries were increasing with a decreasing rate from the first half of the 2000s to the second half of the same decade. This trend is expected to continue up to 2014, since a smaller annual growth of both tourist arrivals and nights are expected.

Table 7.5: Growth rates (%) of tourism demand forecasting compared with historical growth

Models	Historical Growth Rates		Forecasting Growth Rates		
			ARIMA	Econometric Method	
	2000-2004	2005-2009	2009-2014	2009-2014	
All Countries (TO_t)	8.0	7.8	7.0	4.1	ARDL
All Countries (TN_t)	20.0	8.2	3.1	6.4 (4.9)	ARDL (EG)
Europe (TO_t)	9.2	9.0	5.8	3.6	JML-ECM
Europe (TN_t)	18.1	10.1	8.0	11.8	ARDL-ECM
Arab (TO_t)	8.5	2.0	3.3	1.8	EG
Arab (TN_t)	29.6	2.4	4.2	6.7	ARDL
Americas (TO_t)	-5.5	10.4	-4.7	4.5	ARDL
Americas (TN_t)	12.0	8.8	-3.9	2.6	ARDL

Source: Calculated from Table 3, Appendix 7.

European, Arab and American tourists are expected to increase, but with smaller growth rates than their counterparts in the 2000s. In contrast, higher growth rates of tourist nights from both European and Arab markets than the growth of the period (2005-2009) are expected. Consequently, American arrivals are likely to record the highest growth rate over the forecasting period[32], whereas European nights are expected to grow more than others.

Regarding the market shares of these origin regions, European tourists are expected to remain the largest source market for Egypt, with an increasing share of more than three quarter of total arrivals to Egypt on average over the forecasting period (2010-2014). Moreover, a big increase in the contribution of European tourist nights to total nights is expected for the same period. In contrast, the share of Arab countries is expected to decrease in terms of arrivals and nights. Whereas the American share of arrivals is expected to increase, its share of total nights will decrease over the period (2010-2014) as reported in **Figure 7.5**.

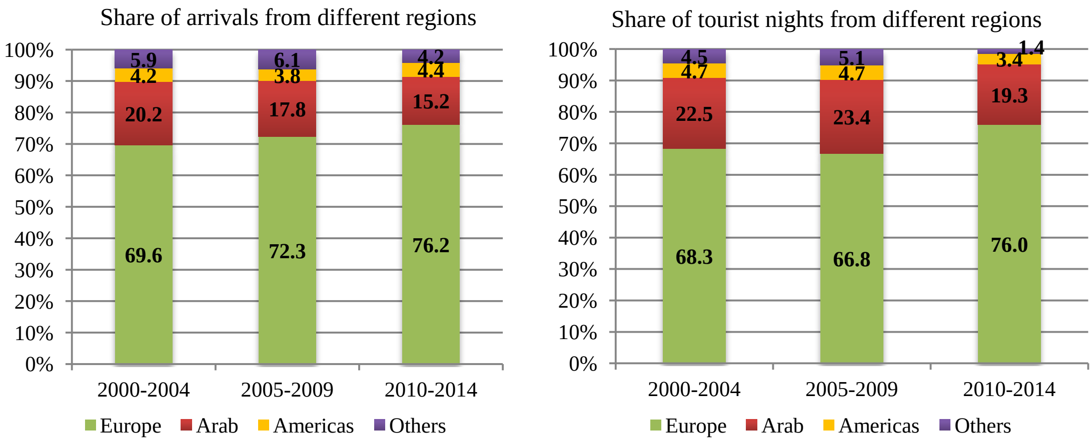


Figure 7.5: Shares (%) of tourist arrivals and nights in forecasting period compared with historical shares
Source: Table 3, Appendix 7.

7.6 Summary and Conclusion

Forecasting comparison (ex-post forecasting) among all the seven methods for all models across five time horizons was conducted over the period 2005-2009, based on three different forecast error measures (RMSE, MAE and MAPE). It is concluded that our econometric methods (presented in Chapters 5 and 6) offer a best prediction with respect to the benchmark produced by the ARIMA. In addition, the tourism demand forecasts of our models are considered ‘highly accurate’ according to the Lewis (1982) criteria, but ‘good forecast’ in just two cases (out of 220 cases). The forecasting comparison results suggest that the EG performs very well. It produces better forecasting in the long-run; the inverse is true in case of the EG-ECM method, which

[32] It is more likely that the expected growth rate of the American arrivals is higher than the actual growth, since the ex-post forecasting for this model shows an over-predict tendency as illustrated in Figure 7.4, whereas the other models show an under-predict tendency.

generated better forecasts in the short to medium term. The ARDL method is superior to the others in terms of both overall forecasting accuracy and consistency. It outperforms other methods in 4 out of 8 models, and it ranks in the top two positions in 65% of all the cases. The ARDL performs relatively better in the long-term horizons. In contrast, the ARDL-ECM has not shown satisfactory performance relative to others along all the time horizons. It is the preferable method only in one model, and forecasts better in the medium term. The JML-ECM performs reasonably; it is the preferable method in only one model, and it ranks in the top two positions in about 50% of all the cases. It usually outperforms others in medium-term forecasting. Therefore, no forecasting method outperforms the others in all cases, in different time horizons or different models, but often the econometric methods outperform the univariate time series methods, and the ARDL method outperforms the other econometric methods. Therefore we can suggest that the recent advances in the co-integration approach and ECMs, especially the ARDL technique, can improve the forecasting performance of tourism demand models.

The ex-ante forecasts show that about 15.9 million tourists will visit Egypt and stay 168.4 million nights in 2014, with smaller growth rate, on average, than its counterparts in the 2000s in most models. It is expected that Europe will remain the leading region of tourist arrivals and nights, with an increasing contribution over the forecasting period. In contrast, the share of Arab countries is likely to decrease in terms of arrivals and nights.

Appendix 7

Table 1: Forecasting accuracy (2005-2009) in terms of RMSE; TO_t is the dependent variable

Forecast Horizon	Forecast Method	Origin regions				Overall
		All Countries	Europe	Arab	Americas	
1 year	EG			0.077(6)		0.077(-)
	EG-ECM			0.050(2)		0.050(-)
	ARDL	0.107(2)	0.178(3)	0.064(5)	0.081(1)	0.108(1)
	ARDL-ECM	0.105(1)	0.212(5)	0.063(4)	0.184(3)	0.141(4)
	JML-ECM	0.182(5)	0.195(4)	0.063(3)	0.266(5)	0.176(5)
	ARIMA	0.114(3)	0.109(1)	0.049(1)	0.196(4)	0.117(2)
	Naive 1	0.117(4)	0.138(2)	0.082(7)	0.147(2)	0.121(3)
2 years	EG			0.083(2)		0.083(-)
	EG-ECM			0.079(1)		0.079(-)
	ARDL	0.146(3)	0.172(3)	0.103(4)	0.089(1)	0.127(1)
	ARDL-ECM	0.135(2)	0.255(4)	0.124(6)	0.255(3)	0.192(4)
	JML-ECM	0.105(1)	0.122(1)	0.112(5)	0.189(2)	0.132(2)
	ARIMA	0.153(4)	0.161(2)	0.083(3)	0.324(4)	0.180(3)
	Naive	0.230(5)	0.267(5)	0.146(7)	0.298(5)	0.235(5)
3 years	EG			0.079(1)		0.079(-)
	EG-ECM			0.110(2)		0.110(-)
	ARDL	0.177(3)	0.181(2)	0.150(4)	0.080(1)	0.147(2)
	ARDL-ECM	0.165(2)	0.262(4)	0.205(7)	0.331(3)	0.241(3)
	JML-ECM	0.119(1)	0.124(1)	0.163(5)	0.166(2)	0.143(1)
	ARIMA	0.203(4)	0.201(3)	0.110(3)	0.448(4)	0.241(4)
	Naive	0.347(5)	0.390(5)	0.176(6)	0.460(5)	0.343(5)
4 years	EG			0.078(1)		0.078(-)
	EG-ECM			0.116(3)		0.116(-)
	ARDL	0.179(2)	0.204(2)	0.184(5)	0.102(1)	0.167(1)
	ARDL-ECM	0.204(3)	0.326(4)	0.328(7)	0.463(3)	0.330(4)
	JML-ECM	0.159(1)	0.175(1)	0.182(4)	0.290(2)	0.201(2)
	ARIMA	0.239(4)	0.225(3)	0.111(2)	0.528(4)	0.276(3)
	Naive	0.420(5)	0.459(5)	0.202(6)	0.570(5)	0.413(5)
5 years	EG			0.087(1)		0.087(-)
	EG-ECM			0.197(4)		0.197(-)
	ARDL	0.152(1)	0.243(1)	0.155(2)	0.142(1)	0.173(1)
	ARDL-ECM	0.322(4)	0.533(5)	0.391(7)	0.725(5)	0.493(5)
	JML-ECM	0.287(2)	0.309(3)	0.209(5)	0.496(2)	0.325(3)
	ARIMA	0.292(3)	0.259(2)	0.157(3)	0.588(3)	0.324(2)
	Naive	0.436(5)	0.464(4)	0.228(6)	0.641(4)	0.443(4)
	Overall	0.204(2)	0.247(3)	0.154(1)	0.322(4)	0.232

Source: Author's own calculation using EViews and Excel. Note: the ranking is included in parentheses, (-) means that general comparison with others cannot be drawn due to the few applications of this method.

Table 2: Forecasting accuracy (2005-2009) in terms of RMSE; TN_t is the dependent variable

Forecast Horizon	Forecast Method	Origin regions				Overall
		All Countries	Europe	Arab	Americas	
1 Year	EG	0.146(6)				0.146(-)
	EG-ECM	0.132(5)				0.132(-)
	ARDL	0.093(1)	0.285(5)	0.069(3)	0.091(1)	0.135(2)
	ARDL-ECM	0.125(4)	0.242(2)	0.102(4)	0.208(4)	0.169(4)
	JML-ECM	0.239(7)	0.276(4)	0.142(5)	0.279(5)	0.234(5)
	ARIMA	0.112(2)	0.257(3)	0.057(1)	0.199(3)	0.156(3)
	Naive 1	0.123(3)	0.156(1)	0.069(2)	0.135(2)	0.121(1)
2 Years	EG	0.193(4)				0.193(-)
	EG-ECM	0.247(7)				0.247(-)
	ARDL	0.156(1)	0.300(4)	0.094(2)	0.112(1)	0.166(1)
	ARDL-ECM	0.194(5)	0.288(2)	0.150(4)	0.287(4)	0.230(2)
	JML-ECM	0.182(3)	0.255(1)	0.373(5)	0.186(2)	0.249(5)
	ARIMA	0.165(2)	0.327(5)	0.093(1)	0.353(5)	0.235(3)
	Naive	0.241(6)	0.300(3)	0.130(3)	0.270(3)	0.235(4)
3 Years	EG	0.237(4)				0.237(-)
	EG-ECM	0.356(6)				0.356(-)
	ARDL	0.198(2)	0.326(3)	0.104(2)	0.153(2)	0.195(1)
	ARDL-ECM	0.270(5)	0.295(2)	0.175(4)	0.376(3)	0.279(3)
	JML-ECM	0.177(1)	0.260(1)	0.390(5)	0.097(1)	0.231(2)
	ARIMA	0.231(3)	0.405(4)	0.098(1)	0.523(5)	0.314(4)
	Naive	0.361(7)	0.432(5)	0.163(3)	0.410(4)	0.342(5)
4 Years	EG	0.232(1)				0.232(-)
	EG-ECM	0.470(7)				0.470(-)
	ARDL	0.253(2)	0.353(3)	0.098(2)	0.158(1)	0.215(1)
	ARDL-ECM	0.357(5)	0.328(2)	0.213(4)	0.533(4)	0.358(3)
	JML-ECM	0.305(4)	0.308(1)	0.454(5)	0.193(2)	0.315(2)
	ARIMA	0.288(3)	0.423(4)	0.081(1)	0.641(5)	0.358(4)
	Naive	0.429(6)	0.498(5)	0.176(3)	0.487(3)	0.397(5)
5 Years	EG	0.221(1)				0.221(-)
	EG-ECM	0.573(7)				0.573(-)
	ARDL	0.314(2)	0.406(1)	0.087(2)	0.155(1)	0.240(1)
	ARDL-ECM	0.473(5)	0.464(3)	0.363(4)	0.861(5)	0.540(4)
	JML-ECM	0.499(6)	0.523(5)	0.854(5)	0.521(3)	0.599(5)
	ARIMA	0.444(4)	0.444(2)	0.084(1)	0.737(4)	0.427(3)
	Naive	0.438(3)	0.498(4)	0.206(3)	0.517(2)	0.414(2)
Overall		0.271(2)	0.346(4)	0.193(1)	0.339(3)	

Source: Author’s own calculation using EViews and Excel. Note: the ranking is included in parentheses, (-) means that general comparison with others cannot be drawn due to the few applications of this method.

Table 3: Forecasting tourism demand for Egypt (2010-2014), comparing with historical data (2000-2009)

	Tourist Arrivals (000s)				Tourist Nights (000s)			
Years	All Countries	Europe	Arab	Americas	All Countries	Europe	Arab	Americas
2000	5506.3	3805.3	994.6	340.7	32787.7	23683.6	5577.7	1965.9
2001	4648.5	3132.5	972.4	251.5	29813.3	20623.7	5996.8	1672.8
2002	5191.7	3583.8	1127.8	171.5	32664.0	22942.6	7121.5	1196.8
2003	6044.2	4203.7	1322.0	187.8	53130.2	33765.0	15077.3	2179.7
2004	8103.6	5919.6	1495.6	257.4	81668.2	54311.4	20388.0	3467.6
2005	8607.8	6120.2	1702.5	297.7	85172.2	55269.1	22259.4	3820.7
2006	9082.8	6259.7	1921.7	340.5	89303.9	55716.4	24895.2	4324.9
2007	11090.9	7936.5	1959.9	429.9	111465.5	73372.9	26141.5	5510.1
2008	12835.3	9621.7	1955.1	486.0	129234.0	90870.4	25400.6	5988.4
2009	12535.9	9416.2	1879.3	488.8	126533.2	89331.5	25046.0	5813.6
2010	11956.5	11417.6	2074.5	534.5	135204.0	93830.9	26309.1	5493.1
2011	12481.8	8739.2	2048.0	577.2	142476.2	102010.4	27635.9	5217.3
2012	13446.4	9074.7	2045.1	605.1	150008.9	112894.6	29029.9	4978.7
2013	14624.9	10961.7	2060.0	623.5	158547.6	126093.6	30493.8	4771.3
2014	15947.5	11638.0	2088.7	636.2	168407.2	141505.0	32031.7	4590.4

Source: Author’s own calculation using EViews.

Chapter 8: Panel Unit Root and Panel Co-Integration Tests (1980s-2009)

8.1 Introduction

Time series data are used to model and forecast international tourism demand for Egypt over the period 1970-2009 in the last 4 Chapters (4⟶7). However, where suitable data exist, a potentially more robust technique is to use panel data to model tourism demand for Egypt, and this is the subject of Chapters 8 and 9. The panel data approach is constructed of a cross section of data (countries) over several time periods. The conjunction of time series and cross-sectional data allows for a higher degree of freedom in the estimation process, gives more information, reduces the problems of multicollinearity and autocorrelation, and finally allows for dynamic specification. Therefore, panel data analysis improves the accuracy of the estimated parameters (Garin-Munoz and Montero-Martin, 2007).

The aim of this chapter is to examine the demand for tourism in Egypt by constructing four panel data models of tourism demand from all origins, as well as three individual regions of origin (Europe, Arab and the Americas) over the period 1980-2009. The most important determinants of tourism demand in Egypt are specified as in the time series analysis. A univariate framework for each series in every model is provided using nine tests for panel unit root. Moreover, the long-run co-movements between tourist inflow to Egypt and the most important determinants of this inflow are investigated using two different co-integration tests.

The main body of this chapter is presented in the following sections. In Section 8.2, the adopted models, variables and their proxies are explained briefly. A brief account of the applied methodology is provided in Section 8.3. Then, the empirical results of panel unit root tests and the co-integration tests in each panel model are shown and explained in Section 8.4. Finally, we highlight and summarize the important results in Section 8.5.

8.2 Models and Variables

8.2.1 Models Specification

Four panel models have been developed for each of Egypt's individual regions of origin, as well as all origins, on a country by country basis. The estimation period in the panel models is varied with respect to the availability of data for each panel of these estimated models from different originating countries. First, we specified a panel model to estimate international tourist inflows from all countries of origin (41 countries) to Egypt from 1985-2009. These countries accounted for 82% of total tourist arrivals to Egypt through the period of the study. The second model estimates the tourism demand from 15 countries representing the European region to Egypt over the period from 1984 to 2009. The third model estimates tourist arrivals from 13 countries representing the Arab region through the period from 1984 to 2009. The final panel model considers the tourist arrivals from the Americas to Egypt from 1980 to 2009, and includes 6 countries from both North and South America.

8.2.2 Variables Specification

International tourist inflows to Egypt, represented by international tourist arrivals, are specified as a function of the income, relative prices, relative non-Egypt prices, globalization, accommodation capacity and political instability in Egypt. Hence, tourism demand models are estimated using the following function:

$$\mathrm{TO_{it}} = f\,(\mathrm{Y_{it}}, \mathrm{P_{it}}, \mathrm{NP_{it}}, \mathrm{G_t}, \mathrm{R_t}, \mathrm{TV_t}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (8.1)$$

As in the time series models, a double log-linear function is adopted for modelling tourism demand. Therefore, the estimated parameters are the demand elasticities. The same variables are introduced in all models, and the balanced panel models for each of the different regions of origin are represented by the following equation:

$$\mathrm{TO_{it}} = \alpha_0 + \beta_1\mathrm{Y_{it}} + \beta_2\mathrm{P_{it}} + \beta_3\mathrm{NP_{it}} + \beta_4\mathrm{G_t} + \beta_5\mathrm{R_t} + \beta_6\mathrm{TV_t} + \varepsilon_{it} \ldots\ldots\ldots (8.2)$$

where: *i* refers to the cross-sectional dimension of the data which represents the number of countries of origin to Egypt, *t* refers to the time series dimension of the data, α_0, $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ and β_6 are the parameters to be estimated, and ε_{it} is an error term.

$\mathrm{TO_{it}}$ is the natural log of tourism demand measured by the number of international tourist arrivals from each country of origination *i* to Egypt in period *t*.

Y_{it} is the natural log of income of each origin country *i* measured by the real GDP per capita (constant US$) in period *t*.

P_{it} is the natural log of tourism prices in Egypt relative to tourism prices in each country of origin *i* in period *t*, measured by consumer price index in Egypt in period *t* (CPI_{Et}) divided by consumer price index in the origin country *i* at period *t* (CPI_{it}) adjusted by nominal exchange rates of the origin country with respect to Egypt in period *t* as follows:

$$P_{it} = \frac{CPI_{Et}}{CPI_{it}} * EX_{it/Et} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (8.3)$$

NP_{it} is the natural log of the composite non-Egypt prices index for each origin country *i* in period *t*, measured as following:

$$NP_{it} = \sum_{C=1}^{n}\left(\left(\frac{CPI_{Ct}}{CPI_{it}} * EX_{it/Ct}\right) * W_{Ct}\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (8.4)$$

where CPI_{Ct} is the CPI of each competing country at period *t*, $EX_{it/Ct}$ is an index of the price of each origin's currency in terms of the currency of each competitor, $C = 1, 2, \dots,$ 6 selected competitors; Israel, Turkey, Tunisia, Morocco, Syria and Jordan, and W_{Ct} is a market share weight of each selected competitor, which equals the number of tourist arrivals for each competitor from a specific origin country divided by the total sum of tourist arrivals in all selected substitute/complement destinations from this origin country *i* at time *t*. The composite non-Egypt price index is an annual weighted average which allows for possible changes in market shares throughout the period of study. Moreover, for each origin region, we have specified a separate model for each alternative destination, in addition to aggregate them in one variable (NP_{it}), to determine the effect of tourism's price of such alternative destination on tourist arrivals to Egypt.

G_t is the natural log of the composite globalization index in Egypt measured by KOF index of globalization. This variable changes over time, but it is a cross-sectional invariant variable.

R_t is the natural log of accommodation capacity in Egypt, measured by the number of hotel rooms available in Egypt in period *t*. Like globalization, this variable is also cross-sectional invariant in the model.

TV_t is political instability and terrorism in Egypt. It has been introduced in the study as a ‘timing variable’ as in the time series model (see Chapter 4). We assumed that the ‘timing variable’ has only a short-run effect on tourist inflows to Egypt, so it cannot be included in the co-integration equation, but its effect will be estimated in the short run in the ECM.

8.3 Methodology

8.3.1 Panel Unit Root Tests

The Monte Carlo simulations suggest that the panel unit root tests have much more power than time series unit root tests, since the power of unit root tests increases by including cross-sectional information (Levin et al., 2002). The results of the panel unit root tests will determine the following stage of our methodology. If the different series in the model have different orders of integration, it is meaningless to proceed by performing co-integration tests among the variables. If just one variable in the model has a different order of integration, we can exclude this variable and proceed with co-integration tests among the rest of the variables. In contrast, if all the variables are found to be integrated in the same order, especially $I(1)$ variables, then, co-integration tests can be performed as a next stage in our methodology.

Panel unit root tests can be categorised with regard to many assumptions. First of all, first generation and second generation tests; first generation panel unit root tests, such as the Levin-Lin-Chu (LLC) test (2002), Im-Pesaran-Shin (IPS) test (1997), Fisher type test [Maddala and Wu (MW) (1999) and Choi (2001)], assume that cross-sections are independent. However it is indicated from the literature that cross-sectional dependence is more likely to occur due to unobserved common factors or macroeconomic shocks. Recently, second generation panel unit root tests, such as Breitung and Das test (2005) and Moon and Perron test (2004) have improved the first generation by allowing for cross-sectional dependence for all variables (Bangake and Eggoh, 2010).

Panel unit root tests can be categorised also with respect to the homogeneity or the heterogeneity of the autoregressive coefficient; some panel unit root tests assume common unit root across countries, which is a potentially restrictive assumption (Levin et al., 2002). This assumption is applied by LLC (2002), Breitung (2000) and Hadri (2000) tests. The other kind of panel unit root tests allows for heterogeneity in the autoregressive coefficient, thus it assumes individual unit root process. These tests are less restrictive and have stronger power. They are proposed by IPS (1997), MW (1999) and Choi (2001).

Moreover, most of the panel unit root tests, such as LLC, IPS, Breitung, Harris-Tzavalist (HT) (1999) and MW tests, have the null hypothesis that the panel data have a unit root or the non-stationary hypothesis against the alternative of panel data have no unit root, whereas Hadri (2000) indicated that the null hypothesis should be unit root not exist or the stationarity of the series to have a more powerful test (Lee and Chang, 2008).

Different assumptions may be made about the asymptotic behaviour of the panel's two dimensions T (time series) and N (cross-section), or the rates at which these dimensions tend to infinity. LLC, IPS and Fisher tests are based on test statistics that have a limiting normal distribution as N, T tend to ∞, and T approaches ∞ sufficiently faster than N. On the other hand, HT, Breitung and Hadri tests consider the case where N tends to ∞ and T is fixed (Blander et al., 2007).

Finally, panel unit root tests can be divided according to the methods of correction for autocorrelation as follows. Breitung, IPS and Fisher ADF tests use regressions on lagged difference terms to correct for autocorrelation. Fisher PP, HT and Hadri use kernel weighting methods for estimating long-run variance as an alternative method. The LLC test uses both methods of autocorrelation correction.

In this chapter, to examine the stationarity of the variables in our four models, seven first generation panel unit root tests have been performed, namely, LLC, HT, IPS, Fisher type test using ADF and PP, Breitung and Hadri tests. In addition, two second generation panel unit root tests, which take into consideration the cross-sectional dependence in the panels, have been applied, namely, Breitung and Das (2005) and Hadri and Kurozumi (2008) tests.

8.3.2 Panel Co-integration Tests

Economic theory suggests that the demand for international tourism is a function of income, relative prices and substitute prices. The variables may move apart in the short run but move together in the long run. If these variables are not individually stationary, but their linear combination (residuals) is stationary, they may be co-integrated.

Economic theory does not tell us whether variables have stochastic trends or not and when such trends are common between variables; therefore, co-integration tests have to be carried out after unit root tests to investigate these issues (Lim and McAleer, 2001).

Despite the increasing popularity of the co-integration techniques in the literature, the low power of these tests when applied to short time data is the main problem. The span of the data was found the reason of the low power of these co-integration tests. Therefore, pooling cross-sectional data and time series data allows for more degrees of freedom and enhances the power of the co-integration techniques (Pedroni, 1999). Whereas most studies of international tourism demand have used the traditional fixed or random effect panels assuming the existence of a long-run relationship between tourism demand and its determinants, this study uses unit root and panel co-integration tests to demonstrate the existence of such a relationship before estimating it. Two panel co-integration tests have been performed in this study to examine the co-integrating relationships among the variables in the models, namely, Kao and Pedroni tests[33].

8.3.2.1 Kao Panel Co-integration Test (1999)

Kao test is based on the standard approach adopted by EG (residual based) procedures, and developed both DF and ADF to test for co-integration in panel data. However, panel unit root tests cannot be applied to the residuals in cases where some regressors are long-run endogenous. To solve this problem, adjusted DF type tests were proposed, namely, $\mathrm{DF}_{\mathrm{p}}^{*}$ and $\mathrm{DF}_{\mathrm{t}}^{*}$ for the co-integration with endogenous relationships between regressors and errors (Breitung and Pesaran, 2005). Monte Carlo results showed that the asymptotic distributions of DF_{ρ}, DF_{t}, $\mathrm{DF}_{\mathrm{p}}^{*}$, $\mathrm{DF}_{\mathrm{t}}^{*}$ and ADF statistics converge to a standard normal distribution $N(0, 1)$ by the sequential limit theory[34] (Baltagi, 2000).

8.3.2.2 Pedroni Tests (1999, 2004)

Pedroni constructs many tests for co-integration which allow for heterogeneous intercepts, trend and coefficients across-sections to examine the null of no co-integration. These tests are also based on the EG framework. Two types of test have been proposed, firstly, four statistics based on the within-dimension approach: panel v-statistics, panel rho-statistics, panel PP-statistics and panel ADF-statistics. The second

[33] Fisher test of co-integration, based on Johansen methodology, are also performed and the results indicated the existence of at least one co-integration relation among the variables in all models, but we haven't reported the results to save space.

[34] A sequential limit theory established by Phillips and Moon (1997) in which $T \rightarrow \infty$ followed by $N \rightarrow \infty$ sequentially (Kao, 1999).

type is based on between-dimension approach, including three statistics: group rho-statistics, group PP-statistics and group ADF-statistics (Lee and Chang, 2008).

The Monte Carlo results suggested that both panel rho-statistic and v-statistics can be used in two extreme cases. The panel rho-statistic is useful in very small panels, whereas panel v-statistics is the best one in the case of fairly large panels. The other statistics (PP-statistics and ADF-statistics) can be used properly in medium sample size. According to the other three panel co-integration statistics, which based on a group mean approach, the comparative advantage of each of these statistics depend on the underlying DGP as the case of panel statistics (Pedroni, 1999).

8.4 Empirical Models

8.4.1 Panel All Countries Model

This model contains 41 countries of origin for tourism to Egypt through the period from 1985 to 2009: 14 European countries, 13 Arab countries from Africa and the Middle East, 6 American countries, and 8 other countries representing non-Arab African and non-Arab Asian and Pacific countries. These countries represent 82% of total tourist arrivals to Egypt on average over this period.

Descriptive statistics of the data are presented in **Appendix 8.1**, **Tables 1**. Prior to testing the existence of a long-run co-integrating equilibrium among the variables, the integration properties of each panel has to be examined, since an incorrect transformation of the data may lead to spurious results.

8.4.1.1 Panel Unit Root Tests for All Countries Model

Four panel unit root tests were carried out on the level of the variables with intercept only, and with both intercept and trend as in **Table 8.1**, then in first differenced form with intercept and without intercept as well (Appendix 8.1, **Tables 2**). For this model, we applied three first generation tests, namely, HT, Breitung and Hadri, in addition to one second generation test; Hadri and Kurozumi (2008), which are more appropriate to the data of this model, where the number of *N* more than the number of *T*.

Table 8.1: Panel unit root tests for variables in level (1985-2009)

	Intercept				Intercept & Trend			
Variable	HT	Breitung	Hadri	Hadri (robust)	HT	Breitung	Hadri	Hadri (robust)
TO_{it}	0.8702 (0.221)	3.8101 (0.999)	25.8994 (0.000)	63.4577 (0.000)	0.5426 (0.000)	-0.4642 (0.321)	10.0362 (0.000)	18.3064 (0.000)
Y_{it}	0.9793 (1.000)	1.1511 (0.875)	27.4398 (0.000)	79.0667 (0.000)	0.8847 (1.000)	5.1200 (1.000)	22.1674 (0.000)	37.6223 (0.000)
P_{it}	0.8462 (0.020)	-2.4061 (0.008)	19.3606 (0.000)	34.7354 (0.000)	0.6880 (0.106)	-2.3513 (0.009)	7.1662 (0.000)	18.4805 (0.000)
NP_{it}	0.8317 (0.002)	-0.9139 (0.180)	21.0024 (0.000)	41.8014 (0.000)	0.6502 (0.004)	-1.0498 (0.147)	12.3780 (0.000)	28.0012 (0.000)
G_t	0.9670 (1.000)	7.9147 (1.000)	21.8941 (0.000)	86.3387 (0.000)	0.7411 (0.755)	-0.6324 (0.264)	9.5407 (0.000)	39.9074 (0.000)
R_t	1.0109 (1.000)	7.9823 (1.000)	23.7637 (0.000)	94.4616 (0.000)	0.8247 (0.999)	-1.7957 (0.036)	13.0842 (0.000)	53.9903 (0.000)

Source: Author's own calculations using STATA. Note: Numbers between parentheses refer to the probability of the test statistics. The null hypothesis of these tests is that the panel series has a unit root, except in the case of Hadri tests for which the null hypothesis is no unit root in panel series.

Whether with intercept only or with both intercept and trend, most of the panel unit root tests conclude that all the variables are non-stationary in level, except for relative prices. In contrast, all the tests indicate that the first differences of all the variables are stationary with or without intercept, except for Hadri tests that reject the null of stationarity for the ΔY_{it}. However the Monte Carlo results suggested that this test should be used with caution because it is undersized in some cases but suffers from over rejection in other cases (Hadri and Kurozumi, 2008).

8.4.1.2 Panel Co-integration Tests for All Countries Model

Two different tests of co-integration are performed to explore the co-movement among the variables in this model: the Kao and Pedroni tests of co-integration. Taking into consideration the results of the panel unit root tests, we can consider the case of excluding P_{it} from the model and apply the co-integration tests including intercept only to insure that all the variables are *I*(1).

Three tests of Pedroni (panel v, panel rho, and group rho) indicate that there is no co-integration among tourist arrivals from all countries of origin to Egypt and its important determinants. In contrast, both Kao[35] test and four other tests of Pedroni, including panel PP, panel ADF, group PP and group ADF, can reject the null hypothesis of no co-integration at the 1% level of significance as illustrated in **Table 8.2**.

[35] As a deterministic trend specification, Kao test only allows for individual intercept in the equation and no individual trend.

Table 8.2: Results of panel co-integration tests for All Countries model excluding P_{it}

Cointegration Tests	Kao Test	Pedroni Test						
		H_1: common AR coefficients (within dimension)				H_1: individual AR coefficients (between dimension)		
Test Statistic	ADF	Panel v	Panel rho	Panel PP	Panel ADF	Group rho	Group PP	Group ADF
Intercept	-3.9665 (0.000)	-0.6228 (0.733)	0.8604 (0.805)	-6.3013 (0.000)	-5.8026 (0.000)	2.6508 (0.996)	-17.7463 (0.000)	-7.1291 (0.000)

Source: Author's own calculations using E-views. Note: P-values are given in parentheses. MAIC is used to determine the optimal number of lags to be included in the second stage regression.

According to the Monte Carlo simulation of Pedroni, the panel ADF and PP as well as the group ADF and PP are the most appropriate tests statistics for this model, since they are working properly in the case of the middle sample size as illustrated before. Therefore, we can regard the estimation model as being panel co-integrated.

8.4.2 Panel European Countries Model

Europe is the most important region to tourism in Egypt, since it registers the largest share of arrivals representing about 40% of total tourist arrivals to Egypt in 1984, increasing to more than 75% in 2009 (Egypt Tourism in Figures, 2009). This panel model consists of 15 European countries of origin, specifically 13 countries: Austria, France, Germany, Switzerland, UK, Turkey, Israel, Italy, Portugal, Greece, Spain, Hungary and Poland, as well as two regions: Scandinavia (Northern Europe region) which includes Denmark, Norway, Sweden and Finland, and the Benelux union (Western Europe) which includes Belgium, the Netherlands and Luxembourg. These 20 countries represented approximately 91% of total tourist arrivals from Europe to Egypt through the period of the study. The estimation period for this panel model covers 26 years from 1984 to 2009; therefore, the number of observations is 390. The descriptive statistics of the data are presented in **Appendix 8.2**, **Tables 1**.

8.4.2.1 Panel Unit Root Tests for European Countries Model

Table 8.3 and Appendix 8.2, **Tables 2⟶4** present the results of panel unit root tests based on five panel unit root tests for all variables in levels and first differences. For this model, we applied four first generation tests, namely, LLC, IPS, Fisher (ADF) and Fisher (PP), in addition to one second generation test; Breitung and Das (2005), which are more appropriate to the data of this model where the number of T more than the number of N.

Table 8.3: Panel unit root tests for variables in level (intercept included)

Variable	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung (robust)
TO_{it}	-1.1369 (0.128)	2.9035 (0.998)	9.0320 (0.999)	16.2812 (0.980)	2.2929 (0.989)
Y_{it}	-4.2302 (0.000)	0.3170 (0.624)	25.1031 (0.720)	32.7536 (0.333)	0.2572 (0.602)
P_{it}	-4.1311 (0.000)	-3.5870 (0.000)	58.7849 (0.001)	41.8869 (0.073)	-0.3419 (0.366)
NP_{it}	-0.5992 (0.275)	-0.8068 (0.210)	37.5078 (0.163)	60.1397 (0.001)	-0.8367 (0.201)
G_t	0.1266 (0.550)	4.1514 (1.000)	4.3994 (1.000)	4.3994 (1.000)	1.1203 (0.869)
R_t	6.2696 (1.000)	11.2210 (1.000)	0.1149 (1.000)	0.1107 (1.000)	1.5823 (0.943)

Source: Author's own calculations using EViews and STATA. Note: Numbers between parentheses refer to the probability of the test statistics. The null hypothesis of these tests is that the panel series has a unit root.

Apart from some limited exceptions, panel unit root test statistics significantly confirm that all the six series have a panel unit root in level with intercept, except for P_{it} series, and stationary variables in first difference, *I*(1) variables. With intercept and trend, tourist arrivals, non-Egypt prices, and hotel capacity are trend stationary variables according to most tests. In contrast, Breitung robust, assuming cross-sectional independent in the data, suggests that all the variables are *I*(1) whether with intercept or with both intercept and trend.

8.4.2.2 Panel Co-integration Tests for European Countries Model

The P_{it} is excluded from the European model and the individual intercept is used to avoid the problem of the stationarity of some series with trend as illustrated before. **Table 8.4** presents the results of both Kao and seven Pedroni panel co-integration tests. The Kao test rejects the null of no co-integration at the 1% level of significance. Apart from the three extreme Pedroni panel co-integration tests (Panel v, panel rho, and group rho); the other four test statistics reject the null hypothesis of no co-integration at the 1% level of significance.

Table 8.4: Results of panel co-integration tests for European countries panel model

Cointegration Test	Kao Test	Pedroni Test						
		H_1: common AR coefficients (within-dimension)				H_1: individual AR coefficients. (between dimension)		
Test Statistic	ADF	Panel V	Panel rho	Panel PP	Panel ADF	Group rho	Group PP	Group ADF
Intercept	-4.0004 (0.000)	-1.9164 (0.972)	0.3702 (0.644)	-6.7524 (0.000)	-5.7904 (0.000)	1.6969 (0.955)	-17.9769 (0.000)	-5.8975 (0.000)

Source: Author's own calculations using EViews. Note: P- values are given in parentheses. 1 lag is included in the second stage regression.

8.4.3 Panel Arab Countries Model

This panel consists of 13 Arab countries: 5 Arab countries from Africa; Algeria, Morocco, Tunisia, Mauritania, Sudan, and 8 countries from the Middle East; Bahrain, Jordan, Kuwait, Libya, Qatar, Saudi Arabia, Syria and Yemen, representing about 80% of total Arab tourist arrivals coming to Egypt on average through the period of the study from 1984 to 2009. So, this model includes 338 observations: 13 countries for 26 years. The descriptive statistics of the data are presented in **Appendix 8.3**, **Tables 1**.

8.4.3.1 Panel Unit Root Tests for Arab Countries Model

Five panel unit root tests have been applied on all the variables to examine the stationarity characteristics of these series, and the results are presented in **Table 8.5** and Appendix 8.3, **Tables 2⟶ 4**). At the 5% level of significance, there is consensus from all the tests that all the series are always $I(1)$ whether with intercept, except NP_{it} according to LLC test, or with both intercept and trend. So, we can proceed by performing co-integration tests among all the variables in this model with intercept and with intercept and trend.

Table 8.5: Panel unit root tests for variables in level (intercept is included)

Variables	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung robust
TO_{it}	2.3732 (0.991)	2.6306 (0.996)	11.3927 (0.994)	13.6406 (0.977)	0.5645 (0.714)
Y_{it}	2.4695 (0.993)	3.9801 (1.000)	13.5108 (0.979)	18.3506 (0.863)	1.0176 (0.846)
P_{it}	0.6479 (0.742)	-0.2291 (0.409)	21.4569 (0.718)	27.3821 (0.399)	-0.1901 (0.425)
NP_{it}	-1.8538 (0.032)	-0.4726 (0.318)	27.0611 (0.406)	38.4798 (0.055)	0.0838 (0.533)
G_t	0.1178 (0.547)	3.8647 (0.999)	3.8128 (1.000)	3.8128 (1.000)	1.1203 (0.869)
R_t	2.5192 (0.994)	6.7753 (1.000)	0.8057 (1.000)	0.0960 (1.000)	1.5823 (0.943)

Source: Author’s own calculations using EViews and STATA. Numbers between parentheses refer to the probability of the test statistics. The null hypothesis of these tests is that the panel series has a unit root.

8.4.3.2 Panel Co-integration Tests for Arab Countries Model

Kao and Pedroni tests have been performed on the null hypothesis of no co-integration between tourism demand from Arab countries to Egypt and its important determinants for the period (1984-2009). Without any restrictions on the deterministic trend, the results of these tests are reported in **Table 8.6**.

The Kao test of co-integration significantly rejects the null of no co-integration at the 1% level of significance. Although three statistics of the Pedroni test cannot reject the null of no co-integration without trend, the other four tests (panel PP, panel ADF, group PP and group ADF) confirm the co-integrating relationship among the variables in the model at the 5% level of significance. By including intercept and trend, a co-integration relationship is detected at the 5% level of significance according to panel PP, Panel ADF and group PP.

Table 8.6: Results of panel co-integration tests for Arab countries model

Cointegration Test	Kao Test	Pedroni Test						
		H1: common AR coefficients (within-dimension)				H1: individual AR coefficients (between dimension)		
Test Statistic	ADF	Panel v	Panel rho	Panel PP	Panel ADF	Group rho	Group PP	Group ADF
Intercept	-3.1175 (0.001)	0.5013 (0.308)	0.8042 (0.789)	-3.3307 (0.000)	-3.6550 (0.000)	2.4315 (0.993)	-1.9418 (0.026)	-2.2061 (0.014)
Trend	-	-2.2110 (0.987)	2.9691 (0.999)	-2.3502 (0.009)	-2.6299 (0.004)	4.0608 (1.000)	-1.8722 (0.031)	-1.0791 (0.140)

Source: Author’s own calculations using EViews. Note: P-values are given in parentheses. MAIC is used to determine the optimal number of lags to be included in the second stage regression.

8.4.4 Panel American Countries Model

The Americas panel covers tourist arrivals from both Northern and Southern America to Egypt from 1980 to 2009. Canada, the US and Mexico represent Northern American countries, and Argentina, Brazil and Colombia are Southern American countries. These countries constitute more than 95% of total American tourists coming to Egypt on average through the study period. Therefore, the dimensions of this model are 6 countries for 30 years (180 observations). The descriptive statistics of the data are reported in **Appendix 8.4**, **Table 1**.

8.4.4.1 Panel Unit Root Tests for American Countries Model

To formally determine the integration order of the different series in the model, 5 panel unit root tests, as in the European and Arab models, have been carried out on 6 variables of the Americas model in levels and first differences.

As reported in **Table 8.7** and Appendix 8.4, **Tables 2⟶4**, all the five panel unit root tests reject the null of unit root in all the levels of the variables whether with intercept or with both intercept and trend. The only exception is TO_{it} variable, which is trend stationary according to 3 (first generation tests) out of 5 tests. Moreover, first differencing can remove non-stationarity as appears from all the variables without any exception. Hence, the co-integration tests can be examined with intercept only to avoid the potential stationarity of the dependent variable with trend.

Table 8.7: Panel unit root tests for variables in level (intercept included)

Variables	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung (robust)
TO_{it}	2.4451 (0.993)	2.3880 (0.992)	4.4587 (0.974)	12.5973 (0.399)	0.0955 (0.538)
Y_{it}	-0.1556 (0.438)	2.6468 (0.996)	2.7971 (0.997)	2.3407 (0.999)	2.1922 (0.986)
P_{it}	-0.0525 (0.479)	-0.4400 (0.330)	10.5295 (0.570)	13.9868 (0.302)	-1.1710 (0.121)
NP_{it}	0.0331 (0.513)	0.5738 (0.717)	9.6808 (0.644)	17.0947 (0.146)	-1.1983 (0.115)
G_t	0.0688 (0.527)	2.7988 (0.997)	1.5898 (0.999)	1.5065 (0.999)	2.0207 (0.978)
R_t	1.6943 (0.955)	5.0117 (1.000)	0.3156 (1.000)	0.2101 (1.000)	4.0812 (1.000)

Source: Author's own calculations using EViews and STATA. Numbers between parentheses refer to the probability of the test statistics. The null hypothesis of these tests is that the panel series has a unit root.

8.4.4.2 Panel Co-integration Tests for American Model

Table 8.8 presents the results of Kao and Pedroni tests over the period (1980-2009) with intercept only, as it is the most appropriate deterministic trend for this model. The Kao test suggests that a co-integration relationship between tourist inflow from Americas and the important determinants for this inflow exists at the 1% level of significance. According to Pedroni tests, both ADF statistics and PP statistics significantly reject the null hypothesis of no co-integration among the variables in the model.

Table 8.8: Results of panel co-integration tests for American countries model

Cointegration Test	Kao Test	Pedroni Test						
		H_1: common AR coefficients (within dimension)				H_1: individual AR coefficients (between dimension)		
Test Statistic	ADF	Panel v	Panel rho	Panel PP	Panel ADF	Group rho	Group PP	Group ADF
Intercept	-5.5698 (0.000)	-1.4134 (0.921)	0.3260 (0.628)	-5.7176 (0.000)	-3.8693 (0.000)	1.3467 (0.911)	-9.9010 (0.000)	-3.7215 (0.000)

Source: Author's own calculations using EViews. Note: P-values are given in parentheses. MAIC is used to determine the optimal number of lags to be included in the second stage regression.

8.5 Summary and Conclusion

Four balanced panel models of Egypt's tourism demand from all countries, as well as different originating regions, Europe, Arab and the Americas, were constructed. In these models, international tourist inflows to Egypt, represented by international tourist arrivals, are specified as a function of the income, relative prices, relative non-Egypt prices, globalization, accommodation capacity and political instability in Egypt.

First, the integration properties of each variable in the different panel models were tested by using nine panel unit root tests. For the All Countries model (N > T), four panel tests; HT, Breitung, Hadri and Hadri robust tests were applied. Including the intercept only, the results conclude that all the variables are non-stationary in level, but stationary in first difference, except for P_{it}. Including intercept and trend, all the variables are integrated of the same order $I(1)$ with some exceptions. Then, the existence of a long-run relationship among the variables of the study, excluding P_{it}, has been tested using two co-integration tests. The results cannot reject the null of there is a co-integration relationship among the variables in the model according to both Kao and four tests of Pedroni.

Regarding to the other three models (T > N), LLC, IPS, Fisher (ADF), Fisher (PP) and Breitung robust tests are applied. According to the European model, panel unit root tests indicate that all the six series have a panel unit root in level with intercept, except for P_{it} series, and stationary variables in first difference. With intercept and trend, tourist arrivals, non-Egypt prices and hotel capacity are trend stationary variables according to most tests. Co-integration relationships among the variables, excluding P_{it}, were tested assuming that the co-integrating equation have only intercept. The results of Kao, ADF and PP Pedroni tests suggested that there exist a co-integration relationship among the variables in this model.

In the Arab model, the results of the panel unit root tests suggest that all the variables are non-stationary variables in level, and stationary variables in first differences, or $I(1)$ variables, with limited exceptions. By performing co-integration tests among all the variables in this model, a co-integrating relationship is detected with intercept in the case of Kao and four tests of Pedroni. By including trend, just three tests of Pedroni panel co-integration tests suggest this co-integrating relation.

According to the Americas model, all the variables are non-stationary in level with intercept, according to all the panel tests, and first differencing can remove non-stationarity. Including time trend effect, TO_{it} turned to stationary variable in level according to 3 out of 5 panel unit root tests. Hence, the co-integration tests were examined with intercept only. Kao and four tests of panel co-integration of Pedroni significantly reject the null hypothesis of no co-integration among the variables in the model at the 1% level of significance.

Appendix 8

Appendix 8.1 Univariate Framework for All Countries Model

Table 1: Descriptive statistics for the All Countries model (data in logarithm form)

Variable		Mean	Std. Dev.	Min	Max	Observations
TO_{it}	Overall	3.3531	1.7018	-1.5896	7.2054	N = 1025
	Between		1.5814	-0.6531	6.0086	n = 41
	Within		0.6737	0.4594	5.6247	T = 25
Y_{it}	Overall	8.4566	1.6391	4.6278	10.8773	N = 1025
	Between		1.6467	4.8834	10.4654	n = 41
	Within		0.1959	7.4932	9.5235	T = 25
P_{it}	Overall	1.0803	2.4662	-3.2346	7.3446	N = 1025
	Between		2.4278	-2.7002	6.4031	n = 41
	Within		0.5711	-2.0263	4.0131	T = 25
NP_{it}	Overall	1.7920	2.4100	-3.0167	7.0847	N = 1025
	Between		2.3955	-2.5938	6.9172	n = 41
	Within		0.4517	-0.1530	3.8774	T = 25
G_{it}	Overall	3.9191	0.1626	3.6179	4.1566	N = 1025
	Between		0.0000	3.9191	3.9191	n = 41
	Within		0.1626	3.6179	4.1566	T = 25
R_{it}	Overall	11.3774	0.5335	10.5961	12.2762	N = 1025
	Between		0.0000	11.37737	11.3774	n = 41
	Within		0.5335	10.59608	12.2762	T = 25

Note: N number of observations, n number of cross section units, T number of time series periods.

Table 2: Panel unit root tests for variables in first difference

	intercept				No intercept included			
Variables	HT	Breitung	Hadri	Hadri (robust)	HT	Breitung	Hadri	Hadri (robust)
ΔTO_{it}	-0.1623 (0.000)	-14.2004 (0.000)	-0.9509 (0.829)	-3.2138 (0.999)	-0.0878 (0.000)	-21.3839 (0.000)	-0.5621 (0.713)	-3.0938 (0.999)
ΔY_{it}	0.1538 (0.000)	-2.8274 (0.002)	11.8351 (0.000)	9.2232 (0.000)	0.3338 (0.000)	-7.7496 (0.000)	12.2662 (0.000)	16.5477 (0.000)
ΔP_{it}	0.1171 (0.000)	-6.2497 (0.000)	-2.5904 (0.995)	-1.4518 (0.927)	0.1375 (0.000)	-15.8939 (0.000)	-1.5631 (0.941)	-0.3840 (0.650)
ΔNP_{it}	-0.0288 (0.000)	-1.6486 (0.050)	-0.5464 (0.708)	-0.7569 (0.775)	0.0004 (0.000)	-15.8299 (0.000)	-0.5068 (0.694)	-0.6309 (0.736)
ΔG_t	-0.0644 (0.000)	0.2636 (0.000)	-3.3831 (0.999)	-3.7179 (0.999)	0.1996 (0.000)	-8.3137 (0.000)	-7.1589 (1.000)	-7.1589 (1.000)
ΔR_t	0.1765 (0.000)	-11.5919 (0.000)	0.0034 (0.499)	0.6703 (0.251)	0.6871 (0.000)	-6.7826 (0.000)	-7.1589 (1.000)	-7.1589 (1.000)

Numbers between parentheses refer to the probability of the test statistics.

Appendix 8.2 Univariate Framework for Europe Countries Model

Table 1: Descriptive statistics for European countries model by country for 1984-2009, data in log form.

Variable		Mean	Std. Dev.	Min	Max	Observations
TO_{it}	Overall	4.2127	1.4918	0.8403	7.2054	N = 390
	Between		1.2621	1.8837	5.9594	n = 15
	Within		0.8573	2.1808	7.1894	T = 26
Y_{it}	Overall	9.5210	0.7083	7.7897	10.5497	N = 390
	Between		0.7115	8.2240	10.4179	n = 15
	Within		0.1673	9.0782	10.0417	T = 26
P_{it}	Overall	1.3907	2.3777	-2.4934	6.6876	N = 390
	Between		2.4092	-1.8726	5.9676	n = 15
	Within		0.4712	0.4822	3.8477	T = 26
NP_{it}	Overall	2.1362	2.2939	-1.2749	7.1355	N = 390
	Between		2.3520	-1.0655	6.9256	n = 15
	Within		0.2921	0.9637	3.8944	T = 26
G_t	Overall	3.9091	0.1672	3.6179	4.1566	N = 390
	Between		0.0000	3.9091	3.9091	n = 15
	Within		0.1672	3.6179	4.1566	T = 26
R_t	Overall	11.3525	0.5382	10.5961	12.2762	N = 390
	Between		0.0000	11.3525	11.3525	n = 15
	Within		0.5382	10.5961	12.2762	T = 26

Author's Own calculations using STATA.

Table 2: Panel unit root tests for variables in level (individual intercept and trend are included)

Variables	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung robust
TO_{it}	-4.5370 (0.000)	-1.5447 (0.061)	53.4412 (0.005)	169.506 (0.000)	-1.2877 (0.099)
Y_{it}	4.9466 (1.000)	3.6884 (0.999)	12.3274 (0.998)	11.9156 (0.999)	1.9993 (0.977)
P_{it}	2.8590 (0.998)	1.2982 (0.903)	14.9794 (0.990)	20.5564 (0.901)	-0.7919 (0.214)
NP_{it}	-2.4604 (0.007)	-1.5015 (0.067)	47.9743 (0.020)	78.8274 (0.000)	-1.5603 (0.059)
G_t	2.7678 (0.997)	1.8473 (0.968)	10.8310 (0.999)	13.3969 (0.996)	-0.9194 (0.179)
R_t	-3.6850 (0.000)	-2.7238 (0.003)	44.9912 (0.039)	44.9912 (0.039)	-0.2857 (0.388)

Numbers between parentheses refer to the probability of the test statistics.

Table 3: Panel unit root tests for variables in first differences (intercept included)

Variables	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung robust
ΔTO_{it}	-18.6382 (0.000)	-15.8272 (0.000)	252.396 (0.000)	388.484 (0.000)	-7.8433 (0.000)
ΔY_{it}	2.5614 (0.995)	-1.9001 (0.029)	54.0078 (0.005)	73.6542 (0.000)	-5.4385 (0.000)
ΔP_{it}	-11.4959 (0.000)	-8.4422 (0.000)	122.231 (0.000)	112.324 (0.000)	-4.3603 (0.000)
ΔNP_{it}	-15.9735 (0.000)	-14.8574 (0.000)	225.590 (0.000)	247.915 (0.000)	-6.6422 (0.000)
ΔG_t	-4.6224 (0.000)	-4.4880 (0.000)	64.5988 (0.000)	222.687 (0.000)	-4.5090 (0.000)
ΔR_t	-15.2991 (0.000)	-15.9513 (0.000)	243.926 (0.000)	240.693 (0.000)	-2.2816 (0.011)

Numbers between parentheses refer to the probability of the test statistics.

Table 4: Panel unit root tests for variables in first difference (without Intercept)

Variables	LLC	Fisher (ADF)	Fisher (PP)	Breitung robust
ΔTO_{it}	-13.4309 (0.000)	181.8290 (0.000)	360.4270 (0.000)	-8.0921 (0.000)
ΔY_{it}	-5.4526 (0.000)	67.8701 (0.000)	95.2867 (0.000)	-4.1794 (0.000)
ΔP_{it}	-13.2232 (0.000)	204.4750 (0.000)	195.4070 (0.000)	-4.8249 (0.000)
ΔNP_{it}	-16.5789 (0.000)	267.7280 (0.000)	336.6100 (0.000)	-9.9827 (0.000)
ΔG_t	-5.45320 (0.000)	55.9262 (0.003)	233.0330 (0.000)	-3.9160 (0.000)
ΔR_t	-2.0850 (0.019)	21.0846 (0.885)	138.8630 (0.000)	-2.6476 (0.004)

Numbers between parentheses refer to the probability of the test statistics.

Appendix 8.3 Univariate Framework for Arab Countries Model

Table 1: Descriptive statistics for Arab countries model (data in logarithm form)

Variable		Mean	Std. Dev.	Min	Max	Observations
TO_{it}	Overall	3.3124	1.6457	-1.5896	6.1770	N = 338
	Between		1.5691	-0.6837	5.4325	n = 13
	Within		0.6548	0.5237	4.9551	T = 26
Y_{it}	Overall	7.8628	1.4228	5.4706	10.5703	N = 338
	Between		1.4629	5.8079	10.0828	n = 13
	Within		0.2073	7.3472	8.8622	T = 26
P_{it}	Overall	0.2243	2.3278	-3.2346	5.0022	N = 338
	Between		2.2797	-2.6911	3.9273	n = 13
	Within		0.7793	-2.9578	3.0816	T = 26
NP_{it}	Overall	1.0874	2.3840	-3.0167	5.5051	N = 338
	Between		2.3873	-2.6048	4.9174	n = 13
	Within		0.6380	-0.9169	3.1134	T = 26
G_t	Overall	3.9091	0.1673	3.6179	4.1566	N = 338
	Between		0.0000	3.9091	3.9091	n = 13
	Within		0.1673	3.6179	4.1566	T = 26
R_t	Overall	11.3525	0.5383	10.5961	12.2762	N = 338
	Between		0.0000	11.3525	11.3525	n = 13
	Within		0.5383	10.5961	12.2762	T = 26

Author's Own Calculations using STATA.

Table 2: Panel unit root tests for variables in level (individual intercept and trend are included)

Variables	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung robust
TO_{it}	1.7188 (0.957)	1.4326 (0.924)	13.1694 (0.982)	21.0209 (0.741)	-0.4908 (0.312)
Y_{it}	-0.6041 (0.273)	1.2485 (0.894)	22.9225 (0.637)	31.6930 (0.204)	0.1581 (0.563)
P_{it}	2.9072 (0.998)	0.7884 (0.785)	15.7116 (0.943)	22.2731 (0.674)	-1.2567 (0.104)
NP_{it}	0.7792 (0.782)	-0.0116 (0.495)	26.8084 (0.419)	32.1766 (0.187)	-1.4620 (0.072)
G_t	2.5767 (0.995)	1.7197 (0.957)	9.3869 (0.999)	11.6107 (0.993)	-0.9194 (0.179)
R_t	1.9146 (0.972)	2.5593 (0.995)	6.2946 (1.000)	38.4430 (0.055)	-0.2857 (0.388)

Numbers between parentheses refer to the probability of the test statistics.

Table 3: Panel unit root tests for variables in first difference (intercept is included)

Variables	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung robust
ΔTO_{it}	-6.8286 (0.000)	-6.8128 (0.000)	104.329 (0.000)	203.280 (0.000)	-7.2257 (0.000)
ΔY_{it}	-7.2247 (0.000)	-7.2305 (0.000)	117.278 (0.000)	216.202 (0.000)	-4.3055 (0.000)
ΔP_{it}	-8.8144 (0.000)	-8.6381 (0.000)	118.195 (0.000)	118.037 (0.000)	-4.0964 (0.000)
ΔNP_{it}	-10.4894 (0.000)	-9.7331 (0.000)	142.379 (0.000)	251.474 (0.000)	-5.1311 (0.000)
ΔG_{t}	-4.3032 (0.000)	-4.1781 (0.000)	55.9856 (0.000)	192.996 (0.000)	-4.5090 (0.000)
ΔR_{t}	-3.9267 (0.000)	-7.3065 (0.000)	100.668 (0.000)	208.601 (0.000)	-2.2816 (0.011)

Numbers between parentheses refer to the probability of the test statistics.

Table 4: Panel unit root tests for variables in first difference (without intercept)

Variables	LLC	Fisher (ADF)	Fisher (PP)	Breitung robust
ΔTO_{it}	-9.0570 (0.000)	109.1960 (0.000)	245.7500 (0.000)	-8.2439 (0.000)
ΔY_{it}	-5.4525 (0.000)	65.7204 (0.000)	235.0160 (0.000)	-9.5128 (0.000)
ΔP_{it}	-12.1651 (0.000)	179.0710 (0.000)	188.8150 (0.000)	-6.2724 (0.000)
ΔNP_{it}	-13.4086 (0.000)	185.6390 (0.000)	299.9230 (0.000)	-8.4696 (0.000)
ΔG_{t}	-5.0767 (0.000)	48.4694 (0.000)	201.9620 (0.000)	-3.9160 (0.000)
ΔR_{t}	-5.9199 (0.000)	61.1780 (0.000)	120.3480 (0.000)	-2.6476 (0.000)

Numbers between parentheses refer to the probability of the test statistics.

Appendix 8.4 Univariate Framework for American Countries Model

Table 1: Descriptive statistics for the Americas model (data in logarithm form)

Variable		Mean	St. dev	Min	Max	Observation
TO_{it}	Overall	2.5257	1.4217	0.0998	5.7723	N = 180
	Between		1.4478	1.2357	5.0801	n = 6
	Within		0.5147	1.0375	3.6366	T = 30
Y_{it}	Overall	8.9560	0.9148	7.5916	10.5636	N = 180
	Between		0.9885	7.7953	10.3163	n = 6
	Within		0.1342	8.6525	9.2649	T = 30
P_{it}	Overall	0.7051	2.7222	-1.9115	7.3446	N = 180
	Between		2.9129	-1.3969	6.3481	n = 6
	Within		0.5480	-0.2023	3.1426	T = 30
NP_{it}	Overall	1.0019	2.5803	-1.6584	6.9474	N = 180
	Between		2.7827	-0.8258	6.4294	n = 6
	Within		0.4112	-0.2494	2.7634	T = 30
G_t	Overall	3.8714	0.1834	3.5882	4.1566	N = 180
	Between		0.000	3.8714	3.8714	n = 6
	Within		0.1834	3.5882	4.1566	T = 30
R_t	Overall	11.2268	0.5968	10.3091	12.2762	N = 180
	Between		0.000	11.2268	11.2268	n = 6
	Within		0.5968	10.3091	12.2762	T = 30

Note: N number of observations, n number of cross section units, T number of time series periods.

Table 2: Panel unit root tests for variables in level (individual intercept and trend are included)

Variable	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung robust
TO_{it}	2.5245 (0.0058)	1.3854 (0.0830)	21.4640 (0.0440)	26.4143 (0.0094)	-0.8129 (0.2081)
Y_{it}	3.2045 (0.9993)	1.3924 (0.9181)	6.3378 (0.8981)	7.3806 (0.8315)	1.0324 (0.8491)
P_{it}	-0.2227 (0.4119)	-0.2767 (0.3910)	10.5526 (0.5676)	10.5780 (0.5654)	-1.0667 (0.1430)
NP_{it}	-1.8611 (0.0314)	-0.8277 (0.2039)	14.6427 (0.2616)	16.4123 (0.1731)	-1.1332 (0.1286)
G_t	0.9605 (0.8316)	0.3318 (0.6300)	7.2540 (0.8404)	9.4345 (0.6654)	-1.3625 (0.0865)
R_t	0.2980 (0.6172)	1.2902 (0.9015)	4.0965 (0.9816)	4.3466 (0.9763)	-0.7253 (0.2341)

Numbers between parentheses refer to the probability of the test statistics.

Table 3: Panel unit root tests for variables in first difference (intercept included)

Variables	LLC	IPS	Fisher (ADF)	Fisher (PP)	Breitung robust
ΔTO_{it}	13.7152 (0.000)	-12.7996 (0.000)	128.281 (0.000)	159.584 (0.000)	-4.9827 (0.000)
ΔY_{it}	-3.9971 (0.000)	-4.6015 (0.000)	43.2129 (0.000)	56.1256 (0.000)	-2.7968 (0.0026)
ΔP_{it}	-7.5267 (0.000)	-6.3756 (0.000)	61.9260 (0.000)	72.3337 (0.000)	-4.6178 (0.000)
ΔNP_{it}	-7.1201 (0.000)	-5.7779 (0.000)	62.2947 (0.000)	131.644 (0.000)	-5.4268 (0.000)
ΔG_t	-10.2252 (0.000)	-12.0761 (0.000)	122.888 (0.000)	121.314 (0.000)	-2.7092 (0.0034)
ΔR_t	-11.3229 (0.000)	-10.2420 (0.000)	102.398 (0.000)	103.049 (0.000)	-5.3052 (0.000)

Numbers between parentheses refer to the probability of the test statistics.

Table 4: Panel unit root tests for variables in first difference (no intercept included)

Variables	LLC	Fisher (ADF)	Fisher (PP)	Breitung robust
ΔTO_{it}	12.4367 (0.000)	137.164 (0.000)	216.206 (0.000)	-9.1929 (0.000)
ΔY_{it}	-5.5767 (0.000)	49.1209 (0.000)	78.0588 (0.000)	-6.1448 (0.000)
ΔP_{it}	-9.2176 (0.000)	97.8200 (0.000)	109.896 (0.000)	-6.8650 (0.000)
ΔNP_{it}	-9.3865 (0.000)	91.9228 (0.000)	157.947 (0.000)	-9.1211 (0.000)
ΔG_t	-3.9601 (0.000)	26.7697 (0.0083)	132.580 (0.000)	-4.8271 (0.000)
ΔR_t	-3.5130 (0.000)	22.4708 (0.0326)	70.1212 (0.000)	-3.1722 (0.000)

Numbers between parentheses refer to the probability of the test statistics.

Chapter 9: Panel Co-integration Estimation (1980s-2009)

9.1 Introduction

The chapter aims to estimate the long-run, as well as the short-run dynamic relationships between tourism demand from worldwide to Egypt and its important determinants in addition to the speed of adjustment to the long-run equilibrium using a panel co-integration and error-correction approach. We split this demand into three main regions, as the basic tourism suppliers to Egypt, and estimate the tourism demand relationship separately for each region in order to capture the differences in consumption patterns among various regions and thus to determine the appropriate policy to increase the number of tourists from each specific group to Egypt.

This chapter is organized as follows. In Section 9.2, the econometric methodology used in the estimation is presented. Section 9.3, reports and discusses the estimation results of the co-integration for each model, including a robustness analysis, treatment of cross-sectional dependence, and multicollinearity in the data. Moreover, a comparison among the estimated results of four models is provided, giving some policy implications. In Section 9.4, Granger causality estimation is provided for each model to determine the causal relationships between tourist arrivals and its determinants. Finally, Section 9.5 summarizes and concludes the main results.

9.2 Methodology

To estimate the tourism demand function in Egypt, a panel co-integration approach is used in this chapter within an error correction techniques framework. The error correction techniques in the modelling of tourism demand are based on the assumption of tourists' rationality in the long run. In the long run, tourists determine their demand for tourism at a certain time using all available information about the income, prices, substitute prices, cost of travel, and other factors. In contrast they are more likely to make temporary mistakes regarding their demand for tourism in the short run because of information asymmetry, and therefore will deviate from their long-run steady state equilibrium. These short-run decision errors are not sustained. Tourists as rational consumers learn from their mistakes and correct them to return to the long-run equilibrium. In other words, dynamic tourism demand is self-correcting (Song et al., 2003). According to Engle and Granger (1987), this self correction process can be analysed within the error correction model.

9.2.1 Panel Co-Integration and Error Correction Estimates

To estimate the co-integration vector using an error correction approach in the context of panel data, there are two commonly used procedures. First, the Mean Group (MG) estimator estimates separate equations for each country and averages the resulting long-run coefficients. This estimator always produces consistent estimates but it does not take into consideration that parameters may be identical across countries in the long run. Second, the traditional pooled estimators, including fixed effect (FE) and random effect (RE), which permit the intercept to differ across countries while constraining all other parameters and error variances to be identical across countries. Pesaran et al. (1999) have proposed the Pooled Mean Group (PMG) estimator as an intermediate estimator that combines both pooling and averaging. This estimator allows for short-run heterogeneous dynamics (as would the MG estimator) but imposes a long-run homogeneous relationship (as would the FE estimator) for countries in the sample. The PMG approach appears to be the appropriate choice for our models, especially when disaggregated by region, since the countries from the same region have access to the common technologies, have some common characteristics, and common consumption patterns; therefore the reaction of tourist outflows from these countries to change in tourist determinants in Egypt may be similar. So, we can assume common long-run parameters across countries. However, the speed of adjustment to the long-run steady state and the short-run parameters, which are determined by technological progress, population growth and country specific factors, are more likely to be different across countries. The validity of this restriction can be investigated using the Hausman test (Tan, 2006).

The PMG estimator has some advantages over others. First, it provides an asymptotic distribution of estimators, and yields the most consistent and efficient estimates, unlike Instrumental Variables (IV), Generalized Methods of Moments (GMM) techniques or simple static methods, which assume homogeneity of all the long-run and short-run parameters. Unlike the case of all other dynamic estimators, which require the same order of integration for all the variables in the model, the PMG permits the co-integration relationship to exist irrespective of whether the variables are $I(0)$ or $I(1)$ or combination of them (Wu et al., 2010). The PMG estimator is consistent and efficient not only in the presence of stationary and non-stationary variables, but also in the case of endogenous variables, since endogeneity of explanatory variables can be overcome by adding a sufficient number of lags of these variables (Binder and Offermanns, 2007). Furthermore, selecting lag order in the ARDL model using the appropriate selection information criteria such as AIC, SC and HQC takes into account the results of the diagnostic tests, ensuring that there is no residual serial correlation, non-normality, heteroscedasticity, and functional form misspecification (Feridun, 2009).

While the PMG is consistent, it is likely to be less reliable in small time series units (*T*) and a large number of explanatory variables, because in this case we have to restrict the maximum number of lags in the ARDL specification. Consequently, the dynamic behaviour of the variables may not be perfectly captured (Bussière et al., 2010).

The PMG Models are developed from the general ARDL (*p*, *q*) model as following:

$$\mathrm{Y_{it}} = \sum_{j=1}^{p} \lambda_{ij}\, \mathrm{Y_{i,t-j}} + \sum_{j=0}^{q} \delta_{ij} \mathrm{X_{i,t-j}} + \mu_i + \xi_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9.1)$$

where p and q are the orders of the autoregressive and distributed polynomial lags respectively, time periods, $t = 1, 2, \ldots, T$, and countries, $i = 1,2,3\ldots, N$, Y_{it} is the dependent variable (tourist arrivals to Egypt), X_{it} is a vector of independent variables in the model which involves five variables (income Y_{it}, relative prices P_{it}, relative non-Egypt prices NP_{it}, globalization G_t and hotel capacity R_t), μ_i is an unobserved country-specific fixed effect, λ_{ij} and δ_{ij} (5x1 row vectors) represent the country-specific parameters, and $\xi_{it} \sim \mathrm{IID}\ \mathcal{N}(0, \sigma^2)$ (Pesaran et al., 1999).

The dynamic fixed effect (DFE) model is a more restrictive estimator. It restricts the parameters to be the same across countries by setting $\lambda_{ij} = \lambda_j$, and $\delta_{ij} = \delta_j$ for each country, and permits only the intercept to differ across countries.

The model can be rewritten in the error correction representation to capture the long-run as well as the short-run parameters, and the unobserved country specific effect is directly eliminated from the estimation process as follows:

$$\Delta \mathrm{Y_{it}} = \Phi_i \mathrm{Y_{i,t-1}} + \beta_i \mathrm{X_{it}} + \sum_{j=1}^{p-1} \lambda_{ij}\, \Delta \mathrm{Y_{i,t-j}} + \sum_{j=0}^{q-1} \delta_{ij}\, \Delta \mathrm{X_{i,t-j}} + \nu_i + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots (9.2)$$

where Φ_i is the vector of the speed of adjustment of parameters, - $\frac{\beta_i}{\Phi_i} = \theta_i$ is the long-run elasticity of tourism demand with respect to the explanatory variables in the model in each country, ν_i represents the country specific intercepts, and ε_{it} is an IID innovation. A long-run equilibrium exists according to this methodology if the speed of adjustment coefficient is significant and has the correct negative sign; this steady state equilibrium can be represented as:

$$Y_{it} = -\left(\frac{\beta_i}{\Phi_i}\right) X_{it} + \eta_{it} \ldots \ldots (9.3)$$

The MG estimator, as the first estimator to allow complete parameter heterogeneity across countries, involves separate estimation of (9.2) for each country in the model, and then averages the estimated parameters across countries. In contrast, the PMG estimator is based on the homogeneity of the long-run parameters, so $\theta_i = \theta$ are the long-run parameters which are restricted to be the same across countries; however, the speed of adjustment to long-run equilibrium is permitted to differ across countries (Lamartina and Zaghini, 2009). Hence, Equation (9.2) can be written as:

$$\Delta Y_{it} = \Phi_i(Y_{i,t-1} + \theta X_{it}) + \sum_{j=1}^{p-1} \lambda_{ij} \Delta Y_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij} \Delta X_{i,t-j} + \nu_i + \varepsilon_{it} \ldots \ldots (9.4)$$

In the application of the PMG estimator, the time dimension has to be long enough to permit separate estimation for each country of the model; the lag length of the variables in the model has to be long enough and selected carefully by appropriate information criteria to overcome the problem of serial correlation in the residuals. Moreover, this estimator assumes cross-sectional independence of the data, which is a hard condition to satisfy (Fayad, 2010).

9.2.2 Panel Causality using the PMG Estimator

> One interesting consequence of the Granger representation theorem is that if X and Y are co-integrated then some form of Granger causality must occur. This is either X must Granger cause Y or Y must Granger cause X or both (Koop, 2000: 180).

Generally speaking, X Granger causes Y if past values of X have explanatory power for current value of Y, so that if X precedes Y, X is inferred to cause Y. Applying this intuition to the PMG estimator, we can detect both the long-run and short-run causality by testing two hypotheses on the following equation.

$$\Delta Y_{it} = \Phi_i(Y_{i,t-1} + \theta X_{it}) + \sum_{j=1}^{p-1} \lambda_{ij} \Delta Y_{i,t-j} + \sum_{j=1}^{q-1} \delta_{ij} \Delta X_{i,t-j} + \nu_i + \varepsilon_{it} \ldots\ldots.\ldots\ldots.(9.5)$$

Using the Wald test distributed as χ^2 with one degree of freedom (χ_1^2), the first hypothesis examines the significance of the error correction term under the null; H_0: $\Phi_i = 0$. The rejection of this null hypothesis indicates that there is a co-integration relationship between the variables (Sims et al., 1990), and implies the existance of a long-run causality (Corradi et al., 1990). Therefore, this test investigates not only the presence of a co-integration relationship between the variables, but also detects the long-run causality between them. The second hypothesis examines the significance of the short-run elasticity of tourism demand with respect to lags of explanatory variables jointly using a Wald test distributed as χ^2 with $q-1$ degrees of freedom (χ_{q-1}^2); H_0: $\delta_{i1} = \delta_{i2} = \delta_{i3} = \ldots\ldots = \delta_{i,q-1} = 0$, since q is the lag order of each explanatory variable. The rejection of this null indicates the presence of short-run causality between inbound tourist arrivals to Egypt and each explanatory variable (Gallego et al., 2010).

9.3 Empirical Results of CI/ECMs

In this section, the results of four different models for estimating tourism demand for Egypt are presented based on two alternative estimators (PMG and DFE). The error correction terms, the long and short-run effects are analysed, and finally causality analysis is introduced. It is likely that the short and long-run effects behave in different ways for three reasons as illustrated by the literature. First, tourists may be locked into contracts that make it difficult for them to react to changes in prices; second, tourists may lack information about consumption possibilities in the short term. Furthermore, some consumption may be habit forming, so tourists are used to travelling to the same place regardless of the changes in their income, or the prices of tourism in this place. Consequently, consumers are likely to make some errors in their decisions in the short run, but they have more information and time to make rational decisions in the long run (Seetaram, 2009).

9.3.1 All Countries Model

This model examines the worldwide tourism demand for Egypt and uses balanced panel data for 41 countries representing tourists from all nationalities for the period 1985-2009, implying 1025 observations. ARDL (1, 1, 1, 0, 2, 1) in differences of the variables has been chosen by SC using maximum lag 3 in levels. According to this ARDL specification, the error correction equation is:

$$\Delta TO_{it} = \Phi_i(TO_{i,t-1} + \theta_i X_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}\, \Delta TO_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}\, \Delta X_{i,t-j} + \delta_i TV_t + \nu_i + \varepsilon_{it} \ldots\ldots\ldots\ldots (9.6)$$

where $i = 1, 2, 3 \ldots 41$ countries, $t = 1, 2, 3 \ldots\ldots 25$ years, TO_{it} is the natural logarithm of tourist arrivals from 41 countries worldwide to Egypt over the period 1985-2009, X_{it} is a vector of explanatory variables for country *i*, it involves: Y_{it}, P_{it}, NP_{it}, G_t and R_t, ΔTO_{it-1} reflects the word of mouth effect, ΔX_{it} is a vector of the first differences of all the explanatory variables, TV_t is a 'timing variable' representing political instability in Egypt, Φ_i is the speed of adjustment to the steady state equilibrium, θ_i are the long-run elasticities of the explanatory variables, λ_{ij} and δ_{ij} are the short-run elasticities of the dependent and the explanatory variables, respectively, to be estimated, p is the optimal lag in level of the dependent variable, and q is the optimal lags in levels of the explanatory variables.

All the variables in this model are $I(1)$, but relative prices is $I(0)$. However we proceed by estimating the co-integration vector of this model with all the variables including P_{it}, since we use the PMG technique which permits a co-integration relationship to exist irrespective of whether the variables have the same integrating order or not. As a first step, a common ARDL (1, 1, 1, 0, 2, 1) is applied, and the results of the PMG and DFE estimates are reported in **Table 9.1** for comparison. Four main findings can be observed.

First, Φ_i is statistically significant, so a long-run relationship exists between tourist arrivals to Egypt and their important determinants. The adjustment coefficient has the correct negative sign according to the two estimators; hence in case of any deviation of the tourist arrivals from the value implied by the steady state equilibrium, the explanatory variables in the model bring about a correction in the opposite direction. In the case of the PMG and DFE, about 38% and 35% respectively of the disequilibrium in the short run will be corrected annually; therefore a long-run equilibrium will exist after 2.6 years (PMG) or 2.9 years (DFE). This finding is consistent with econometric theory, since averaging yields faster adjustment than pooling (Pesaran et al., 1999).

Second, the long-run elasticities of tourism demand are all significant at the 1% level of significance according to both the PMG and the DFE estimators (except prices with respect to the DFE), and they have the expected signs, except for relative price which is positive according to both estimators. The long-run income elasticity is significant, and has the expected positive sign. The relative non-Egypt prices elasticity has negative effect on tourist arrivals to Egypt, suggesting that tourism in these competitors is considered as complementary to tourism in Egypt.

Table 9.1: Alternative estimates; the PMG and DFE, within ARDL (1, 1, 1, 0, 2, 1)

	PMG	DFE
Long-Run Coefficients		
Y	0.7655***	0.7819***
P	0.3016***	0.1964*
NP	-0.5395***	-0.3204***
G	0.2995***	1.5489***
R	0.9370***	0.7254***
EC(Φ_i)	-0.3800***	-0.3460***
Hausman Test	0.47 [0.993]	0.00 [1.000]
Short-Run Coefficients		
ΔY_{it}	1.1930**	-0.0718
ΔY_{it-1}	-1.0991*	-0.1343
ΔNP_{it}	0.2912***	-0.0554
ΔG_t	1.5169***	1.5985***
ΔG_{t-1}	0.9457**	1.2317***
ΔR_t	-0.0967	-0.5752***
ΔR_{t-1}	0.4009*	0.1781
TV_t	-0.2348***	-0.2779***
Constant	-5.3698***	-5.8332***
No. of Observations	902	902
R^2	0.3661	0.3925

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Third, the PMG estimator constrains the long-run parameters to be identical across countries or imposes the homogeneity assumption across countries. If this hypothesis is rejected and heterogeneity is found in the model, the PMG estimates are inconsistent. The MG estimates are always consistent, although if homogeneity is proved in the long run, this estimator is consistent but inefficient. A Hausman test has been performed under the null hypothesis of difference in coefficients between the PMG estimates and the MG estimates is not significant (Blackburne and Frank, 2007). The calculated Hausman statistic is 0.47 (*p*-value is 0.993); hence we cannot reject the null hypothesis and we conclude that the PMG is consistent in this model and more efficient than the MG estimator. This result implies that the long-run relationship between tourist arrivals and their determinants is equal across the generating countries. The DFE model is subject to a simultaneous equation bias resulting from the endogeneity between the error term and the lagged dependent variable. Hence, the Hausman test had to be applied again to measure the extent of this endogeneity (Ibid, 2007). The results suggested that simultaneous equation bias is not found in this model, and it is concluded that the DFE is preferred over the MG estimator.

Fourth, with regard to the short-run coefficients, income is significant and elastic according to the PMG. As can be noted, the parameters of word of mouth are very small according to all the estimators. This is one drawback of these estimators which suffer from downward bias on the coefficient of the lagged dependent variable (word of mouth) as observed by Pesaran.

> There are, however, a number of unresolved issues. For small T all the estimators (Group-Specific, Mean Group, Pooled Mean Group and Fixed Effects) will be subject to the familiar downwards bias on the coefficient of the lagged dependent variables. Since the bias is in the same direction for each group, averaging or pooling does not reduce this bias (Pesaran et al., 1999: 16).

The relative prices variable is insignificant in all cases, whereas the non-Egypt prices are significant with a positive effect according to the PMG. Globalization is significant and has a positive elastic effect on tourist arrivals to Egypt according to all the estimators. Hotel capacity is significant according to the DFE estimator, with a negative sign. As expected, political instability significantly affects tourist arrivals to Egypt negatively at the 1% level in all cases. The constant is significant and negative in most cases.

Finally, R^2 ranges from 37% in the case of the PMG estimator to about 39% in the case of the DFE, which means that from 37% to 39% of the variations in the tourist arrivals to Egypt across 41 origin countries over time can be explained by income, relative prices, non-Egypt prices, globalization, hotel capacity and political instability in Egypt.

9.3.1.1 Robustness Analysis

After estimating the relationship between tourist arrivals from worldwide to Egypt and their determinants for the period 1985-2009, it is important to check for robustness of these relations. Four adjustments to the baseline estimation have been applied.

9.3.1.1.1 Outliers Bias

Four cross-sectional units (Benelux, Portugal, Sudan and Japan) are considered as outliers, having maximum tourism demand elasticities with respect to the different variables in the co-integration vector according to the MG estimator, and dropped from the model. We then re-estimated Equation (9.6) with only 37 countries.

The results are reported in **Table 9.2**, and suggest the goodness of the baseline estimation since relatively the same results with respect to the PMG and DFE were obtained both in the long run and short run (Appendix 9.1, **Table 1**). Hence both estimators are robust to outliers. Finally, Hausman test results indicate again the greater efficiency of both the PMG and the DFE over the MG estimator.

Table 9.2: Long-run estimates; the PMG and DFE for 37 countries

Variable	PMG	DFE
Y	0.7780***	0.7228***
P	0.2768***	0.1289
NP	-0.4757***	-0.3611***
G	0.2424**	1.7149***
R	0.9304***	0.6587***
EC(Φ_i)	-0.3748***	-0.3687***
Hausman Test	0.58 [0.989]	0.00 [1.000]
No. of Observations	814	814
R^2	0.4219	0.4320

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

9.3.1.1.2 Lag Order Choices

We re-estimated Equation (9.6) with ARDL (1, 1, 1, 0, 1, 1), which was chosen by AIC using maximum lag 2 in level of the variables, to examine the robustness of the alternative estimates to choice of lag order. **Table 9.3** presents the long-run elasticities, and the short-run elasticities are reported in Appendix 9.1, **Table 2**.

Table 9.3: Long-run alternative pooled estimates within ARDL (1, 1, 1, 0, 1, 1)

Variables	PMG	DFE
Y	0.6609***	0.6075**
P	0.1593***	0.1801*
NP	-0.3411***	-0.2812**
G	-0.0087	0.3005
R	0.9819***	0.9835***
EC(Φ_i)	-0.3582***	-0.3158***
Hausman Test	0.31 [0.9974]	0.00 [1.000]
No. of Obs.	943	943
R^2	0.3876	0.3904

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Comparing the two different ARDL specifications in case of the PMG estimates (Table 9.1, Table 9.3 and Appendix 9.1, Table 2) reveals some differences in the values of the long and short-run elasticities. The long-run effect of globalization turned insignificant, the short-run effect of income turned insignificant, and finally word of mouth turned significant. This may indicate a relative bias of the PMG to lag order choice. The DFE estimator registers the least changes in its estimates in the new specification; only the long-run effect of globalization turned insignificant. Again, the Hausman test indicates that both the PMG and the DFE are consistent in this model and more efficient than the MG estimator.

9.3.1.1.3 Cross-Sectional Dependence

Cross-sectional dependence can be caused by common shocks, such as macroeconomic, technological, legal, political, environmental, and health shocks. Therefore these common factors are a likely feature of cross-section economic data (Andrews, 2005). Some common shocks may affect all countries (cross-section unit) similarly or in very different ways. In both cases, undesired cross-sectional dependence in the errors may occur. For example, global recession may affect the per capita income of some countries much more than others. Terrorism in a specific year may affect tourist arrivals from all source countries considerably and differently.

The PMG estimator assumes cross-sectional independence of innovations. Cross-sectional dependence in the data is considered and two tests (Pesaran and Friedman Tests) proposed by Pesaran (2004) are constructed and can reject the null of cross-sectional independence as illustrated in **Table 9.4**.

Table 9.4: Cross-sectional dependence tests in All Countries model

CSD tests	*t*-value	*p*-value
Friedman Test	79.221	0.000
Pesaran Test	8.248	0.000

Source: Author's own calculations using STATA.

> The issue of how to deal with cross sectionally dependent dynamic panels has not yet been fully addressed in the economic literature, and so far, little is known about estimating slope coefficients under cross sectionally dependent innovations in a non-stationary panel (Bussière et al., 2010: 65).

To address the problem of common shocks, two alternative procedures are performed; first, demeaned data (TO_{it}, Y_{it}, P_{it} and NP_{it}). Globalization and hotel capacity in Egypt cannot be demeaned because these variables are common to all cross-sections (countries). This adjustment method assumes the homogeneity of the correlation across countries that is the response to global shocks is the same among all countries, which is a very restrictive assumption (Fayad, 2010). Therefore the estimated equation in this case is:

$$\Delta TOm_{it} = \Phi_i(TOm_{i,t-1} + \alpha_i Xm_{it} + \theta_i W_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}\, \Delta TOm_{i,t-j} + \sum_{j=0}^{q-1} \mu_{ij}\, \Delta Xm_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}\, \Delta W_{i,t-j} + \delta_i TV_t + \nu_i + \varepsilon_{it} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (9.7)$$

where TOm_{it} is the level of the demeaned dependent variable, Xm_{it} is a vector of the level of the demeaned explanatory variables Ym_{it}, Pm_{it}, NPm_{it}, whereas W_{it} is a vector of the cross-sectional invariant variables. ΔTOm_{it}, ΔXm_{it} and ΔW_{it} are vectors of the first differences of the demeaned dependent variable, demeaned explanatory variables and cross-sectional invariant explanatory variables respectively. The α_i and θ_i are the long-run elasticities of the demeaned and the cross-sectional invariant explanatory variables, and λ_{ij}, μ_{ij} and δ_{ij} are the short-run elasticities of the demeaned dependent variable, demeaned explanatory variables and cross-sectional invariant variables respectively.

The results of the long-run and the short-run estimates of the PMG on the demeaned data are reported in **Table 9.5**. The long-run elasticities are statistically significant at the 1% level, whereas the short-run elasticities are insignificant (except the globalization) including the political instability, which indicates a loss of important information because of demeaning the data.

The second procedure applied to eliminate the cross-sectional dependence in the data is the PMG augmented by cross-sectional averages of all the variables. This method is proposed by Binder and Offermanns (2007). Three specific cases can be considered. First, the full augmentation by adding cross-sectional averages of all the variables with their lags in the co-integration vector as well as in the short-run dynamics, since the averages of the variables represent the common factors. In this case the estimated equation is:

$$\Delta TO_{it} = \Phi_i(TO_{i,t-1} + \tau_i TOa_{it-1} + \theta_i X_{it} + \beta_i Xa_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}\, \Delta TO_{i,t-j} + \sum_{j=1}^{p-1} ב_{ij}\, \Delta TOa_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}\, \Delta X_{i,t-j} + \sum_{j=0}^{q-1} \omega_{ij}\, \Delta Xa_{i,t-j} + \delta_i TV_t + \nu_i + \varepsilon_{it} \ldots\ldots\ldots\ldots (9.8)$$

where TOa_{it-1}, Xa_{it-j}, ΔTOa_{it-j} , ΔXa_{it-j} are the levels and the first differences of the averages of the cross-sectional variant variables and their lags. In this case 30 parameters for each country have to be estimated, as illustrated in Equation (9.8), which is impossible since there are only 25 annual observations.

Table 9.5: Demeaned and augmented PMG estimates, ARDL (1, 1, 1, 0, 2, 1)

Variables	Demeaned Variables PMG	Long-Run Augmentation PMG
Long-Run Coefficients		
Y	2.4234***	0.9569***
P	-0.9103***	0.0717
NP	0.5570***	-0.7711***
G	2.9394***	1.0371***
R	-0.4490***	0.9028***
EC(Φ_i)	-0.2719***	-0.3401***
Hausman test	1.11 [0.9530]	0.00 [1.000]
Short-Run Coefficients		
ΔP_{it-1}	0.0865	-0.1790**
ΔNP_{it}	0.1566	0.2810***
ΔG_t	-0.5457	1.8309***
ΔG_{t-1}	-0.6029	1.2050***
ΔG_{t-2}	-0.8476***	0.2758
ΔR_{t-1}	-0.0113	0.5745**
TV_t	0.0011	-0.2598***
Constant	-1.6211	3.6044***
R^2	0.3932	0.3146

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Second, augmentation by adding only averages of the first differences of variables (variables in the short run), which assumes that common factors do not affect the co-integrating vector. We applied this method on our model by estimating the equation 9.9. In this case, estimating 26 parameters is also impossible.

$$\Delta TO_{it} = \Phi_i(TO_{i,t-1} + \theta_i X_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}\, \Delta TO_{i,t-j} + \sum_{j=1}^{p-1} \beth_{ij}\, \Delta TOa_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}\, \Delta X_{i,t-j} + \sum_{j=0}^{q-1} \omega_{ij}\, \Delta Xa_{i,t-j} + \delta_i TV_t + \nu_i + \varepsilon_{it} \ldots\ldots\ldots (9.9)$$

Third, augmentation by adding averages of the variables in levels, which allows for the common factor to be part of the co-integrating vector. This can be constructed as in Equation (9.10). Therefore 24 parameters have to be estimated as shown in Table 9.5.

$$\Delta TO_{it} = \Phi_i(TO_{i,t-1} + \tau_i TOa_{it-1} + \theta_i X_{it} + \beta_i Xa_{it}) + \sum_{j=1}^{p-1} \lambda_{ij}\, \Delta TO_{i,t-j} + \sum_{j=0}^{q-1} \delta_{ij}\, \Delta X_{i,t-j} + \delta_i TV_t + \nu_i + \varepsilon_{it} \ldots\ldots\ldots (9.10)$$

According to our model, this is the most appropriate adjustment because it captures the common factor (global shocks) which affects the long-run steady state equilibrium; whereas the 'timing variable' (TV_t) reflecting political instability in Egypt can capture the most important shocks which result from terrorism and riots in the short run[36]. The results of the different adjustment methods also support this treatment.

Comparing the results of the PMG estimates before and after adjustment (long-run augmentation), relative prices elasticity turned insignificant; globalization still has a positive and significant effect, but with elasticity more than unity. Some difference was detected also in the short run, as illustrated in Table 9.5.

However, the augmentation adjustment is data-intensive because of including four more variables in the regression (the averages of the level of cross-section variant variables), which therefore reduces the number of degrees of freedom. In a relatively short country time-series this could lead to loss of precision in the estimates.

9.3.1.1.4 Multicollinearity

The insignificance of the long-run relative prices elasticity may be due to the inclusion of the relative non-Egypt prices which are highly correlated with the relative prices as can be illustrated from the correlation matrix (Appendix 9.1, **Table 3**). Moreover, the Variance Inflation Factor (VIF) test detects relatively a high VIF value of NP_{it}, although it is less than 10 (Appendix 9.1, **Table 4**). Hence, the multicollinearity between these two variables may change the results. Therefore dropping non-Egypt prices from the model and re-estimating the model with five explanatory variables is an essential procedure to address this issue.

Moreover, the data were corrected using the augmented PMG (adding averages of the variables in the co-integration vector), and Equation (9.10) was re-estimated and the PMG results are presented in **Table 9.6**. The results of the long-run elasticities have improved, since P_{it} turned significant with the expected negative sign, the income elasticity increased slightly to be elastic, and the speed of adjustment increased to 37%, instead of 34%. In addition the R^2 increased after excluding NP_{it} from the regression, which indicates the existence of multicollinearity.

To conclude, income is the most important determinant of tourism demand in Egypt in the long run, with the expected positive effect and more than unit elasticity. However, as far as the short-run elasticities are concerned, tourist income is insignificant and it does not have any effect on the number of tourist arrivals to Egypt. This result does not

[36] In this case the timing variable works as time-specific effects in the estimation.

mean that short-run income is not important for all the countries in the model as a determinant of tourist arrivals to Egypt, but this may result from the different effects of this variable with respect to different countries which have different income levels. In other words, tourists in some countries in the short run when their income increases will prefer to travel to more expensive destinations, since the cost of the trip is higher than its counterpart in Egypt, so their income elasticity in this case has a negative effect on tourist arrivals to Egypt. It is noted from the individual estimated elasticities of this model that countries which have a higher per capita income have such a negative relationship between TO_{it} and Y_{it}, such as Switzerland, Qatar, Austria, Benelux and Germany, since all these countries had per capita income more than US$ 10,000 a year on average over the period of the study. In other countries of origin, tourists will increase their arrivals to Egypt with the increase of their income, so their income elasticity has a positive sign and tourism in Egypt is regarded as a superior good for these countries. It can be indicated from the individual results that most of these countries have a lower per capita income (less than US$ 10,000 a year) such as India, Pakistan, China, Morocco, Jordan, Brazil and Hungary. Therefore, the negative signs in some countries along with the positive signs in others turn the income elasticity (which is calculated as an average of the income elasticities of all the countries in the model) insignificant in the short run.

The relative own price elasticity is negative and less than unity, which is in line with economic theory, since a 1% increase in relative price elasticity in Egypt leads to decrease tourist arrivals from worldwide to Egypt by 0.6%. The low value of price elasticity suggests that the degree of substitutability is low between tourism in Egypt and domestic tourism in each country of origin. In addition, low price elasticity in general is associated with higher popularity of international tourism[37]. Eilate and Einav (2004) and Naude and Saayman (2005) concluded that tourism to less developed countries is less sensitive to prices changes since the prices in these countries is relatively low. As far as the short-run elasticity is concerned, changes in prices have a negative effect on tourist arrivals to Egypt before excluding the NP_{it}, but turn insignificant after excluding it.

[37] This popularity results from the tour operators' ability to decrease the cost of the trip by spreading the organized trips and package tours; therefore the tour operators can minimize their cost by selling in high quantities.

Globalization has a very considerable effect on tourist arrivals with an elastic demand whether in the long term, or in the short term. In the long run, a 1% increase in globalization induces a rise in tourist arrivals by 1.8%. In the short run, a 1% increase in globalization increases tourist arrivals in the same year by 1.7% and in the following year by 1.3%.

Table 9.6: The augmented estimates of All Countries model excluding NP_{it}, ARDL (1, 1, 1, 2, 1)

Variables	PMG
Long-Run Coefficients	
Y	1.2094***
P	-0.5846***
G	1.8479***
R	0.7515***
$EC(\Phi_i)$	-0.3746***
Hausman test	0.15 [1.000]
Short-Run Coefficients	
ΔG_t	1.7207***
ΔG_{t-1}	1.3047***
TV_t	-0.2796***
Constant	-1.0140***
R^2	0.3817

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Hotel capacity positively affects tourist arrivals to Egypt in the long run with inelastic demand. Specifically, a 1% increase in the hotel capacity in Egypt is associated with 0.75% increase in worldwide tourist arrivals to Egypt, indicating that expenditure on the Egypt tourism industry promotes its growth. In contrast, this variable is insignificant in the short run; this may suggest that the general level of hotel capacity in Egypt is taken into account by international tourists when choosing their trips, but changes in this hotel capacity over time are not important for them.

Political instability affects tourist arrivals to Egypt negatively at the 1% level of significance, since the year of the riot induces a fall in tourist arrivals in that year of 28%. The constant is significant and takes a negative value, indicating that other variables, such as common culture, common language and distance are important factors in determining tourism inflows to Egypt and affect this demand negatively but are not included in the demand function. Finally, the value of the adjustment coefficient is 37% which means that there are more than 2.5 years between the actual variation of the demand for tourism in Egypt and the desired long-run level.

9.3.2 European Countries Model

In the European model, we analyse tourist arrivals from 15 European countries to Egypt through the period from 1984 to 2009. Optimal lag orders for this model were chosen by SC subject to a maximum lag of 3 in levels, specified as ARDL (0, 1, 2, 0, 2, 2). The same variables are used as in Equation (9.6). **Table 9.7** presents the estimates of the error correction terms, the long-run as well as the short-run elasticities of the tourism demand based on the PMG and DFE estimators.

Table 9.7: Alternative pooled estimators; the PMG and DFE, within ARDL (0, 1, 2, 0, 2, 2)

	PMG	DFE
Long-Run Coefficients		
Y	5.6898***	3.4581***
P	0.6768***	0.7827**
NP	-0.5614***	-0.6200***
G	-0.4974	3.005**
R	0.6076***	0.4531
EC(Φ_i)	-0.4551***	-0.2869***
Hausman Test	0.96 [0.9654]	0.00[1.000]
Short-Run Coefficients		
ΔY_{it}	-1.6955*	0.1992
ΔY_{it-1}	-3.6039**	-1.2973*
ΔP_{it}	0.2108**	0.1256
ΔP_{it-1}	-0.3371**	-0.2861***
ΔP_{it-2}	-0.0457	-0.1938**
ΔNP_{it}	0.3164*	-0.0242
ΔG_t	1.2718**	0.2272
ΔG_{t-1}	1.4780***	0.6693
ΔG_{t-2}	-0.0678	-1.2315***
ΔR_{t-2}	-0.8188***	-0.8434***
TV_t	-0.4153***	-0.4764***
Constant	-24.8137***	-12.6539***
No. of Obs.	345	345
R^2	0.4234	0.4448

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

The adjustment coefficients are significant at the 1% level and have the expected negative signs according to the two alternative estimates, which mean that a long-run equilibrium exists between tourist arrivals from Europe and their fundamental determinants. As suggested before, pooling suggests a smaller estimated speed of adjustment than averaging: the DFE 29% and the PMG 46%.

In the long run, most of the elasticities are significant according to both estimators, and have the expected signs, except for relative prices which have a positive effect. In order to test for long-run homogeneity of all the long-run estimates, the joint Hausman test was performed to determine any statistical differences between the PMG and MG. The null hypothesis cannot be rejected at the 5% level of significance. This indicates that the long-run relationship between tourist arrivals and their fundamentals is equal across the European countries. Hence, the PMG is consistent and more efficient than the MG in this model.

In the short run, at the 1% level of significance, the main determinants of tourist arrivals are income (PMG), relative prices (PMG, DFE), globalization (PMG, DFE), lagged hotel capacity (PMG, DFE) and the political unrest (PMG, DFE). The R^2 is 42% for the PMG and 44% for the DFE.

9.3.2.1 Cross-Sectional Dependence

The cross-sectional dependence test proposed by Pesaran (2004) can be used to test for cross-sectional dependence in the context of large *N* and small *T*; hence, it has been applied to All Countries model. In contrast, the Breusch and Pagan (1980) test can be used to test for cross-sectional dependence in the context of large *T* and small *N*. Hence this test is more appropriate for this model, as well as the Arab and Americas models. The Breusch-Pagan LM test is performed under the null of cross-sectional independence in the residuals of the regression model. The resulting test statistic (408.84, Pr = 0.000) strongly rejects the null of cross-sectional independence.

First we demeaned the cross-sectional variant variables in the model, and re-estimated the model using the PMG estimator. The results were statistically and theoretically unsatisfactory, especially in the short run. Therefore, we proceeded by applying the augmented PMG technique by adding the averages of the variables in levels, which allows for the common factor to be part of the co-integrating vector. This adjustment captures the common factor which affects the long-run steady state equilibrium; whereas the political instability can capture the most important shocks which result from terrorism and violence in the short run as assumed before. **Table 9.8** reports the results of the PMG estimator after the adjustment to eliminate the cross-sectional dependence in the data.

The long-run elasticity of prices turned insignificant, whereas the globalization elasticity turned significant and elastic. As far as the short-run elasticities are concerned;

income, relative prices, hotel capacity and political instability play the main role in determining arrivals to Egypt.

Table 9.8: The augmented estimates, ARDL (0, 1, 2, 0, 2, 2)

Variables	Augmented PMG
Long-Run Variables	
Y	4.0645***
P	-0.2624
NP	-0.4894***
G	1.8953**
R	3.8078***
$EC(\Phi_i)$	-0.3930***
Hausman Test	0.00 [1.000]
Short-Run Variables	
ΔY_{it}	2.0493**
ΔY_{it-1}	-4.5983***
ΔP_{it}	0.2489***
ΔP_{it-1}	-0.6329***
ΔG_{t-1}	0.9603*
ΔR_t	-0.9526***
ΔR_{t-2}	-0.4857**
TV_t	-0.4015***
Constant	14.3605***
R^2	0.4451

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in [ ]. ***, **, * indicate significance at the 1%, 5% and 10% respectively.

9.3.2.2 Multicollinearity

The previous estimated results report long-run insignificant effect of prices elasticity, which may occur due to the high correlation between the relative prices and the non-Egypt prices variables in the model. The correlation matrix of all the variables (Appendix 9.2, **Table 1**), in addition to the VIF test prove the existence of high collinearity between these two variables (Appendix 9.2, **Table 2**).

As a first procedure to solve this problem, we separated the relative prices variable into two variables: CPI in Egypt relative to CPI in each originating country, and the exchange rate between the Egyptian pound and the currency of the originating country. This treatment reduces the multicollinearity problem in the model, since there is no correlation between NP_{it} and CPI_{it} and no high correlation between NP_{it} and EX_{it} as illustrated in the correlation matrix (Appendix 9.2, Table 1). The optimal lag length of each variable has been chosen based on the SC. Then the augmented PMG estimates are reported in **Table 9.9** based on ARDL (0, 1, 1, 1, 1, 0, 1). In the long run, CPI_{it} elasticity is insignificant, and EX_{it} is significant at only 10%, with the expected negative effect. In the short run, the effect of CPI_{it} is negative and significant, but the effect of its lag is positive and significant as well. The effect of lagged EX_{it} is negative and significant. Therefore, the same results as in the case of including only one variable for relative prices (P_{it}) have been obtained.

Table 9.9: The augmented PMG of different models' specifications

Variables	T Y P NP G R (0,1,2,0,2,2)	T Y CPI EX NP G R (0,1,1,1,1,0,1)	T Y P G R (0,1,2,2,2)	T Y NP G R (0,1,0,2,2)
Long Run Coefficients				
Y	4.0645***	3.4593***	2.8738***	2.4968***
P	-0.2624	-	0.1936	-
CPI	-	-0.1222	-	-
EX	-	-0.3038*	-	-
NP	-0.4894***	-0.9136***	-	-0.8574***
G	1.8953**	3.5960***	11.9564***	6.6344***
R	3.8078***	3.6111***	4.3493***	7.3197***
EC(Φ_i)	-0.3930***	-0.4636***	-0.1765***	-0.2015***
Short Run Coefficients				
ΔY_{it}	2.0493**	-1.9802**	1.5598*	0.6262
$L(\Delta Y_{it})$	-4.5983***	0.6455	-4.0096***	-1.9852**
ΔP_{it}	0.2489***	-	-0.0324	-
$L(\Delta P_{it})$	-0.6329***	-	-0.5454***	-
ΔCPI_{it}	-	-0.8575***	-	-
$L(\Delta CPI_{it})$	-	1.5546***	-	-
ΔEX_{it}	-	0.1508*	-	-
$L(\Delta EX_{it})$	-	-0.3203***	-	-
ΔNP_{it}	-0.0806	0.4103***	-	0.3063*
$L(\Delta NP_{it})$	-	0.6491***	-	-
$L(\Delta G_t)$	0.9603*	-	1.1023**	-1.0729***
ΔR_t	-0.9526***	-0.7285**	-0.5795*	0.1510
$L(\Delta R_t)$	-0.4857**	-0.8660***	-0.6449***	0.3612
TV_t	-0.4015***	-0.4792***	-0.4270***	-0.4268***
Constant	14.3605***	2.0506***	-4.4981***	12.1247***
R^2	0.4451	0.3552	0.4132	0.3687

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

The second procedure to examine the effect of the multicollinearity between P_{it} and NP_{it} on the different elasticities is to drop non-Egypt prices variable and re-estimate the model based on ARDL (0, 1, 2, 0, 2). In addition, we re-estimated another model excluding P_{it}, based on ARDL (0, 1, 0, 2, 2). The results of these two models, associated with the result of the main augmented model using the PMG estimator are reported in Table 9.10 for comparison. It seems from the different estimates that relative prices remain insignificant even after excluding NP_{it} from the regression (column 4), whereas globalization and hotel capacity take very big values, reflecting biased estimates resulting from the omission of an important variable. In column 5, the relative prices variable has been dropped from the model, and the results indicate that NP_{it} is still significant and negative such as before, but G_t and R_t have bigger values, indicating again omitted variable bias. Moreover, R^2 in the case of excluding NP_{it} or P_{it} from the model is less than its value when they are included (column 2).

9.3.2.3 The Effect of Separate Substitute Prices on Tourism in Egypt

In this section, the effect of non-Egypt prices (NP_{it}) on tourist arrivals has been divided into the effect of tourism prices of six alternative destinations on tourist arrivals to Egypt. Therefore, the effect of tourism prices in Israel, Turkey, Tunisia, Morocco, Syria and Jordan on tourist arrivals to Egypt is examined separately to determine the most competitive destination to Egypt from the perspective of European tourists.

To do that, six different models have been estimated using Equation (9.10), and replacing the NP_{it} by substitute prices of different alternative destinations each in a separate model, where SPI_{it}, SPK_{it}, SPT_{it}, SPM_{it}, SPS_{it} and SPJ_{it} are the relative prices of Israel, Turkey, Tunisia, Morocco, Syria and Jordan respectively. Due to the high multicollinearity between P_{it} and each substitute prices separately (see correlation matrix **Table 3**, Appendix 9.2), the CPI_{it} and EX_{it} are used to reflect the relative prices of tourism in Egypt instead of P_{it}. The data are augmented to treat the problem of cross-sectional dependence as before.

As illustrated in **Table 9.10**, tourism in the alternative destinations is considered as a complement for tourism in Egypt in the long run, but it turns substitute in the short run, with some exceptions. In the short run, as illustrated by **Figure 9.1**, seven European countries consider Israel as an alternative to tourism in Egypt at the 5% level of significance. Five of them consider tourism in Israel as a competitor to tourism in Egypt, whereas tourists from Greece and Poland prefer to visit the two destinations in one trip. Tourists from Switzerland and Portugal consider tourism in Israel as the strongest competitor to tourism in Egypt relative to the other substitute destinations. Ten European countries consider Turkish tourism as an important alternative to Egyptian tourism; it is a substitute with respect to seven countries and complement for three countries. The substitute elasticities are inelastic in all cases, except for France, which treats Turkish tourism as a considerable substitute to tourism in Egypt at the 1% level of significance.

Table 9.10: The augmented PMG estimates of substitute tourism prices, ARDL (0, 1, 1, 1, 1, 0, 1)

	SPI_{it}	SPK_{it}	SPT_{it}	SPM_{it}	SPS_{it}	SPJ_{it}
Long run	-7.707***	-7.7635***	-0.398**	-0.1146	-3.6349***	-4.0800***
Short-run coefficients						
France	0.9073*	1.0522***	-3.0111***	0.7671	0.7339***	0.3146
Germany	0.4060*	0.6269***	-2.4092***	1.3784**	0.4570**	0.1699
UK	0.5164*	0.4876***	-1.0871***	-0.9751**	0.5895**	0.2523
Italy	-0.5794*	-0.5994***	-0.3073	-1.6888***	0.4784**	-0.0174
Switzerland	1.0963**	-0.7665***	-1.6647	1.4388	0.8649***	1.0030**
Hungary	0.1719	-0.4699**	4.1482***	2.1075***	0.5711**	0.4040
Turkey	-0.2385	-	-0.6274	0.2784	0.2030	0.4617*
Israel	-	0.2310	1.4812*	1.8212*	0.4455	-0.2982
Austria	0.6177***	0.8247***	-1.8837***	2.4205***	0.4829**	0.5793***
Benelux	0.5246**	0.6682***	-1.0971**	2.7771***	0.5714***	0.7374***
Scandinavia	0.5599	0.8418***	-2.7668***	0.7748	0.2925	-0.1468
Greece	-0.8871**	-0.3312*	-1.2542***	-0.6876	0.2408	-0.5992***
Spain	0.9666***	0.6624***	-2.4593***	1.0467	0.8083***	0.7300*
Portugal	1.1387**	0.4947	-1.6643	0.7383	0.7071**	0.4791
Poland	-0.4271**	0.1901	0.7475**	0.1156	-0.2455	-0.1323
Average SR	0.3405***	0.3719***	-0.8699*	0.9793***	0.4855***	0.2403**

Source: Author's own calculations using STATA, ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

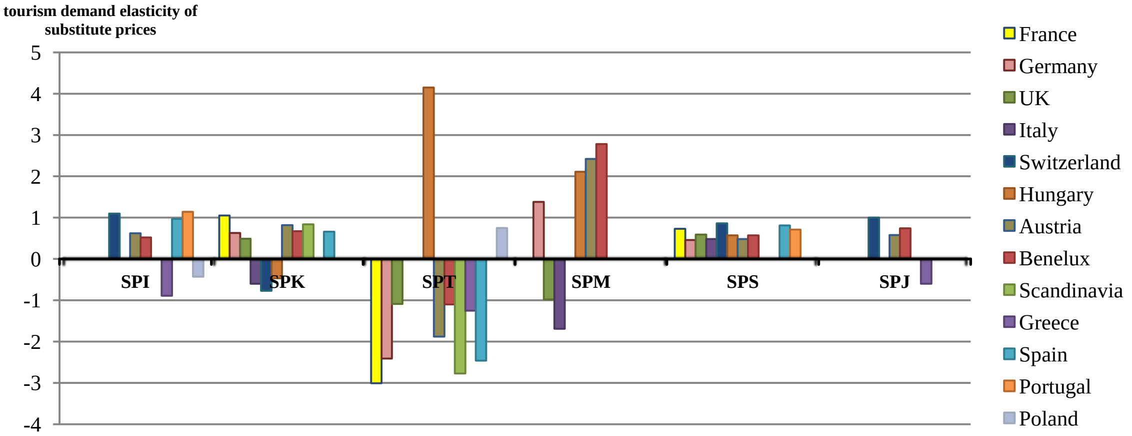


Figure 9.1: Substitute relationship between Egypt and its alternative destinations from the perspective of European originating countries in the short run (1984-2009).
Source: Calculated from Table 9.11.

Tourism in Tunisia is the strongest alternative to tourism in Egypt relative to the European region. Ten origin countries consider Tunisian tourism as complements/ substitutes for tourism in Egypt; with elastic estimates for nine countries. The results suggest that Tunisian tourism is the most important complement to Egyptian tourism from the perspective of France, Germany, the UK, Scandinavia, Greece and Spain, and the most important substitute according to both Hungary and Poland. Morocco is also an important competitor according to six European countries, with substitute prices elasticities bigger than one in most cases. According to Italian tourists, tourism in Morocco is the strongest complement, but it is the strongest competitor to tourism in

Egypt according to tourists from Austria and the Benelux. Syria is a significant competitor according to ten European countries, with smaller substitute elasticities than its counterpart in the other destinations. Only three European countries consider Jordan as a substitute for Egyptian tourism, while Greece considers tourism in Jordan as a complement to tourism in Egypt.

9.3.2.4 Short-Run Dynamic Estimates of Individual European Countries

Examining the augmented PMG estimates for each European country separately in the short run[38] may help in understanding closely the relationship between tourist arrivals from Europe to Egypt and their main determinants. The hypothesis of no long-run relation between tourist arrivals and their fundamentals can be rejected in 14 out of 15 European countries; the only exception is Turkey. The speed of adjustment always has the expected negative sign, and it ranges from a maximum of about 72% in Germany to a minimum of just 10% in Greece, suggesting an adjustment from short-run disequilibrium of between less than 1.5 year and 10 years (see Appendix 9.2, **Table 4**).

The short-run income elasticity is significant and greater than unity in 12 countries, ranging from around -11.7 in Switzerland to 12 in Spain. It has a negative sign in 10 rich countries and a positive sign in two countries, Hungary and Spain. So, on average this variable has a very significant effect on tourist arrivals to Egypt in the short term with a negative effect, indicating that tourism in Egypt is a poor substitute for other countries in the European tourists' choice set, so when their income increases they prefer to travel to other destinations which may provide better quality service at higher prices, or they may prefer to travel to long haul markets which involves a higher transportation cost.

The effect of the changes in relative prices is significant in eight countries and always positive in the same year (except for Portugal), most likely because tourists are unaware of these temporary changes. However, the effect of the lagged relative prices is always negative and significant in ten European countries in the model, with elasticities less than unity in most cases.

Globalization and its lags are significant and positive variables at the 5% level of significance for five countries: Germany, UK, Hungary, Austria, and Benelux. It also

[38] The PMG estimates the parameters of each country in the short run separately to calculate the coefficient means, but in the long run it imposes homogeneity of the slope coefficients, and pools the data.

has a significant negative effect in the case of Italy, Scandinavia and Israel. Tourism demand is always very elastic to changes in this variable in all countries. Thus, this variable has a significant effect (at the 10%) on average on tourist arrivals from this group. Hotel capacity significantly affects tourist arrivals from seven European countries with the unexpected negative effect, and an expected positive effect in three countries. So, on average this variable is significant in the short run and has a negative effect.

As expected, political instability is always significant and has a negative effect on tourism demand for Egypt over the period of the study. More specifically, this variable is significant for all the countries in Europe region except Hungary. It affects tourist arrivals to Egypt negatively by a maximum of 64% in the case of Portugal, and at a minimum of 18% in Italy (at 10%). The constant is significant and positive for most countries.

9.3.3 Arab Countries Model

The data of this model are for 13 Arab countries for the years 1984-2009. A maximum lag order of 3 in level was imposed based on the AIC and the SC. ARDL (0, 0, 0, 0, 2, 2) was then selected as optimal lag order for the various variables. **Table 9.11** presents estimates of the long and short-run tourism demand elasticities with respect to the main determinants of tourism and the speed of adjustment coefficients.

All the estimates of the adjustment coefficients are negative and significant at the 1% level, suggesting that any deviation of tourism demand from the long-run equilibrium relationship will be corrected in the opposite direction within slightly more than 2.5 and 3.5 years according to the PMG and DFE respectively. Whereas all the long-run estimates are significant with respect to the PMG estimator, only globalization and hotel capacity are significant according to the DFE. The Hausman test statistic cannot reject the long-run homogeneous restriction, suggesting that there is a long-run homogeneous relationship among the countries of the model.

In the dynamic estimation, both globalization and hotel capacity play a significant role according to the both estimators. In addition, political unrest has a negative and significant effect on tourist arrivals with a small effect, since the year of riot decreases tourist arrivals to Egypt by about 12% and 15% with respect to the PMG and the DFE respectively. Finally, just 2% (PMG) and 9.6% (DFE) of the variation in the tourist arrivals to Egypt across Arab countries over time is explained by the model, which is smaller than its counterparts in the All Countries and the European models.

Table 9.11: Alternative pooled estimates; the PMG and DFE, within ARDL (0, 0, 0, 0, 2, 2)

	PMG	DFE
Long Run Coefficients		
Y	0.5208***	0.2336
P	0.1948***	-0.0274
NP	0.2117**	0.0341
G	0.2453*	-2.2835**
R	0.3954***	1.3452***
$EC(\Phi_i)$	-0.3905***	-0.2828***
Hausman Test	0.72 [0.9818]	0.00 [1.000]
Short Run Coefficients		
ΔG_t	1.4394**	1.5650***
ΔG_{t-1}	1.1096*	1.0419**
ΔR_t	-0.3884*	-0.6812**
ΔR_{t-1}	-0.5433*	-0.0943
TV_t	-0.1181***	-0.1546***
Constant	-2.4829***	-1.2460
No. of Obs.	299	299
R^2	0.0196	0.0964

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

9.3.3.1 Cross-Sectional Dependence

A Breusch-Pagan LM test was performed on the residuals of the regression model. The resulting test statistics (428.67, Pr = 0.000) strongly rejected the null of cross-sectional independence. To remove this cross-sectional dependence, as suggested before, we applied the augmented PMG technique in the long run as in Equation (9.10). **Table 9.12** reports the results of the PMG after this adjustment to eliminate the cross-sectional dependence in the data.

Income is significant and inelastic, indicating that a 1% increase in income of Arab countries increases tourist arrivals from these countries by just 0.47%. Tourism from Arab nations to Egypt is a regional tourism, so its elasticity is less than unity. The long-run prices turned to the expected negative effect, with an elastic demand indicating high substitution effect between tourism in Egypt and domestic tourism in the Arab countries. Tourism demand elasticity with respect to non-Egypt prices is still significant at 1%, and affects tourist arrivals to Egypt positively with elasticity nearly equal to unity. Globalization turned significant with a negative effect.

In the short run, globalization is the main determinant with positive and elastic demand, and the political stability is significant at 1% with bigger value. As a result of improving the estimation after the long-run augmentation, R^2 increased to 13%.

Table 9.12: The augmented PMG, DFE estimates, within ARDL (0, 0, 0, 0, 2, 2)

	PMG
Long-Run Coefficients	
Y	0.4680***
P	-1.0661***
NP	0.9966***
G	-1.8288***
R	0.3750***
EC(Φ_i)	-0.3817***
Hausman Test	0.78 [0.999]
Short-Run Coefficients	
ΔG_t	1.4787**
ΔG_{t-1}	1.0381*
TV_t	-0.1431***
Constant	-0.3238
R^2	0.1333

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

9.3.3.2 Multicollinearity

Examining the correlation matrix among the variables in Arab model, a high correlation between P_{it} and NP_{it} was detected (see Appendix 9.3, **Table 1**); therefore this model is prone to the problem of multicollinearity. Moreover, a test for VIF was performed and confirmed the existence of this problem (see Appendix 9.3, **Table 2**). To solve this problem, we separated the relative prices variable into two variables; CPI in Egypt relative to CPI in each originating country, and the exchange rate between the Egyptian pound and the currency of the originating country.

The optimal lag length of each variable in the new model, based on the SC has been selected, and then the long-run augmentation for all the cross-sectional variant variables has been estimated using the PMG estimator. The results of ARDL (0, 0, 1, 0, 0, 2, 2) are reported in **Table 9.13**. For further examination, the NP_{it} is dropped from the regression as another solution to the multicollinearity problem, and the results reported also in Table 9.13 (column 4).

Table 9.13: The augmented PMG estimates of different models' specifications

	T Y P NP G R	T Y CPI EX NP G R	T Y P G R
	(0, 0, 0, 0, 2, 2)	(0, 0, 1, 0, 0, 2, 2)	(0, 0, 0, 3, 3)
Long Run Coefficients			
Y	0.4680***	0.4410***	-1.0492***
P	-1.0661***	-	-0.1703***
CPI	-	-0.4732***	-
EX	-	-0.5862***	-
NP	0.9966***	0.8479***	-
G	-1.8288***	-2.9884***	-1.9191***
R	0.3750***	0.1505**	1.5392***
$EC(\Phi_i)$	-0.3817***	-0.4349***	-0.5274***
Short Run Coefficients			
ΔG_t	1.4787**	2.1270***	2.7856***
$L(\Delta G_t)$	1.0381*	1.0824	1.3379**
ΔR_t	-0.2572	-0.2155	-0.7316**
$L(\Delta R_t)$	-0.2529	-0.1365	-0.8892*
TV_t	-0.1431***	-0.1878***	-0.1571***
Constant	-0.3238	3.6133***	0.1868
R^2	0.1333	0.0069	0.0043

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

By comparing the results in the case of including P_{it} as a one aggregated variable (column 2) or separating it into two variables (column 3), approximately the same elasticities of demand have been obtained in the two models whether in the long run or the short run. Therefore, the high collinearity between P_{it} and NP_{it} does not affect the estimated elasticities in the first model. Moreover, when the NP_{it} is dropped from the model (column 4), the effect of relative prices still significant and negative with a smaller value; however, income becomes negative, indicating that omitted variable bias affects the estimates negatively.

9.3.3.3 The Effect of Separate Substitute Prices on Tourism in Egypt

In this section, the non-Egypt prices (NP_{it}) variable has been separated into six variables (SPI_{it}, SPK_{it}, SPT_{it}, SPM_{it}, SPS_{it} and SPJ_{it}), each of which was estimated in a separate model, along with the other variables (TO_{it} Y_{it} CPI_{it} EX_{it} G_t R_t)[39], to investigate the relationship between tourism in Egypt and tourism in each alternative destination.

As illustrated in **Table 9.14**, Turkey, Tunisia and Syria are effective competitors to tourism in Egypt in the long run at the 1% level of significance. In the short run, at the 5% level of significance, tourism in Morocco, Tunisia, Syria and Jordan are important substitutes for tourism in Egypt. Six Arab countries consider tourism in Syria as a

[39] We prefer to treat the relative prices as two variables (CPI_{it} and EX_{it}) rather than as a one variable (P_{it}) to reduce the multicollinearity between P_{it} and SP_{it} (see Appendix 9.3, **Table 3**).

substitute to tourism in Egypt, five Arab countries select tourism in Tunisia or Morocco as effective alternatives to the Egyptian tourism. In addition, Jordanian tourism is considered as a substitute for Egyptian tourism from the perspective of four Arab tourists as illustrated in **Figure 9.2**.

Table 9.14: The PMG estimates of substitute tourism prices

	SPK_{it}	SPT_{it}	SPM_{it}	SPS_{it}	SPJ_{it}
ARDL Models	(0,0,1,1,0,0,1)	(0,0,1,1,0,0,1)	(0,1,0,0,0,0,0)	(0,0,1,0,0,2,2)	(0,0,1,1,0,0,1)
Long run	4.8369***	10.9351***	0.5478	4.2079***	1.6369*
Short run coefficients					
Mauritania	0.2809*	0.0648	0.5820	0.4358**	-0.0357
Bahrain	0.0757	1.1577***	1.2816***	-0.0538	0.1065
Jordan	0.0833	0.2320	0.1212	0.4615*	-
Kuwait	0.1340	1.8623***	1.7849***	-0.3010*	-0.0737
Libya	0.7537**	0.2819	1.0518**	0.9642***	0.7813*
SA	0.1976	0.8024***	0.5103**	0.3443***	0.5523***
Syria	0.1359**	0.1334	0.3899***	-	0.6467***
Yemen	0.0390	-0.1163	-0.0796	-0.2044	-0.0862
Morocco	0.0433	3.0163***	-	0.4481***	0.1773
Sudan	0.0301	-0.2173**	0.0574	0.0469	0.1752
Tunisia	0.7529**	-	3.0340	0.2783**	2.3078***
Algeria	-0.3941	-0.0486	-0.3681	0.3418	-0.1574
Qatar	-0.1974	0.7437	0.0848	0.7385***	1.2987***
Average SR	0.1488*	0.6086**	0.6500**	0.2692***	0.4379**

Source: Author’s own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

In specific, Libyan tourists consider tourism in Morocco as the strongest substitute for tourism in Egypt, with an elastic demand. Saudi Arabian tourists consider all the specified destinations, except Turkey, substitutes for tourism in Egypt, with Tunisia as the strongest competitor. Morocco’s tourists consider tourism in both Tunisia and Syria as competitors to tourism in Egypt, with higher, elastic demand for Tunisia, whereas Tunisian tourists consider Jordan, Turkey and Syria as important substitutes, with elastic demand for Jordan. Tourism in Tunisia and Morocco are very effective competitors to tourism in Egypt from the perspective of Bahrain and Kuwait’s tourists, with an elastic demand in all cases. In contrast, Jordan followed by Syria is a considerable substitute destination for Egypt according to Qatar.

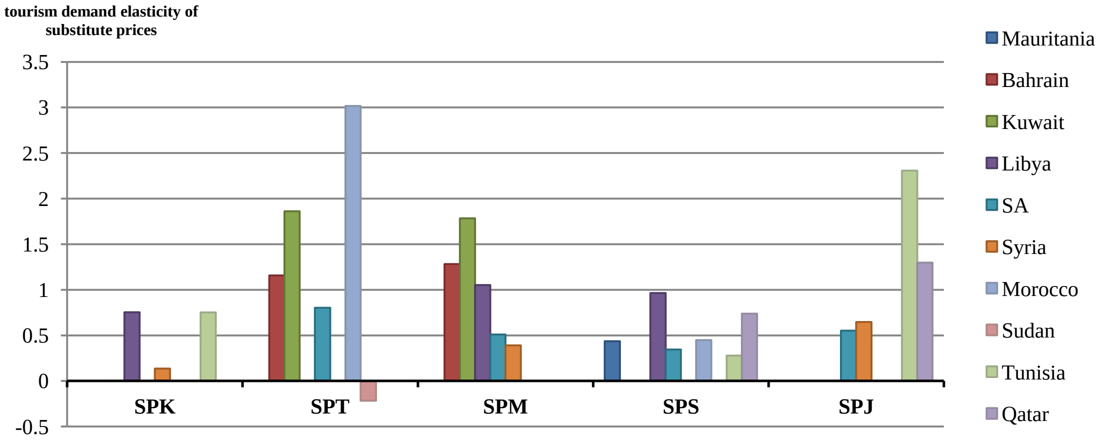


Figure 9.2: Substitute relationship between Egypt and its alternative destinations from the perspective of Arab originating countries in the short run (1984-2009).
Source: Calculated from Table 9.16.

9.3.3.4 Short-Run Dynamic Estimates of Individual Arab Countries

By analysing the augmented PMG estimates for each Arab country separately in the short run, the following results have been obtained. A long-run relationship exists for 10 countries out of 13, since all the Arab countries help in achieving long-run equilibrium, except for Mauritania, Yemen and Algeria. The speed of adjustment always has a negative sign and its value fall in the range from 100% in Bahrain and Qatar to 10% in Sudan, as illustrated in Appendix 9.3, **Table 4**.

The income elasticities are significant and more than unity in five countries in the model at the 1% level of significant. It has the positive elastic expected sign in four countries (Jordan, Saudi Arabia, Syria and Morocco). However it is negative, with elastic value, in one country, Bahrain, which has the higher per capita income after Qatar and Kuwait, which are insignificant. Relative price elasticity is significant in the case of five Arab countries; it is significant and takes the expected negative sign in just two counties; Syria and Tunisia. It is always less than unity in all Arab countries. Hence, on average ΔY_{it} and ΔP_{it} are insignificant in the short run. This insignificant effect is due to the conflicting effect of these variables across countries, since it contributes positively with regard to some countries, and negatively for others.

Globalization significantly affects tourism from 11 Arab countries to Egypt in the short run, at least at the 5%. More globalization in Egypt increases tourist arrivals from seven countries, and decreases tourist arrivals from four countries in this region. Moreover, tourism demand elasticity for globalization is more than unity in all cases. This variable is significant and positive at the 5% on average, and it is considered the key factor in the short run. Hotel capacity does not affect tourist arrivals from most Arab countries in the short run, except for Libya and Syria with a positive effect, and Algeria with a negative effect. Political instability negatively contributes to tourist arrivals to Egypt in seven Arab countries, and the parameters of this variable are small for most Arab countries, ranging from 10% in the case of Saudi Arabia to 41% in the case of Qatar. The constant is significant and positive in most cases.

9.3.4 The Americas Countries Model

In the Americas model, we analyse the tourist arrivals from six American countries to Egypt through the period from 1980 to 2009 using two alternative estimators (PMG and DFE). First, optimal lag orders of the ARDL model were selected for each variable using AIC subject to a maximum lag of 2 in level. ARDL (1, 1, 1, 0, 1, 0) was specified as the most suitable form of this model and the error correction equation was estimated. The results of the PMG and DFE estimates are reported in **Table 9.15** for comparison.

The adjustment coefficients are significant at 1% with respect to the two estimators. Pooling regression always estimates a smaller speed of adjustment towards the steady state equilibrium; the DFE estimates indicate speed of adjustment of 39% a year, the PMG 58%. The long-run slope homogeneity hypothesis was tested via the Hausman test, and the results indicate that the PMG estimates are consistent and more efficient than the MG estimates. The estimates of the long-run elasticities according to the PMG are reasonable and theoretically expected, except for hotel capacity and relative prices. Relative prices elasticity is significant, but has a positive effect on tourist arrivals to Egypt, whereas hotel capacity elasticity is not significant.

In the short-run dynamics, word of mouth has an insignificant effect on tourist arrivals in all cases. Income is significant with respect to the DFE, and it has the expected positive and elastic demand. Relative price or its lag significantly affects tourist arrivals according to the two estimators with positive inelastic demand. Non-Egypt prices are significant and negative in the case of the DFE. Globalization and its lags are always significant and contribute positively to tourism demand under the two estimators with elastic demand. Hotel capacity is significant and negative according to both estimators. Political instability is a very important determinant of tourism demand for Egypt. It is always significant at the 1% level. The constant is negative and very significant. The R^2 is bigger in this model than the others, reaching 77% in the case of the PMG estimator.

Table 9.15: Alternative pooled estimates; PMG and DFE, within ARDL (1, 1, 1, 0, 1, 0)

	PMG	DFE
Long-Run Coefficients		
Y	3.6230***	1.9449**
P	0.4634***	0.4401*
NP	-0.4739***	-0.3296
G	1.7243***	2.4825**
R	0.1236	0.1502
EC(Φ_i)	-0.5768***	-0.3937***
Hausman Test	3.76[0.5849]	0.01[1.0000]
Short-Run Coefficients		
ΔY_{it}	1.3066	2.8188***
ΔP_{it}	0.1115	0.2580**
ΔP_{it-1}	0.1373**	-0.0474
ΔNP_{it}	-0.2152	-0.4363***
ΔG_t	1.3478**	1.1303*
ΔG_{t-1}	2.0313***	1.8207***
ΔR_t	-0.7610***	-1.0015***
TV_t	-0.4386***	-0.4227***
Constant	-21.3675***	-10.1463***
No. of Obs.	168	168
R^2	0.7729	0.7825

Source: Author's own calculations using STATA. Note: P-values for Hausman tests are reported in brackets. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

9.3.4.1 Cross-Sectional Dependence

A Breusch-Pagan LM test was performed to detect the cross-sectional independence in the residuals of the regression model. The resulting test statistics (79.759, Pr = 0.000) strongly reject the null of cross-sectional independence. To remove the cross-sectional dependence, we added the averages of the level of variables into the co-integration vector, assuming that the unobserved common factor could be part of the co-integration space.

Table 9.16 reports the estimated elasticities of the augmented PMG within ARDL (1, 1, 1, 0, 1, 0). The speed of adjustment takes approximately the same value as before the cross-sectional correction. Long-run parameters exhibited some changes; however the short-run parameters are approximately the same.

Table 9.16: The augmented PMG, within ARDL (1, 1, 1, 0, 1, 0)

	PMG
Long-Run Coefficients	
Y	4.5746***
P	0.5298***
NP	-0.5711***
G	1.261**
R	0.0190
EC(Φ_i)	-0.5610***
Short-Run Coefficients	
ΔY_{it}	1.0903*
ΔP_{it-1}	0.1179*
ΔG_t	1.5180***
ΔG_{t-1}	2.0422***
ΔR_t	-0.6667***
TVt	-0.4356***
Constant	-19.9535***
R^2	0.7464

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

9.3.4.2 Multicollinearity

The correlation matrix of all the variables in this model was measured (Appendix 9.4, **Table 1**) to examine the problem of multicollinearity. The results indicate high correlation between non-Egypt prices and relative prices on the one hand and between globalization and hotel capacity on the other (to a lower degree). However, the test of multicollinearity based on the VIF shows that the highest value of VIF corresponds to the NP_{it}, with values less than 10, but is very low for the rest of the variables in the model (Appendix 9.4, **Table 2**). This may indicate that the problem of multicollinearity is not serious in this model. However the model was re-estimated four times, based on the augmented PMG estimator, first by replacing the relative prices (P_{it}) by two separate variables as in the last models; CPI_{it} and EX_{it}. Second, dropping NP_{it} from the model was also considered to examine the changes in the results. Moreover, we estimated two other models excluding G_t in one model, and excluding R_t in the other as illustrated in **Table 9.17**.

The speed of adjustment is always significant and has the expected sign, ranging between 56% and 60%. Income elasticity is always significant at the 1% level, and has approximately the same value in all cases. Relative prices elasticity is significant, and still has the unexpected positive sign. In addition, both the CPI_{it} and EX_{it} are very significant and have a positive effect on tourist arrivals from the Americas. Non-Egypt prices also have the same negative effect in all models. The effect of both globalization and hotel capacity differs from model to another according to the included variables. In the short run, the positive and significant effect of the globalization and its lags are very clear in all the models, the negative effect of the hotel capacity is also significant in all cases, the political instability is always significant and negative, ranging from 39% to 47%, and the constant coefficients are always significant and negative. The effect of the exchange rate and its lag are insignificant. The effect of the CPI is significant and negative, but the effect of its lag is significant and positive, hence the effect of lagged P_{it} is mostly significant, with a positive sign.

Table 9.17: The augmented PMG estimates of different models' specifications

Variables	T Y P NP G R (1,1,1,0,1,0)	T Y CPI EX NP G R (1,1,1,1,1,1,0)	T Y P G R (1,1,1,1,0)	T Y P NP G (1,1,1,0,1)	T Y P NP R (1,1,1,0,0)
Long Run Coefficients					
Y	4.5746***	4.4998***	4.6876***	4.6186***	5.2283***
P	0.5298***	-	0.1089***	0.4410***	0.3786***
CPI	-	0.4142***	-	-	-
EX	-	0.4594***	-	-	-
NP	-0.5711***	-0.4347**	-	-0.5103***	-0.5152**
G	1.261**	-0.5927	0.8594*	0.9310*	-
R	0.0190	-0.5057**	-0.2375*	-	0.0075
EC(Φ_i)	-0.5610***	-0.5605***	-0.5846***	-0.6000***	-0.5666***
Short Run Coefficients					
ΔY_{it}	1.0903*	-0.3537	0.4888	0.5155	0.6802
ΔP_{it-1}	0.1179*	-	0.1740***	0.1404***	0.0246
ΔCPI_{it-1}	-	-0.6417**	-	-	-
ΔCPI_{it-1}	-	1.4938***	-	-	-
ΔNP_{it-1}	-	-0.1793**	-	-	-
ΔG_t	1.5180***	2.0290***	1.8457***	1.6776***	-
ΔG_{t-1}	2.0422***	1.9326***	1.8720***	1.9291***	-
ΔR_t	-0.6667***	-0.4074**	-0.3558**	-	-0.5781***
TV_t	-0.4356***	-0.4746***	-0.4092***	-0.4154***	-0.3915***
Constant	-19.9535***	-54.6188***	-5.7088***	-17.9471***	-20.3903***
R^2	0.7464	0.7799	0.7331	0.7424	0.7394

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

9.3.4.3 The Effect of Separate Substitute Prices on Tourism in Egypt

In this section, the effect of non-Egypt prices (NP_{it}) on tourist arrivals has been divided into six alternative destinations, each in a separate model. In addition, to avoid the high collinearity between P_{it} and each substitute prices variable (Appendix 9.4, **Table 3**), we have replaced P_{it} by both CPI_{it} and EX_{it}. The long and short-run elasticities of detailed substitute prices are reported in **Table 9.18**.

Table 9.18: Augmented PMG estimates of substitute prices, ARDL (1, 1, 1, 1, 1, 1, 1)

	SPI_{it}	SPK_{it}	SPT_{it}	SPM_{it}	SPS_{it}	SPJ_{it}
Long Run Results						
SP_{it}	-0.8620***	0.2012	-0.5152***	-0.2605*	-0.7769***	0.9894**
Short Run Results						
Canada	-0.4559***	-0.0895	-0.4536**	-0.6487***	0.3999**	-0.4988***
Mexico	-1.4314***	-0.3361	-1.1169***	-0.3017	1.1056***	-2.1063***
US	-0.5485**	-0.6601***	-1.1843***	-1.3906***	0.2348	-0.5961**
Argentina	1.7166***	-1.0973***	-0.6471***	-0.7179**	-0.6398**	-0.7633*
Brazil	-0.8309***	-0.2068	-0.6306**	-0.6850***	-0.2639	-0.9019***
Colombia	-0.1670	-0.3602***	-0.5987***	-0.6541***	-0.3064	-0.8677***
ΔSP_{it}	0.0345	-0.4137***	-0.6749***	-0.7176***	-0.2074	-0.8199***

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Regarding the long distance (long haul journey) from the Americas to Egypt and all its alternative destinations, tourism in Egypt is considered as a complement for tourism in Israel, Tunisia, and Syria in the long run, but a substitute for Jordan. As far as the short run is concerning, Jordan, Morocco, Tunisia and Turkey are significant complements over the period of the study. Whereas Israeli tourism is a significant alternative to Egyptian tourism for all origin countries, except Colombia, the substitute prices of Israel are insignificant in the short run. This is because tourism in Israel is a stronger substitute (+) for tourism in Egypt from the perspective of the Argentinean tourists, but a complement (-) for the others as illustrated in **Figure 9.3**. Tourists from the US consider all the alternative destinations, except Syria, are complements to tourism in Egypt; however tourism in Morocco and Tunisia is the strongest complements, with an elastic demand. For Canadian tourists, all the destinations, except Turkey, are complements with inelastic demand.

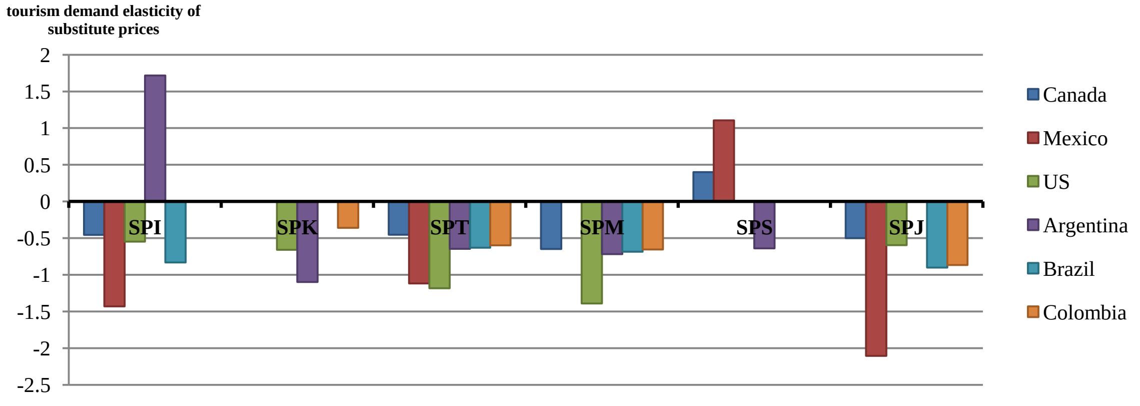


Figure 9.3: Substitute relationship between Egypt and its alternative destinations from the perspective of American originating countries in the short run (1980-2009).
Source: Calculated from Table 9.21.

9.3.4.4 Short-Run Dynamic Estimates of Individual American Countries

The augmented PMG estimates for each American country separately in the short run are presented in Appendix 9.4, **Table 4**. The speed of adjustment to the common equilibrium relationship differs greatly across countries, taking a minimum value of 23% in Brazil and a maximum value of more than 100% in Argentina, and it is significant at the 1% level in all the American countries; in addition, it always has the correct negative sign. Word of mouth effect is always insignificant, except for Argentina, which has a very significant and positive attitude towards tourism in Egypt. The tourism demand elasticity with respect to income and its lags is negative and significant in Canada, Argentina and the US, whereas it is positive and significant for Brazil, with elastic demand in all cases.

The exchange rate effect is mostly insignificant at the 5% level, except for Canada, with positive effect. However the effect of CPI is negative for Canada (at 1%) and the US (at 10%), but the effect of its lag is positive and significant for all countries, except Argentina and Brazil. So, on average, the CPI is negative, but its lag is positive at the 1% level in both cases. Globalization is a very important determinant of tourist arrivals from the Americas, since it significantly contributes to tourist arrivals from all the countries, except Mexico. Changes in globalization or its first lag always have positive effect, with values higher than unity in all significant cases. Hotel capacity has insignificant effect on all the countries in this group, except for Brazil; therefore the average effect of this variable becomes significant with a negative effect.

Political instability negatively affects all the countries in the Americas at the 1% level of significance. It affects tourist arrivals to Egypt negatively by a maximum of 43% in the case of Mexico, and a minimum of 41% in Argentina. The constant is always very significant and has negative signs with big parameters in all countries.

9.3.5 Comparison among the Empirical Results of the PMG Estimation and Policy Implications

An essential comparison among the estimated tourism demand elasticities of the four models in the long run as well as the short run is presented in **Table 9.19** using the augmented PMG estimator, with different ARDL specifications. Non-Egypt prices are excluded from the All Countries model, since it affects the results negatively because of the multicollinearity between NP_{it} and P_{it}.

Table 9.19: Augmented PMG estimates of tourism demand in Egypt: model comparison

Variables	All Countries (1, 1, 1, 2, 1)	Europe (0, 1, 2, 0, 2, 2)	Arab (0, 0, 0, 0, 2, 2)	Americas (1, 1, 1, 0, 1, 0)
Long-Run Coefficients				
Y	1.2094***	4.0645***	0.4680***	4.5746***
P	-0.5846***	-0.2624	-1.0661***	0.5298***
NP	-	-0.4894***	0.9966***	-0.5711***
G	1.8479***	1.8953**	-1.8288***	1.261**
R	0.7515***	3.8078***	0.3750***	0.0190
EC(Φ_i)	-0.3746***	-0.3930***	-0.3817***	-0.5610***
Short-Run Coefficients				
ΔY_{it}	0.3976	2.0493**	0.5769	1.0903*
L(ΔY_{it})	-0.9629	-4.5983***	-	-0.6036
ΔP_{it}	-0.0430	0.2489***	-0.0187	0.0422
L(ΔP_{it})	-0.0711	-0.6329***	-	0.1179*
ΔG_t	1.7207***	0.1414	1.4787**	1.5180***
L(ΔG_t)	1.3047***	0.9603*	1.0381*	2.0422***
ΔR_t	-0.0689	-0.9526***	-0.2572	-0.6667***
L(ΔR_t)	0.2817	-0.4857**	-0.2529	-
TV_t	-0.2796***	-0.4015***	-0.1431***	-0.4356***
Constant	-1.0140***	14.3605***	-0.3238	-19.9535***
No. of Countries	41	15	13	6
No. of Obs.	902	345	299	168
R^2	0.3817	0.4451	0.1333	0.7464

Source: Table 9.6, Table 9.9, Table 9.14 and Table 9.19.

9.3.5.1 Long-Run Equilibrium

Although a long-run equilibrium relationship between tourist arrivals and the fundamental determinants exists in all the models, a different speed of adjustment toward the steady state equilibrium is suggested within each model. Whereas 37% of this disequilibrium is corrected each year through these explanatory variables according to the All Countries model, and similar speeds are obtained in the European (39%) and Arab (38%) models, a much higher speed is obtained in the Americas model (56%). Therefore, it is easier to improve the number of tourist arrivals from the American countries than others. Exploring new markets and decreasing the extent of dependence on a few countries of origin is a good policy to increase the speed of adjustment from different regions.

9.3.5.2 Word of Mouth Effect

The lagged dependent variable was included in two models, the All Countries model and the Americas model, according to the appropriate ARDL specification chosen by AIC or SC criteria. The results suggest that the effect of word of mouth is insignificant in both cases. This result may be caused partly as a drawback of the used estimators, which suffer from downward bias on the coefficient of word of mouth as observed by Pesaran. However, more improvements to the quality of the tourist products and services, even at higher prices, are an essential requirement. Moreover, tourism ministry and policy makers have to control all tourism service providers, including accommodation, tourist operators, restaurants and transportation companies to ensure that they provide high quality services at reasonable prices.

Our finding is consistent with the results of Naude and Saayman's (2005) study of the tourism demand for Africa from different origin regions using the Arellano-Bond within dynamic panel data framework. They found that word of mouth effect is insignificant with respect to worldwide, America and Europe at the 5% level of significance, but significant and positive only for African tourists.

9.3.5.3 Income Elasticity

With regard to income elasticity, as expected the long-run income elasticities are positive and greater than unity in all cases, but inelastic for the Arab model. A 1% increase in worldwide income, European income and American income tends to increase tourist arrivals to Egypt by 1.2%, 4.1% and 4.6% respectively. These results imply that tourism arrivals in Egypt appear to benefit more from the increase in American income in boom periods, and suffer more in recession periods. By comparison, in the case of Arab countries, a 1% increase in the income of the Arab countries is associated with just 0.47% increase in tourist arrivals from these countries to Egypt. An empirical study by Martin and Witt in 1988 analysed tourism demand from the US to Canada, and the estimated income elasticity was 0.37 which is in line with our estimate. Moreover, the long-run income elasticities of our models lie within the calculated range of income elasticities of 23 reviewed studies in Chapter 3 (Appendix 3, Table 3), which range from 0.48 to 7.88.

Whereas a high degree of significance is observed in the co-integration equations in all the models, different significance was obtained in the short-run dynamics. On the one hand, changes in income do not have any significant effect on tourist arrivals to Egypt with respect to both the All Countries and Arab models, indicating that income affects tourism demand in the long run more than in the short run. This finding is in line with Friedman's (1957) permanent income hypothesis, since consumption depends on what consumers expect to earn over a long time, and short-run income which fluctuates considerably has a small effect on consumption (Li et al., 2005). On the other hand, short-run income affects both European and American tourists positively and significantly, but lagged income affects Europe group negatively.

These findings are in line with Naude and Saayman’s (2005) estimates since the income of countries of origin from all regions is insignificant, but the lagged income elasticities in the case of Europe region are significant and negative and in the case of Africa are significant and positive. Habibi et al. (2009) estimated the tourism demand function for Malaysia using panel data techniques, and concluded that the estimated coefficient for the income variable in the short run is insignificant. According to Proença and Soukiazis (2005), using panel data analysis, the per capita income variable is a very significant explanatory variable for tourism demand for Portugal in the long run, and the income elasticity is higher than one, ranging from 1.3 to 1.6, but the short-run income elasticity is insignificant in all cases. Phakdisoth and Kim’s (2007) suggested that whereas long-run income is significant at the 1% level and has the expected positive effect on tourism demand for Laos, ranging from 0.59 to 0.62 across the models using the static FE and RE models, the short-run income is not significant in the dynamic panel model using Arellano and Bond technique.

Given the estimated elasticities, it would be worthwhile for policy makers to closely monitor the economic cycles in the Americas and European countries since tourism in Egypt is more sensitive to changes in income of these countries than others, in both the long and short run. In addition, tourism strategies should reduce any overdependence on a single region or a single group of homogenous regions.

9.3.5.4 Relative Prices Elasticity

To explain the estimated price elasticities, we have to understand the effect of change in prices on satisfaction in a luxury service, such as tourism. The price of tourism can be an indicator of both the sacrifice required to buy this service and the quality of this service. In other words, the effect of prices works in two different directions. First, prices reflect the sacrifice (cost) which the tourists have to pay for obtaining this service; hence there would be a negative relationship between prices and the satisfaction of tourists. In the other direction, there is a positive relationship between satisfaction of tourists and the quality of the service provided, which is reflected by its prices, especially in case of lack of information, which is likely to happen in the short term[40]. When the price increases, the tourist's satisfaction increases up to a certain price level; after this level of price, the relationship becomes negative (Campo and Yague, 2008). These two sign directions between prices and tourists' satisfaction are responsible for the contradictory results in the tourism literature about the relationship between tourism demand and prices.

The results of our empirical study confirm this discussion, since in the short run with information asymmetry, tourists use prices as an indicator of quality, and therefore they increase their demand for tourism in Egypt when its prices increase. This may explain the positive relationship in the short run between tourism prices in Egypt and tourist arrivals from European countries at the 1% level of significance. By comparison, lagged prices are highly significant and have a negative effect on tourist arrivals from the same region, since more information has been available. In contrast, tourists in the long run have more information about tourism in Egypt; hence the long-run price elasticities are significant at a 1% level in all the models, except for Europe. More specifically, a 1% increase in tourism prices in Egypt decreases tourist arrivals from worldwide and Arab nations by 0.58% and 1.1% respectively, but increase American tourists by 0.53%. Moreover, the tourism demand with respect to prices is always inelastic whether in the short run or in the long run, suggesting low substitutability between tourism in Egypt and domestic tourism in each originating country, except for Arab countries, which have high substitutability relation with tourism in Egypt.

Naude and Saayman's (2005) study suggested that relative prices elasticity is insignificant as a determinant for tourism in Africa whether in the static or in the dynamic analysis. According to Mervar and Payne (2007), the estimated parameters for prices with different proxies are always statistically insignificant, suggesting that relative prices do not have a significant impact on tourism demand for Croatian destinations. According to Proença and Soukiazis (2005), the relative price variable has the expected negative sign in the long run but without statistical significance. Using Arellano-Bond analysis, short-run prices are also insignificant in all cases. Moreover, apart from the Americas model, results of our models lie within the range of price

[40] This word is in line with the economic theory which identifies that in prestige goods when the consumer does not have perfect information about the market, the price-quality curve is positive.

elasticities of 23 tourism demand studies (Chapter 3, Appendix, Table 3), which extend from -0.37→-3.40.

Hence, a rise in tourism prices in Egypt is recommended in all markets, except for the Arab region, since the tourism price elasticities are always under unity. Therefore, the total revenue of tourism in the tourist-related industries, such as hotels, restaurants and airlines, will increase after tourist prices increase, no matter whether the long-run or the short-run elasticities are considered. In addition, because of the differences of the price elasticities in each origin region, a separate pricing policy should be adopted for each region with regard to these different elasticities.

9.3.5.5 Non-Egypt Price Elasticity

This variable is significant for all regions in the long run, but insignificant in the short run. It has two possible effects on tourist arrivals to Egypt with respect to the different countries even in the same region: first, a positive effect in case of substitute relationships; second, a negative effect in case of complementary relationships. In the short run, these alternative destinations are considered as substitutes for some countries in the group and complements for others, overall, the insignificant effect of this variable on the whole group is obtained. Moreover, tourism in Egypt and its competitors might be complements in the long run yet short-run substitutes with respect to the origin countries.

In the long run, non-Egypt price elasticities are found significant at the 1% level, and reflect a complementary effect between tourism in Egypt and tourism in its competing destinations in all regions, but in the Arab region it represents a substitute relationship. A 1% increase in relative tourism prices in these alternative destinations decreases tourist arrivals from Europe and the Americas to Egypt by 0.49% and 0.57% respectively, whereas it increases tourist arrivals from the Arab region by 0.99%. This suggests that most European and American tourists prefer to visit Egypt along with other neighbouring countries in the Middle East and North Africa during the same trip, while Arab tourists are more likely to choose among Egypt and its competing destinations.

With respect to the European region, tourism in the alternative destinations is considered complementary in the long run, but it turns substitute in the short run. Although all the destinations are considered as strong substitutes in the short run, tourism in Tunisia is the strongest complement to tourism in Egypt for most European countries (for eight European countries) more than substitute (for two countries). In contrast Jordan is the least competitor according to this region.

Tourism in Egypt's alternatives is considered as substitute to tourism in Egypt from the perspective of Arab countries, whether in the long run or in the short run. In the long run, tourism in Turkey, Tunisia and Syria are effective competitors to tourism in Egypt at the 1% level of significance. In the short run, at the 5% level, tourism in Morocco, Tunisia, Syria and Jordan are important substitutes to tourism in Egypt for Arab countries. With regard to the Arab Gulf States, Kuwait and Bahrain consider tourism in both Tunisia and Morocco as the strongest competitors to tourism in Egypt, whereas Qatar considers Jordan and Syria of great importance. From the perspective of Saudi Arabian tourists, all the four destinations are important substitutes for tourism in Egypt. For North African countries, the same destinations are considered, in addition to Turkey.

Because of the long haul journey from the Americas to Egypt and all its alternative destinations, tourism in Egypt is considered as a complement for tourism in most destinations, no matter whether the long run or the short run is concerned. In the long run, tourism in Israel, Tunisia and Syria is an effective complement to tourism in Egypt, but tourism in Jordan is a substitute. As far as the short run is concerned, all the alternative destinations are important complements for American tourists; however, Tunisia, Morocco and Jordan are the most important complements.

From the above discussion, Tunisia is found to be the most important alternative to tourism in Egypt over the period of the study from the perspective of all nationalities. This result is consistent with Ibrahim's (2011) study, which indicated that tourism in Tunisia is a very significant substitute to tourism in Egypt from worldwide, with an elastic demand. In addition, our results are in line with those of most other studies, since the calculated range of substitute price elasticity for 23 studies in Chapter 3 is (- 0.31 → -3.32) for complements and (0.43→ 5.20) for substitute.

One important marketing strategy is the possible extension of the tourism market in Egypt as well as its competing destinations from Middle East and North Africa through joint marketing efforts by introducing varied tourism products, services and experience they can offer jointly. Furthermore, the inelastic demand with respect to both non-Egypt prices and Egypt's own prices from most markets implies that non-price competition, such as improving service quality and an effective promotional strategy, is more likely to enable the products to be sold for higher prices and also enhance repeat visitation.

9.3.5.6 Globalization Elasticity

Globalization is a considerable variable for tourism in Egypt, whether in the long run or in the short run. In the long run, it has the expected positive effect on tourist arrivals to Egypt from all regions, but is negative for the Arab region, with an elastic demand in all cases. At the 5% level of significance, a 1% increase in the globalization in Egypt increases tourist arrivals from worldwide, Europe and American countries by 1.8%, 1.9% and 1.2% respectively. This expected result is due to the positive effect of globalization through establishing more infrastructures, increasing foreign direct investments, bringing in skilled workers from all over the world, decreasing costs of air travel and facilitating access to destinations at relatively low prices, in addition to facilitating the communication and reservation systems. In contrast, a 1% increase in globalization decreases Arab tourists by 1.8%. This finding may be a result of providing homogenous global service in the long run, rather than retaining the Middle-Eastern (oriental) characteristics of the Egyptian tourism, which attract especially Arab tourists. Therefore, improving the quality of tourist service in Egypt along with maintaining the identity of Egypt are essential issues to overcome the challenge of the increasing competition among destinations. By comparison, short-run changes in globalization and its lag affect tourist arrivals from all regions significantly and positively with elasticities more than unity

9.3.5.7 Hotel Capacity Elasticity

Hotel capacity is a very significant variable for all the models in the long term, except for the Americas region. It has the expected positive effect; a 1% increase in hotel capacity in Egypt raises tourist arrivals from worldwide, Europe and the Arab region by 0.75%, 3.8% and 0.38% respectively. In contrast, hotel capacity has a significant and negative effect on European and the Americas tourists at the 1% level of significance in the short run.

Our findings suggest that expenditure on improvement of tourism supply may be considered as financial outflows in the short run, but such expenditure generates inflow of tourism demand in the long run; consequently, it has to be regarded as an important investment. It is recommended that the quality of this hotel capacity has to be improved to increase American tourist arrivals to Egypt in the long run, as well as those of other nationalities in the short run.

Saayman and Saayman (2008) concluded that hotel capacity has negative effect on tourist arrivals from Europe and Americas to South Africa in the long run, whereas it does not have any effect on tourists from Australia.

9.3.5.8 Political Instability

The atmosphere of insecurity and political unrest has serious implications for arrivals to Egypt. It negatively affects tourist arrivals from all the regions at the 1% level of significance. It has the smallest effect on arrivals from the Arab countries since they are not a potential target, and its greatest effect is on the American tourists. A year of riots or political incident decreases Arab tourist arrivals by 14%, whereas it decreases tourist arrivals from the Americas by 44% and from Europe by 40%. Overall, the year of terrorism in Egypt is responsible for a 28% decrease in tourist arrivals from worldwide to Egypt.

In 1977, Mohammed's study concluded that terrorism in Egypt has a negative effect on tourist arrivals from all non Arab groups; this effect is only significant in the case of the American and the African & Asian non-Arab countries, and is responsible for a 19% and 20% fall in tourist arrivals from each group respectively. Moreover, our result is in line with the results of Naude and Saayman's (2005) study, which concluded that political stability affects total tourist arrivals to Africa negatively by 18%, and it is of great interest to international tourism from the Americas and Europe region.

The tourism ministry as well as the government has to strictly control the tourist places in Egypt through the peak season. In addition, the tourism industry needs a set of comprehensive terrorism crisis management guidelines. The experiences of other tourist countries that have faced political unrest or terrorism may provide a helpful guide in determining the effective and ineffective management and recovery policies.

9.4 Empirical Results of Causality Relationships

First the optimal lag order of each variable was specified to be included in ARDL model using AIC and SC information criteria with 4 lags in level as a maximum number of lags. Then by using the Wald tests distributed as (χ_1^2), the long-run causality relationships between tourist arrivals and each explanatory variable were examined.

Moreover, using the Wald tests distributed as (χ^2_{q-1}), the short-run causality between these variables was determined as illustrated before in Equation (9.5), and the results of these hypotheses are reported in **Table 9.20**.

The results of all the models suggest the importance of long-run income, rather than short-run income for tourism in Egypt. In the long run, a two-way feedback between tourism in Egypt and income of all regions has been found. However, a unidirectional relationship, running from Arab and American income to tourist arrivals, has been suggested in the short run. This finding is in line with the results of our panel co-integration and ECM. This suggests that tourism in Egypt can benefit more from economic growth and from an increase in tourists' income in the long run.

Table 9.20: Panel long-run and short-run causality: model comparison

Variables	All Countries	Europe	Arab	Americas
Long-Run Causality Relationship at 5% level of significance				
Y_{it}	Bi-Directional $TO \Leftrightarrow Y$	Bi-Directional $TO \Leftrightarrow Y$	Bi-Directional $TO \Leftrightarrow Y$	Bi-Directional $TO \Leftrightarrow Y$
P_{it}	Bi-Directional $TO \Leftrightarrow P$	Bi-Directional $TO \Leftrightarrow P$	Bi-Directional $TO \Leftrightarrow P$	Bi-Directional $TO \Leftrightarrow P$
NP_{it}	Bi-Directional $TO \Leftrightarrow NP$	Bi-Directional $TO \Leftrightarrow NP$	Bi-Directional $TO \Leftrightarrow NP$	Unidirectional $TO \Rightarrow NP$
G_t	Bi-Directional $TO \Leftrightarrow G$	Bi-Directional $TO \Leftrightarrow G$	Bi-Directional $TO \Leftrightarrow G$	Bi-Directional $TO \Leftrightarrow G$
R_t	Bi-Directional $TO \Leftrightarrow R$	Bi-Directional $TO \Leftrightarrow R$	Bi-Directional $TO \Leftrightarrow R$	Bi-directional $TO \Leftrightarrow R$
Short Run Causality Relationship at 5% level of significance				
ΔY_{it}	No Relationship $\Delta TO \not\Leftrightarrow \Delta Y$	No Relationship $\Delta TO \not\Leftrightarrow \Delta Y$	Unidirectional $\Delta Y \Rightarrow \Delta TO$	Unidirectional $\Delta Y \Rightarrow \Delta TO$
ΔP_{it}	No Relationship $\Delta TO \not\Leftrightarrow \Delta P$	Unidirectional $\Delta TO \Rightarrow \Delta P$	No Relationship $\Delta TO \not\Leftrightarrow \Delta P$	Unidirectional $\Delta TO \Rightarrow \Delta P$
ΔNP_{it}	Unidirectional $\Delta NP \Rightarrow \Delta TO$	Unidirectional $\Delta TO \Rightarrow \Delta NP$	Unidirectional $\Delta TO \Rightarrow \Delta NP$	No Relationship $\Delta TO \not\Leftrightarrow \Delta NP$
ΔG_t	Bi-Directional $\Delta TO \Leftrightarrow \Delta G$	Bi-Directional $\Delta TO \Leftrightarrow \Delta G$	Unidirectional $\Delta TO \Rightarrow \Delta G$	Bi-Directional $\Delta TO \Leftrightarrow \Delta G$
ΔR_t	Bi-Directional $\Delta TO \Leftrightarrow \Delta R$	Bi-Directional $\Delta TO \Leftrightarrow \Delta R$	Bi-Directional $\Delta TO \Leftrightarrow \Delta R$	Bi-Directional $\Delta TO \Leftrightarrow \Delta R$

Sources: **Appendix 9.5**, **Table 1**, and **Table 2**.

A bi-directional relationship between tourist arrivals and relative prices has been detected in the long run in all models at the 1% level of significance. In contrast, there is a unidirectional relationship between TO_{it} and P_{it} in the case of both the European and American models, running from tourist arrivals to relative prices at the 5% level. No such a relationship between the two variables in the All Countries and Arab models. Consequently, tourism price policies in Egypt have a long-run effect on tourists from all regions, whereas they do not play any effective role in the short run. Therefore, in the short run, other policies, such as improving the quality of the introduced services, introducing global products and hotels and marketing efforts, may be more effective than price policies in attracting international tourists.

In the long run, at the 5% level the non-Egypt prices Granger cause tourist arrivals in Egypt in all models, except the Americas. In addition, tourist arrivals generate non-Egypt prices in all models. In the short run Arab and European tourists cause non-Egypt prices, whereas non-Egypt prices cause all tourists and American tourists. Therefore, tourist suppliers have to monitor the price policy of Egypt's substitute destinations, in addition to organizing comprehensive trips including Egypt and other complementary destinations, especially for European and American tourists.

There are dual relationships between tourism inflows to Egypt and globalization at the 5% level in all the models in both the long run and the short run, but unidirectional for the Arab model in the short run. This has an important implication of our study, since there is a complementary link between tourism and globalization in Egypt, so globalization can promote tourism inflows and tourism inflows generate more globalization which would amplify the positive effect of both variables on countries' economic development.

At the 5% level of significance, a two-way feedback between tourism demand and tourism supply has been found in all models, whether in the long run or in the short run. Hence, improving tourism supply is a very important requirement for tourism growth in Egypt, and *vice versa*. Therefore, a push in one direction will support both.

From the causality analysis, it is concluded that in addition to the typical demand factors (income, prices and non-Egypt prices); there are other factors that strongly affect tourism in Egypt, such as globalization and hotel capacity. Therefore, tourism has special characteristics which impose different determinants of demand compared to other goods or services. This result is consistent with Naude and Saayman's (2005) study, which suggested that traditional demand factors such as income, relative prices and travel cost were less significant in explaining the tourism demand for Africa, and other factors, including infrastructure, marketing and information and the level of development at the destination were the main responsible for tourism in Africa.

9.5 Summary and Conclusion

In this chapter, the demand for tourism in Egypt has been examined using a variety of methods. Panel data analysis is used because it contains more information than time-series data or cross-sectional data, so it provides more degrees of freedom and consequently more reliable estimates. Co-integration techniques are used to test the long-run equilibrium relationship between the variables in the model, followed by estimating the ECM. Four models are considered in this chapter, explaining tourist arrivals from all origins as well as three different originating regions to Egypt: Europe, Arab and the Americas. Compared with the MG estimator, the tests for homogeneity in long-run parameters suggested using the PMG estimator, as a more efficient and still consistent estimator in the context of the panel CI and ECM. Some robustness analyses were performed to provide reassurance of the estimates.

Tourist arrivals to Egypt are found to be co-integrated with their fundamental determinants in all models, indicating that a long-run equilibrium exists between tourist arrivals and these determinants at the 1% significance level. The speed of adjustment coefficients were found to be negative, suggesting that any deviation of tourist arrivals from the long-run equilibrium with its specified determinants brings about a correction in the opposite direction which takes from 1.8 years in the Americas model to 2.6 years in the Arab model. The estimated long-run income elasticities are always significant and elastic, except for Arab tourists, with different values for each group. However short-run income elasticities are only significant for Europe and the Americas (at 10%). As far as relative prices are concerned, long-run elasticities have a significant effect on tourist arrivals to Egypt from all regions, except for Europe, whereas short-run price elasticities are significant only in the Europe model. Non-Egypt price elasticities suggest that Egypt's alternative destinations are regarded as complementary destinations in the perspective of tourists from all nationalities in the long run, except Arab tourists, for whom these alternative destinations are considered substitutes. Regarding the short-run effect, these destinations are considered as tourism substitutes for Egypt from the perspective of all nationalities, but complements for the American tourists. According to European tourists, in the short run, tourism in Tunisia is the strongest alternative to tourism in Egypt, with elastic demand in most cases. According to Arab tourists, the Arab Gulf States consider Tunisia, Morocco, Jordan and Syria as the strongest competitors to Egypt. For North African Arab countries, in addition to these destinations, Turkey is of great importance. According to American tourists, both Tunisia and Jordan are the most important alternatives over the period of the study.

Globalization has an important and positive effect on tourist arrivals to Egypt in both the long and the short run in most cases. Hotel capacity significantly and positively affects tourist arrivals from all groups in the long run, except the Americas, whereas it has negative effect in the short run in the case of both the European and the Americas tourists. Finally, political instability affects tourist arrivals to Egypt negatively, significantly and strongly. The American tourists are the group most affected by these political incidents, whereas Arab tourists are the least affected.

The results of Granger causality tests support the results of the co-integration and the ECM and give more explanation to the relationships between tourism and its determinants. The results suggest a long-run bidirectional relationship between tourism inflow to Egypt and all its determinants in all models, but a unidirectional relation, running from tourism to non-Egypt prices in the Americas model. With respect to the short-run causality, whereas income promotes arrivals in the Arab and Americas models, tourist arrivals generate prices and non-Egypt prices in most cases. Dual feedback between tourism demand and both globalization and hotel capacity exists in most cases.

Appendix 9

Appendix 9.1 All Countries Model

Table 1: Short-run alternative pooled estimates; the PMG and DFE without outliers

Variable	PMG	DFE
ΔY_{it}	1.1610*	0.0193
ΔNP_{it}	0.2519**	-0.0335
ΔG_t	1.4829***	1.4861***
ΔG_{t-1}	0.8693**	1.0619***
ΔR_t	-0.1228	-0.5722***
TV_t	-0.2163***	-0.2538***
Constant	-5.2217***	-5.9692***

***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Table 2: Short-run alternative pooled estimates, ARDL (1, 1, 1, 0, 1, 1)

Variable	PMG	DFE
ΔTO_{it-1}	-0.0984**	-0.0306
ΔY_{it}	1.2601*	0.1024
ΔP_{it}	0.0529	0.0756*
ΔNP_{it}	0.2168***	-0.0642
ΔG_t	1.4680***	1.0963***
ΔG_{t-1}	0.7086*	0.9838***
ΔR_t	-0.1505	-0.4650**
TV_t	-0.2474***	-0.2622***
Constant	-4.5608***	-4.2134***

***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Table 3: Correlation matrix of all the variables in All Countries model

Variables	TO_{it}	Y_{it}	P_{it}	NP_{it}	G_t	R_t
TO_{it}	1					
Y_{it}	0.5882	1				
P_{it}	-0.3642	-0.3592	1			
NP_{it}	-0.2603	-0.3086	0.9604	1		
G_t	0.2877	0.0771	-0.1058	0.0315	1	
R_t	0.3006	0.0854	-0.0917	0.0354	0.8955	1

Source: Author's own calculations using STATA.

Table 4: Variance inflation factor test for multicollinearity

Variable	VIF	1/VIF
NP_{it}	8.4709	0.1181
G_t	2.1244	0.4707
Y_{it}	1.5320	0.6527
P_{it}	1.1344	0.8815
R_t	1.0586	0.9447

Mean VIF: 2.8641

Appendix 9.2 Europe Model

Table 1: Correlation matrix of all the variables in European countries model

	TO_{it}	Y_{it}	P_{it}	NP_{it}	G_t	R_t	CPI_{it}	EX_{it}
TO_{it}	1							
Y_{it}	0.6776	1						
P_{it}	-0.3181	-0.2600	1					
NP_{it}	-0.2163	-0.2148	0.9739	1				
G_t	0.4649	0.2037	-0.1439	0.0182	1			
R_t	0.5030	0.2145	-0.1279	0.0186	0.9005	1		
CPI_{it}	-0.3434	-0.5686	-0.0834	-0.0619	0.0155	0.0127	1	
EX_{it}	-0.1425	0.0010	0.8997	0.8600	-0.1608	-0.1390	-0.4845	1

Table 2: Variance inflation factor test for multicollinearity

Variable	VIF	1/VIF
NP_{it}	11.1868	0.0894
P_{it}	1.3335	0.7499
R_t	1.0338	0.9673
Y_{it}	1.0209	0.9795
G_t	1.0238	0.9768

Mean VIF: 3.1198

Table 3: Correlation matrix of all the tourism's prices in the European model

	P_{it}	NP_{it}	CPI_{it}	EX_{it}	SPI_{it}	SPK_{it}	SPT_{it}	SPM_{it}	SPS_{it}	SPJ_{it}
P_{it}	1									
NP_{it}	0.9739	1								
CPI_{it}	-0.0834	-0.0619	1							
EX_{it}	0.8997	0.86	-0.4845	1						
SPI_{it}	0.9832	0.9883	-0.0830	0.8786	1					
SPK_{it}	0.9720	0.9892	-0.0824	0.8688	0.9888	1				
SPT_{it}	0.9912	0.9874	-0.0853	0.8893	0.9952	0.9879	1			
SPM_{it}	0.9887	0.9905	-0.0843	0.8857	0.9971	0.9929	0.9989	1		
SPS_{it}	0.9810	0.9897	-0.0841	0.8778	0.9956	0.9917	0.9933	0.9964	1	
SPJ_{it}	0.9935	0.9852	-0.0863	0.8935	0.9905	0.987	0.9973	0.9965	0.9932	1

Table 4: Augmented PMG Results for Europe Model (1984-2009) by country

	France	Germany	UK	Italy	Switzer.	Hungary	Turkey	Israel	Austria	Benelux	Scand.	Greece	Spain	Portugal	Poland
EC(Φ_i)	-0.42***	-0.72***	-0.34***	-0.53***	-0.51***	-0.27***	-0.03	-0.16**	-0.46***	-0.46***	-0.42***	-0.10***	-0.68***	-0.53***	-0.26***
ΔY_{it}	3.60	3.07	-4.77***	3.59	-1.07	5.50***	-0.02	-0.42	0.51	5.47**	1.13	-2.18	12.02***	3.82	0.50
$L(\Delta Y_{it})$	-0.99	-10.19***	9.53***	-10.63***	-11.70**	-1.44	-0.97	-6.42**	-6.43***	-8.95***	-8.79**	1.22	-1.10	-6.20**	-5.94**
ΔP_{it}	0.41**	0.19	0.36***	0.57***	0.41	1.08***	-0.22	-0.12	0.29**	0.29**	0.48***	0.07	0.17	-0.545***	0.31**
$L(\Delta P_{it})$	-0.73***	-0.84***	-0.80***	-0.75***	-0.49	-2.23***	-0.35*	0.03	-0.71***	-0.63***	-0.81***	-0.33*	-1.38***	-0.54***	-0.17
ΔNP_{it}	0.93*	-0.59**	-0.99***	-1.76**	-0.60	0.79*	-0.25	0.66	0.02	0.02	0.66	-0.53	0.18	0.35	-0.10
ΔG_t	-1.68	0.77	4.09***	-2.38**	2.13	-0.87	-2.16	2.10*	2.36***	1.92***	0.32	0.25	0.31	-2.081*	-0.20
$L(\Delta G_t)$	0.83	2.96***	1.69***	0.51	2.12	3.38***	0.20	-5.08***	-1.82***	-1.12**	-2.44***	1.15	1.79*	-2.29**	0.62
ΔR_t	-1.96***	-0.73	-1.81***	-0.21	0.44	-3.96***	-1.05	-3.31***	-1.02**	-0.79**	-0.30	1.48*	-2.69**	-0.51	-0.16
$L(\Delta R_t)$	1.03	1.19**	-1.06***	0.24	1.14	-2.14***	0.38	-2.16**	1.83***	1.74***	-1.69***	-1.77**	0.79	-1.05	-0.71
TV_t	-0.57***	-0.35***	-0.59***	-0.19*	-0.58***	-0.19	-0.25**	-0.40***	-0.54***	-0.34***	-0.20**	-0.44***	-0.23*	-0.64***	-0.52***
Constant	15.15*	24.78*	11.35*	21.83**	15.99	11.58**	1.54	6.35*	15.75*	16.42*	14.30*	4.21*	25.62**	19.89**	10.76*

Source: Author's own calculations using STATA. ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Appendix 9.3 Arab Model

Table 1: Correlation matrix of all the variables in Arab countries model

Variables	TO_{it}	Y_{it}	P_{it}	NP_{it}	G_t	R_t	CPI_{it}	EX_{it}
TO_{it}	1							
Y_{it}	0.2753	1						
P_{it}	-0.4115	-0.7288	1					
NP_{it}	-0.3004	-0.6117	0.9338	1				
G_t	0.2662	0.0567	-0.0898	0.0415	1			
R_t	0.2658	0.0719	-0.0894	0.0339	0.9005	1		
CPI_{it}	0.1619	-0.4623	0.4716	0.4215	0.0995	0.0937	1	
EX_{it}	-0.5451	-0.5985	0.9003	0.8510	-0.1530	-0.1485	0.0420	1

Table 2: Variance inflation factor test for multicollinearity

Variable	VIF	1/VIF
NP_{it}	10.5752	0.9054
P_{it}	1.2702	0.2127
Y_{it}	1.1340	0.1182
R_t	1.0320	0.0310
G_t	1.0204	0.0200

Mean VIF: 3.0063

Table 3: Correlation matrix of all the tourism's prices in the Arab model

variable	P_{it}	NP_{it}	CPI_{it}	EX_{it}	SPI_{it}	SPK_{it}	SPT_{it}	SPM_{it}	SPS_{it}	SPJ_{it}
P_{it}	1									
NP_{it}	0.9744	1								
CPI_{it}	-0.0868	-0.0457	1							
EX_{it}	0.8617	0.8199	-0.5803	1						
SPI_{it}	0.9835	0.9852	-0.0714	0.8404	1					
SPK_{it}	0.9762	0.9874	-0.0734	0.8354	0.9888	1				
SPT_{it}	0.9912	0.9852	-0.0831	0.8527	0.9908	0.9893	1			
SPM_{it}	0.9896	0.9883	-0.0794	0.8494	0.9941	0.9939	0.9989	1		
SPS_{it}	0.9804	0.984	-0.0704	0.8374	0.9956	0.9887	0.9856	0.9904	1	
SPJ_{it}	0.9934	0.983	-0.0864	0.8562	0.9863	0.9881	0.9976	0.9966	0.9853	1

Table 4: Augmented PMG results for Arab countries (1984-2009) by country, ARDL (0, 0, 0, 0, 2, 2)

Variable	Mauritania	Bahrain	Jordan	Kuwait	Libya	SA	Syria	Yemen	Morocco	Sudan	Tunisia	Algeria	Qatar
$EC(\Phi_i)$	0.01	-1.04***	-0.1329*	-0.83***	-0.54***	-0.13**	-0.25***	0.01	-0.13***	-0.10**	-0.58***	-0.02	-1.22***
ΔY_{it}	-1.05	-2.34***	1.00***	-0.26	1.10	1.12***	3.58***	-1.78*	3.41***	-1.24	2.83	1.58	-0.45
ΔP_{it}	0.36**	-0.11	-0.08	0.11	-0.16	0.12	-0.92***	0.18*	0.56***	-0.07	-0.49**	-0.23	0.50***
ΔNP_{it}	-0.23	-0.37***	0.32*	-0.70***	-0.67	0.57***	1.18***	-0.15	0.96***	0.11	-0.05	-1.45***	-0.40**
ΔG_t	2.32*	1.98***	0.04	4.60***	4.72*	1.99***	2.39***	-0.38	-1.58**	-1.07	3.21**	-4.25*	5.24***
$L(\Delta G_t)$	-0.31	0.65***	-1.88***	0.71	2.60	-1.46***	1.38**	-1.54***	-2.18***	-4.13***	2.92*	5.94***	3.16***
ΔR_t	-1.17	-0.13	-0.10	-0.42	0.73	0.01	1.40***	-0.56*	-0.81*	-1.33*	0.33	-0.65	-0.64
$L(\Delta R_t)$	-0.42	0.15	0.16	-0.44*	3.25**	0.39	0.65*	0.08	-0.78	-0.70	-0.04	-2.82***	0.64*
TV_t	-0.23**	-0.22***	-0.06	-0.15***	0.04	-0.09***	-0.08	-0.14***	-0.17**	-0.13	-0.30*	0.09	-0.41***
Constant	0.26	-2.42*	0.40**	-0.61	0.14	0.10	-0.19	0.22***	0.13	0.62***	-0.24	0.38***	-3.00**

Note ***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Appendix 9.4 the Americas Model

Table 1: Correlation matrix of the variables in American countries model

variable	TO_{it}	Y_{it}	P_{it}	NP_{it}	G_t	R_t	CPI_{it}	EX_{it}
TO_{it}	1							
Y_{it}	0.8764	1						
P_{it}	-0.5931	-0.7264	1					
NP_{it}	-0.5148	-0.6781	0.9778	1				
G_t	0.2536	0.1249	-0.1088	0.0624	1			
R_t	0.2397	0.1281	-0.0829	0.0781	0.9279	1		
CPI_{it}	-0.3373	-0.3238	0.0076	-0.0944	-0.4272	-0.3822	1	
EX_{it}	0.0278	-0.0455	0.4532	0.5339	0.3308	0.3026	-0.8879	1

Table 2: Variance inflation factor test for multicollinearity

Variable	VIF	1/VIF
NP_{it}	8.8303	0.1132
Y_{it}	2.9243	0.3420
G_t	1.4394	0.6948
P_{it}	1.020	0.9803
R_t	1.0067	0.9934

Mean VIF=3.0442

Table 3: Correlation matrix of all the prices in the Americas model

	P_{it}	NP_{it}	CPI_{it}	EX_{it}	SPI_{it}	SPK_{it}	SPT_{it}	SPM_{it}	SPS_{it}	SPJ_{it}
P_{it}	1									
NP_{it}	0.9778	1								
CPI_{it}	0.0076	-0.0944	1							
EX_{it}	0.4532	0.5339	-0.8879	1						
SPI_{it}	0.9868	0.993	-0.0546	0.5026	1					
SPK_{it}	0.9809	0.9932	-0.0367	0.484	0.9911	1				
SPT_{it}	0.993	0.9855	-0.0038	0.4602	0.9926	0.9914	1			
SPM_{it}	0.9917	0.9905	-0.0178	0.4721	0.9953	0.9952	0.9991	1		
SPS_{it}	0.9843	0.994	-0.0642	0.51	0.9965	0.9909	0.9885	0.9923	1	
SPJ_{it}	0.9947	0.9838	0.0059	0.4523	0.989	0.9905	0.9981	0.9973	0.9882	1

Table 4: the Augmented PMG results for American countries, ARDL (1, 1, 1, 1, 1, 0)

Variables	Canada	Mexico	US	Argentina	Brazil	Colombia
$EC(\Phi_i)$	-0.392***	-0.868***	-0.314***	-1.021***	-0.235***	-0.534***
ΔTO_{it-1}	-0.104	0.006	-0.059	0.526***	0.001	0.139
ΔY_{it}	-2.856**	0.023	-2.397*	-0.480	4.407***	-0.820
ΔY_{it-1}	-2.515**	-1.573	-2.153	-4.453***	2.039*	0.821
ΔCPI_{it}	-1.373**	-1.035	-1.330*	-0.599	0.128	0.358
ΔCPI_{it-1}	1.917***	1.245**	2.958***	0.011	0.039	2.793***
ΔEX_{it}	0.295***	-0.319	0.298*	-0.469*	0.221	0.036
ΔEX_{it-1}	0.151	0.422	0.110	-0.335	-0.116	-0.105
ΔNP_{it}	0.327	0.141	-0.634**	0.141	-0.390*	-0.232
ΔNP_{it-1}	-0.163	-0.588*	-0.073	0.027	-0.052	-0.226
ΔG_t	0.803	3.628**	2.272***	2.767	1.216	1.488
ΔG_{t-1}	1.010**	0.868	2.673***	1.533	3.505***	2.006*
ΔR_t	0.183	-0.577	-0.078	-1.069*	-1.035**	-0.740
TV_t	-0.427***	-0.574***	-0.542***	-0.410***	-0.467***	-0.429***
Constant	-38.321***	-83.777***	-31.480***	-100.808***	-22.205**	-51.122***

***, **, * indicate significance at the 1%, 5% and 10% levels respectively.

Appendix 9.5 Panel Causality Estimation

Table 1: Long-run causality relationship: model comparison

Variables	All Countries		Europe		Arab		Americas	
Long Run Causality								
Variables	χ_1^2	P-value	χ_1^2	P-value	χ_1^2	P-value	χ_1^2	P-value
Y ⟹ TO	25.22	0.00	5.45	0.02	19.80	0.00	16.92	0.00
TO ⟹ Y	8.89	0.00	25.97	0.00	6.98	0.01	9.82	0.00
P ⟹ TO	7.69	0.01	10.36	0.00	12.90	0.00	7.09	0.01
TO ⟹ P	425.12	0.00	354.65	0.00	38.18	0.00	54.89	0.00
NP ⟹ TO	27.15	0.00	6.24	0.01	6.99	0.01	2.84	0.09
TO ⟹ NP	71.35	0.00	29.89	0.00	26.53	0.00	8.31	0.00
G ⟹ TO	27.50	0.00	7.64	0.01	15.03	0.00	4.70	0.03
TO ⟹ G	581.62	0.00	178.53	0.00	171.26	0.00	25.21	0.00
R ⟹ TO	54.71	0.00	15.63	0.00	57.90	0.00	22.75	0.00
TO ⟹ R	5.05	0.03	31.64	0.00	5.84	0.02	6.53	0.01

Source: Author's own calculations using STATA.

Table 2: Short-run causality relationship: model comparison

Variables	All Countries		Europe		Arab		Americas	
Short Run Causality								
Variables	χ_{q-1}^2	P-value	χ_{q-1}^2	P-value	χ_{q-1}^2	P-value	χ_{q-1}^2	P-value
ΔY⟹ΔTO	3.26	0.35	0.04	0.83	14.94	0.00	8.13	0.04
ΔTO⟹ΔY	1.64	0.44	2.48	0.48	2.36	0.12	6.13	0.11
ΔP⟹ΔTO	0.17	0.98	5.04	0.08	0.26	0.61	0.18	0.68
ΔTO⟹ΔP	2.28	0.32	6.20	0.01	0.13	0.72	8.60	0.04
ΔNP⟹ΔTO	13.52	0.00	2.87	0.09	1.06	0.30	7.65	0.05
ΔTO⟹ΔNP	2.65	0.10	15.67	0.00	5.91	0.02	6.97	0.07
ΔG⟹ΔTO	32.02	0.00	42.54	0.00	4.37	0.22	58.18	0.00
ΔTO⟹ΔG	63.88	0.00	201.69	0.00	17.70	0.00	49.32	0.00
ΔR⟹ΔTO	5.87	0.02	32.14	0.00	13.88	0.00	1254.63	0.00
ΔTO⟹ΔR	39.59	0.00	12.85	0.00	9.80	0.00	269.97	0.00

Source: Author's own calculations using STATA.

Chapter 10: Conclusions and Recommendations

10.1 Introduction

This thesis is concerned with identifying the important determinants of demand for tourism in Egypt, and evaluating the extent to which tourism is affected by these factors over the period 1970-2009. The purpose of this chapter is to draw conclusions about the theoretical and empirical findings and their related recommendations and policy implications. The contributions of the thesis are explained. Limitations and suggestions for further research are also presented.

10.2 Summary of the Main Findings

In Chapter 2 an overview of worldwide tourism and of tourism in Egypt was provided. With respect to the worldwide tourism, the focus was on global tourism contribution and trends since the 1950s. In the case of the tourism in Egypt, tourism contribution to the Egyptian economy, an examination of some characteristics of tourism, and tourism development according to different indicators from the 1950s to the 2000s were examined.

Tourism contributes strongly to the Egyptian economy through generating foreign currency, reducing the balance of payments deficit, generating income, and creating employment opportunities. Tourism's contribution to the economy in Egypt plays a more effective role compared to the role of tourism at the global level. In addition, Egypt is the main tourist destination in the Middle East region, achieving the largest receipts and arrivals in 2009, followed by Saudi Arabia. Intra-regional tourism is considerable for most countries in the Middle East, as well as other regions worldwide, generating more than half the visitor arrivals to the region. Egypt, however, did not benefit from this phenomenon like other destinations in the region, including Syria and Bahrain.

Leisure tourism is the main purpose of tourism in Egypt and its share increased over time. Travelling by air is the most important means of transportation to Egypt. This fact can be explained by global improvements in air transport from the 1970s onwards, in addition to limited vacation periods, convenience, and the affordability of air travel relative to other types of transport. The problem of seasonality is not as serious in Egypt as it is in other Mediterranean destinations, especially Tunisia and Turkey. This may be attributed to the diversity of the structure of tourist arrivals and the different purposes of tourism in Egypt. The peak seasons have been extended in recent decades to include six months over the summer, autumn and spring periods, and demand has tended to be smoothed out over the year.

Although political instability in Egypt has caused many fluctuations in tourism demand for Egypt, the number of international tourist arrivals has increased 35-fold, tourist nights 28-fold, and tourist receipts 21-fold over the period 1970 to 2009. Europe has been the most important source of tourist arrivals to Egypt from the 1980s to date, and has an increasing share. Germany, UK, Italy and France from Western Europe and Russia from Eastern Europe were the main originating countries to Egypt over the period of the study. The Arab share of total arrivals varied considerably throughout the study period, trending downwards from the mid 1970s to 2009. Saudi Arabia, Libya and Palestine were the main origins over the study period. Tourists from the Americas had a smaller contribution than other regions, with a decreasing market share over the study period. The US and Canada were the main originating markets in this region. The political climate in Egypt, especially after the Middle East War in 1973, the economic circumstances in the originating countries, the economic and political relationships between Egypt and origin countries, and geographical proximity were noted to be the main determinants of tourism demand for Egypt through the period of the study.

Egypt's main rivals in the Middle East and North African region were specified according to various criteria; they have the same main originating countries as Egypt, they have some characteristics in common, and providing similar tourist products and services. The descriptive evidence suggested that Israel, Turkey, Tunisia, Morocco, Syria and Jordan are tourists' major alternatives to Egypt in the region. With respect to the European market in the 1980s, Turkey and Tunisia were considered the biggest destinations in the region. Israel and Morocco were the most competitive destinations to Egypt from the perspective of German, British and Russian tourists; and Turkey was an important competitor for Egypt from the perspective of Italian and French tourists. In the 2000s, there was a considerable change in the market share of these European countries. Whereas both Israel's and Morocco's share decreased dramatically over two decades, Turkey dominated the German, British and Russian markets. Egypt achieved remarkable improvement since it became the most important destination to Italian tourists instead of Tunisia. Tunisia became the most important competitor to Egypt in the German, British and Russian markets, with more contribution to Egypt in all cases, whereas Turkey is a considerable competitor to Egypt in the French market with more contribution than Egypt. Regarding Arab generating countries, Egypt improved its position dramatically in Libyan departures from the second position after Tunisia in the 1980s, to take the first position in the 2000s. In contrast, Egypt's share in the Saudi Arabia market decreased over time to fall back from the second position after Jordan in the 1980s, to the third position after both Jordan and Syria in the 2000s. Finally, the share of Egypt in American departures decreased slightly throughout the period of the study (1980-2009); occupying the third position after Turkey and Israel.

A review of the theoretical and empirical literature on tourism demand was introduced in Chapter 3. This helped to establish an analytical framework for understanding the main determinants of international tourism flows, the expected direction and magnitude of the relationship between these factors and tourist flows, the frequency of data, the regions or countries of interest, the applied econometric methods, and the main findings of the empirical studies. These studies contributed considerably to knowledge in the area of tourism demand. However, a clear gap in the literature can be identified that connects tourism to some important factors and determines the direction of causality relationship between tourism demand and its determinants and this provides an important motivation for this thesis. Moreover, few tourism demand studies have been directed to the Middle East countries, and especially to Egypt, despite its great tourism achievements and potential. Therefore, the present study attempts to address these matters and provide a deeper, more technical understanding of the tourism demand for Egypt based on recent advances in econometrics.

The descriptive analysis of the main trends and evolution of tourism demand in Egypt, along with reviewing tourism demand literature provided a background and informed the quantitative approach adopted in the empirical chapters (Chapters 4-9). Until the beginning of the 1990s, static regression dominated tourism demand literature. That approach suffers from various statistical problems, since it assumes that all the variables in the model are stationary. It has been proved from the literature that tourism demand, income and prices are mostly non-stationary variables; therefore the assumptions of the OLS estimator are violated, and it does not produce reliable estimates and the regression tends to be spurious. Moreover, the forecasting performance of these models has been found to be poor and cannot compete with the simplest time series models as suggested by Martin and Witt (1988) and Witt and Witt (1995). In an attempt to solve the problem of spurious regression, researchers use differenced variables in the model to obtain stationary variables, but in this case important information related to the long-run analysis is lost. The co-integration approach is very attractive since it retains the long-run relations and obtains highly consistent parameters in the long run (Stock, 1987). Moreover, the associated error correction model estimates the short-run dynamics relations and the speed of adjustment toward the long-run equilibrium. However, there are some restrictions, such as the integration and co-integration tests, that the model has to overcome in order to apply this approach.

In Chapters 4 to 7 time series tourism demand for Egypt was estimated and forecast over the period 1970 to 2009. In Chapter 4, four different models were constructed: All Countries, Europe, Arab and the Americas, representing the most important sources of tourism in Egypt. The same variables were specified for all the models. Tourist arrivals and tourist nights were specified as dependent variables in two different models for each region, whereas income, relative prices, non-Egypt prices, globalization, hotel capacity and political instability were specified as the most important determinants of tourism inflows to Egypt according to the theory, literature, and taking into consideration the specific circumstances of Egypt as a developing country. In addition, the integration properties of the different time series of all the models were examined using two time series unit root tests (ADF and PP tests). The results suggested that all the variables of all the models are found to be $I(1)$ series, with some exceptions.

The methodological and econometric approaches introduced in the empirical chapters proceeded from the simple to the more complex structure to obtain more reliable estimates. In Chapter 5 tourism demand for Egypt was estimated using time series co-integration approach in a single equation, including the Engle Granger two-step (EG2S) followed by the Autoregressive Distributed Lag (ARDL).

The EG2S approach is relatively straight forward and easily implemented in practice; therefore, it remains useful tool of analysing the co-integration relationship between time series. However this approach has some disadvantages. First, the statistical performance of the long-run static parameters cannot be examined, since the standard errors of the co-integration parameters are not standard normal. Second, the OLS estimator is not efficient unless all the explanatory variables are exogenous, which is not the case in our models, as indicated by the Hausman (1978) test. Third, not all the series in our models are integrated of order one, so it is not possible to apply this approach on these models due to the spurious regression problem.

The ARDL approach is an appropriate alternative approach within the single equation framework, since it is a dynamic econometric method, permits the explanatory variables to be endogenous, reduces the problem of multicollinearity and most of the statistical diagnostics and stability tests can be examined whether in the long run or in the short run to ascertain the good fit of the models. Finally and more importantly, it can be performed irrespective of whether the series of the model are $I(0)$, $I(1)$, or combination of them. However, the single equation approach has some disadvantages; it misses the interdependencies among variables in the model, cannot perform testing for restrictions across equation coefficients, and finally, if more than one co-integrating relationship exists among the underlying variables, the approach is only able to obtain a linear combination of these vectors by taking an average co-integrating vector over a number of co-integrating vectors.

The Johansen's Maximum Likelihood (JML) method was applied in Chapter 6, as a system of equations approach, to reflect the important interrelationships among variables, reduce the risk of endogeneity bias, obtain estimates of all the possible co-integrating vectors, and minimize the problem of multicollinearity. The problem of this approach is that it is a data-intensive method and, in tourism contexts, data are relatively scarce. In addition it is a complicated approach and difficult to implement.

Based on the EG approach, a test of co-integration between tourism demand for Egypt and its determinants was applied on five out of eight models (which only have $I(1)$ series) and suggested the existence of a co-integrating relation in just two models. In contrast, the ARDL approach of co-integration was applied on all the models, even if the underlying series are trend stationary or first difference stationary, and a co-integrating relation was detected in all models at different lag lengths. Based on the JML procedure, one or more co-integrating relations exist between tourist arrivals or tourist nights and their fundamental determinants in all cases over the period 1970-2009.

The adjusted R^2 was very high in all models according to all the co-integrating procedures. Whereas we cannot evaluate the statistical performance of the EG procedure in the long run (apart from the R^2 and DW test), both the ARDL and JML models passed all the long-run diagnostic tests, indicating no statistical problem in most of the models and they were stable. In addition, the models performed reasonably according to theory and most of the long-run estimated elasticities displayed the expected signs.

The long-run results in the different models using different co-integration approaches indicate that income is the most important determinant of tourism in Egypt, since its elasticities are always significant and positive, but the magnitude of these elasticities differs from one model to another. The income elasticity is more sensitive to inter than intra-regional tourism. Moreover, the income elasticity of tourist nights is more than the income elasticity of tourist arrivals in most models.

Relative tourism price is another influential and significant factor in determining the demand for tourism in Egypt, with the expected negative signs in most cases. Tourist arrivals in Egypt are mostly price inelastic. As is the case in the income elasticity, price elasticity of tourist nights is more than price elasticity of tourist arrivals in most models. Non-Egypt tourism prices are found to be a significant factor for all models according to both the ARDL and the JML approaches, except the European and All Countries models for the JML approach.

According to the JML approach, globalization is also a significant determinant, with elastic demand in most cases. It affects tourist arrivals positively with respect to American and European models, but negatively according to the Arab and All Countries models. However, according to the ARDL approach, globalization has a significant effect on tourism in the Arab and All Countries models, with a negative effect. Hotel capacity is also a considerable factor; it affects tourist nights of all the models significantly (except the American model) and positively according to both the ARDL and JML approach, indicating that tourism supply supports tourist nights in Egypt. In contrast, hotel capacity has no effect on tourist arrivals from different regions, except the Arab tourists.

As far as the short-run effect is considered, all the ECM models achieve a good fit and fulfil most of the diagnostic and stability tests. A discrepancy is expected between the estimated results of the ARDL-ECM and the estimated results of the JML-VECM, since the temporal effect of the variables in the short run is not addressed in the case of the latter approach, and only the lagged effect is considered. The error correction terms are always significant and take the expected negative sign with high values, implying that the short-run disequilibrium between tourism demand in Egypt and its determinants can be corrected in roughly 1 to 5 years according to all the models and all the estimation approaches. Word of mouth effect is significant and positive in the Arab models according to all the estimating approaches, and in the Americas models according to ARDL approach. This may indicate good experience and loyalty to tourism in Egypt, especially among the Arabs; but European tourists may prefer new experiences than to travel to a familiar setting. Terrorism is always significant, except in the Arab model, and its effect is maximized in the case of tourists from the Americas.

Besides evaluating the theoretical and statistical performance of the different econometric methods, the forecasting ability of these methods, introduced in Chapter 7, is a fundamental aspect of their evaluation. A forecasting comparison (ex-post forecasting) among five econometric methods (EG, EG-ECM, ARDL, ARDL-ECM and JML-VECM), as well as two time series methods (ARIMA and naive no change) for all models across five time horizons was conducted over the period 2005-2009, based on three different forecast error measures. It is concluded not only that our econometric methods offer a better prediction with respect to the time series methods, but they also produce highly accurate forecasts according to the Lewis (1982) criteria. No forecasting method outperforms the others in all cases, in different time horizons or different models, but often the ARDL method outperforms the other methods in terms of both overall forecasting accuracy, and consistency across time horizons and across models. Naive no change performs well only in the first year ahead forecast, ECMs (EG-ECM, ARDL-ECM, VECM) always perform better in the medium term, whereas the long-run methods (EG, ARDL) perform better in the long-term. Therefore we can conclude that the recent advances in the co-integration approach and ECM, especially the ARDL technique, can improve the forecasting performance of tourism demand models, especially for longer time horizons.

The ex-ante forecasts show that about 12.0 million tourists will visit Egypt and stay 135.2 million nights in 2010, increasing to 15.9 million tourists and 168.4 million nights in 2014. Whereas the forecast number of arrivals and nights from all origin markets is likely to increase in absolute terms through the forecasting period, it is not expected to be a flourishing period in the tourism industry in Egypt, since the expected rates of growth are smaller than those of its counterparts in the 2000s in most models. Europe is expected to remain the leading region of tourist arrivals and nights, with an increasing contribution over the forecasting period. In contrast, the share of Arab countries is likely to decrease in terms of arrivals and nights.

While in Chapters 4 to 7 tourism demand for Egypt was estimated and forecast using time series co-integration approach, panel co-integration approach was applied in Chapters 8 and 9 as a potentially more robust technique. The panel data approach was constructed of cross-sectional data, presenting the number of origin countries in each region, over several time periods (1980s-2009). The conjunction of time series and cross-sectional data allows for a higher degree of freedom in the estimation process, gives more information, reduces the problems of multicollinearity and autocorrelation, and finally allows for dynamic specification. Therefore, panel data analysis improves the accuracy of the estimated parameters.

Four balanced panel models of tourism demand for Egypt from all originating countries and three major originating regions, including Europe, Arab and the Americas were constructed in Chapter 8. International tourist arrivals are specified as a function of income, relative prices, relative non-Egypt prices, globalization, accommodation capacity and political instability in Egypt over the period from 1980 to 2009. Nine panel unit root tests were performed to determine the order of integration of the variables in the different models. The results concluded that all the series are $I(1)$ in the case of some models, but combination of $I(1)$ and $I(0)$ series in the others. The existence of a long-run relationship among the $I(1)$ variables of the study was then tested using two co-integration tests. The results cannot reject the null of a co-integration relationship between tourist arrivals and the explanatory variables in the different models according to both Kao and four tests of Pedroni.

In Chapter 9 the demand for tourism in Egypt was modelled using the panel co-integration technique to estimate the long-run equilibrium relationship between the variables in the models, and estimating the dynamics of the ECMs simultaneously. The pooled mean group (PMG) approach based on the ARDL procedure is the most appropriate panel co-integration procedure for our models, since it can be safely used irrespective of whether the regressors are $I(0)$, $I(1)$, or combination of them. This estimator allows for short-run heterogeneous dynamics but imposes a long-run homogeneous relationship for countries in the sample (Pesaran et al., 1999). Tests for homogeneity in long-run parameters were applied to all our models and indicated that the PMG estimator is more efficient than the Mean Group (MG) estimator and still consistent in the context of the panel co-integration and error correction models. Some robustness analyses were performed and these provided reassurance.

Tourist arrivals to Egypt were found to be co-integrated with their fundamental determinants in all models according to the PMG approach, indicating that a long-run steady state equilibrium exists at the 1% significance level. The speed of adjustment coefficients were found to be negative, suggesting that any deviation of tourist arrivals from the long-run equilibrium with its specified determinants brings about a correction in the opposite direction which takes from 1.8 years in the Americas model to 2.6 years in the Arab and Europe models.

The estimated long-run income elasticities in Egypt are 4.6, 4.1 and 0.5 in the Americas, Europe and Arab models respectively. This result implies that tourist arrivals in Egypt appear to benefit more from the increase in American and European countries' income in boom periods, and suffer more in recession periods. In contrast, short-run income elasticities are only significant for Europe and the Americas.

Long-run prices have a significant effect on tourist arrivals to Egypt from all regions, except for Europe, indicating that the level of prices in Egypt relative to the level of prices in the European countries is not considered in the decision of tourists to choose Egypt as a destination place, and other factors are responsible for this decision. A 1% increase in tourism prices in Egypt relative to origin countries decreases tourist arrivals from worldwide and Arab countries by 0.58% and 1.1% respectively, but increases American tourists by 0.53%. In contrast, short-run price elasticities are significant only in the Europe model.

Non-Egypt prices were divided into six variables, reflecting the effect of relative tourism prices in Israel, Turkey, Tunisia, Morocco, Syria and Jordan separately on tourist arrivals to Egypt to determine the most competitive destination to Egypt from the perspective of each originating region. The results suggest that all the alternative destinations are regarded as complementary destinations according to all nationalities in the long run, except Arab tourists, for whom these alternative destinations are considered as substitutes. Regarding the short-run effect, according to European tourists, tourism in Tunisia is the strongest alternative to tourism in Egypt, which is considered as a complement for eight European countries but a substitute for two countries, with elastic demand in most cases. According to Arab tourists, the Arab Gulf States consider Tunisia, Morocco, Jordan and Syria as the strongest competitors to Egypt. For North African Arab countries, in addition to these destinations, Turkey is also a considerable competitor. According to American tourists, Tunisia, Morocco and Jordan are the most important complements over the period of the study. Therefore, Tunisia is considered the most important alternative to Egypt from the perspective of tourists from all nationalities; it is a complement to Egypt according to European and Americas tourists but a substitute from the perspective of Arab tourists, whether in the short run or in the long run.

Globalization has an important, positive, and more than unity effect on tourist arrivals to Egypt in both the long and short run in all cases, except that it has a negative effect with respect to Arab tourists in the long run, as was the case in the time series models. A 1% increase in globalization in Egypt increases tourist arrivals from worldwide, Europe and American countries by 1.8%, 1.9% and 1.2% respectively. This expected result is due to the positive effect of globalization through establishing infrastructure, increasing foreign direct investments, bringing in skilled workers from all over the world, decreasing costs of air travel and facilitating access to destinations at relatively low prices, in addition to facilitating the communication and reservation systems. In contrast, a 1% increase in globalization decreases Arab tourists by 1.8%. This finding may be a result of providing a homogenous global service in the long run, rather than retaining the Middle-Eastern characteristics of Egyptian tourism, which attract Arab tourists in particular.

Hotel capacity significantly and positively affects tourist arrivals from all groups, except the Americas, in the long run, whereas it has a negative effect in the short run in the case of both European and American tourists. Our findings suggest that increasing tourism supply is considered as a financial outflow in the short run, since it takes time to affect tourism demand positively and significantly.

Finally, the atmosphere of insecurity and political unrest has serious implications for arrivals to Egypt. It negatively affects tourist arrivals from all the regions at the 1% level of significance. It has the smallest effect on arrivals from the Arab countries, since they are not a potential target, and its greatest effect is on American tourists. A year of riots or political incident decreases Arab tourist arrivals by 14%, whereas it decreases tourist arrivals from the Americas by 44% and from Europe by 40%. Overall, the year of terrorism in Egypt is responsible for a 28% decrease in tourist arrivals from all nationalities to Egypt.

Important points can be raised from the panel Granger causality results. The results of all the models suggest the importance of long-run income, rather than short-run income for tourism in Egypt, since a two-way feedback between tourism in Egypt and long-run income of all regions has been found. However a unidirectional relationship, running from Arab and American income to tourist arrivals, has been suggested in the short run. This finding supports Friedman's permanent income hypothesis on the one hand, and is in line with the results of our panel co-integration on the other. This suggests that tourism in Egypt can benefit more from economic growth and from an increase in tourists' income in the long run. Bi-directional causal relationships between tourist arrivals and both relative prices and non-Egypt prices have always existed in the long run, whereas only unidirectional relationships exist in the short run, often running from tourist arrivals to tourism prices in different regions. There are dual relationships between tourism inflows to Egypt and globalization in all the models in both the long run and the short run, but a unidirectional relationship for the Arab model in the short run. This has an important implication for our study, since there is a complementary link between tourism and globalization in Egypt, so globalization can promote tourism inflows and tourism inflows generate more globalization, which would amplify the positive effect of both variables on countries' economic development. At the 5% level of significance, a two-way feedback between tourism demand and tourism supply has been found in all models, whether in the long run or in the short run. Hence, improving tourism supply is a very important requirement for tourism growth in Egypt, and *vice versa*; therefore a push in one direction will support both.

10.3 Related Policy Implications and Recommendations

From the policy perspective this thesis provides a support for Egypt's tourist-related industry and the Ministry of Tourism. It suggests some recommendations that could be taken by the Egyptian authorities in order to maximize the benefit of tourism sector. The recommended policies can be categorized with respect to supply-side policies, demand-side policies and other policy implications.

1) Supply-side policy recommendations

Whereas tourism is an intra-regional rather than an inter-regional phenomenon, as the statistics demonstrated, Egypt does not benefit from this characteristic, since the share of Arab tourists to total tourists in Egypt has continually decreased since the mid 1970s. The Ministry of Tourism in Egypt should give more attention to regional tourism, due to the importance of Arab tourists especially in the years of terrorist incidents, since it is the region least affected by the political unrest in Egypt. Moreover, Arab tourists spend longer time in Egypt relative to other nationalities. Ending visa requirements among Middle East countries is recommended to strongly promote intra-regional tourism to Egypt. In addition, keeping Egypt's tourism prices competitive with its rivals in the Middle East and North Africa region is a significant policy.

Leisure tourism was the main purpose of tourism in Egypt over the study period; more interest has to be given to other purposes for several reasons. First, leisure tourism is more elastic to the economic and political changes than other types of tourism, so it is prone to the dramatic decrease in time of crises. Second, health and education tourism require longer stay in the destination, whereas business and convention tourism entail a higher average spending than the case of leisure tourism.

Although the problem of seasonality is at its lowest in Egypt relative to other Mediterranean destinations, effective policies such as placing additional emphasis upon cultural and historical tourism in Egypt on the one hand, and following effective promotional programmes, reducing prices, introducing new festivals, conferences and sport events during the off-peak season on the other hand, are recommended.

Compared with other destinations in the literature, our results indicate reasonable speed of adjustment toward the steady state equilibrium. A reduction in the extent of dependence on a few countries of origin and exploring new markets, especially in the EAP region, to benefit from the remarkable improvement in economic growth in this region, is a good policy to increase the speed of adjustment from different regions.

Based on the co-integration and causality results, one important marketing strategy is the possible extension of the tourism market in Egypt as well as its competing destinations from the Middle East and North Africa through joint marketing efforts by introducing a variety of tourism products, services and experiences they can offer jointly to foreign tourists. Moreover, tourist suppliers should monitor the price policy of these alternative destinations (especially Tunisia) to make Egypt's prices competitive with respect to its substitutes from the perspective of Arab tourists.

Improving the quality of tourist service in Egypt, along with maintaining the identity of Egypt, are essential issues to overcome the challenge of the increasing competition among destinations in a more globalized world and therefore enhance tourist arrivals from all nationalities.

Tourism supply generates inflows of tourism revenue in the long run; consequently, it should be considered as an important long-run investment. Hence, increasing the quantity of hotel capacity is recommended to attract more tourist arrivals to Egypt from all originating regions, except for the Americas. Improvement in the quality of such hotel capacity as well as the quality of other tourist services is also required.

The forecasting results indicate that the number of arrivals and nights from all originating markets is likely to increase in absolute terms through the five-years forecasting period (2010-2014), but the expected rates of growth are smaller than their counterparts in the 2000s in most models, therefore, tourist-related business should increase tourist facilities in the coming years depending on the forecasted values.

2) Demand-side policy recommendations

International tourism in Egypt has elastic demand with respect to income of long-haul tourists; therefore, government and tourism organization should pay attention to monitoring and forecasting the expected level of economic activities in these countries and enhancing the capacity of tourist services in times of economic boom, and decrease it in times of economic recession.

The government or tourist providers can impose taxes or increase the prices of tourist services in order to maximize tourist expenditures and increase the yield of the industry in all markets, except for the Arab region, since the tourism price elasticities with respect to non-Arab regions are always under unity. In addition, because of the differences of the price elasticities in each origin region, a separate pricing policy should be adopted for each region with regard to these different elasticities.

The inelastic demand with respect to both non-Egypt prices and Egypt's own prices from most markets implies that non-price competition, such as improving service quality and an effective promotional strategy, is more likely to enable the products to be sold for higher prices and also enhance repeat visitation.

Whereas tourism prices Granger cause tourism arrivals in Egypt in the long run, they do not cause them in the short run. Therefore, price policies are ineffective in the short run, and other policies are recommended.

The co-integration and causality results suggest that there is a variation of tourism demand elasticities with respect to different determinants in the different originating markets, so a specific policy for each region needs to be provided because there is no unified policy that would be applicable for all countries of origin.

3) Other policy and procedure recommendations

As tourism crisis management procedures, the Ministry of Tourism as well as the government should strictly control the tourist places in Egypt through the peak season. In addition, the tourism industry needs effective guidelines of terrorism crisis management depending on the experiences of other tourist destinations that have faced political unrest or terrorism.

For researchers and practitioners concerned with modelling and forecasting tourism demand, the panel co-integration approach is recommended to improve the accuracy of the estimated parameters. For forecasting purpose, the CI and ECM approach, especially the ARDL technique, is strongly suggested to improve the forecasting performance of tourism demand models. Long-run co-integration techniques are recommended to produce long-term forecasts; ECM techniques are best in generating medium-term forecasts. Naive no change is an accurate and easy method to use for just one year ahead. For more than one year ahead forecasting, time series methods, including ARIMA and naive no change, are not recommended. Moreover, it is proved that in addition to the typical demand factors (income and prices); there are other factors that strongly affect tourism in Egypt, such as globalization, political stability and hotel capacity. Therefore, tourism has special characteristics which impose different determinants of demand compared to other goods or services.

10.4 Contribution of the Thesis

While the previous studies contributed considerably to knowledge in the area of tourism demand, there is limited coverage of the literature on some aspects related to the selected destinations, determinants of tourism demand and their specifications, and the utilized econometric approach. In this context, this thesis makes significant contributions to the literature on tourism demand.

Firstly, developed countries and some East Asia and Pacific developing countries have dominated tourism research studies as focus areas. These regions have different tourism potentials and characteristics from the present case study, Egypt, which has attracted limited literature in number and in technical approach.

Secondly, this thesis adopted a more comprehensive approach in selecting the determinants of tourism demand, introducing a new factor, and providing a new specification for another factor. In specific, factors associated with the destination country, such as political instability, accommodation capacity and globalization in Egypt has been considered. Globalization has been included to tourism demand model using KOF composite index of globalization; such variable has not previously included in the tourism demand literature. In addition, substitute/complement relationships between tourism in Egypt and tourism in six alternative destinations, including Israel, Jordan, Morocco, Syria, Tunisia and Turkey, have been estimated in time series and panel data context, whether in the long run or in the short run. This variable has been aggregated in a weighted composite index, in addition to estimate the effect of each rival destination separately on tourist arrivals to Egypt. No previous study in Egypt explored the effect of this variable in detail.

Thirdly, this thesis used rigorous econometric analysis to improve the results of the estimation and forecasting. Advanced econometric techniques based on CI/ECM have been used to model and forecast tourism demand for Egypt. Although panel data analysis has been used in the tourism demand literature since the 1970s, few earlier studies analysed tourism demand based on panel CI and ECM framework. Moreover no previous study in Egypt employed this approach whether in time series of in panel framework.

Finally, the causality relationship between tourism demand and its economic determinants in Egypt has been estimated based on panel data analysis in the long run and the short run, which may provide more guidance for policy makers in Egypt.

10.5 Limitations of the Thesis

Having presented the contribution of the thesis to the tourism demand literature, this section reveals a few limitations that should be acknowledge and put forward suggestions for further research.

The main limitation of this study relates to the availability of data and, for some variables, the lack of appropriate data. With respect to the availability, the thesis depends on annual data instead of using quarterly or monthly data, which would be appropriate to analyse the effect of seasonal fluctuations of tourism demand. Tourism data also tends to be aggregated, where there are different forms of tourism, such as leisure, education, business and others. More insight could be gained by analyse such forms separately. On appropriateness, this point can be illustrated with respect to tourism prices. Relative consumer price index adjusted by the exchange rate is used as a proxy for tourism prices rather than using a composite price index for tourist products and services, as such an index is not available, not only for Egypt but for all other countries as well. Moreover, some important determinants of tourism demand could not be included in the function due to lack of reliable data, such as marketing efforts or costs of transportation. Finally, domestic tourism is not within the scope of this thesis, yet domestic tourism is a substitute for international tourism.

In the panel data analysis, the PMG approach assumes that the time series dimension is adequately long to enable estimation for each country separately in the short run, especially when many explanatory variables are included. In addition, the PMG estimates of panel co-integration suffer from downward bias on the parameter of the lagged dependent variable (word of mouth) for small *T*, as observed by Pesaran.

10.6 Suggestions for Further Research

Further research is needed to extend this study in alternative directions. Such proposed research can be grouped according to the frequency of data and aggregating criteria, model specifications, and the determinants of tourism demand.

Although aggregated data provide important results, especially for policy makers, disaggregated data is essential for providing accurate policy implications for specific tourism sectors. While we disaggregated tourism demand for Egypt according to tourists' geographical regions, further research could differentiate tourists by other criteria such as income level, tourists' development status, social group and age or gender. Moreover, it is recommended that the tourism product be differentiated according to tourism purpose and each purpose analysed separately. Further research based on monthly or quarterly series would clearly be of interest to analyse the seasonality effect on tourism demand.

Although the context of the analysis carried out in this study concerns the tourism demand for Egypt from all origins, as well as three individual regions of origin, the time series models in Chapters 5 to 7 can be readily extended based on country by country estimations when a long time series is available, to formulate specific policies for each originating country. Moreover, for panel data analysis (Chapters 8 and 9), the research can be extended to model tourism demand for many tourist destinations from many originating markets in a comparative study, using three dimensional panel data analysis. In addition, forecasting tourism demand based on panel data analysis could be explored.

The present thesis focuses on one side of tourism market, which is demand side, assuming that supply side is infinitely elastic and tourism demand is the driving force in the tourism market. However, when appropriate data on supply-side determinants are available, other studies are recommended to estimate both tourism demand and tourism supply equations simultaneously using simultaneous equation model. To build such a model, an appropriate study on the determinants of tourism supply would be required.

Although the globalization variable has proved to be relevant and has a significant effect on tourism demand for Egypt from different regions, more empirical studies are needed to examine and validate the usefulness of this factor in modelling international tourism demand for other destinations. Moreover, other important variables, which are related specifically to the tourism industry, such as transportation infrastructure, communication, destination risk, education index, urbanization rate, common border or common language and others, could be included and examined.

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