
TOURISM DEMAND IN ALGERIA: DYNAMIC PANEL DATA APPROACH

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Abstract: In worldwide, tourism contribution to GDP is increasing continuously from 1995 to the end of the studying period 2014, the total and direct contribution to GDP increased from 4,045.69, 1,262.62 US\$ billion (the real price) in 1995 to 6,955.78, 2,196.02 in 2014 respectively. In addition, the total and direct contribution to GDP increased from 227.09, 72.64 million of jobs in 1995 to 276.34, 105.35 million of jobs in 2014 respectively, according to the World Travel and Tourism Council. World governments are concerned for the increase of the number of tourists' arrivals which lead to the new employment opportunities, and the increase of foreign exchange earnings which affect the balance payment in the country. The main purpose of the work is to explore determinants of the tourism demand function in Algeria by using the panel data approach over the period from 1995 to 2014. The work is based on 23 partner countries which represent the largest percentage of the total number of tourists in Algeria. The empirical study is using a dynamic panel data analysis together with the GMM system proposed by Arellano and Bover (1995). This estimator helps the researchers to solve the problems of serial correlation, heteroskedasticity and endogeneity for some explanatory variables. The GMM-System estimator is an alternative to the standard first differenced GMM estimator, to estimate the dynamic model. The Arellano Bond estimation starts the difference GMM by transforming all regressors, usually by differencing, and uses the Generalized Method of Moments, so-called "difference GMM". After that, the forward orthogonal deviations transformation, as proposed by Arellano and Bover (1995), is sometimes performed instead of differencing. The result explored the significant relationship between a dependent variable "tourists' arrival in Algeria" and lagged the dependent variable which is one of the most important variable what leads us to use the dynamic panel data approach, public investment variables, the relative price, and some dummy variables such as a common language and a common border. The empirical result shows that the lagged dependent variable is significant in the demand of the inbound tourist in Algeria as well as in the capital investment and relative price index. This result represents that the consumer loyalty and "word-of-mouth" is the key factor for the tourism demand in Algeria. This work has important implementations for the decision makers – takers who can improve the efficiency of their policy to increase the number of tourists' arrivals in Algeria.

Keywords: tourism demand, dynamic panel data, GMM system, Algeria.

1. INTRODUCTION

In the recent years, the international tourism is increasingly becoming very important for the global economic growth. In the same context, governments in the developing and new industrialized countries have channeled their resources for investment in this industry as a vital sector. Moreover, great efforts have been made to explore the main and significant determinants which effect tourism within their countries (Witt et al 2009). In fact, tourism is the industry with the largest number of employees and a significant contribution to improving the standard of living, and it also has a vital impact on increasing the GDP, capital investment, taxes and value added, according to the world travel and tourism council (WTTC). The international tourism generates foreign exchange earnings which contribute positively to the economic growth rate in the developing countries and newly industrialized countries. In 2011, the total travel and tourism job opportunities in tourism and travel sector represent the world largest sector, with nearly 258 million jobs with percentage of 9.07 % of all employees. Moreover, the direct job opportunities contributed by the tourism and travel sectors are around 99 million job opportunities with percentage of 3.47% in the same year. In year 2020, the World Tourism and Travel Council forecasted total and direct job opportunities from tourism and travel by 320, and 119 million employees, respectively. In addition, total tourism and travel contribution to GDP in year 2011 is estimated to be approximately US\$6,462 billion (real price) of the economic activity, with percentage of 9.45 % of GDP, but the direct tourism and travel contribution to GDP is around US\$1,920 billion (real price) to the economic growth, with percentage of 2.95 %. The Council also predicted total and direct contribution of tourism and travel to GDP in 2020 to be US\$8,690 and 2,716 billion (real price), respectively.

The purpose of the paper is to investigate the effects of different factors on the dynamic of tourism demand in Algeria. For that reason, we use econometric methodology by applying Generalized Method of Moment estimator (GMM system) on the dynamic panel data model. Specifically, there are few studies using dynamic panel data analysis in tourism in Algeria. In this paper, the panel data approach will be used to explore the determinants of

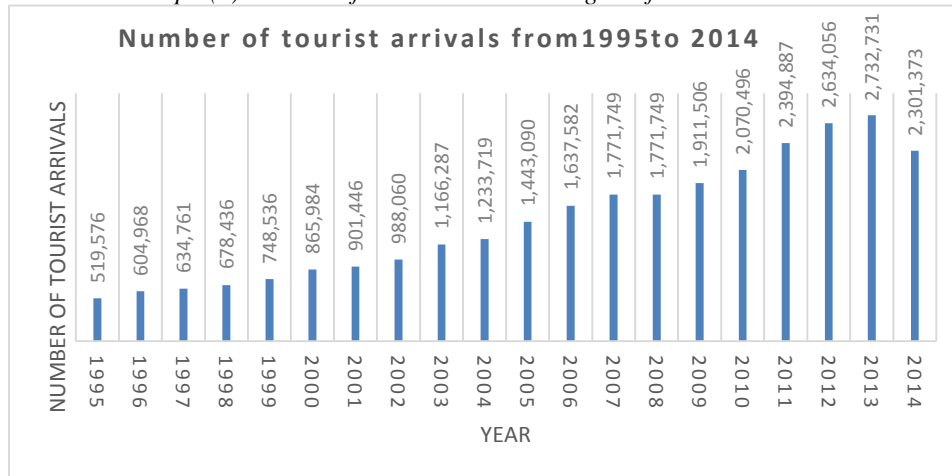
tourism demand function for the first time. The main aim of this paper is to estimate the model applying this methodology in that vital part of economic, and evaluate the contributions of the variables included in the model, which affect the tourism demand in Algeria by using the dynamic panel data models based on the generalized method of moment, in the period from 1995 -2014.

The study provides the decision-making policy with convenient information to increase the tourism flow in this country with the effect of directly increasing the GDP, foreign currency and decreasing the percentage of unemployment in Algeria. In addition, this is the first paper about tourism demand function in Algeria using dynamic panel data in Algeria. The research will be organized as following: Section 2 describes the importance of tourism sector in Algeria, Section 3 describes the data source and variables and econometric model. The empirical results will be presented in Section 4. Finally, the concluding discussion and policy implementation will be presented in Section 5.

2. IMPORTANCE OF TOURISM IN ALGERIA

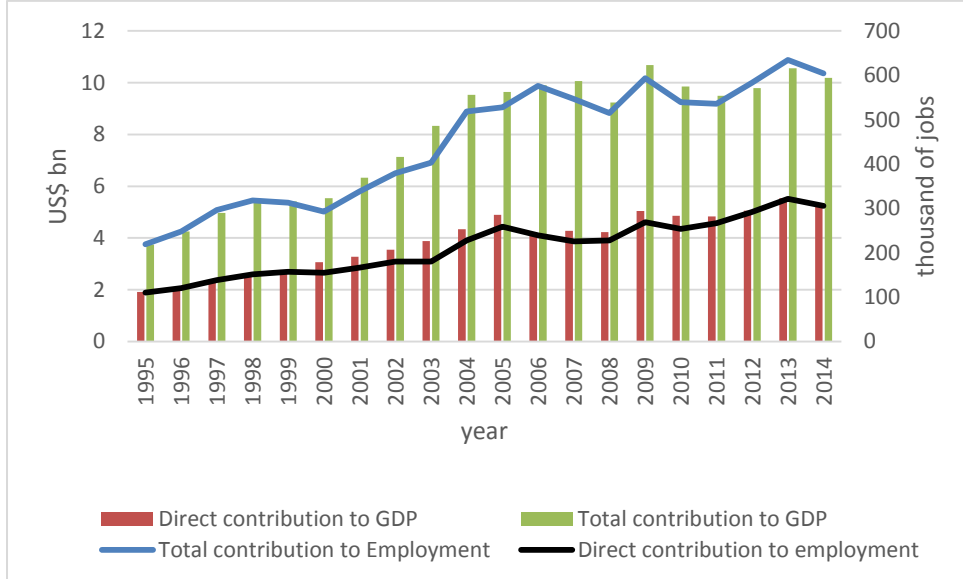
Algeria is one of the most important destinations for tourism in North African countries. Tourism industry has a significant direct and total contribution to domestic GDP as well as the employment. The tourism total contribution in the employment is around 526 thousand jobs in 2004, which represent 7% of the total employment in the country. Moreover, the percentage of tourism industry share in GDP is 8 % in year 2004, which represents US\$9.5 billion, according to The World Travel and Tourism Council Site.

Graph (1) Number of tourist arrivals in Algeria from 1995 to 2014



The graph represents the number of tourist arrivals to Algeria in the period from 1995 to 2014; the number rises significantly from half million in year 1995 until it reaches the peak in year 2013, which represents approximately 2.7 million. Furthermore, this number decreases again in year 2014, to approximately 2.3 million.

Graph (2) total and direct tourism contribution to GDP and employment in Algeria 1995-2014



The graph illustrates direct and total tourism contribution to GDP and employment in Algeria in the period from 1995 to 2014; total tourism contribution to GDP and employment are sharply rising with small fluctuations over the period. Total contribution to GDP reaches its peak in year 2009 with approximately US\$10.68 billion (real price). After that, it fell again to US\$9.49 billion (real price) in year 2011, perhaps due to the political instability which took place in Arabic countries such as Egypt and Tunisia. On the other hand, total tourism contribution in employment increased from 219.5 thousand jobs in year 1995, to having the largest value in year 2013 with approximately 635 thousand jobs. In addition, direct tourism contribution to the GDP and employment are slowly increasing over the period, achieving US\$5.05 and 292.24 billion (real price) in year 2013, respectively.

3. ECONOMETRIC MODEL AND METHODOLOGY

Traditional methods of estimation such as ordinary least square or maximum likelihood would give biased and inconsistent estimator in case of dynamic panel data where the model contains lagged of the dependent variable as explanatory variable. Hence, Arellano and Bond (1991) solved this problem by providing first difference generalized method of moment DIFF-GMM and GMM system which was proposed by Arellano and Bover (1995). These methods provide a consistent and an efficient estimator for dynamic panel data (Montero - Martin, 2007). There are many advantages of using GMM-system, such as efficiency. The second advantage is feasibility. means, Making GMM practical requires a feasible estimator for the optimal weighting matrix. There is also a disadvantage of difference and system GMM in that they are complicated and so can easily generate invalid estimates.

The Arellano-Bover/Blundell-Bond estimator augments Arellano-Bond by making an additional assumption. The GMM system estimator is consistent if there is no second-order serial correlation in the residuals. But that first differences of instrumenting variables are correlated with the fixed effects; the dynamic panel data model is valid if the estimator is consistent and the instruments are valid. There are also assumptions about the data generating process for the difference and system GMM estimators when we design panel analysis: the process and data may be of dynamic type, with current realizations of the dependent variable influenced by past ones (lagged dependent variable); some regressors may be endogenous, and/or predetermined (not strictly exogenous).

Special interest in statistical inference is post-estimation procedure for the method (GMM-system). **Firstly**, Arellano-Bond test for serial correlation in the first-differenced residuals should be applied (command in Stata *estat a bond*). The estimation by GMM-system is valid only if there is no serial correlation in the idiosyncratic errors. If Arellano-Bond test rejects the null hypothesis of no serial correlation in the first-differenced errors at order one, it does not imply that the model is misspecified. However, rejecting the null hypothesis at higher orders implies that the moment conditions are not valid. **Secondly**, Sargan test of the overidentifying restrictions (command in Stata *estat Sargan*) The moment conditions used by GMM-system can produce consistent estimates only if the moment conditions used are valid. Although there is no method to test if the moment conditions from an exactly identified model are valid, one can test whether the overidentifying moment conditions are valid.

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The dynamic panel data (DPD) is used to estimate the tourism demand in Algeria in the period from 1995 to 2014 with respect to 23 major Algerian countries represented as follows: Belgium, Mauritania, Switzerland, Canada, Morocco, Tunisia, France, Netherlands, Turkey, Germany, Nigeria, United Kingdom, Greece, Norway, United States of America, Italy, Portugal, Austria, Japan, Spain, Mali, Libya and Sweden. In addition, there are advantages of using DPD such as increasing the degree of freedom. DPD enables us to have more degree of freedom than using cross-sections data or time series data.

The Dependent and explanatory variables:

The Dependent variable: number of tourist arrivals (NT_{it})

This variable represents the annual number of tourist arrivals according to the United Nation World Tourism organization in the period from 1995 to 2014

The explanatory variables:

1) Lagged dependent variable: (NT_{it-1})

This variable is the most important variable which is supposed to effect the tourism flow in Algeria as “Word -of-mouth”, the information and opinion about the destination spread as a people taking and showing the photography between their family and their friends; all these recommendations increase the certainty of the destination for the potential visitors (Aslan, Kaplan, Kula, 2008; Leittao, 2015). This hypothesis will be tested by lag of the dependent variable and is expected to have a positive effect on the tourism flow. This trust and recommendation plays a vital role in the destination selection.

2) Lag Government individual expenditure: (GIE_{it-1})

This variable represents the government spending on travel and tourism services to visitors (one year ago), such as cultural, or recreational services (Crouch, Schultz, and Valerio 1992; Tang, Selvanathan, 2007). Data for these variables are available on the World Travel and Tourism Council site.

3) Lag Investment (capital investments): (CI_{it-1})

This variable relates to the capital investment (one year ago) by all types of industries involved in travel and tourism assets, such as accommodation for visitor and passenger transport equipment, as well as restaurants and leisure facilities for specific tourism use. The data for these variables are available on the World Travel and Tourism Council site.

4) Gross domestic product per capita ($GDPPC_{it}$):

This variable is supposed to have a positive relationship with the tourism flow in Algeria. GDPPC is measured by the gross domestic product in the origin countries divided by the mid-year population. Furthermore, this factor is considered an important factor which affects people's decision to travel, especially when tourism is not necessarily good for a person; it is a luxury good with different elasticity from one person to another (Witt and Witt, 1992; Greenidge, 2001; Turner and Witt 2001). The source of data for this variable is based on the World Bank's site.

5) Relative price index: (RPI_{it})

This variable will be given as a ratio of the consumption price index in the hosting country (Algeria) and consumption price index in the sending countries (23 countries) with respect to the exchange rate in the hosting and sending countries. (Webber, 2001; Croes and Vanegas, 2005; Durbarry and Sinclair, 2005) The source of this variable is a formula calculated on the basis of data from the World Bank:

$$p_{it} = \frac{CPI_{Algeria}}{CPI_{Sending\ countries} ER_{it}}$$

6) common border: (CB_{it})

The common border between the countries may affect the tourism flow increase in the hosting countries; this variable will be presented as a dummy variable which takes value unit when the sending country has common border with Algeria.

7) common language: (CL_{it})

The common language also has positive impact of increasing the number of tourist arrivals in Algeria; this variable will be presented as a dummy variable which takes value unit when the sending country has common language with Algeria.

As per the previous explanation, the econometric model will be suggested as follows:

The econometric panel data model of tourism demand in our empirical analysis contains the following explanatory variables:

$$NT_{i,t} = f(NT_{i,t-1}, GDPPC, RPI_{i,t}, GIE_{i,t-1}, CI_{i,t-1}, CB_{i,t}, CL_{i,t})$$

Witt and Witt (1995) the double-logarithmic form for the tourism demand function is the most recommended in previous empirical literature and easy for the interpretation of the ratios through the demand elasticity. Therefore, our econometric model for estimation has the following form:

$$\ln NT_{i,t} = \beta_0 + \beta_1 \ln NT_{i,t-1} + \beta_2 \ln GDPPC_{i,t} - \beta_3 \ln RPI_{i,t} + \beta_4 \ln GIE_{i,t-1} + \beta_5 CL_{i,t} + \beta_6 \ln CI_{i,t-1} + \beta_7 CB_{i,t} + \gamma_t + \mu_i + \varepsilon_t$$

With $i=1,2, \dots, 20$ and $t= 1,2, \dots, 23$.

when: $V_{it} = \gamma_t + \mu_i + \varepsilon_{it}$, V_{it} is the fixed effects, μ_i , γ_t are country effect and time effect, respectively.

For ε_{it} , which is the error term, it must be serially uncorrelated with zero mean, and independently distributed across individuals, it has also to be uncorrelated with the dependent variable for all t . The parameter β_1 indicates to what degree the tourism demand in Algeria is affected by the number of previous tourist arrivals.

Because of using the dynamic processing in the model, the model will have problem of correlation between the first explanatory variable (lagged dependent variable) and the error term. So, if we used the fixed effect (OLS) or random effects (GLS) our estimated ratio will not be efficient, and it would be biased estimator. Therefore, Generalized Method of Moment (GMM) estimation will be used to estimate dynamic panel data, by Arellano and Bover (1995), but there is assumption for that method that is no second-order autocorrelation in the errors; the main advantage of using GMM estimate is that it will control the endogeneity by using the lagged values of the levels of the endogenous and the predetermined variables as instruments.

4. THE EMPIRICAL RESULT

The value of studying tourism demand models planning and policy has been discussed widely in many studies using traditional regression model, and they concentrated on static model which had many issues, including forecasting failures. To solve this problem, we will use Generalized Method of Moment estimation (GMM system), developed by Arellano and Bover (1995). This method is used to estimate dynamic panel data (in STATA V.12). We have lagged dependent as explanatory variable, to capture persistent effects of the tourists' habits and behavior. There are two reasons of using the lag variables number of arrivals tourists in Algeria; first of them is uncertainty, there is strong certainty associated with visiting the country that you know and are familiar with it. Second, knowledge and experience from other people is spread by tales about the beauty of a destination and comparativeness of the country, and that depends on many variables, like level of education, infrastructure, number of old heritages and many others.

Table (2) Estimation results for the linear and dynamic model (1995-2014)

Variables	GMM system estimator Of Arellano and Bond (Two step)
Constant	1.479 (0.000)
lnNT _{it-1}	0.866 (0.000)
Ln GDPPC _{it}	-0.435 (0.247)
Ln RPI _{it}	-0.537 (0.009)
Ln GIE _{it-1}	0.143 (0.603)
Ln CI _{it-1}	0.077 (0.012)
CB _{it}	0.153 (0.033)
CL _{it}	-0.0993 (0.063)
Number of observations	436
Wald hi2(7)	36658.12 (0.000)
AR (1)	-3.3738 (0.000)
AR (2)	1.3556 (0.1702)
Sargan chi2 (34)	21.371 (0.9548)

The bold numbers are significant at 0.05 significance level

Table (2) represents the estimated equation for the tourism demand function in Algeria using dynamic panel data when the i (individuals) defined as number of countries from 1 to 23, and the T defined as number of years from 1995 to 2014; based on the Arellano and Bond method we had the following estimated function:

The equation will be as follows:

$\ln NT_{i,t} =$

$$1.479 + 0.866 \ln NT_{i,t-1} - 0.435 \ln GDPPC_{i,t} - 0.537 \ln RPI_{i,t} + 0.143 \ln GIE_{i,t-1} + 0.077 \ln CI_{i,t-1} + 0.153 CB_{i,t} - 0.099 CL_{i,t}$$

Number of observation = 436, Wald chi (7) test = 36658.12, Sargan = 21.371 (0.968)

From the previous equation, the value of Sargan test statistic has value 21.371 and p value 0.9548, which means that the test is not significant. It means that we accept null hypothesis implying that the instruments used in this regression are correct. Moreover, there is no autocorrelation from the second order, because AR(2) test is not significant at 0.05 significance level. Another interesting result, the ratio of lagged dependent variable ($\ln NT_{i,t-1}$) is significantly estimated in the equation. That means it is based on the behavior and habits (Word of mouth) of tourists to come to Egypt, and this result support using demand is a dynamic process, agree with previous studies which also found a positive effect for this variable.

5. CONCLUSION

The main aim of this paper is to identify and estimate the impact of the explanatory variables in the tourism demand function in Algeria from partner countries which have the highest percentages from total number of tourist arrival, by using dynamic panel data in the period from 1995 to 2014, by using STATA v.12 depending on GMM-system method which is presented by Arellano and Bover (1995) for analyzing of dynamic panel data models. From the comment for the estimated elasticity in our model, we obtained a positive sign for the lagged variable of the number of tourists, the value is lower than one and positive sign (0.866). Moreover, the relative price index is negative and it significantly affects the tourism flow in Algeria by value (-0.537).

Regarding the public investment in tourism, there is a positive impact of the capital investment on increasing the number of tourism flow in Algeria, which is represented by positive significant for variable Lag capital investment (0.077). This study can be a recommendation for decision makers in Algeria to put priority on the investment in tourism sector, i.e., investments in infrastructures, communication, more rooms, leading to the increase in the number of tourist arrivals from sending countries. Algeria must spend money in this important sector, especially in those countries, because they represent a large percentage of the total number of tourist arrival in Algeria. Finally, the common border has a significantly positive impact on increasing the number of tourism in Algeria.

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