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Libyan patients' medical tourism impact on a Sfax region polyclinic: ARDL co-integration approach analysis

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Abstract :

Since the Libyan revolution, most of the private Tunisian polyclinics have managed to live thanks to the Libyan patients. Therefore, there are important predictive motivations of these customers who have chosen Tunisia and precisely Sfax region as a favourite destination. It is in this framework that we tried to explain the increasing expenses of the Libyan patients in private polyclinics of Sfax. Relying on an Autoregressive-Distributed Lag (ARDL) model, we tried to explain the expenses on the basis of the Libyan patients' number and the amounts of the earned profits. Using monthly data over a period running from March 2007 to December 2013, our results show that health tourism cannot be the best means to attract the Libyan customers, and that motivating these customers to opt for this type of tourism remains a difficult task.

Keywords: Medical Tourism, Libyan patients, motivational, Autoregressive-Distributed Lag, costs.

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1. Introduction

Tunisia is famous for its coasts and beaches as a tourist destination. Undoubtedly, the most important tourist areas lie on the coasts and the political strategies have long worked to promote this choice. However, for various reasons (competition, economic crisis, the post revolution political and security context, and the equipment and infrastructure deterioration), the seaside tourism can no longer be enough to promote this sector and bring about the support that it used to have for the Tunisian economy.

Health tourism can be a good alternative especially as Tunisia has undeniable qualities in this field. Qualified, well-trained and experienced staff, natural resources conducive to the patients' recovery (regimes in the Northwest), satisfactory clinics and hotels accommodation capacity. This tourism potential, which is based on health-related services, is clearly perceived through the experience of Libyan patients in Tunisia and specifically in Sfax. Despite the problems experienced by this neighboring country, this experience can be generalized to conquer other regions and motivate other patient-clients. Based on an autoregressive delayed ARDL model, we tried to explain the expenditures according to the number of Libyan patients and the profit amounts.

The choice of our research theme was dictated by this context of crisis requiring urgent solutions. Indeed, this sector has been focused on seaside resorts for several decades, reflecting several signs of weaknesses. Similarly, this sector has for long been confined by a long-standing development strategy, namely: The standardized service inspired by the Fordian production model. This model derived its strength from mass production at low cost allowing for scale gains. This situation has led this sector contributers to reflect on an alternative tourism to solve its problems and requested the researchers community to define it as a dilemma that needs to be considered.

The sector of tourism is considered as one of the fundamental drivers of economic and social development in Tunisia. It contributes at the rate of 7% to GDP in 2009, generates from 18 to 20% of the foreign currency income per year, covers about half of the trade deficit and employs more than 400000 people, about 12% of the active population, providing them with direct and indirect jobs.

However, this sector, still restricted to the seaside, has already begun to show signs of regression during the last few decades. Actually, it remained confined to a past development strategy, consisting of the standardized service based on the Fordist productive model. This model drew its strength from a cheap mass production permitting gains of scale, regular and constantly developing wage policy, which stimulates the consumption of goods and services available on the market.

When Fordism based on the principle "we sell what we produce" was overthrown by Toyotism in the early seventies of the past century, the new strategy, relying on the "we produce what we sell" principle raised the standard of the varied production and all the global economy sectors gradually complied with this new rule. The tourism sector was no exception and it is now the customers' choices that dictate the type of product or service, its variety, and its range, among many others. Therefore, there is a diversification effort regarding the offered products such as particular tourist services in countries with deeply rooted tourism habits.

However, this crucial change did not take place in Tunisia. Tunisians have stubbornly kept on investing in the standardized range of services which attract only "poor" customers spending little and merely consuming the "natural" products (beach, sun, etc.) with low added value of working population employed seasonally and unwilling to become involved in providing a better service quality. Similarly, although attempts of opening on such types as 'alternative', 'cultural' or 'ecological' tourism have been reported from time to time, the statements remained reluctant.

Certainly, the political and economic authorities are aware of the need to redress the balance of this sector, diagnose its situation and introduce changes that could diversify the tourist products and improve its profitability. For this reason, one can cite the recommended study by the Tunisian Ministry of Tourism in 2009[1] to diagnose the situation and propose the necessary solutions. Unfortunately, as soon as the ministry began its implementation, a political earthquake hit the country in late December

[1] Statistical study "Tourisme à l'horizon 2016".

2010. Therefore, the socio-political tensions and particularly the ideological climate took us back to the starting point and even worsened the crisis the tourism sector itself was already suffering from.

During 2012-2013 the Tunisian tourist sector seemed to shift towards the 'halal' tourism conforming with the precepts of the "correct" Islam. Attempts were made to develop this vision in our country as it was the case in Malaysia, Singapore and Turkey. Some Tunisian politicians continued to nurture the idea that Islamic tourism is possible. Consequently, many highly-positioned political leaders at the top of the Tunisian State have taken decisions towards reconfiguring this sector. Having become a crucial issue in the global development policy, the religious pretext tends to overwhelm not only tourism but also other tightly-related sectors, such as food of wine industries. However, this orientation could only generate fairly odd paradoxes and might lead this vital sector of the Tunisian economy to bankruptcy. The new leaders claim a Muslim-Arab funded tourism whereas shareholding entrepreneurs, mainly from the Gulf countries, showed little or no interest in any type of tourism other than the seaside one. Neither Western nor Tunisian investors differ on this idea. They are both attracted by the guaranteed gain and low risk: the seduction of money has no color or religion.

As consumers, these same citizens of Gulf countries do not consider Tunisia as a privileged destination. Nor do they consider its products and "cultural" tourism services as high quality goods and services. It is rather the neighboring "Algerian and Libyan" customers who flock in large numbers to Tunisia during the summer and even the winter. Western as well as Tunisian investors pursue profits in any project they launch. They are both attracted by the guaranteed gain and low risk: the seduction of money has neither color nor religion.

For many consumers Tunisia is not a privileged destination. It is rather the neighboring "Libyan" customers who flock in large numbers to Tunisia for their health care.

A second paradox can be easily deduced consisting in the fact that, health tourism, which suffers from many difficulties, has recovered some of its losses thanks to the Libyan patients seceding in some private polyclinics in Tunisia.

Throughout our study, we tried to answer two hypotheses:

- Hypothesis 1: Libyan customers are motivated for the health tourism;
- Hypothesis 2: Health tourism is the best means to attract Libyan customers.

Given the importance of the studies targeting the promotion of medical tourism, we tried, in a second section, to analyze the theoretical foundations of the tourists' behavior. In the third section, the ARDL model results and interpretations were introduced. These study conclusions were drawn and discussed in the last section.

2. Literature review

In his introduction of "Body and Society", Roberts (2011) pointed out that "medical tourism" describes a "social and medical reality actively promoted by Governments and private companies. In this context, he rather referred to a discussion related to globalization, mobility, neo-liberalism and health systems than to an actual anthropological terminology. As for the relationship between migration and health issues, it has always been referred to, in France at least, the "migrants' health. Fassin (2000) pointed out how this theme was developed around two approaches: that of discrimination, establishing a polyclinic "Apart", and that of "naturalization", due to the primacy given to the biological consequences only of situations that primarily reflect social, economic and political reasons.

According to Roberts (2013), "medical tourism" is often associated with travelling elsewhere to receive medical care. However, both 'medical tourism ' and 'health migration' implicitly reflect the distinction between the "rich" and the "poor" according to Musso (2009). The use of the word 'mobility', itself therefore, is just an attempt to solve the above mentioned problem schemes.

On the one hand, the term 'mobility' may refer to the (political, legal, administrative, economic, cultural) conditions and constraints that model, shape and 'decide' whether this movement is possible or not. These constraints can be embodied in the legal framework for access to the therapeutic devices related to fertility, therapeutic stalemate, lack of resources, etc. On the other hand, mobility certainly involves not only individuals, such as patients and professionals, but also objects, techniques, products, knowledge, therapeutic models and health standards. Simply stated, the use of the term "mobility" enables us to gain a wider focal range that we might have lost in the conceptual precision framework of a constitutional research field. Medical tourism is becoming a small phenomenon on its own which disrupts the traditional tourism sector.[2]

As stated by a number of anthropological and medical studies devoted to "Healing Holidays", therapeutic "travelling" is far from being a new phenomenon. The Euro-American tradition of the spas or that of pilgrimage during the 19th [3] century are just illustrations of this old practice. The visited sites were connected to certain climatic, geophysical or spiritual characteristics. The visited areas suggests large variations of destinations depending on costs, legal framework and global economic structures.

Hospital cost change determinants have been the subject matter of a great deal of research in the literature. The most studied factors can be grouped in five categories to explain these cost variations by Homogenous Patients Groups (HPG): scale and scope economies, patient characteristics differences, exogenous factors that are uncontrollable by institutions (prices, the local hospital market structure, etc.), institutions specific production factors (salary scale), and care quality.[4] Some of these differences of the observed costs among the institutions can be justified as these factors are not necessarily controllable by hospitals, especially in the public sector.[5]

The hospital economics literature identifies numerous factors that can generate cost differences between institutions having an equal efficiency level. The facility size and its activity scope, the care quality, the differences in the treated patients characteristics and the production factors are all recognized as contributing factors to explain these costs variations.

The literature analysis shows that the fares should be better adjusted to take into account such factors as they are not always controllable by public institutions but still directly impact costs.[6]

Previous studies suggest that the variation impact on the costs for the patients of the same HPG is far from being marginal: the intra-HPG variations explain about 50% of these cost changes between institutions and it seems that the HPG needing more health care are the subject of most intra- HPG cost variations.[7]

Theoretically, cost changes from one patient to another in the same HPG is not a problem for the "pricing for the activity" where prices are just supposed to reflect the average cost. Practically, the problem arises because patients are not randomly distributed among hospitals and some hospitals may receive more seriously ill and therefore more expensive patients for the same HPG.

In the absence of a thorough analysis of the medical practices in different institutions, paying a single rate for patients with very heterogeneous polyclinical profiles may lead to an inequitable financing; unduly over-funding certain institutions while under-funding others. This may also impact the hospital's therapeutic choices[8].

[2] See Faist (2013).

[3] See Brougère and Fabbiano (2014).

[4] See Keeler (1990)

[5] See Malcomson (2007).

[6] See Or and Renaud (2009).

[7] See Lynk (2001).

[8] See Econ and Pope (1990).

Sen (2000) affirmed that if health and the unequal values of lives are an example of the human cost of globalization, the new observed connections and changes in processes in this field are indicators of the innovative dynamics of globalization and how it affects the bodies, the medical systems, the States and the pharmaceutical industries, as well as new emerging communities in the field. Consequently, globalization is not limited to the external and normative framework of this mobility, but also the result of its accumulations, meetings and respective dynamics.

Indeed, research about the tourism field has greatly increased in recent years.[9] However, most of the studies were conducted in Australia, Europe and the United States resulting in a scarcity of empirical data when it comes to the African regions.

Olson and Dover (1979) defined the customers' behaviors as a judgment about a specific product or service. The motivations are of crucial importance for the service quality and the customer satisfaction, according to the literature on dissatisfaction of Boulding et al. (1993). In fact, he suggests that customers build a standard motivation of future events according to what is suitable or deserved.[10] The motivation provides a tool to measure the customer's satisfaction. According to Mill and Morrison (1985), the motivation arises whenever an individual wishes to satisfy a need.

From the tourism perception of, the fact that it is defined as a pressure concept is important.[11] A push model is a socio-psychological pattern that has always been implemented. From this point of view, one can elicit that consumers are "pushed" by their emotional needs to use a certain service or product during their visits. Thus, the emotional needs are relevant when it comes to seeking pleasure and choosing behaviour.[12] The consumer's behaviour literature underlines that the motivations might be interrelated as stated by Goodall (1988). People may travel to meet their physiological (food, climate and health) or psychological ones (adventures and relaxation).

Referring to Mayo and Jarvis's (1981) needs hierarchy, it can be stated that leisure travelling would not exclusively be linked to a basic physiological need, but might also surge from a desire to forge new friendships and prestige. Several researchers noted that customers have various expectations and that people can have different reasons for choosing either national or international holidays. Crompton (1990), for instance, states that each destination offers a variety of products and services to attract visitors in such a way that every tourist has the opportunity to choose among a set of various destinations.

Different factors such as age, income, personality, cost, distance, risk and motivation, may influence the choice of a destination. Tourism literature highlights the importance of the push or the pull factors when developing the tourists' motivations and choosing the holiday destinations.[13] The 'push' factors refer to the traveller's intangible and intrinsic desires like escapism, rest and relaxation, adventure, health or prestige. The "pull" factors, however, are essentially related to the attractiveness and tangible features of a given destination such as beaches, accommodation, recreational facilities and cultural and historical resources.[14]

Consequently, the evaluations of the corresponding tourist attributes as well as their usefulness could become crucial criteria in the final choice and ranking of a major destination. Uysal et al. (1990) insists on the fact that several attempts have been made to classify the major elements of a destination. Among these elements, we can cite the climate, ecology, culture, architecture, hospitality, transportation, recreation among others. The basic attributes of a destination are numerous and differ from one place to

[9] See Guo et al. (2007).

[10] See Greg and Arc (2013).

[11] See Neuhofer et al. (2014).

[12] See Goossens (2000).

[13] See Crompton (1990).

[14] In this framework, we can refer to the works of Uysal et al. (1990).

another.[15] Privileged sets and destination attributes can be adapted to specific customers' psychological profiles. As an illustration, we can take Hakonsson et al. (1993),'example citing a resting-exhaust group that prefers destinations offering a night life, entertainment, water sports, golf, tennis, fishing, shopping, and sports games. Similarly, there are destinations that offer varied multi-products. Customers could visit a destination during the summer just to relax, but others visit the same destination in the winter to seek adventure.[16] As motivation is a dynamic concept, it can vary from one person to another, from a market segment to another, and from one place to another as a decision-making process for the next visit.[17]

It is not surprising, therefore, that the concept of the motivations is considered as a tourism market segmentation element in many empirical surveys, as mentioned by Crompton (1990). Chon (1991), for example, thinks that examining the customers' important benefits is essential for the promotion and planning of a destination. Furthermore, there is a relationship between the motivations and post-consumption satisfaction level.[18] On the other hand, Dann (1988) claims that research on tourism will be meaningless if the tourist behaviours are not seriously taken into account.

3. Empirical analysis

The objective of this study was to explain the expenses relative the Libyan patients' number, the profit and the required staff, which would enable us to identify the profitability of the demand for this service and then recommend some strategies that can boost the demand. For this reason, we briefly presented the methodology and the different necessary tests to estimate the considered relationship.

3.1. The ARDL approach

According to the stationarity results, some variables are found to be stationary in level (i.e. I(0)) while others are first difference stationary (i.e. I(1)). Using the co-integration technique of Johansen-Juselius, the explanatory power might not be good enough because of the assumption that all the variables should be I (1). However, many previous studies showed that all the variables in the system have the same order of integration, which is not the case in this study.

In order to solve this problem, we chose to use the ARDL approach of co-integration (Autoregressive Distributed Lag Model), which is a relatively new econometric technique developed by Pesaran et al. (2001) to estimate the long-term relationship between the variables. This approach tests the co-integration relationship without requiring the same integration order for all the variables.

The Autoregressive Distributed Lag model is probably the most widely used model to estimate the relationships in the context of time series. Therefore, the ARDL model can achieve a clear separation between the short and long run effects. Moreover, it has some econometric advantages when compared to other co-integration procedures. First of all, it helps avoid the endogeneity problems and the inability to test the hypotheses on the long run estimated coefficients using the Engle-Granger method. Secondly, it simultaneously estimates the short and long-run model parameters. Thirdly, all the variables are assumed to be endogenous. Fourthly, the econometric methodology does not have to establish the integration order of the variables nor to carry out the unit root test. In this paper, we tried to understand whether public debt, public expenditure and economic growth are co-integrated using the new "Bounds Tests" procedure to analyze the level of the relationship with the ARDL structure. The ARDL co-integration approach involves an estimation of the conditional error correction version of the ARDL model. This representation is formulated as follows:

[15] See Mura and Tovakali (2015).

[16] See Wolfram and Burnill-Mair (2012).

[17] See Richards (2011).

[18] In this context, we can refer to the work of So-Ahola (1982).

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$$\Delta y_t = \alpha_0 + \delta_0 y_{t-1} + \delta_1 x_{1,t-1} + \delta_2 x_{2,t-1} + \delta_3 x_{3,t-1} + \sum_{i=1}^{p} \lambda_i \Delta y_{t-i} + \sum_{j=0}^{q} \beta_j \Delta x_{1,t-j} + \sum_{j=0}^{q} \alpha_j \Delta x_{2,t-j} + \sum_{j=0}^{q} \gamma_j \Delta x_{3,t-j} + u_t \quad (1)$$

where y_t is the endogenous variable (Log total expenses) and x_1 represents the Log of income, x_2 represents the Log of the Libyans number and x_3 represents the Log of the staff number in the polyclinic.

Before testing the model, we presented a brief discussion of the ARDL co-integration approach. As noted by Pesaran and Shin (1999). Two steps are required to make the ARDL approach effective for the co-integration procedure. First, the existence of a relationship between the variables in the system should be tested. In particular, the null hypothesis of the absence of integration or a long run relationship between the system variables $H_0 : \delta_0 = \delta_1 = \delta_2 = \delta_3 = 0$, was tested against the alternative hypothesis $H_1 : \delta_0 \neq 0; \delta_1 \neq 0 ; \delta_2 \neq 0; \delta_3 \neq 0$. The "Bounds Tests" procedure is based on Fisher's F statistics.

The statistics used for this procedure has a non standard distribution because the variables in the system are I(0) or I(1). Therefore, two sets of critical values are calculated by Pesaran et al. (2001) for a given significance level. The first set assumes that all the variables are I(0) and the second that they are all I(1). If the calculated F-statistics exceeds the upper limit of the critical values, then, H_0 is rejected. If the calculated F statistics falls between two landmarks, then, the test is inconclusive. Finally, if the calculated F statistics is below the lower bound of the critical values, this means that there is no co-integration relationship.

Secondly, once the long-run relationship is established, the long-run estimates of both Error Correction (ECM) and the ARDL models can be obtained from equation (1). Estimating an ARDL model implies first determining the number of lags to be introduced. Both of the Akaike (AIC) information the Schwarz (SBC) criteria are usually applied. The SBC criterion is generally privileged to the AIC because the latter tends to retain too many lags. During the second stage of the ARDL co-integration method, it is also possible to perform a parameter stability test for the properly selected ARDL representation of the error correction model. Nevertheless, the imperfections of the previous methods[19] could be overcome by using Brown's (1975) procedure if we followed Pesaran and Pesaran (1997). Brown's et al. stability test technique is based on the recursive regression residues.

A general representation of the error correction model (ECM) of equation (1) is formulated as follows:

$$\Delta y_t = \alpha_0 + \sum_{i=1}^{p} \lambda_i \Delta y_{t-i} + \sum_{j=0}^{q} \beta_j \Delta x_{t-j} + \sum_{j=0}^{q} \alpha_j \Delta x_{2,t-j} + \sum_{j=0}^{q} \gamma_j \Delta x_{3,t-j} + \delta \, EC_{t-1} + \varepsilon_t \quad (2)$$

where δ is the adjustment parameter speed and EC are the residues obtained from the co-integration model estimation of the short-run equation (1).

In the ARDL procedure first stage, the lag order on the variables first difference in the short run equation is usually obtained from a non-restricted vector Autoregressive (VAR). Since we used annual observations, we have experienced up to 13 lags on the first difference of each of the variables and calculated the F statistics for the corresponding significance of the variables lag levels.

The long-run conditional model for y_t can be obtained from the solution of the reduced form (1) when

$$\Delta y_{t-i} = \Delta x_{1,t-i} = \Delta x_{2,t-i} = \Delta x_{3,t-i} = 0:$$

$$y_t = \theta_0 + \theta_1 x_{1t} + \theta_2 x_{2t} + \theta_3 x_{3t} + v_t \quad (3)$$

where $\theta_0 = -\alpha_0/\delta_0$, $\theta_1 = -\delta_1/\delta_0$, $\theta_2 = -\delta_2/\delta_0$, $\theta_3 = -\delta_3/\delta_0$ and v_t are random errors. These long-run coefficients are estimated using the ARDL co-integration approach of Pesaran and Shin (1999). This implies the estimation of the conditional

[19] Hansen et al. (1991).

ECM in (2) by the OLS and the use of the various criteria to identify the optimal structure for the ARDL short-run dynamics specification.

3.2. Data and variables

The data analyzed in this study are based on the information provided by Sfax private polyclinic. These are monthly data collected over the period March 2007 - December 2013, distributed over 4 variables defined as follows:

- LOGCT: the natural logarithm of total expenditure;
- LOGNBL: the natural logarithm of the number of Libyan patients;
- LOGREVENU: the natural logarithm of the amount of profits;
- LOGPERSONEL: the natural logarithm of the number of staff.

The aim of this paper was to find out how the variables (LOGNBL, LOGREVENU, LOGPERSONEL) can better explain the (LOGCT) expenditures. Moreover, after estimating an econometric model of the Autoregressive lag type (ARDL), it can be deduced that total the expenditure may depend on the three variables mentioned below.

Table 1: Descriptive analysis

Statistics	LOGCT	LOGNBL	LOGREVENU	LOGPERSONEL
Mean	12.06	5.96	13.50	5.55
Median	11.50	5.89	12.94	5.60
Maximum	16.29	7.97	17.80	5.89
Minimum	10.01	4.93	11.48	5.24
Standard Deviation	1.62	0.47	1.64	0.25
Skewness	1.35	1.28	1.40	-0.10
Kurtosis	3.75	6.37	3.86	1.33
variation Coefficient	0.13	0.08	0.12	0.05
Jarque-Bera	26.70	61.13	29.25	9.70
Probability	0.00	0.00	0.00	0.01
Observations	82	82	82	82

Source: The authors' estimation of the data source.

To study the nature of the relationship, an important step helps examine the behaviour of the different variables in our model. The aim behind this is to test their stationarity. As a matter of fact, we used Perron's (1989) and Zivot's and Andrews' (1992) unit-root tests owing to the structural changes in their evolvement. After that, we resorted to the determination of the optimal number of lags using Pesaran et al. (2001) F statistics to identify the existence of a long-run relationship of the ARDL approach.

According to Table 1, it can be seen that for the monetary variables (LOGCT and LOGREVENU), the income is higher than the charges. In fact, for the income, the average value is about 13.5 with a standard deviation of 1.64. Moreover, the log charges have an average of 12.06 with a standard deviation of 1.62. The two series are non-symmetrically skewed to the right and slightly thick compared to the normal distribution.

On the other hand, the two variables that measure the number of Libyans and workers (LOGNBL and LOGPERSONEL) in log are on average almost identical. In fact, the first presents an average of 5.96 with a standard deviation of 0.47 and the second presents an average of 5.55 with a standard deviation of 0.25. Besides, their forms are opposite. LOGNBL is asymmetrically skewed to the right and leptokurtic while LOGPERSONEL is skewed to the left and platykurtic. However, they are not normal according to the Jarque-Bera test.

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Figure1: Different variables evolution

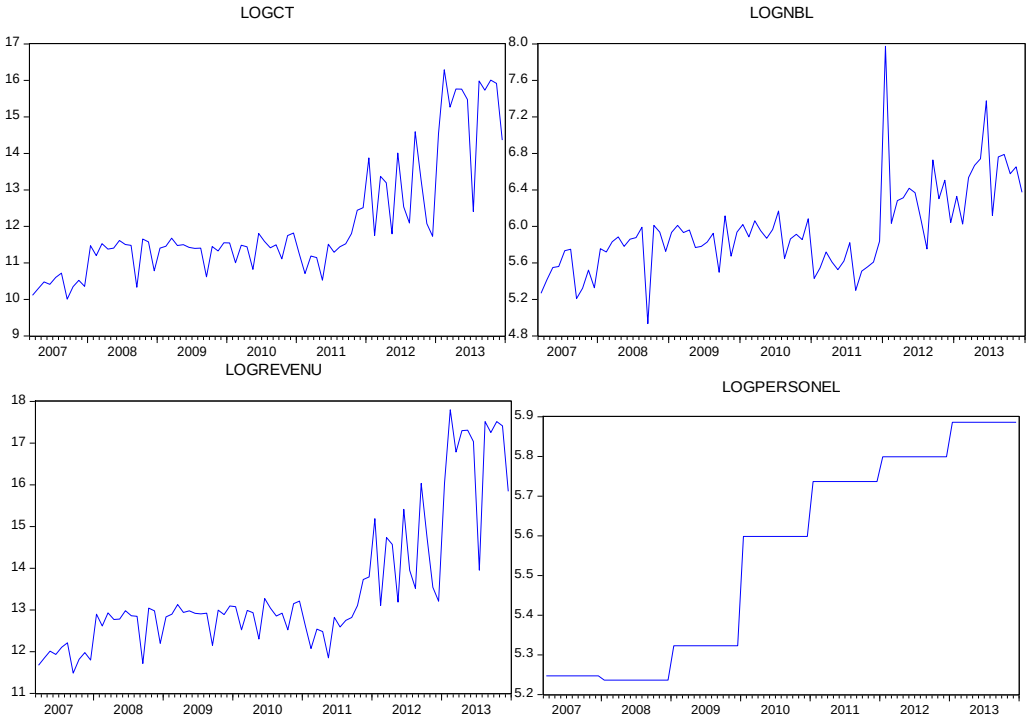

Figure 1 illustrates the evolution of these four variables over the study period. Actually, they show structural changes especially during the final months of 2011 when the Tunisian and Libyan revolutions occurred. Since these changes significantly affected our estimation, we d to take them into account in the unit root tests. For this reason, we resorted to the tests of Perron (1989) and Zivot and Andrew (1992) to reflect such changes.

3.3. The variables stationarity tests

The first step of the empirical study consists in determining each of the variables degree of integration. At this point, it is useful to give a literature summary of the stationary concept and its implications on the estimation of the econometric models. If a data series has a unit root (i.e. is non-stationary), this implies that a shock on this series has a continuing impact over time. On the other hand, if the series is stationary, the shocks can have only a temporary effect.

The variables integration degree is important because the estimation techniques differ according to these variables classification. Various non-stationarity tests of the series are used to know if non-stationarity is deterministic or stochastic in nature. We applied the efficient unit root tests of Perron (1989), as well as the unit root test with structural break of Zivot and Andrew (1992). These tests can help us know if the series has a unit root, i.e. if our chronicle follows a non-stationary stochastic process. Moreover, once the non-stationarity of the variables is checked and the variables are integrated by the same proportion, we can apply the ARDL co-integration test.

Zivot and Andrews (1992) simulated the asymptotic critical values of the three tests. Their critical values are larger in absolute value than those obtained by Perron (1989) where ë is considered fixed. The results of the Zivot-Andrews test for the variables LOGCT, LOGNBL, LOGREVENU and LOGPERSONEL are presented in Table 2.

Table 2: The Zivot and Andrews (1992) unit root test

Variables	Model A			Model B			Model C		
	T_B	Statistics	Lag	T_B	Statistics	Lag	T_B	Statistics	Lag
LOGCT	2012 M12	-4.170 (0.000)	2	2011M 8	-4.868 (0.000)	2	**2011M 2**	**-5.100 (0.017)**	**2**

LOGNBL	2012M1	-6.669 (0.009)	1	**2011M8**	**-5.494 (0.099)**	1	2012M1	-6.584 (0.004)	1
LOGREVENU	2012M12	-4.140 (0.001)	2	**2011M8**	**-4.808 (0.000)**	2	2011M2	-5.167 (0.007)	2
LOGPERSONEL	**2010M1**	**-7.780 (0.000)**	**0**	2012M2	-2.998 (0.072)	0	2010M1	-8.834 (0.000)	0

Source: The authors' estimation of the data source.

Note: T_B represents the break period. Model A: exogenous change in the level of the trend; Model B: exogenous change in the growth rate; Model C: exogenous change in the level and trend in the slope. The significant periods are presented in bold.

Regarding the LOGCT variable, an exogenous change was detected in the level of the trend and the slope (Model C) during the second month of 2011. For the NBL LOG and REVENU LOG estimators, an exogenous change was revealed in the growth rate (Model B) during the eighth month of 2011. Similarly, the PERSONAL LOG variable suffered an exogenous change on the level of trend (Model a) in the first month of 2010.

The asymptotic critical value of Zivot and Andrews is, 4.8 at a 5% threshold. Therefore, the hypothesis of a unit root without structural change is rejected for all the variables (LOGCT, LOGNBL, LOGREVENU and LOGPERSONEL). The significant periods presented in bold do not reject the null hypothesis of a unit root. Zivot and Andrews (1992) emphasize that the critical values of a finite sample may differ because of the Time-Dependency Data.

Table 3: Perron (1989) unit root test in level

y_t	LOGCT	LOGNBL	LOGREVENU	LOGPERSONEL
Constant	3.773***	4.432**	5.278***	1.755***
@trend	0.016	0.003	0.010	0.002***
y_{t-1}	0.628***	0.215	0.582***	0.660***
Δy_{t-1}	-0.207*	-0.1667	-0.180	0.079
DU	0.231	0.382**	0.851**	0.059*
DTB	-0.445**	-0.709*	-0.901	-0.022
T_B	2011M2	2011M8	2011M8	2010M1
Model	A	A	A	A
λ	0.6	0.7	0.7	0.4
Critical value at 5%	-3.76	-3.80	-3.80	-3.72
t_α	-3.32	-5.49	-3.73	-2.90
Decision	Non stationary	Stationary	Non stationary	Non stationary

Source: The authors' estimation of the data source.

Note: T_B represents the break period. Model A: exogenous change in the level of the trend; Model B: exogenous change in the growth rate; Model C: exogenous change in the level and trend in the slope. The critical values are obtained from Perron (1989). Δ the first difference. $\lambda = T_B/T$.

Table 3 shows the results of Perron's (1989) unit root test in levels. Being at the threshold of 5%, the estimated values are below the values tabulated by Student, therefore, they are non-stationary. However, in the case of the LOGNBL variable, the estimated Student statistics value is larger than the tabulated one. Therefore, the variable is stationary.

Table 4: Perron's (1989) unit root test in first difference

Δy_t	LOGCT	LOGNBL	LOGREVENU	LOGPERSONEL
Constant	0.154	0.109	0.155	0.005
@trend	-0.005	-0.004	-0.004	0.0003
Δy_{t-1}	-0.924***	-1.046***	-0.930***	-0.099**
$\Delta^2 y_{t-1}$	0.373***	0.328**	0.376**	0.024
DU	0.404	0.225	0.422	-0.018*

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DTB	-0.353**	-0.229*	-0.267	0.022
T_B	2011M2	2011M8	2011M8	2010M1
Model	A	A	A	A
λ	0.6	0.7	0.7	0.4
Critical Value at 5%	-3.76	-3.80	-3.80	-3.72
t_α	-10.23	-10.54	-10.26	-4.58
Decision	Stationary	Stationary	Stationary	Stationary

Source: The authors' estimation of the data source.

Note: T_B represents the break period. Model A: exogenous change in the level of the trend; Model B: exogenous change in the growth rate; Model C: exogenous change in the level and trend in the slope. The critical values are obtained from Perron (1989). Δ^2 the second difference.

Table 4 shows the results of the unit root test in first difference carried out on our variables. At the threshold of 5%, the values of the Student statistics estimates are higher than the tabulated ones. As a result, our tests indicate that all the variables are stationary in first difference.

3.4. Short and long-term estimates: Pesaran's et al. (2001) terminal test

The use of the ARDL approach is imposed by the long-run data. A maximum order of 15 delays was chosen for the conditional error correction ARDL vector model using the Akaike Information Criterion (AIC) and Bayesian (SBC) and Fischer's test.

Table 5: Short-run estimation of ARDL(13,0,13)

Variables	Estimated coefficient	Variables	Estimated coefficient
Constant	-0.254***	$\Delta x_{2,t}$	1.004***
y_{t-1}	-0.338***	$\Delta x_{2,t-1}$	-0.438***
$x_{1,t-1}$	-0.019***	$\Delta x_{2,t-2}$	-0.270*
$x_{2,t-1}$	0.362***	$\Delta x_{2,t-3}$	-0.305*
Δy_{t-1}	0.455***	$\Delta x_{2,t-4}$	-0.055
Δy_{t-2}	0.286*	$\Delta x_{2,t-5}$	-0.304*
Δy_{t-3}	0.320**	$\Delta x_{2,t-6}$	-0.051
Δy_{t-4}	0.068	$\Delta x_{2,t-7}$	-0.010
Δy_{t-5}	0.319*	$\Delta x_{2,t-8}$	-0.325*
Δy_{t-6}	0.068	$\Delta x_{2,t-9}$	0.121
Δy_{t-7}	0.021	$\Delta x_{2,t-10}$	-0.159
Δy_{t-8}	0.336*	$\Delta x_{2,t-11}$	-0.186
Δy_{t-9}	-0.111	$\Delta x_{2,t-12}$	0.014
Δy_{t-10}	0.170	$\Delta x_{2,t-13}$	-0.662**
Δy_{t-11}	0.199	Trend	0.0008***
Δy_{t-12}	-0.003	$\mathbf{EC_{t-1}}$	-0.898***
Δy_{t-13}	0.668**	**F**	13.23
$\Delta x_{1,t}$	-0.008**	**SBC**	-8.39

Source: The authors' estimation of the data source.

Note: *, **, *** represents the significance at 90%, 95% and 99%, respectively.

Several F statistics were calculated where each variable is considered to be (standard) dependent in the ARDL-OLS regressions. According to Pesaran et al. (2001), there is a long-run relationship between the variables of each model when the calculated F statistics is greater than the critical values of the upper limit at the level of 1% (7.52), 5% (5.85) and 10% (5.06), respectively. This implies that the null hypothesis of no cointegration between the variables will not be rejected.

For our application, there is a co-integration relationship between the different variables of the model because the F statistics indicates a value of 6.14 higher than 5.85 at 95% confidence. This step brings us to accurately estimate the order of delays for each

variable in the model and the estimation of the error correction model to ensure the long-term correction mechanism. In addition we will deduce the long-term relationships. Thus, in what follows, we presented the short and long-run estimates and those of the error correction model.

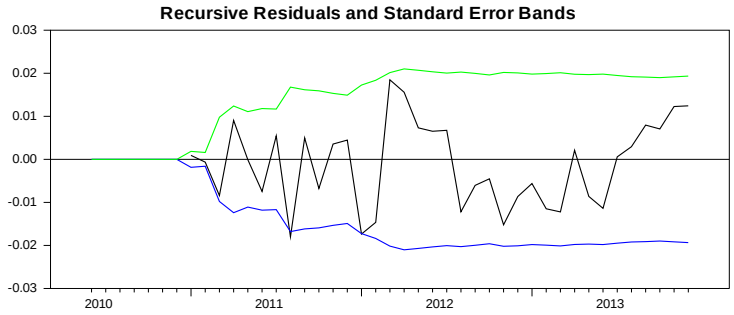
Once the co-integration relationship is established, the conditional long-run ARDL model (p,q_1,q_2,q_3) could be estimated. The optimum levels of the ARDL model (p,q_1,q_2,q_3) of the four variables are selected using the Akaike (AIC) and Schwarz (SBC) Information Criteria.

It should be noted that in this approach, it is a must to use the first difference of the variables to find out the short-term relationship. In our study, the LOGPERSONEL variable did not show significant changes from one month to the other, however, this first difference is null. Using this variable in the model is inadequate and, therefore, it has to be eliminated.

Consequently, the new model has three variables: LOGCT, LOGREVENU and LOGNBL. For a number of maximum delays equal to 15, the most appropriate model is represented by an ARDL (13, 0, 13). The short-term estimation results show the significance of at least 10% of the delayed factors. It is clear that the chosen variables have a significant impact but with a different order of delays on the expenses.

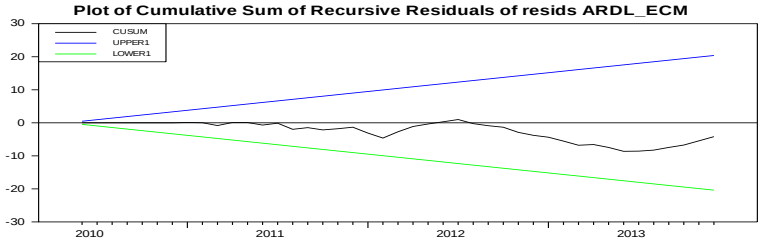
On the basis of the short-term results of income growth rates and those of the number of staff have significant effects (positive and negative) for different delay orders. Similarly, the delayed variables are significant. Actually, the expenses and delayed revenues for a period negatively affect the costs growth rate. On the other hand, the number of Libyan patients delayed by one period has a positive impact on the costs growth rate.

Figure2: Representation of the recursive residues of the ECM-ARDL model (13, 0, 13)



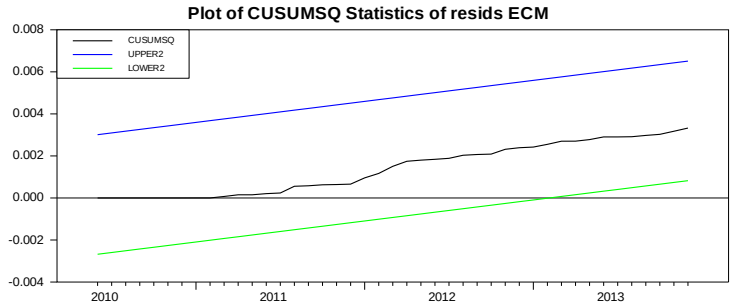
In order to achieve the stability test on the preferred representation of the error correction model of the ARDL method, the ECM-ARDL representation is also shown in table 5 by the coefficient δ of the residual term delayed of a period. In fact, the results indicate that the error correction term EC_{t-1} is statistically significant and negative, which proves that there is a co-integration relationship between the model variables. More specifically, the estimated value of EC_{t-1} is -0.898, which implies that the adjustment speed of the long run balance, in response to the imbalance caused by the short run shocks of the previous period, is very strong. As a consequence, the adjustment speed of the long-run equilibrium in response to the imbalance caused by short run shocks of the previous period is 89.8%.

Figure 3: Representation of the cumulative sum ECM - ARDL (13, 0, 13)



The long run coefficient stability is tested by the short-run dynamics. Once the error correction (ECM) model is estimated, the cumulative sum of the recursive residual (CUSUM) test and that of the squared CUSUM and the (CUSUMSQ) are applied to assess the stability of Pesaran's parameters (1997). The results indicate that there is no instability of the coefficients because the evolution of the CUSUM and CUSUMSQ statistics are within the critical values of the confidence interval at 5% of the parameters stability (mean and variance).

Figure 4: Representation of the cumulative sum of the square of the ECM-ARDL (0, 13, 13)



The achieved short run results were used to determine the long run estimates which are presented in table 6 for the different selected endogenous variables.

According to these estimates, a one point increase of the overall expenses is associated with a drop of the amount of profits by 0.057 points. (i.e. a decrease of 0.096 to 0.018 points in the long run).

Table 6: Short run results of the ARDL approach

Variables	Long run
Constant	-0.747***
Income	-0.057***
Libyan	0.964***
Trend	0.0008***

Source: The authors' estimation of the data source.

Note: *, **, *** represents the significance at 90%, 95% and 99%, respectively.

However, some variables directly affect the overall expenses. A one point increase of the total spending is associated with an increase of the number of Libyan patients by 0.964 points (that is an increase by 0.947 to 0.982 points in the long run).

Here, we need to check whether the used explanatory variables have the expected signs and emphasize their importance for the expenses. It should be noted that a one point increase of one of these variables, of the long or short run relationship would vary the net inflows of the expenses of the coefficient value of this variable, while the others are considered constant. In other words, the interpretation of the effect of the different variables on the expenditures depends on the importance of the signs and the values of the coefficients with which they are associated.

In the long and short run, the expenses are significantly affected by the Libyan number of patients and the amount of profits. In short, the empirical analysis reveals that the number of Libyan patients and the amount of profits may be an incentive factor to the expenses. Overall, the variables are seen to be significant. Therefore, the health care cost in this region is the most attractive factor, particularly for the Libyan patients.

According to our expectations, the crisis in Libya has some negative repercussions on the Tunisian health sector and in this case on polyclinic which tries to cope with this painful situation and keep its financial balance. Unfortunately, if the situation is going to last, the polyclinic could be forced to lay off some of its staff to reduce its expenses.

In fact, according to the managers of Sfax private polyclinics, three polyclinics of the South were already forced to shut down. Similarly, the current occupancy level in the Tunisian capital polyclinics has dropped by nearly between 50 and 60 percent since early January. Moreover, these managers assert that the nightmare of the closure and dismissal haunts the polyclinic bosses due to the slowdown of their business activity and the decline of the occupancy rate of the Libyans. Therefore, different officials of these polyclinics declared: "we used to receive dozens of Libyan patients as well as some Tunisians every day. However, in the wake of the recent events in the region, and because of the fragility of the security situation, patients prefer now to stay at home and be treated in local hospitals".

Health tourism can be a considered as one of the main products for which the demand has been steadily increasing. Moreover, this type of tourism is a real source of foreign currency which funds the state budget. However, as we may predict, an increase of the overall expenses by one point is associated with a decrease of the amount of profit by 0.057 point, which represents a drop by between 0.096 and 0.018 points in the long run. The conflict in Libya will probably have negative effects on tourism in general and medical tourism, in particular, in Tunisia.

Without pretending to have an exhaustive study of the topic or its problems, this research has tried, as far as possible, to study the problems of Tunisian tourism and propose some solutions. Indeed, we could have used other variables and implemented other approaches. Similarly, we could have broadened the scope of our research to other countries. These shortcomings, far from being dissuasive, would allow us to open up other perspectives in further works. To solve the problems of the sector, the Tunisian tourism industry has to target other nationalities and increase the number of visitors. According to Kim and Prideaux (2015), different national cultures have been valued to ensure customer loyalty and satisfaction. A thorough understanding of expectations can contribute to improving the visit quality and customer satisfaction. Once clients perceive their tourism experiences in a better way, levels of satisfaction and reliability will increase. This is important because any dynamic and sustainable tourism industry will significantly contribute to the country's economic well-being.

4. Conclusion

Medical tourism represents a real asset for Tunisia. From a global point of view, this sector participates in the integration of Tunisia into the world economy. This type of tourism also has a significant impact, particularly in terms of economic development and spatial valuation. Tunisia is well placed in medical tourism through highly skilled and specialized medical and surgical teams. Moreover, in terms of costs, Tunisia remains competitive, with inexpensive staff and lower payroll taxes, besides; the exchange rate totally favours health tourists.

However, the Libyan crisis created a difficult situation which Tunisian polyclinics continue to suffer from. Long and short run costs are significantly affected by both the number of Libyan patients and the amount of profits. Therefore, the cost of the health care offered in this region is the most attractive factor, mostly for Libyan patients, and that motivating these customers to opt for this type of tourism remains a difficult task. However, the crisis in Libya has disastrous consequences on the Tunisian polyclinics, mainly those of Sfax. These polyclinics found themselves forced to lay off some of their staff to reduce both costs and losses.

At the end of our study, we can deduce that our tourist sector, as it is the case of most of the African countries and the world in general, is experiencing economic and social hardships. These crises worsened after the Arab revolutions that generated an insecure precarious situation in the neighboring countries, especially Libya, and of course in our country. As a result, the adopted strategies have to be changed and adapted to this new context through objective and realistic studies and research that needs to diagnose gaps and problems and suggest adequate long-lasting solutions.

Since tourism is closely related to security, this has aggravated the problems of the sector. As a result, strategies must be changed and adapted to this new context through objective and realistic studies and research that must diagnose gaps and problems and propose the most appropriate solutions. Similarly, Tunisian tourism has not managed to diversify its markets and its attractive means.

To solve the problems of the sector, the Tunisian tourism industry must target other nationalities and increase the number of visitors. According to Kim and Prideaux (2015), different national cultures have been highlighted to ensure customer loyalty and satisfaction. A thorough understanding of motivations can contribute to improving the quality of the visit and customer satisfaction. Once clients perceive their tourism experiences in a better way, levels of satisfaction and reliability will increase.

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