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International tourism demand in Tunisia: Evidence from dynamic panel data model

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Abstract

The purpose of this paper is to identify and study the main determinants of international tourism demand with special reference to Tunisia over the period 1994–2012. The empirical study is based on estimations of GMM dynamic panel data model. Using a sample of 47 generating countries, empirical results show that consumer loyalty is a key determinant for foreign tourism demand in Tunisia. Estimated prices elasticities suggest that Tunisian tourism is surprisingly considered by foreigners as a luxury service and provide evidence that Tunisia and Morocco are substitute destinations. According to the supply induced demand theory, our investigation reveals that Tunisia is able to boost international tourism flows by promoting the tourism supply especially the accommodation capacity and the air supply.

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1. Introduction

Tunisia is one of the most popular tourist destinations in North-Africa and one of the most visited seaside destinations in the Mediterranean region. The tourism sector in Tunisia is an important component of economic activity. In fact, the tourism industry contributes to around 8% of GDP and to 12% of employment. As a main source of foreign currency, it contributes to 20% of exports and covers 60% of the deficit of the trade balance.

Given the importance of the tourism industry for the economic development of Tunisia, tourism demand analysis plays a crucial role for planning and decision making policy. The determinants of tourism demand provide planners essential information about the strategy to follow in order to increase tourism flows in the destination and preserve its share markets. Tourism demand modeling has undergone notable developments in terms of diversity of interests and advances in research methods. Regarding tourism demand for Tunisia, there have been only two studies, Ouerfelli (2008) and Choyakh (2008), that focus on the key determinants of Tunisian tourism demand using time series cointegration techniques. These studies propose to include variables that measure the tourism supply in addition to the typical determinants of tourism demand such as the level of income in the origin country and the relative prices. Ouerfelli (2008) concludes that estimated values of the supply elasticity corroborate the supply induced demand hypothesis. While, Choyakh (2008) finds that Tunisian tourism is less sensitive to price variations and tourism investment than to the income of the tourist-generating countries.

Most studies have used time series techniques to model the tourism demand (Bonham et al., 2009; Ouerfelli, 2008; Chan et al., 2005) or else to generate forecasts (Athanasopoulos and Hyndman, 2008; Chu, 2009; De Mello and Nell, 2005). In contrast, the panel data approach has been little applied to the analysis of international tourism demand. Panel data analysis has some relative advantages compared to econometric time series models. It incorporates much richer information, both of time series and cross sectional data. In fact, Ledesma-Rodriguez, Navarro-Ibáñez, and Pérez Rodríguez (2001) used the method of dynamic and static data Panel to model the demand for tourism in Tenerife. This study explores the impact of a new explanatory variable in tourism demand: the promotional expenditure. Authors find that advertising and marketing are significant factors as well as income, exchange rate, travel cost, and infrastructure.

Furthermore, Naudé and Saayman (2005) have used panel data to study the international tourism demand in 43 African countries in order to address traditional econometric problems in cross-country regressions such as unobserved country effects, outliers, endogeneity, dynamics and model uncertainty. Findings highly recommend that political stability, tourism infrastructure, marketing and information, and the level of development at the destination are key determinants of travel to Africa. Typical factors of tourism demand, such as the level of income in the origin country, the relative prices and the cost of travel, are not significant in explaining the demand for African destinations. Hence, the authors suggest that attention should be paid to improving the general stability of the continent and the tourism infrastructure. Roget and Rodriguez-Gonzalez (2006) investigate the demand for rural tourism in Galicia (Spain) using panel data model and the number of overnight stays as dependent variable. Empirical results suggest that the number of overnight stays in rural tourism institutions depends mainly on economic determinants, such as the price of services in rural tourism establishments, the transport costs and the tourists' income. The latter reveals the highest elasticity. Besides the impact of economic determinants on rural tourism demand depends essentially on the status and distinctiveness of each institution. Similarly, Sakai, Brown and Mak (2000) applied the approach of panel data to analyze the effects of

demographic change on the Japanese propensity to travel. They find that age and cohort membership are determinant factors of Japanese international travel demand.

Other studies have used dynamic panel data model to take into account the changing structure of consumer preferences and to reflect the importance of consumer loyalty to the destination as a determinant of tourism demand. In fact, Garín-Muñoz and Montero-Martín (2007) propose to identify and measure the impact of the main determinants of the inbound international tourism flows to the Balearic Islands by estimating a dynamic model. The results suggest that the demand is heavily dependent on the evolution of economic activity in each of the origin countries and on the relative cost of living of tourists in the destination. This study also recommends the diversification of tourism products and the provision of high-quality services.

Tourism demand in the Canary Islands has been also studied by Garín-Muñoz (2006) using a Generalized Method of Moments estimation of a dynamic panel model in view of unobserved country-specific effects. The preferred model is the GMM-DIFF proposed by Arellano and Bond to deal with problems arising from the non-stationarity of data. The author concludes that tourism to Canary Islands is considered as a luxury service and is highly dependent on the evolution of relative prices and travel cost between origin and destination countries.

In their recent review of tourism economics research, Song et al. (2012) conclude that more attention should be paid to the dynamic version of panel data analysis. This paper aims to investigate this field with the intention to provide a better understanding of international tourism demand with special reference to Tunisia. This research complements the existing literature by providing some contributions. First, we consider a dynamic model using a wide dataset of 47 generating countries. Second, according to the supply-induced demand theory, we consider tourism supply variables as determinants of tourism demand. Our empirical investigation provides to planners essential information about the strategy to follow in order to increase tourism flows in the destination and preserve its share markets. Finally, we examine the effects of some one-off events on international tourism demand over the period 1994–2012 such as the the September 11th attacks and the Arab Spring.

The remainder of the paper is organized as follows. Section 2 provides an analysis of the main features of the tourism demand in Tunisia. Section 3 presents the econometric methodology. Section 4 describes the data. Section 5 discusses the empirical results. Section 6 concludes and presents a number of policy implications.

2. Methodology

As a first step, we examine the international demand for Tunisian tourism by estimating a linear regression in the following form:

$$Arrivals_{it} = \beta_0 + \beta_1 Arrivals_{it-1} + \beta_2 GDPPC_{it} + \beta_3 OP_{it} + \beta_4 SP_{it} + \beta_5 TC_{it} + \varepsilon_{it} \quad (1)$$

where $Arrivals$ is the international tourism demand for the Tunisian destination measured by the annual tourist arrivals from 47 origin countries; $GDPPC$ denotes the tourist income in the origin country measured by the GDP per capita. OP[1] represents the relative price of tourism in Tunisia. SP[2] defines the relative substitute price in Morocco, the main direct competitor of

[1] *OP* is the own price calculated as the ratio of the consumer prices index in Tunisia to the CPI in the origin country adjusted by the respective exchange rates: $OP_{it} = [(CPI_{Tunisia}\ \ EX_{Tunisia})\ \ (CPI_{it}\ \ EX_{it})]$.

[2] *SP* is the substitute price calculated as the ratio of the consumer prices index in Morocco to the CPI in the origin country adjusted by the respective exchange rates: $OP_{it} = [(CPI_{Morocco}\ \ EX_{Morocco})\ \ (CPI_{it}\ \ EX_{it})]$.

Tunisian destination. *TC* is the transport cost approximated by the price of crude oil. All variables are transformed to logarithms so that coefficients may be interpreted as elasticities.

Ouerfeli (2008) reveal that the international tourism demand is often measured either in terms of the number of tourist arrivals, tourist bed-night or in terms of tourist expenditure in the destination country. As shown in Eq. (1), our dependent variable is the tourist arrivals which is the most used variable to explain the tourism demand (Ouerfeli (2008), Li et al., (2005); Wong et al., (2007); Song et al., (2003); Kulendran et King (1997)). This variable takes into account the number of visits; the flow of tourists; the number of tourists and leisure travelers in independent travel (scheduled) travel lumpsum (charter flights) and travel by land or sea. We introduce is the lagged number of tourist arrivals $Arrivals_{it-1}$ to control for persistent arrivals dynamics. We use the annual real GDP per capita $GDPPC_{it}$ to measure the income level of an origin country. The own-price variable OP_{it} reflects the costs of tourism activities in Tunisia relative to those in the source country. This variable is crucial when choosing between domestic and international tourism. However, the substitute price SP_{it} reflects the costs of tourism activities in Tunisia relative to those in Morocco, the main direct competitor of Tunisian destination. OP_{it} and SP_{it} variables are adjusted by exchange rate to capture as well the effect of effective prices of goods and services in Tunisia as the impact of inflation and exchange rate movements. Transport cost refers to the cost of travel between the origin and the destination countries. We use crude oil price which is a good proxy as well for air transport cost as land transport cost (Garín-Muñoz and Montero-Martín, 2007).

The presence of lagged tourist arrivals in the regression puts our model inside the context of dynamic panel models, and efficient estimators are given through the generalized method of moments (GMM). To avoid spurious regression due to non-stationary variables, we apply the difference GMM estimator proposed by Arellano-Bond (1991) on the first-difference transform of Eq. (1):

$$\Delta Arrivals_{it} = \beta_1 \Delta Arrivals_{it-1} + \beta_2 \Delta GDPPC_{it} + \beta_3 \Delta OP_{it} + \beta_4 \Delta SP_{it} + \beta_5 \Delta TC_{it} + \varepsilon_{it} \quad (2)$$

This estimator takes the first difference for each period in order to remove the specific country effect. Under the assumption that the error ε_{it} is serially uncorrelated, valid instruments for the equation in first difference are levels of the series lagged at least two periods. The difference GMM estimates can be based on either a one-step or a two-step estimator. In the one-step estimator, the error term ε_{it} is assumed to be independent and homoskedastic across countries and time. In the two-step estimator, the residuals of the first step are used to consistently estimate the variance-covariance matrix of the residuals, relaxing the homoskedasticity assumption. So, we use the two step estimator which is asymptotically more efficient than the first step estimator.

An important step that is relevant for the estimation of our model is to conduct M2, Sargan and Hansen tests. The M2-test checks problem regarding the second-order serial autocorrelation of the error terms. The Sargan test verifies that the instruments used are not correlated with the residuals. The Hansen test of over-identification provides statistics for weak instruments test.

Following Ouerfelli (2008) and Dupont (2006), we use the tourism supply as a determinant of international tourism demand in the case of the supply-induced demand theory. Favorable nature and climate as well as a rich cultural product do not guarantee systematically the choice of a destination. To ensure customer loyalty, the tourism stakeholders should provide adequate infrastructure and show great hospitality. Thus, in a second step, we introduce a set of explanatory variables in Eq.(2) that measure the tourism supply in Tunisia. Therefore, we estimate a regression model in the following form:

$$\Delta Arrivals_{it} = \beta_1 \Delta Arrivals_{it-1} + \beta_2 \Delta GDPPC_{it} + \beta_3 \Delta OP_{it} + \beta_4 \Delta SP_{it} + \beta_5 \Delta TC_{it} + \beta_6 \Delta X_{it} + \varepsilon_{it} \quad (3)$$

The set of supply indicators (X_{it}) include, firstly, the accommodation capacity (AC) measured by the hotel capacity, we use the annual average capacity put into operation, which is equal to the total number of beds divided by the total number of hotels. In fact, the accommodation capacity can affect potential demand by reflecting the quality of the product and by giving a brand image of the destination. Secondly, we use the number of flights (*NF*) offered by airline companies as a proxy of the air supply which constitutes an important component of the tourism offer. Thirdly, we introduce (*Tourism Invest*) to examine the effect of tourism investment on the international tourism demand in Tunisia. Finally, (*A agencies*) and (*B agencies*) are two indicators that measure the tourism supply by travel agencies types A and B. Travel agencies type A are tour operators who organize and sell travels and trips; whereas travel agencies type B just sell travel products offered by agencies type A. (*A agencies*) and (*B agencies*) are measured respectively by the number of tourism agencies types A and B.

Finally, international tourism demand in Tunisia has experienced several exogenous shocks during the last two decades. We propose to examine some one-off events with dummy variables. D_{2002} considers jointly the effect of the events of September 11, 2001 and the effect of terrorist attacks of Djerba (Tunisia) in April 2002. Dummy variable, D_{2011}, takes into account the impact of the Tunisian revolution.

3. Data

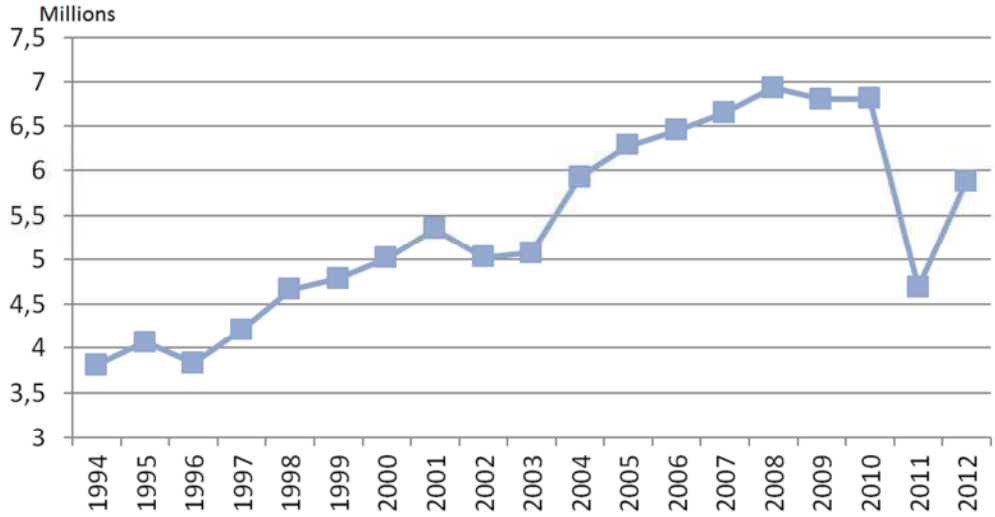
We use annual data of 47 tourists' generating-countries to Tunisia. Table A1 in the appendix shows the countries included in the sample by region. The study is conducted on annual Tunisian data covering the period from 1994 to 2012.

Tourism data are provided by the National Office of Tunisian Tourism while macroeconomic data are obtained from the statistical base "*International Financial Statistics*" of the International Monetary Fund (IMF) and from the WDI-World Bank Development Indicators statistics. A summary of the sources and definition of the variables are presented in in table A2 in the appendix.

Fig.1 shows that the overall trend of international tourist arrivals to Tunisia over the period 1994-2012 is characterized by a sustainable growth with some significant shocks. The annual international tourist arrivals in Tunisia over the period 1994-2012 have evolved at an average annual growth rate of 3.1%. Indeed, International tourism demand in Tunisia has recorded a significant decline of 6% in 2002 following the events of September 11, 2001 in the United States, which have especially affected the international tourism for air travel, but also following the attacks in Djerba (Tunisia) in April 2002, affecting all source markets.

In addition, the year 2009 was marked by a decrease in the international tourism demand in Tunisia of 2%. Indeed, this is due to the negative effects of the global economic crisis on the purchasing power in the main tourist-generating countries, particularly the European markets: the most important inbound markets for Tunisia.

Fig.1. Evolution of international tourist arrivals to Tunisia (1994-2012).



Source: Self-elaborated from ONTT database

Finally, the recent crisis following the revolutionary events of January 14, 2011 represents the biggest crisis in the history of Tunisian tourism. Although the revolution is finished as such, a confidence crisis of tourists has been costly to the country that is known as a favorite destination for customers looking for a low price. In fact, Fig. 1 shows a significant drop in tourist flows in the order of 31.2% in 2011.

Table 1 : Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Arrivals	893	113627.2	276068.3	215	1995236
GDPPC	866	22584.39	16209	1064.18	74021.45
OP	853	7.65	96.34	0.00055	2447.315
SP	853	75.38	993.59	0.004	25267.67
Transport Cost	893	46.914	29	14.41	99.58
AC	893	174871.1	18512.39	136587	197831
NF	893	90327.4	11565.39	70318	109156
Tourism Invest	893	309346.7	69508.07	204559	449100
A agencies	799	367.23	150.58	170	618
B agencies	799	98.76	23.41	66	142

Tables 1 and 2 report the summary statistics and the pair-wise correlation for all variables, respectively. The descriptive statistics show a high variability of tourist arrivals across the 47 countries in our sample over the period 1994 to 2012. The minimum and maximum arrivals are respectively from Qatar in 1994 and Libya in 2009. Otherwise, we note that the mean of GDP per capita of tourist in Tunisia is approximately 22584 $ with high standard deviation of 16209 $. This means that Tunisian tourism market is positioned as a low cost destination but also attracts wealthy tourists seeking luxury tourism.

Regarding tourism prices, summary statistics show that the relative price of tourism in Morocco is approximately 10 times more expensive than in Tunisia. This observation can be

explained by the diversity of the tourist offer in Morocco (beach, cultural, saharian, event, business…) unlike in Tunisia where the offer is focused on mass seaside tourism.

Table 2 : Pairwise Correlation Matrix

	Arrivals	GDPPC	OP	SP	Transport Cost	AC	NF	Tourism invest	A Agencies	B Agencies
Arrivals	1									
GDPPC	0.30	1								
OP	0.02	0.38	1							
SP	0.02	0.37	0.79	1						
Transport Cost	0.05	0.12	0.06	0.02	1					
AC	0.05	0.11	0.09	0.01	0.86	1				
NF	0.06	0.11	0.06	-0.02	0.88	0.86	1			
Tourism invest	-0.06	-0.08	-0.05	0.00	-0.60	-0.77	-0.62	1		
A agencies	0.05	0.12	0.07	-0.01	0.91	0.90	0.89	-0.52	1	
B agencies	0.04	0.11	0.06	-0.01	0.82	0.82	0.81	-0.51	0.94	1

The correlation matrix presented in table 2 shows that outcomes are consistent with the economic theory predictions. Tourist arrivals are positively correlated with all variables except tourism investment. This can be explained by the lagged effect of tourism investment on international tourism demand. Furthermore, GDP per capita is positively correlated with relative price of tourism in Tunisia and in Morocco.
Moreover, the results reported in the table 2 show that relative price of tourism in Tunisia is positively and highly correlated with substitute price in Morocco.

Table 3 reports the outcomes of a panel-data unit root estimation based on the Im, Pesaran and Shin (2003) test. The results indicate that the non-stationarity null hypothesis is not rejected at

Table 3: Panel-data unit root test (Im, Pesaran and Shin,2003)

$\bar{t}$ Statistic	**Arrivals**		**GDPPC**		**OP**		**SP**		**Transport Cost**	
	Level	***First Diff***	***Level***	***First Diff***	***Level***	***First Diff***	***Level***	***First Diff***	***Level***	***First Diff***
No time effects	-1.29	-2.06*	-1.20	-2.44*	-1.69	-4.24*	-0.46	-1.69*	-0.63	-1.69*
Trend	-1.69	-2.47*	-1.40	-3.48*	-1.82	-3.76*	-0.69	-1.92*	-2.33*	-2.68*

(*)The non-stationarity null hypothesis is rejected at the 5% significance level.

the 5% significance level for all variables. Nonetheless, the null hypothesis, that the panel series has a unit root, is rejected for the first differences for all variables. Thus, it can be said that all variables are integrated of the first order. This finding justifies the use of difference GMM estimator.

4. Results and Discussion

The results from estimating Eq. (2) are reported in Table 4. Column (1) presents standard OLS regression which is used as a benchmark. Two steps difference GMM regression for the overall sample is reported in column (2). The results of OLS regressions provide evidence that all variables have the expected sign and are tightly estimated. The column (2) regression confirms the previous finding when first difference GMM regression is used to avoid omitted variable and endogeneity biases. It should be noted that the estimated coefficients by difference GMM are short-run demand elasticities. The results reveal that the lagged dependent variable has a significant effect on the demand of inbound tourism. This finding

suggests that the word-of-mouth effect and habit persistence are important features in the demand for Tunisian tourism. The major implication of this finding is that provision of high quality tourism services is crucial for attracting new and repeat tourists to Tunisia.

Table 4: International Tourism Demand in Tunisia
Dependent variable: The number of tourist arrivals in Tunisia

Regressions	OLS	Two Step Difference GMM		
	Overall sample	Overall sample	Europe	MENA
	(1)	(2)	(3)	(4)
$Arrivals_{t-1}$	0.981***	0.219***	0.309***	0.315***
	(4.02)	(3.07)	(3.1)	(4.79)
GDPPC	0.017***	1.66***	1.40***	2.19***
	(2.14)	(3.17)	(2.45)	(2.86)
OP	-0.515***	-0.48***	-0.761***	-0.529***
	(-3.06)	(-2.49)	(-4.78)	(-3.41)
SP	0.5***	0.6***	0.844***	0.528***
	(2.9)	(3.19)	(5.4)	(2.91)
Transport Cost	-0.132***	-0.042*	-0.046**	-0.27
	(-2.57)	(-1.83)	(-2.00)	(-1.49)
R-squared	0.966			
F Test (p-value)	0.000			
Wald Test		0.000	0.000	0.000
M2 Test		0.781	0.621	0.795
Sargan Test		0.228	0.153	0.308
Hansen Test		0.308	0.374	0.488
N. Countries	47	47	27	16
N. Observations	788	738	452	218

T-Student are reported in parentheses. ***, **, and * indicate significance levels at 1, 5, and 10 percent, respectively. For the M2 test for autocorrelation, the null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation. For Sargan test, the null hypothesis is that the instruments used are not correlated with the residuals. For the Hansen test of over-identification, the null hypothesis is that the instruments used are not potentially weak by many instruments. For Wald Test, M2 test, Sargan Test, and the Hansen test the p-values are reported.

The estimated coefficient for the income variable has the expected sign. According to the estimated elasticity value (1.66), tourism in Tunisia is considered by international tourists as a luxury service. Although surprising, this can be explained by the emergence of new luxury tourism products in Tunisia as direct substitutes for seaside tourism, such as Spa, Saharian, cruising and cultural tourism, etc. Furthermore, empirical results show that tourism in Tunisia is significantly dependent on price. The relative price elasticity suggests that tourism arrivals to Tunisia are not very responsive to price changes. In fact, according to the estimated value, a 1% increase in prices would lead to a 0.48% decrease in the number of arrivals. As Morocco is the main direct competitor of Tunisia, the substitute price in this destination is taken into account. The magnitude of the elasticity implies that Tunisia and Morocco are substitute destinations. Therefore, tourism planners must consider this information to maintain or improve price competitiveness. In this respect, several rival destinations, in particular Morocco, are making major efforts to improve the price-quality ratio of their supply. Estimations outcomes reveal that the transport cost is also a significant determinant of tourism demand for Tunisia. This finding may be explained by the important share that travel represents in the total expenditure of holidays to Tunisia.

As a robustness check, we examine whether the results of GMM estimates change across sub-samples. Thus, a test of spatial stability of the coefficients is proposed in columns (3) and (4) of Table 4. Results show that the estimated coefficients are robust and appropriately estimated for our full sample and for the subsamples. Estimates outcomes reveal that European tourists

are more price sensitive than those from MENA countries. Whereas, an increase in the cost of transport affects less European arrivals than arrivals from MENA region. This can be explained by the proximity of Tunisia to the Europe and an abundant air supply to this region.

Table 5 reports the estimations results of Eq. (3) that focuses on the effect of tourism supply components and one-off events on international demand for tourism in Tunisia. Columns (1) to (4) report Difference GMM estimates with a set of supply indicators introduced one by one. Columns (5) and (6) present regressions with one-off events, namely the effect of the events of September 11, 2001; the terrorist attacks of Djerba in April 2002 and the impact of the Tunisian revolution of 2011.

Table 5: International Tourism Demand in Tunisia
Difference GMM estimates, Two-step results
Dependent Variable: The number of tourist arrivals in Tunisia

Regressions	(1)	(2)	(3)	(4)	(5)	(6)
$Arrivals_{t-1}$	0.258***	0.266***	0.223***	0.235***	0.216***	0.247***
	(8.73)	(9.67)	(7.26)	(8.78)	(6.24)	(6.95)
GDPPC	1.96***	2.13**	2.39***	2.49**	2.26**	1.93***
	(2.91)	(1.95)	(2.35)	(2.24)	(2.12)	(2.09)
OP	-0.516***	-0.58***	-0.41***	-0.59***	-0.44**	-0.518***
	(-2.63)	(-2.50)	(-4.77)	(-4.31)	(-1.95)	(-2.85)
SP	0.515***	0.68***	0.49***	0.62***	0.48**	0.55***
	(2.35)	(3.97)	(2.91)	(2.78)	(2.29)	(2.70)
Transport Cost	-0.071**	-0.136*	-0.096	-0.055	-0.025	-0.014
	(-1.95)	(-1.81)	(-1.05)	(-1.02)	(-1. 7)	(-1.6)
AC	1.44***					
	(2.57)					
NF		1.27**				
		(2.10)				
Tourism Invest			0.34***			
			(2.42)			
A agencies				0.28***		
				(4.20)		
B agencies					0.217	
					(0.97)	
D_{2002}						-0.163***
						(-3.82)
D_{2011}						-0.559**
						(-2.32)
Wald Test	0.000	0.000	0.000	0.000	0.000	0.000
M2 Test	0.676	0.919	0.601	0.739	0.584	0.538
Sargan Test	0.263	0.197	0.555	0.395	0.468	0.165
Hansen Test	0.284	0.338	0.299	0.202	0.547	0.386
N. Countries	47	47	47	47	47	47
N. Observations	738	738	738	648	648	738

T-Student are reported in parentheses. ***, **, and * indicate significance levels at 1, 5, and 10 percent, respectively. For the M2 test for autocorrelation, the null hypothesis is that the errors in the first-difference regression exhibit no second-order serial correlation. For Sargan test, the null hypothesis is that the instruments used are not correlated with the residuals. For the Hansen test of over-identification, the null hypothesis is that the instruments used are not potentially weak by many instruments. For Wald Test, M2 test, Sargan Test, and the Hansen test the p-values are reported.

In fact, according to the supply induced demand theory, the high significant estimated elasticity values of the accommodation capacity and the number of flights offered by the airline companies show the importance of the supply variable in the demand model for overall sample. With regard to tourism investment, it should be noted that it measures as well the government investment in the tourism sector, including all infrastructure and activities that have a direct influence on the tourism attractiveness and advertisement, as private

investment such as hotels, travel agencies, thalassotherapy center, coffee houses, restaurants, advertisement, etc. Despite the significant impact of this variable, estimation results reveal that Tunisian tourism is less sensitive to tourism investment than to the accommodation capacity and to the air supply.

The number of travel agencies type '*A*' has a significant positive impact on international tourist arrivals to Tunisia; in contrast to agencies type '*B*' that have a non-significant effect. This is can be explained by the fact that travel agency type '*A*', also known as tour-operators, which offers package tours, either directly or through resellers-retailers, improves the destination image by attracting visitors and providing new services; especially as travel agencies type '*A*' have a strong bargaining power and efficient marketing communication methods.

Finally, the dummy variables representing the impact of the terrorist attacks in USA and in Djerba (Tunisia), D_{2002}, and of the Tunisian revolution, D_{2011}, have the expected negative signs and both are significant. It is an incontestable fact that safety and security issues gained a much bigger importance in the last two decades in tourism. To mitigate the negative impacts of safety and security incidences on the tourism industry, practitioners must seek new strategy. In fact, after those events, the tourist behavior has changed. In the new situation, an increase in domestic tourism (people stay in their own country, visiting friends and family) and a decrease in long-haul destinations, reachable by air, have been detected.

An important step that is relevant to the estimation of our model is to conduct M2, Sargan and Hansen tests. The M2 test confirms the absence of a second-order serial correlation of the residuals in the differenced regression. The Sargan test confirms no correlation between the used instruments and the residuals. In addition, the Hansen test does not detect any problem regarding over-identification restrictions and confirms the validity of variables in difference and in levels as instruments in two-step difference GMM. Therefore, all tests show that our estimations are robust.

5. Conclusions and Policy Implications

Tourism sector in Tunisia is an important component of economic activity. It makes an important contribution to GDP, trade balance and providing jobs for Tunisian economy. For better control of tourism demand fluctuations in Tunisia, our paper investigates the main determinants of the international tourism demand in Tunisia. The empirical study is based on estimations of difference GMM dynamic panel data model. Using a sample of 47 tourist-generating countries over the period 1994-2012, empirical results reveal that the lagged dependent variable has a positive and significant effect on the demand of inbound tourism. This finding proves that consumer loyalty is a key determinant for foreign tourism demand in Tunisia.

Estimations put in evidence that tourism demand in Tunisia is very sensitive to prices. Hence, decision makers in the tourism sector must be cautious when fixing prices in order to maintain the competitiveness of the Tunisian destination. It is also important to control the quality/price relationship and to improve the quality of services. The estimated coefficient of short-run income elasticity suggests that tourism to Tunisia is considered by foreigners as a luxury service. Although surprising, this can be explained by the emergence of new luxury tourism products in Tunisia as direct substitutes for seaside tourism, such as Spa, Saharian, and cultural tourism, etc. Furthermore, the estimated elasticity of substitute price of tourism in Morocco provides evidence that Tunisia and Morocco are substitute destinations. Therefore, tourism planners and practitioners must consider this finding to enhance price

competitiveness by improving the price-quality ratio of Tunisian tourism supply. Moreover, tourism demand in Tunisia is also sensitive to the transport cost. This is may be explained by the important share that transport represents in the total expenditure of holidays to Tunisia.

Although a large literature examines the effects of income and price factors on tourism demand variation, there are very few studies investigating the tourism supply as determinant of international tourism demand according to the supply-induced demand theory. In order to improve these results, we use a set of supply indicators including the accommodation capacity, the number of flights offered by the airline companies, the tourism investment and the number of travel agencies type A and type B. The results provide an empirical evidence of the supply induced demand hypothesis. Indeed, the supply factor is significant in the destination choice decision. To consolidate their market shares and improve the attractiveness of their destination, practitioners must diversify the supply and improve the quality of tourist services. External shocks (e.g., terrorist attacks, the Tunisian Revolution) may have a meaningful impact on tourism demand in Tunisia. For instance, practitioners must adjust their strategy in situations of political instability where people tend to substitute long-haul by short-haul destinations, and destinations reachable by land transport, are favored to those involving air travel.

Finally, the qualitative component of tourism demand is very important since tourism is a service sector. Our regressions omit qualitative variables such as the quality of services, security and communication which significantly determines the tourist demand. Unfortunately, data on qualitative features of tourism demand are not available for the Tunisian tourism industry. We recommend to National Office of Tunisian Tourism to implement data collection system using electronic questionnaires at territory exit point. These data will be very useful to model and predict international tourism demand.

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Appendix

Table A1. List of origin countries by region

Europe			MENA		Various Markets		
West Europe	**Central and East Europe**	**Scandinavian countries**	**Middle East**	**Arab Maghreb**	**North America**	**Africa**	**Japan**
France	Serbia	Sweden	Saudi Arabia	Algeria	USA	Africa	Japan
Germany	Russia	Denmark	Syria	Libya	Canada		
UK	Czech	Norway	Iraq	Morocco			
Italy	Slovak	Finland	Lebanon	Mauritani			
Switzerland	Bulgaria		Jordan				
Belgium	Hungary		Kuwait				
Netherlands	Poland		Sudan				
Austria	Romania		Yemen				
Spain	Turkey		Qatar				
Luxembour			Bahrain				
Greece			Oman				
Portugal			UAE				
Ireland			Egypt				
Malta							

Table A2. Definition of Variables

Variable	Definition	Measure	Source
Arrivals	the international tourism demand for the Tunisian	Annual tourist arrivals in Tunisia	ONTT
GDPPC	The tourist income	GDP per-capita (constant 2005 US$)	WDI
OP	The relative price of tourism in Tunisia	$OP_{it} = [(CPI_{Tunisia}\ \ EX_{Tunisia})\ \ (CPI_{it}\ \ EX_{it})]$	IFS
SP	The relative substitute price of tourism in Morocco	$OP_{it} = [(CPI_{Morocco}\ \ EX_{Morocco})\ \ (CPI_{it}\ \ EX_{it})]$	IFS
TC	The transport cost	The price of crude oil	IFS
AC	The accommodation capacity	The annual average hotel capacity put into operation	ONTT
NF	The air supply	The number of flights offered by airline companies	ONTT
Tourism Invest	Tourism investment	Annual investment in Tourism sector (constant LCU)	ONTT
A agencies	The tourism supply by travel agencies having license A	The number of tourism agencies type A	ONTT
B agencies	The tourism supply by travel agencies having license B	The number of tourism agencies type B	ONTT