Tourism Demand, Oil Price Fluctuation, Exchange Rate and Economic Growth: Evidence from ARDL Model and Rolling Window Granger Causality for Tunisia

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Abstract: *The paper examines the relationship between tourism demand and its macroeconomic determinants (GDP, oil price, exchange rate) with an aim to test the dynamic interdependence between them in the case of Tunisia. Using yearly data from 1971 to 2014, the output of the ARDL model and the more recent Bootstrap rolling window Granger causality tests show important results with great economic implications for researchers, regulators, investors, … The results substantiate, especially, the following causal relationships, i.e. i) tourism-demand induces substantial increase in both economic growth and oil price, ii) economic growth led tourism demand, iii) increase in oil price affects negatively the tourism demand, iv) tourism demand and exchange rate are not significantly associated.*

Keywords*: Tourism demand, GDP, Oil price, ARDL, Bootstrap Rolling window*

JEL Classification*: O40, L83, P1.*

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Introduction

Tunisia is one of the most important places for European tourists with more than 56% over the period starting the year 2000 of arrivals are European (about 78% in 2009)[i]. The increasing arrival of European tourists is due the diversification in the tourist offers (beach tourism, Saharan tourism, health and thalassotherapy tourism, golf tourism…). Tourism plays a vital role in income and job creation. It weighs 6% of GDP and employs approximately 386,000 jobs, including 96,000 direct and 290,000 indirect jobs in 2009, according to the National Office of Tunisian Tourism[ii]. It represents the first foreign exchange earner (revenue reached 3471.9 million dinars, i.e. about 1928 million Euros). It contributes about 12.9% to cover the trade deficit. This activity creates an economic surplus in the country. The amount tourism investment is estimated to 309.3 million dinars in 2009. The average share of tourism investment in Gross Fixed Capital Formation (GFCF) is 4.4% during the period 2008-2009. In addition, the tourism sector stimulates other vital sectors such as the food industry (10.61%), transport and communication (2.51%).

Backed by a constant effort of the State for the development of a modern infrastructure and a range of measures and fiscal and financial incentives, the accommodation offer has experienced rapid and consistent growth since the beginning of tourism development in Tunisia; the number of establishment spent 226 in 1971 with a capacity of 41 225 beds to 856 establishment with a capacity of 239900 beds[iii]. This evolution took place in parallel with the rise of the category of the hotel establishments. In fact, the classified hotels represent nearly 90% of the accommodation capacity. Other establishments are divided into holiday villages and unclassified hotels (about 5%), and in guesthouses (marginal: around 0.6%)[iv].

However, although the tourism sector's importance is gradually recognized and its positive effect on growth is warranted, its impact on economic development is still unclear. Indeed, the increasing numbers of tourist arrivals need extra amounts of energy either for transport or for air conditioning and heating.

The factors that affect the demand for tourism are diverse, ranging from international politics, energy price, and diplomatic relations to national policies. It is necessary to identify the key factors that influence tourism demand in order to effectively understand changes and trends in the tourism market, and create competitive advantages for the tourism. The tourist destinations are increasingly associated to the role played by the price for visitors in different market segments. Indeed, Price is an important factor to determine the tourism costs and tourism demand (Davis and Mangan, 1992; Lim et al., 2008). Tourism is clearly dependent

on oil, because of its inherent transport component (Becken, 2008). Additionally, there is a range of particular vulnerable tourism activities, such as recreational activities that depend substantially on fossil fuels (Becken and Simmons, 2002).

The linking between tourism demand and macroeconomic indicators has been analyzed in earlier studies under various aspects. Some studies have analyzed the relationship between tourism and energy consumption (Zaman et al. 2016; Lei Zhang and Gao 2016; Nepal, 2008; Katircioglu 2014). Other studies have analyzed the impact of the energy price fluctuation on tourism (Becken et al., 2003; Kelly and Williams, 2007). Some others have investigated the effect of tourism on economic growth (Min, 2013; Lee and Chang, 2008; Chang et al. 2012; Çağlayan et al., 2012). The social effect of tourism is analyzed through the relationship between tourism and health expenditures (Harrick, 2007; Smith and Forgione, 2007). Finally, the environmental requirements and climate changes are analyzed in several studies (Zaman et al. 2016; Kuo and Chen, 2009; Lin, 2010; Mayor and Tol, 2010; Berrittella et al., 2006; Köberl et al., 2015; Cai et al., 2011; Amelung and Moreno, 2012; Tapsuwan and Rongrongmuang, 2015).

The relationship between tourism demand and the economic fundamental such as the economic growth, oil price fluctuations and exchange rate is with greater importance for practitioners and government policy decision. However, analysis of the interrelation between these variables gives mixed results. Energy plays an important and strategic role in the structure of the economies. In fact, oil is considered the main driver of economic activity in the developed and developing countries. The increase in the tourism demand positively affects the economic growth. In the same way, economic growth requires more and more the energy for the transport, air conditioning and heating. On the other hand, the fluctuation in oil price affects negatively the tourism demand. In fact the fluctuation in oil price affect oil demand, since oil price increases induce substantial increase in the cost of service (transport, heating, …). Also, the increase in the value of the local currency against the foreign currency negatively affects the tourism demand. Moreover, price constitutes another important factor in tourists' destination choice (Crouch, 1994; Lim, 1997; Witt and Witt, 1995).

The aim of this paper is to examine the dynamic long-run and short-run linkages between the tourism demand and the macroeconomic fundamental based on the ARDL model and to test for the dynamic causality using the more recent Rolling window Granger causality tests for the case of Tunisia. Empirical findings show that tourism demand is highly sensitive to the economic development and oil price shocks. We find also that increases in tourism demand lead to the improvement of the economic development but at the same time to an increase in the total oil costs.

The remainder of this paper is organized as follows. In the second section, we provide a brief review of the related empirical literature. Section 3 provides the data description and the methodology. In section 4 we summarize the main results and their discussion. Finally, section 5 concludes.

Literature Review

The tourism sector has attracted the interest of a growing number of economists. Indeed, tourism revenues are considered as an alternative form of export that can contribute to improving the balance of payments of a country, promote employment and generate additional tax revenues (Durbarry 2002; West 1993; Uysal and Gitelson, 1994; Archer 1995).

Çağlayan et al. (2012) have analyzed the relationship between tourism and economic growth using the panel Granger causality analysis for 11 groups of countries. The results obtained by the authors are mixed. The causal relationship is bidirectional in Europe, while it is unidirectional going from GDP to tourism in America, Latin America & Caribbean and the rest of the World. In the East Asia, South Asia and Oceania countries, unidirectional causality going from tourism to the GDP is detected. However, no causal links are confirmed in Asia, Middle East & North Africa, Central Asia and Sub Saharan Africa. Lee and Chang (2008) analyzed the causal relationship between tourism and economic growth of OECD and non-OECD groups. Their study confirms a unidirectional causality from tourism development to economic growth in OECD countries and bidirectional causality in non-OECD countries.

Li et al. (2016) have examined the role of tourism in reducing regional income inequality in China from 1997 to 2010. To analyze this relationship, the authors used a spatiotemporal autoregressive model to capture spatial and temporal dependence as well as spatial heterogeneity between the variables. They concluded that tourism contributes more significantly to the economic growth of China. The authors have also provided evidence that domestic tourism can accelerate regional economic convergence faster than international tourism. According to Bowden (2005), "it is domestic, not international, tourism in china that is fueling support for small-scale, labor-intensive forms of tourism that lead directly to poverty alleviation in some areas" (Li et al., 2016). Domestic tourism is, therefore, more efficacious in promoting regional balanced development.

We note also the despite its positive impacts, the tourism sector has negative effects on several other sectors. Several empirical studies have examined the implications of tourism regarding environmental issues, such as its contribution to greenhouse gas emissions and global warming (Becken et al., 2001; Gössling, 2002, Becken, 2005;

Bode et al., 2003). In this perspective, Katircioglu (2014) has analyzed the effect of arrival tourism on energy consumption and environmental pollution in Turkey. He concluded that Tourism in Turkey exerts positive and statistically significant effects on CO2 emissions in the long- and the short-term. His results show that tourism development leads to significant increases in CO2 emissions and energy consumption, especially in the long-term. The CO2 emissions converge to the long-term equilibrium path significantly by a 91.01 percent speed of adjustment, owing to tourism development, energy consumption, and aggregate output.

Zaman et al. (2016) have examined the dynamic linkages between tourism, energy consumption and the EKC hypothesis in three diversified World's region, including thirty-four countries, during the period of 2005–2013. The empirical results show that the environmental hazards associated with the expansion of tourism sector are growing high. So, Tourism sector development should not be the cost of environmental degradation. Therefore, the policy makers should have to device ecotourism policies in the region.

As regards the energetic balance, the positive effect of tourism on energy consumption explains its negative effect on the deficit of the energy balance in the country. Particularly, the increase in energy demand together with the sharp increase in prices in 2008 have lead to extreme raise in operating costs for airlines. The global airline industry recorded consequently unprecedented losses increasing to nearly US$ 5.2 billion (International Air Transport Association, 2008). Due to these events induce substantially higher airfares and "lead likely to reductions in travel and cause tourists to shift from more distant to closer destinations" (Gillen, 2004).

The negative relationship between tourism and oil price is justified in the previous literature (Becken and Lennox, 2012; Becken, 2011; Yeoman et al., 2007). In testament to that, the United Nations World Tourism Organization (UNWTO) has expressed its concern regarding the negative effects of oil prices on tourism[v]. In fact, the UNWTO has concluded that high oil prices are affecting certain tourism industry segments (e.g. airlines, cruise lines, etc.) disproportionately more than others. In the same perspective, Becken (2011) analyzed the combined effect of oil price, namely the macroeconomic and microeconomic effect. The author concluded that the use of higher oil prices generally leads to higher inflation, while they negatively influence the country's income. From a microeconomic perspective, positive oil price shocks lead to a decline in disposable income. These developments will have an immediate and negative impact on tourism, mainly due to the fact that tourism is regarded as a luxury good (Lim et al., 2008; Nicolau, 2008; Dritsakis, 2004).

Becken and Schiff (2011) have analyzed the impact of transport prices on tourists' travel choices within New Zealand, finding that travel patterns are rather price-insensitive, but differ significantly between market segments based on tourist origins and other characteristics. A related study on price elasticities established quite different values for 18 international tourist market segments. This research also highlighted the importance of exchange rate both for arrivals to New Zealand and consumption of tourism products and services within the country (Schiff and Becken, 2011). It can therefore be assumed that an increase in prices (due to oil or other factors) will affect both the market composition and tourist behavior.

Data and Methodology

Data Description

To examine for the tourism demand impact of the economic growth, oil price and exchange rate, we use annual data over the period spanning 1971 to 2014. The following variables are used, i.e. the tourism demand consists in the number of tourist arrivals, the economic growth is measured in term of per capita GDP (in natural logarithm), the oil price is expressed in term real national price. The real national price is computed as the product of the nominal oil price and the exchange rate deflated by the consumer price index. The UK Brent nominal price is used as a proxy for the nominal oil price. Finally, the exchange rate proxy by the nominal exchange rate expressed in the number of national currencies for one USD unit. The data for the oil price and the oil production are obtained from the Energy Information Administration (EIA) database and the International Financial Statistics (International Monetary Fund). Finally the data for the macroeconomic data (producer price index, consumer price index, exchange rate) are compiled by the "Central Bank" of Tunisia.

Estimate Specification

In this section we try to enumerate the various steps required in order to perform the ARDL regression model. In a first step we are used to investigate the stationary properties of the variables. We employ the mostly used classical unit root tests, namely the ADF, PP, and KPSS. We investigate, in a second step, the existence of co-integration relationship between variables applying the Bounds test developed by Peseran et al. (2001). Once, the hypothesis of the existence of co-integration relationships is confirmed, the following step consists to investigate the long and short-run causality between the variables applying the ARDL model. The use of the ARDL model is motivated by at least four reasons. Firstly, it is applied irrespective whether the variables included in the model are I(0) or I(1). Secondly, it allows

investigating simultaneously the short-run and the long-run sensitivity of the dependent variable to the independent variables. The ARDL approach has in addition superior results in analyzing small samples compared to other classical co-integration approaches. The fourth advantages of applying ARDL approach is that it eliminates the endogeneity problems associated with the Engle-Granger technique (see. Al-Mulali et al., 2015 and Seker et al. 2015) since it assumes all the variables as endogenous.

The ARDL model specification for the impact of the independent variables (GDP, Oil price, Exchange rate) on the dependent variable (Tourism demand) is as follows:

$$TD_t = \alpha_0 + \sum_{i=1}^{q_1} \alpha_{1i} TD_{t-1} + \sum_{i=1}^{q_2} \alpha_{2i} GPD_{t-1} + \sum_{i=1}^{q_3} \alpha_{3i} OP_{t-1} + \sum_{i=1}^{q_4} \alpha_{4i} ExR_{t-1} + \varepsilon_t \qquad (1)$$

where TD is the tourism demand used as the dependent variable, GDP is the economic growth taken in natural logarithm and used as a first independent variable, OP is a oil price, taken in natural logarithm, used as a second independent variable, ExR is the nominal exchange rate expressed in the number of national currencies for one USD unit, and $\alpha = (\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4)$ is a vector of long run parameters to be estimated.

To examine for for the bounds test, the equation 1 can be formed in Unrestricted Error Correction model specification as indicated in equation 2.

$$\Delta TD_t = \alpha_0 + \alpha_1 t + \beta_0 TD_{t-1} + \beta_1 GDP_{t-1} + \beta_2 OP_{t-1} + \beta_3 ExR_{t-1} + \sum_{i=1}^{p} \gamma_i \Delta TD_{t-i} + \sum_{i=1}^{q} \theta_i \Delta GDP_{t-i} + \sum_{i=1}^{s} \varphi_i \Delta OP_{t-i} + \sum_{i=1}^{k} \delta_i \Delta ExR_{t-i} + \mu_t \qquad (2)$$

where all variables are as defined above, p, q, s, and k are lag orders and β_1, the aforementioned long-run impacts of the lagged GDP on the Tourism Demand, β_2 the aforementioned long-run impacts of Oil Price and β_3, the aforementioned

long-run impacts of Exchange Rate on tourism demand. $\sum_{i=1}^{q} \theta_i$ measures the short-run impacts of the GDP on the Tourism Demand, $\sum_{i=1}^{s} \varphi_i$ measures the short run influences of Oil Price on the Tourism and finally, $\sum_{i=1}^{k} \delta_i$ captures the short run influences the Exchanges Rate on the tourism demand.

For testing the existence of co-integration relationship, we estimate, in a first step, the equation 2 using the OLS method. We apply the general to specific procedures to define the final specification of the estimated model. In a second step we to test for the presence cointegration using the F-bounds test (Pesaran et al. 2001; Shin et al., 2014). The F-bounds approach consists to test for the null hypothesis that $\beta_0 = \beta_1 = \beta_2 = \beta_3 = 0$ using the Wald F-test.

Empirical Results and Discussion

From one hand, the estimates of the ARDL model require that no I(2) variable is involved. From the other hand, the rolling window Granger causality approach requires that the variables are I(1). For these two reasons, we are used to perform conventional unit root tests. The outcome of ADF, Phillips-Perron and KPSS unit root tests in level and in the first difference of the tourism demand, the national oil price, the GDP and the exchange rate are presented in Table 1. Based on these results we show that all variables included in our model are I(1). We are therefore able to continue our estimation process.

Table 1: Conventional Unit Root Tests

	ADF	PP	KPSS
In level			
Tourism demand	-2.0119	-1.9024	0.7998***
Oil price	-2.5099	-2.5107	0.6210**
GDP	-1.2841	-1.3376	0.8353***
Exchange rate	0.4978	0.3843	0.8180***
In difference			
Tourism demand	-6.5580***	-8.7381***	0.2931
Oil price	-6.1506***	-6.1506***	0.2017
GDP	-9.5966***	-9.0860***	0.1715
Exchange rate	-5.3933***	-5.3346***	0.1483

Since all variables included this analysis are I(1), we are used to start with the second step of our analysis and proceed by testing for the F-Wald test of cointegration. Table 2 reports the outcome of the ARDL lag length selection as well as the F-bound testing. The selection of the lag length order is based on the AIC information criterion. The F-bound statistic shows a Wald statistic significant at the 1% level.

Table 2: ARDL Lag Length Selection and F-Bound Test.

ARDL Model	AIC	SC	F Wald test	Lower-bound	Upper-bound
ARDL(4,5,3,2)	-1.134945	-0.229963	6.568856***	10% ----> 2.72 5% ---- > 3.23 1% ---- > 4.29	10% ----> 3.77 5% ---- > 4.35 1% ---- > 5.61

Note : Lower and Upper bound are selected from the Table CI(iii) Case III: Unrestricted intercept and no trend in Pesaran et al. (2001, p. 300). The ARDL lag length is selected based on AIC information criterion.

The results of the ARDL model estimates are reported in Table 3. Before analyzing the results of the estimates model, we are used to judge the adequacy of the dynamic specification on the basis of various diagnostic tests. We control therefore for the error normality, the serial correlation and the autoregressive conditional heteroskedasticity, and the structural stability using the graphs of the Cusum and Cusum of squares statistics. The diagnostic statistics are given in the lower of the Table 3. Based on these results, we show that our model surpass all diagnostic tests for error normality, serial correlation, arch effects. The Cusum and Cusum of the squares statistics graphs (Fig. 1 and 2) show also that the model surpasses the test of stability of parameters. There are no omitted variables in the model specification.

The next step, then, consists to discuss the results of the long- and short-run relation. A negative long-run impact of oil price on tourism demand is detected. While the long-run tourism demand impact of the GDP appears to be significant and positive. The exchange rate appears to have no significant long-run impact on tourism demand. In the short-run, the results indicate significant negative tourism impact of both lagged oil price and lagged exchange rate. The lagged economic growth appears to exert a significant and positive short-run impact on the tourism demand. This dynamic long-run and short-run relation between tourism demand from one hand and the macroeconomic fundamental, namely oil price, GDP, and exchange rate, from the other hand, are confirmed by the results of the full sample Granger causality tests (Table 4), the rolling window regression based causality tests (Figure 2).

Table 3: ARDL Estimates.

	Coefficient	t-Statistic
C	2.1521	0.7171
TD_{t-1}	-0.5468***	4.8930
GDP_{t-1}	0.6385***	3.7296
OP_{t-1}	-0.5006**	-2.6333
ExR_{t-1}	0.3200	1.1508
ΔTD_{t-4}	0.4133***	2.9263
ΔGDP_{t-1}	1.7949*	1.8595
ΔGDP_{t-2}	1.6991*	1.8764
ΔGDP_{t-3}	2.4521**	2.0877
ΔOil_{t-3}	-0.3051***	-3.9903
ΔOil_{t-5}	-0.2505***	-3.0869
ΔExR_{t-2}	-1.1116***	-3.2353
Diagnostic test		
R-square	0.6683	
Adjusted R-squared	0.5279	
DW	2.3571	
J-B (p-value)	0.7978 (0.6710)	
LM(1) (p-value)	2.5787 (0.1083)	
LM(2) (p-value)	5.3586* (0.0686)	
Arch(1) (p-value)	0.0963 (0.7562)	
Arch(1) (p-value)	2.8792 (0.2370)	

Figure 1: CUSUM for ARDL Model Estimates

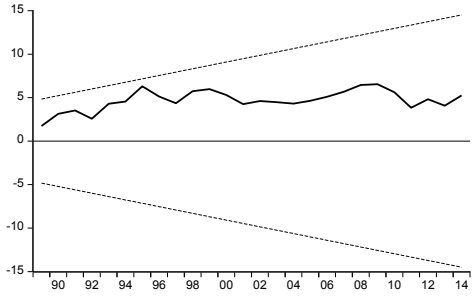


Figure 2: CUSUM of SQUARED for ARDL Model Estimates

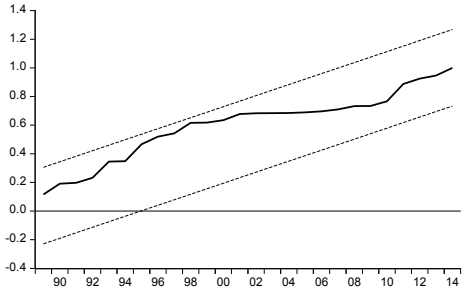


Table 4: Full Sample Bootstrap Granger Causality Test Between Oil Price, Gdp, Exchange Rate and Tourism Series

Equation for series: iv			Equation for series: dv		
Null hypothesis	LR-statistic	Bootstrap p-value	Null hypothesis	LR-statistic	Bootstrap p-value
GDP→ TD	11.049**	0.0100	TD →GDP	10.711**	0.0100
OP→TD	6.216***	0.0000	TD →OP	6.2785*	0.0813
ExRe→ TD	2.1008	0.3060	TD →ExR	3. 7024	0.2309

The results of the full sample Granger causality test between tourism demand and each of the macroeconomic fundamental included in our model (oil price, GDP, Exchange rate) show high important evidence. Bidirectional Granger causality is significantly detected between oil price and tourism demand and between GDP and tourism demand. We fail, however, to confirm the hypothesis of bidirectional or unidirectional Granger causality between tourism demand and Exchange rate.

The parameter stability tests appear to confirm and support the aforementioned results we obtained based on the dynamic regression (ARDL) and the Bootstrap Granger causality for the two bivariable relations: oil price – tourism demand and GDP-tourism demand. The Exchange rate-tourism demand appears to be unstable.

In the rest of the analysis we perform the more recent bootstrap rolling window Granger causality tests to examine for the causality between tourism demand and

each of its macroeconomic determinants we included in our analysis namely the GDP, the Oil Price and the Exchange rate[1].

In order to illustrate the bootstrap LR Granger causality between the Tourism Demand and each of the independent variables we included in the analysis, let's consider the following process of bivariate VAR(p):

$$Y_t = \phi_0 + \phi_1 Y_{t-1} + \phi_1 Y_{t-2} + \cdots + \phi_1 Y_{t-p} + \varepsilon_t, \qquad t = 1, \cdots, T \qquad (3)$$

where $\varepsilon_t = (\varepsilon_{1t}, \varepsilon_{2t})'$ represents a zero mean independent white noise process with nonsingular covariance matrix. The lag length (p) is determined based on the AIC information criterion. Y_t of the equation (3) can be divided in the two subvectors y_{1t} and y_{2t} that are related respectively to the dependent variable and for each independent variable. The equation (3) can be written as follows (equation 16):

$$\begin{pmatrix} y_{1t} \\ y_{2t} \end{pmatrix} = \begin{pmatrix} \phi_{10} \\ \phi_{20} \end{pmatrix} + \begin{pmatrix} \phi_{11}(L) & \phi_{12}(L) \\ \phi_{21}(L) & \phi_{22}(L) \end{pmatrix} \begin{pmatrix} y_{1t} \\ y_{2t} \end{pmatrix} + \begin{pmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{pmatrix} \qquad (4)$$

where $\phi_{ij}(L) = \sum_{k=1}^{p} \phi_{ij,k} L^k$, i,j=1,2 and L is the lag operator defined as $L^k x_t = x_{t-k}$. Let consider in this setting, y_1 the tourism demand and y_2 each of the independent variables included in the analysis (GDP, OP, and ExR). The null hypothesis that y_2 does not Granger cause y_1 can be tested, accordingly, by imposing zero restrictions $\phi_{12,i} = 0$ for i=1,…,p. In the same way, the null hypothesis that y_1 does not Granger cause y_2 can be tested, accordingly, by imposing zero restrictions $\phi_{21,i} = 0$ for i=1,…,p.

[1] For more details on the bootstrap Rolling windows Granger causality tests the readers can refer to Balcilar, et al. (2010) (to save space due to the large details on the technical analysis and the complete results reported hereafter, we tried to not report additional details but they still available upon request the authors.)

Table 5: Parameter Stability Tests

	Equation for series: iv		Equation for series: dv	
	Statistics	Bootstrap p-values	Statistics	Bootstrap p-values
GDP				
Sup-LR	7.85671**	0.0440	3.695630**	0.0115
Exp-LR	1.99238*	0.0830	6.50210***	0.0070
Mean-LR	3.91565*	0.0750	6.50210**	0.0271
OP				
Sup-LR	7.82265***	0.0032	3.659756**	0.051
Exp-LR	3.10030**	0.0155	5.72130**	0.0350
Mean-LR	6.14631*	0.0510	7.26750***	0.0060
ExR				
Sup-LR	1.485809	0.1750	1.340820*	0.0934
Exp-LR	2.49558*	0.0820	1.366630	0.2000
Mean-LR	0.83122	0. 3780	0.720374	0.32000

Figure 3 plots the p-value of the Bootstrap Granger causality tests for the bivariable relation between oil price and tourism demand (a and b) and the rolling window regression based on the causality test for the same variables (c and d). The Figure 4: (a) and (b) plot the p-value of the Bootstrap Granger causality tests for the bivariable relation tourism demand-GDP, while Figure 4: (c) and (d) plot for the same variables the bootstrap of the sum of the rolling coefficients for the impact of the GDP on tourism demand for the impact of tourism demand on GDP, respectively. At the same way, Figure 5 plots the p-value of the Bootstrap Granger causality tests for the bivariable relation between exchange rate and tourism demand (a and b) and the rolling window regression based on the causality test for the same variables (c and d).

The results of the rolling window Granger causality tests indicate a significant negative predictive power of oil price on tourism demand over the sub-period till 2002. The impact becomes insignificant after this date. The tourism impact of oil price was insignificant till 1994 and becomes significant and positive over the rest of the sample period. The negative impact of oil price on tourism demand is obviously due to the fact that oil price acts as inflationary factor. When the oil price increases dramatically, the costs of transportation heating and air conditioning increase accordingly. This negatively affects the tourism demand due to the increase in service delivery costs. The insignificant impact of oil price on tourism demand over the sub-

period starting the end 2002 is due to the fact that tourism has become cultural, medical and that the informational, cultural and health benefit that draw the visitor outweighs the additional costs generated by a positive change in oil prices.

The GDP appears to have significant positive predictive power on tourism demand over the period from 1994 to 2010. While the GDP impact of tourism demand is significant and positive over the whole period 1986-2015 with the exception to the years of the Arab spring revolution (i.e. 2010 to 2014) in which some turbulence in tourism demand accrued due to the terrorism effect. The Tourism represents thus a driver of economic growth. It constitutes in fact an economic development tool since it stimulates economic growth by generating income, employment, investment and exports. The positive impact of the GDP on Tourism demand is explained in terms of increases in infrastructure, investment cultural expenses and grants that require higher GDP and stimulates and spurs the Tourism demand.

The bidirectional effect of tourism demand and exchange rate remains unstable over the whole sample period. This is due to the government regulations and the local as well as international economic conditions and circumstances that impact the exchange rate. No evidence of global significant correlation is detected. Only some rare causal effects without important significance are detected. This finding confirms the results of the NARDL estimates and full sample Granger causality tests.

Overall, these results are with great economic implications for researchers, regulators, investors, … The results substantiate, especially, the following causal relationships, i.e. i) tourism-demand induces substantial increase in both economic growth and oil price, ii) economic growth led tourism demand, iii) increase in oil price affects negatively the tourism demand, iv) tourism demand and exchange rate are not significantly associated. Policy makers are accordingly incited to enhance the tourism service to spur the economic growth. In the opposite side, they are incited to spur the tourism infrastructure by spending more expenditure (increasing the share of GDP in tourism investment) to help investor in this pivotal sector in the economy, improving the quality of their service and thus attracting more arrivals.

Figure 3: Rolling Window Estimation Results for the Oil Price-Tourism Demand Relation.

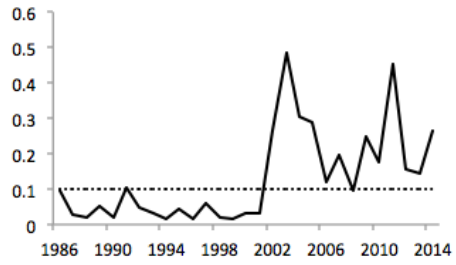
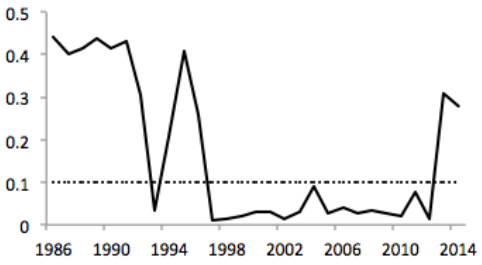
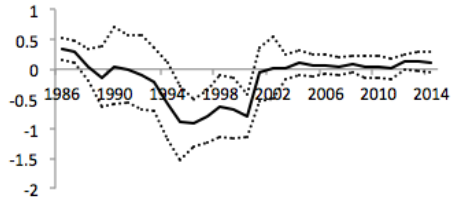
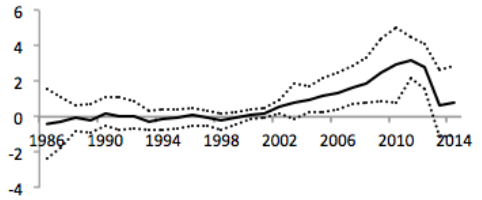
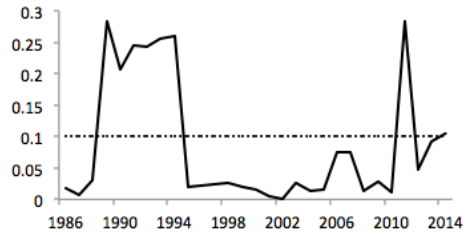
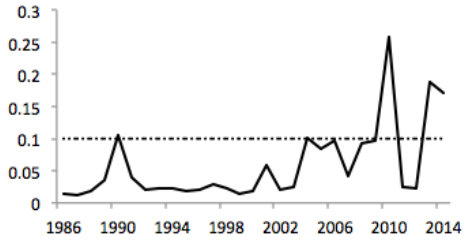
<table>
<tr><td>(a) Bootstrap estimate of the sum of the rolling coefficients for the impact of oil price on tourism demand</td><td>(c) Bootstrap estimate of the sum of the rolling coefficients for the impact of tourism demand on oil price</td></tr>
<tr><td> 
</td><td> 
</td></tr>
<tr><td>(b) Bootstrap p-value of LR test statistic testing the null hypothesis that oil price does not Granger cause tourism demand</td><td>(d) Bootstrap p-value of LR test statistic testing the null hypothesis that tourism demand does not Granger cause oil price</td></tr>
<tr><td> 
</td><td> 
</td></tr>
</table>

Figure 4: Rolling Window Estimation Results for the GDP-Tourism Demand Relation.

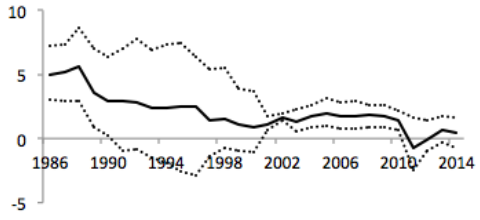
(a) Bootstrap p-value of LR test statistic testing the null hypothesis that GDP does not Granger cause tourism demand



(c) Bootstrap p-value of LR test statistic testing the null hypothesis that tourism demand does not Granger cause GDP



(b) Bootstrap estimate of the sum of the rolling coefficients for the impact of GDP on tourism demand



(d) Bootstrap estimate of the sum of the rolling coefficients for the impact of tourism demand on GDP

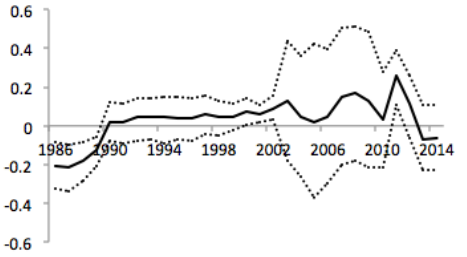
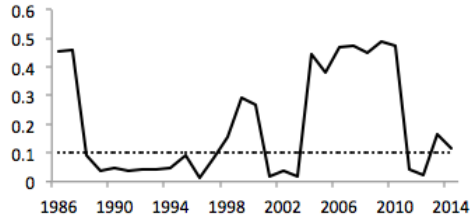
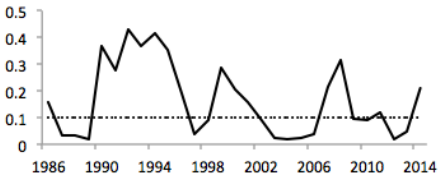
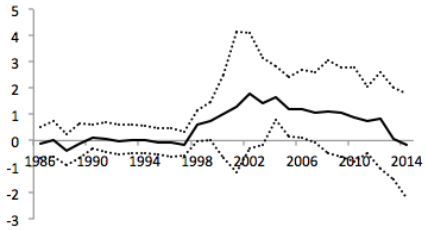
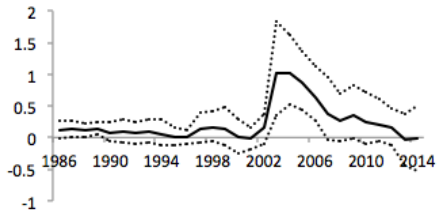


Figure 5: Rolling Window Estimation Results for the Exchange Rate-Tourism Demand Relation.

(a) Bootstrap p-value of LR test statistic testing the null hypothesis that Exchange rate does not Granger cause tourism demand	(c) Bootstrap p-value of LR test statistic testing the null hypothesis that tourism demand does not Granger cause Exchange rate
	
(b) Bootstrap estimate of the sum of the rolling coefficients for the impact of Exchange rape on tourism demand	(d) Bootstrap estimate of the sum of the rolling coefficients for the impact of tourism demand on Exchange rate
	

Concluding Remarks

The present paper investigates the dynamics between tourism demand from one hand and GDP, oil prices, and exchange rate from the other hand using monthly data for Tunisia. One of the contributions of our analysis to the existing literature on tourism demand and its macroeconomic determinants relationship consists in using cointegration approach termed as Autoregressive Distributed Lag (ARDL). This approach allows to examine the possible asymmetry in the short-run as well as long-run. The study has employed data for the period of 1971 to 2014.

The results of the ARDL estimation as well as those of the Bootstrap Rolling Window Granger causality converge to confirm the significant causal effect of GDP

and Oil price to Tourism demand. Overall, our findings serve as confirmation that the tourism demand is highly sensitive to the economic development and the oil price shocks from one hand. From the other hand, the tourism demand increases lead to the improvement of the economic development but at the same time increase the total oil costs due to the increase in oil based services.

Our findings confirm also that with the new development of the tourism industry and the governmental strategic orientation to medical and cultural tourism, the positive impact of tourism demand on the oil costs smoothen slowly and the positive impact on the GDP is enhanced.

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